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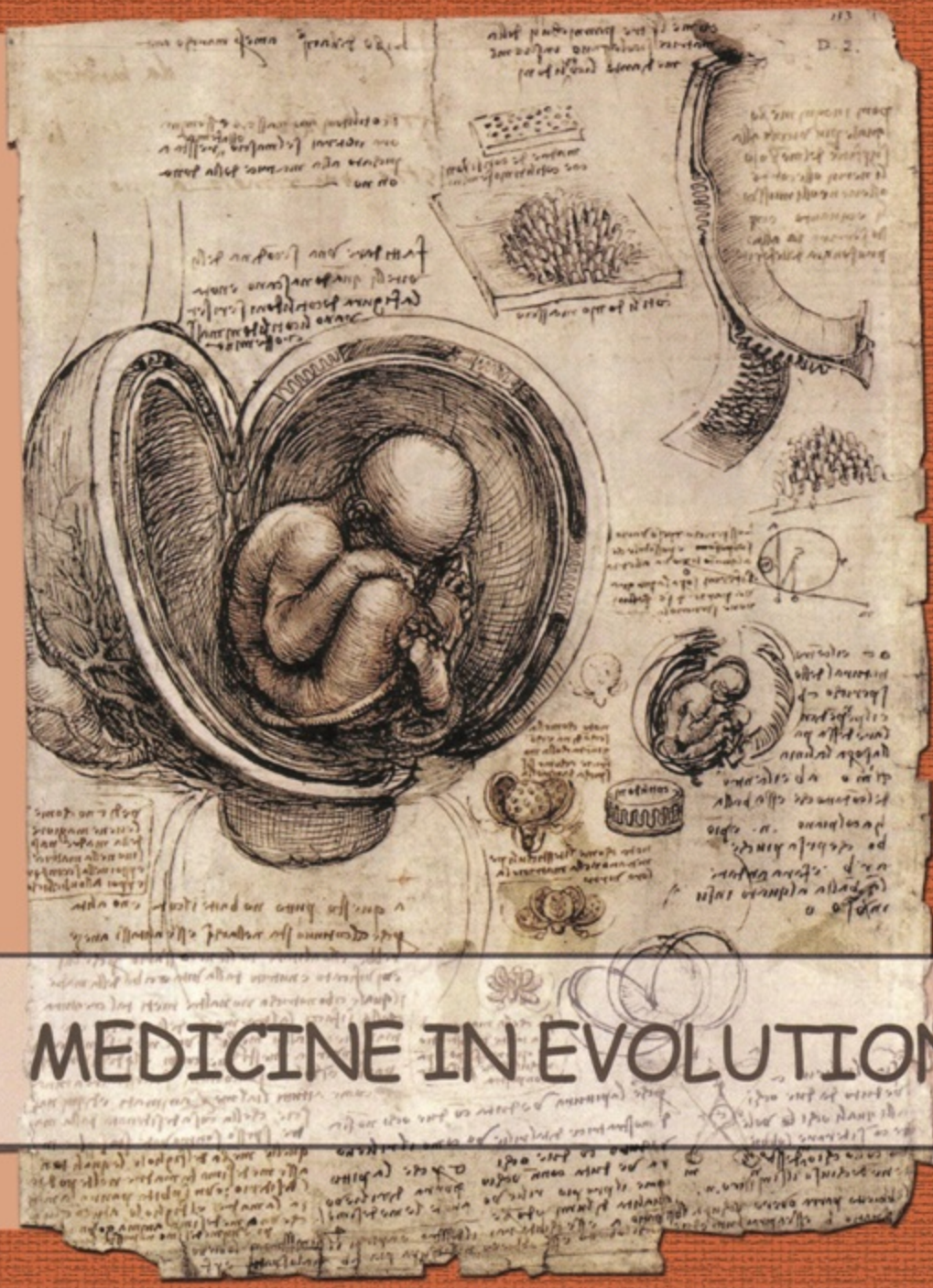

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REDUCE ŞI AJUTĂ LA PREVENIREA PROBLEMELOR GINGIVALE ÎN 4 SĂPTĂMÂNI PENTRU A ÎNTRERUPE CICLUL GINGIVITEI

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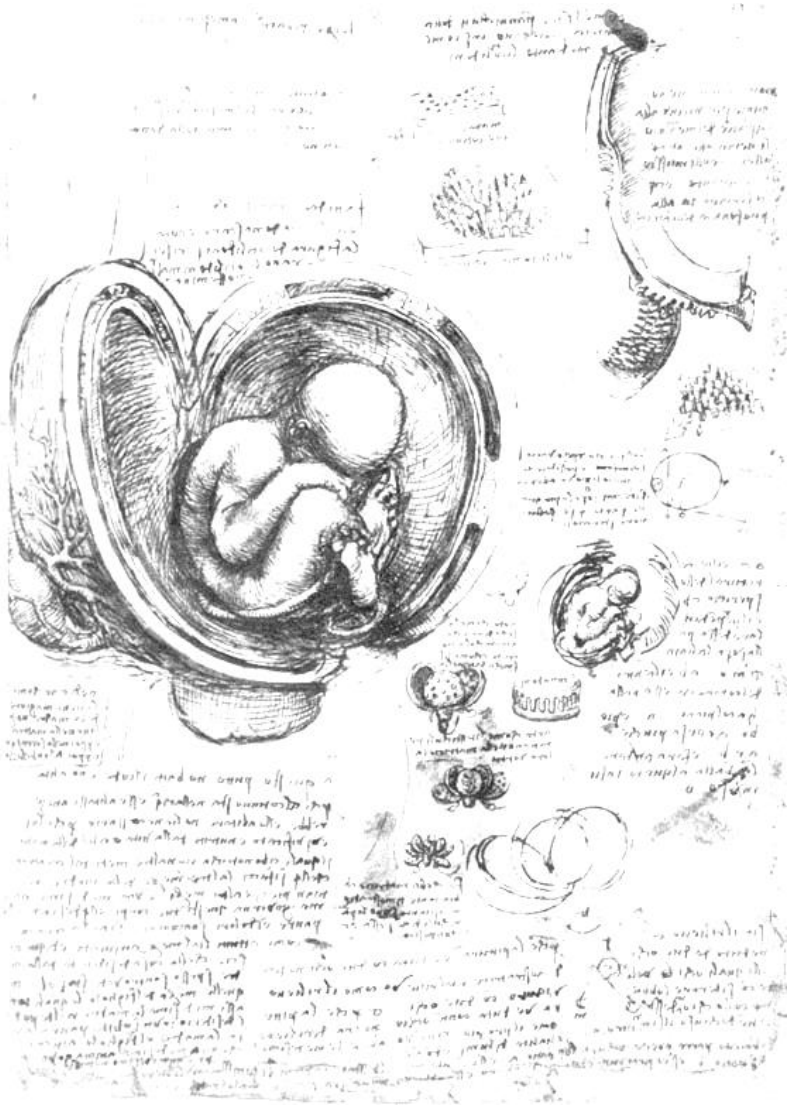

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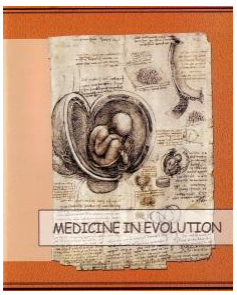
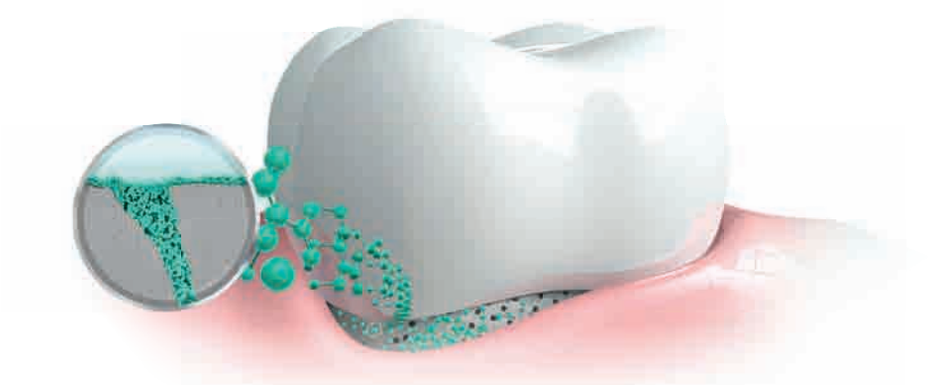


ARTICLES

Noul elmex®SENSITIVE PROFESSIONAL cu tehnologia PRO-ARGIN

Calmarea **imediată* și de durată** a durerii din sensibilitatea dentară[1,2]



- În contact cu saliva, se formează un strat bogat în calciu, care obturează instant[1,*] tubulii dentinari deschiși
- Stratul rămâne intact în timp, chiar după expunerea la acizi, asigurând calmarea de durată a durerii din sensibilitatea dentară[2,3]

93% dintre pacienți confirmă calmarea durerii din sensibilitatea dentară[4]

93% dintre pacienți — confirmă reducerea hipersensibilității dentinare[4]

91% dintre pacienți — apreciază recomandarea medicului stomatolog[4]

Calmarea imediată* a durerii din sensibilitatea dentară[1]

Calmarea imediată* și de durată începe cu recomandarea dumneavoastră**

*Pentru calmare imediată, aplicați direct cu degetul pe dintele sensibil și masați ușor pentru 1 minut;
**Doar în legătură cu pasta de dinți

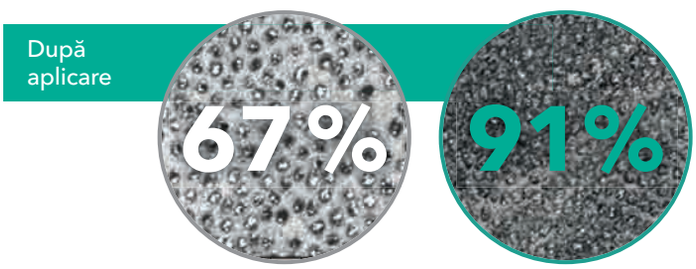
Referințe: 1. Nathoo S, et al. J Clin Dent. 2009;20(Spec Iss):123 –130; 2. Docimo R, et al. J Clin Dent. 2009;20(Spec Iss): 17– 22.; 3. Report Deon Hines-0003, 2016; 4. Studiu Ipsos cu privire la utilizarea produsului elmex® SENSITIVE PROFESSIONAL Repair & Prevent, efectuat în Polonia, rezultate după 2 săptămâni de utilizare, cu 325 de participanți (2017).

elmex® SENSITIVE PROFESSIONAL realizează obturarea superioară a tubulilor dentinari în comparație cu tehnologiile concurente[1,2,*]

Studiul 1[1,*]

Tehnologia cu fluorură de staniu/ fluorură de sodiu

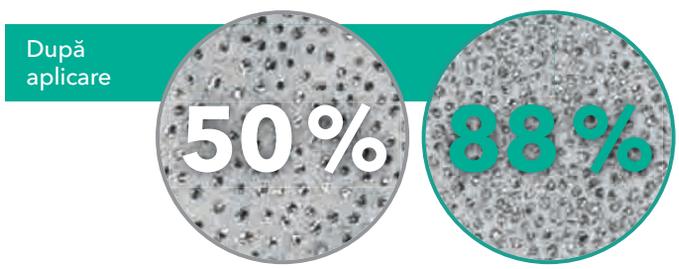
Tehnologia PRO-ARGIN



Studiul 2[2,*]

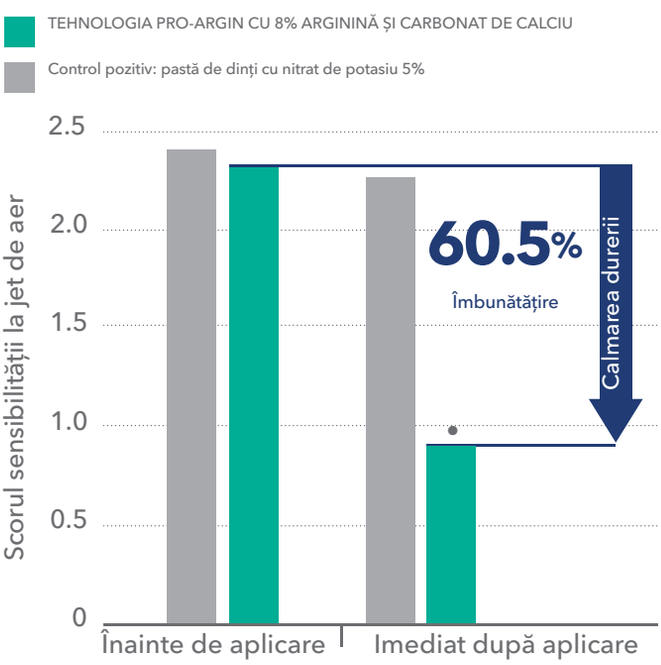
Tehnologia Novamin/ fluorură de sodiu

Tehnologia PRO-ARGIN



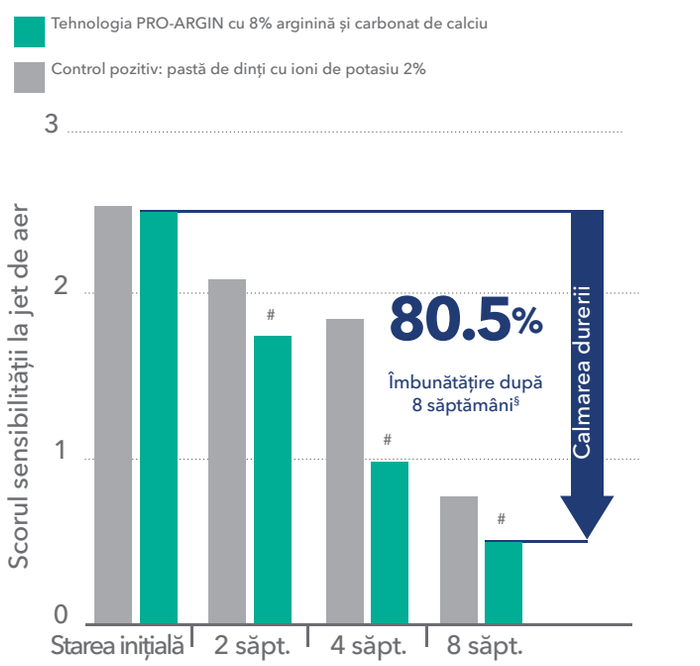
elmex® SENSITIVE PROFESSIONAL oferă calmare semnificativă imediată** și de durată a durerii din sensibilitatea dentară[3,4]

Calmarea semnificativă a durerii din sensibilitatea dentară instant[3,‡,**]



‡ În comparație cu starea inițială (sunt prezentate doar datele relevante)
• Semnificativ statistic (p<0,001)

Calmarea semnificativă de lungă durată a durerii din sensibilitatea dentară după 2, 4, și 8 săptămâni de utilizare[4,§,&]



§ În comparație cu starea inițială
& În comparație cu o pastă de dinți comercială desensibilizantă, ce conține 2% ioni de potasiu și 1450 ppm de fluor (NaF)
# Semnificativ statistic (p<0,05)

*Studiu in vitro, imagini reale de microscopie confocală după 5 aplicări (p<0,05%);
**Pentru calmarea imediată aplicați direct pe suprafața sensibilă și masați ușor cu vârful degetului timp de 1 minut.

Referințe: 1. Hines D, et al. Poster acceptat, July 2018 IADR. Colgate- Palmolive Company 2018.; 2. Hines D, et al. Poster #0742, March 2018 AADR. Colgate-Palmolive Company 2018.; 3. Nathoo S, et al. J Clin Dent. 2009;20(Spec Iss):123 –130; 4. Docimo R, et al. J Clin Dent. 2009; 20(Spec Iss): 17– 22.

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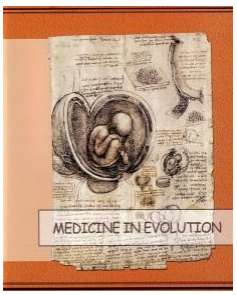
SENSITIVE PROFESSIONAL

Surgical treatment of a giant tumor resembling an inguinal hernia



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Abstract

The paper's aim is to present a case of successful diagnosis and treatment of a male patient with a giant lipoma of the right groin area. The patient was hospitalized in the Plastic Surgery Department at "Bagdasar-Arseni" Emergency Clinical Hospital. The particularity of this case is given by the area involved, the close boundaries with important anatomical structures, the large size of the tumor and the potential differential diagnosis. As lipomas with such localization are considered to be a rare pathology, orientation of preoperative diagnosis is fundamental for planning the surgical protocol. Taking into consideration the minimum period of hospitalization, the rapid functional recovery and the degree of patient satisfaction, the result of the therapeutic approach was a success.

Keywords: giant lipoma, femoral hernia differential diagnosis, inguinal tumor.

INTRODUCTION'

Lipomas are the most common benign soft tissue masses that can develop in the human body. Histopathologically, they consist of mature adipocytes surrounded by a fibrous capsule. The inguinal region is one of the rarest localisations. At this level, the tumor can be subcutaneous or intramuscular. Symptoms regarding nerve and vessel compression or muscle belly impairment can be noticed. Tumors exceeding 5 cm in size are treated as locally malignant and need special care in diagnosis and treatment. Treatment consists of local resection, which sometimes can be difficult, because of poor tumor borders that lead to incomplete resection, resulting in tumor recurrence.

CASE REPORT

I. Anamneses

A 62-year-old Caucasian male patient presented at our clinic with a giant tumor located in the right groin region. From the pathological antecedents the following were conclusive: myocardial infarction with stent mounting (2017), high blood pressure, trauma due to a road accident with bilateral anterior thigh wounds, post-traumatic bilateral occlusion of superficial femoral arteries (1993), left femoral popliteal bypass (1993). The patient denied drugs or food allergies.

The tumor appeared approximately 10 months ago and gradually increased in size and volume. The patient had no symptoms, except for a slight pain in the right side of the inguinal area.

II. Clinical examination data

During the clinical examination of the right groin region a giant tumor was palpated. The skin-colored tumor had a round-oval shape and a dimension of 12 cm long and 8 cm wide. It was well delimited by the surrounding tissues, soft, elastic, and movable on the adjacent planes. Passive and active reductions were not possible. At the level of the anterior side of the thighs, there were identified posttraumatic, old, soft, smooth, white scars. No locoregional adenopathies were noticed. Testicles were painless and normal in size and consistency. The abdominal examination was also normal.

III. Paraclinical investigations

Preoperatively, a MRI of the lower abdomen and pelvis was performed (Fig. 1). In the MRI report the following were described:

- The image of a right inguinal hernia with fat cell tissue (having a diameter of about 15 mm, through a defect of about 12 mm, at the level of the right groin);
- Inguinal lipomatous degenerated adenopathies, situated bilaterally, of 22 mm, without pathological significance;

A voluminous space replacement structure, located at the level of the external right groin region, extended in the upper portion of the anterior thigh, with maximum axial diameters of 117/76 mm, developed subfascially, at the level of the right sartorius muscle, with thick, regular walls and fine septa; the lesion is well delimited by the adjacent vascular and muscular structures, having suggestive characters for a lipoma.

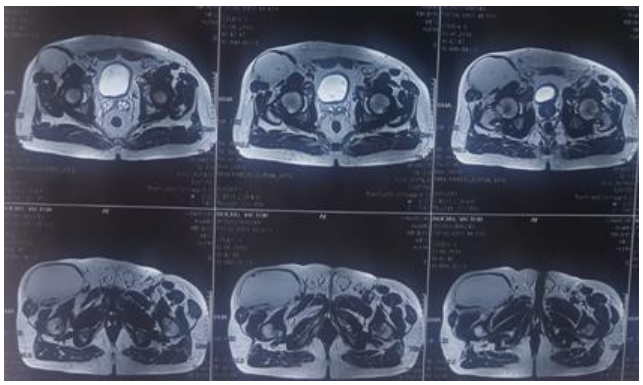

Figure 1. Lower abdomen and pelvis MRI

IV. Treatment and evolution

The surgery was performed under spinal anesthesia. An S-shaped surgical incision, centered on the tumor surface was made and then meticulous dissection in anatomical planes with exposure and protection of the vessels and nerves was done.

Figure 2. Voluminous lipoma mass in the right inguinal region, covered by sartorius muscle- intraoperative aspect

A giant tumor, measuring about 12 cm × 8 cm, covered by sartorius muscle was highlighted and completely removed (Fig. 3 and Fig. 4).

Figure 3. Intraoperative view of the lesion

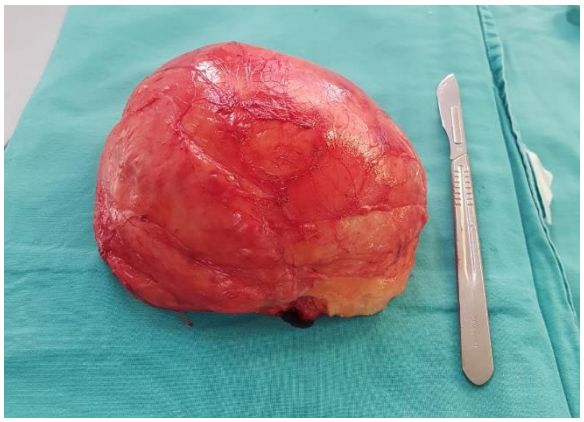

Figure 4. The macroscopic appearance of an encapsulated fat tissue tumor

Rigorous hemostasis control and negative pressure drainage installation followed. The tumor excised was sent for histopathological examination, in order to establish a certain diagnosis. Wound closure was performed by intradermal suture technique (Fig. 5).

Figure 5. Drainage installation and wound closure using the intradermal suture technique

The presumptive diagnosis of giant lipoma of the groin region was pathologically confirmed. The report described a well-defined encapsulated mass of mature adipocytes-characteristic features for a benign lipomatous tumor.

During hospitalization, the patient was given antibiotic, analgesic and anticoagulant treatment. The immediate postoperative evolution was favorable, so the patient was discharged home during the healing process, in the second day after surgery and subsequently being reassessed regularly after the intervention (Fig. 6). Regarding complications, we mention seroma and minimal wound dehiscence.

Figure 6. The aspect 14 days postoperative after suture removal

DISCUSSIONS

The particularity of this case is given by the area involved, the close boundaries with important anatomical structures, the large size of the tumor and the possible differential diagnosis.

Lipomas located in this specific anatomical region are rarely mentioned in the specialized literature, so wrong orientation of preoperative diagnosis may occur [1].

Differential diagnosis should consider other pathologies, which typically occur at this site such as: inguinal hernia, femoral hernia, malignant tumor, cyst of the spermatic cord, inguinal adenopathy, ectopic testicle and aneurysm of great saphenous vein [2].

A lipoma in the right groin region may be confused with an inguinal hernia, due to similar symptoms and physical examination findings. The inguinal region is a weak area of the antero-lateral abdominal wall, arising from the adoption of the bipedal position [3-5]. As in all cases of hernia, it consists of the externalization of viscera in a peritoneal sac, through a weak point. Inguinal hernia consists of the presence of a pseudotumoral structure that deforms the area, with the possibility of reduction in the abdomen [6].

Femoral hernia consists of the externalization of viscera in a peritoneal sac at the groin-femoral region, through the femoral ring or other weak points. The inspection shows a pseudotumoral structure, of round-oval shape, which increases in size at the effort of coughing. Percussion can highlight the sound if in the sac is part of the intestine [7].

A sarcoma is a rare, malignant, soft tissue tumor which usually occurs in the thigh - that should also be kept in mind for the differential diagnosis.

An inguinal adenopathy, an ectopic testicle and a venous aneurysm should be mentioned, even though the tumor size is larger in the case presented. An ectopic testicle can be suspected if we notice its absence in the scrotum. In case of a venous aneurysm we can notice that it fills immediately after palpation.

Further investigations such as ultrasonography, computed tomography or magnetic resonance imaging should be considered in the differential diagnosis of inguinal masses. So, preliminary diagnosis of a tegumentary elevation in the groin region is crucial, both to provide the best therapeutic solution and to perform the most appropriate surgery [8].

Intraoperatively, careful dissection should be performed, under direct visual control, protecting the femoral vascular-nerve bundle. In this case, the deep localization under the sartorius muscle, made the surgical approach of the tumor even more difficult. Respecting the above mentioned indications, the excision was completely achieved and the surgery was a therapeutic success.

CONCLUSIONS

Lipoma of the groin region is considered to be a rare pathology. This situs may lead wrongly to other diagnoses (such as inguinal hernia, femoral hernia, malignant tumor, cyst of the spermatic cord, inguinal adenopatia, ectopic testicle, aneurysm of great saphenous vein), if we take into consideration only the clinical criteria.

In case of misdiagnosis, there is a high risk of intraoperative complications.

Preoperative diagnosis is fundamental for planning the surgical approach.

Further investigations such as ultrasonography, computed tomography or magnetic resonance imaging should be considered in the differential diagnosis of inguinal masses.

Open surgical treatment with wide approach is the best solution in this case.

Sending the excised mass to histopathological examination is mandatory in the diagnostic scheme.

Patients should be followed up regularly after surgical treatment for early detection in case of tumor recurrence.

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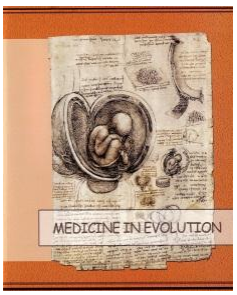
A Prescriptive Sound Amplification Method for Tinnitus Relief, Using Hearing Aids



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Abstract

Aim and objectives: To improve the quality of life of the tinnitus patients, using an innovative sound amplification algorithm, delivered via hearing aids.

Material and methods: Each subject served as his own control. Tinnitus Functional Index (TFI) questionnaire was used for tracking the progress of the therapy. Scores were calculated at the first presentation, 2 weeks, and 1, 3, 6 and 12 months after that. There were 15 adult patients with subjective tinnitus of non-tumoral etiology, 12 with tinnitus and hearing loss and 3 with tinnitus and normal hearing.

Results: After 12 months of therapy, a statistically significant decrease in TFI score was observed. The improvement was gradual for most of the patients.

Conclusion: The designed prescriptive amplification method is an efficient way of helping patients with disabling tinnitus, regardless of the fact that hearing loss is present or the hearing thresholds are normal.

Keywords: tinnitus, masking, prescriptive method, hearing aids, quality of life

INTRODUCTION

Tinnitus represents a perception of sounds in the absence of a real external source (1). Prevalence rates of tinnitus in general adult population is 8,2-20 %, rising to 18-30% in individuals over 50 years of age (2).

The quality of life of some of the tinnitus sufferers is severely affected, in areas as cognition, attention, performing daily professional and social tasks, resting and relaxing (2).

There are numerous therapies that are targeting to reduce the impact of the tinnitus on daily life of the sufferers, but none of them is offering a cure. The most commonly used therapies for tinnitus relief are sound therapies (1). These therapies include the use of maskers, TRT, music sounds etc.

For most tinnitus patients, the sounds of the noise generators, that have to be quite loud in order to be able to mask tinnitus, are producing both additional discomfort and difficulty hearing the useful environmental sounds. Also, for many of the tinnitus maskers, there is a need to change frequently the parameters of the masking sound, in order to remain effective (3).

Aim and objectives

Our aim is that by providing amplification of real environmental sounds in the frequency region of the tinnitus sound, we will obtain the masking of tinnitus, without adding the discomfort of an amplified sound that doesn't belong in the natural hearing environment of the patient.

Another aspect that we addressed is that as many as 75% of the tinnitus sufferers have an impaired capacity of speech understanding (4).

The speech intelligibility is further reduced when there is an artificial therapy sound overlapping the speech from the real sound environment of the patient. (5).

Therefore, another aim is that by amplifying the real environmental sounds situated in the frequency region of the tinnitus, we will provide a more appropriate stimulation of the classic auditory structures involved in processing and transmission of the sound signals.

MATERIAL AND METHODS

Participants inclusion criteria: the group of patients is represented by 15 adult patients, 8 men and 7 women. In order to include the patients in the study group, they have to comply with all the following inclusion criteria:

- unilateral or bilateral subjective tinnitus in the frequency range of 125-8000 Hz
- tinnitus older than 6 months, with or without hearing loss in the classic audiometry range 125-8000 Hz
- no active external or middle ear pathology at the time of first presentation
- Tinnitus Functional Index Questionnaire score in the category Moderate Problem or worse, at the first presentation
- no other parallel treatments for tinnitus

Design, equipment and method

Design: we used a single-case research design, each patient being his own experimental control for collecting and processing data at first visit in the audiology office, then at 2 weeks, 1 month, 3 months, 6 months and 12 months after the first intervention.

Equipment:

- one clinical audiometer (Harp by Inventis)
- one tympanometer (Flute by Inventis)
- one Levono laptop operating Connexx software with Audioservice hearing aids database

- 30 hearing aids, meaning 2 hearing aids per patient, operating on at least 6 frequency channels in terms of amplification and compression
- 90 Tinnitus Functional Index (TFI) questionnaires

Method: the patients presented with subjective tinnitus as main complaint, after being seen by ENT specialists that ruled out external and middle ear pathologies, as well as tumoral pathologies. For the 3 patients with normal hearing included in the study, tinnitus was the result of acoustic trauma, older then 6 months: one after 4 hours of exposure to loud music at a concert, two after military shooting training.

Each patient underwent the following audiological investigations: pure tone audiogram, speech audiogram, tympanometry, stapedius reflex. After these tests, the perceived tonality and level of intensity of the tinnitus were investigated. The patients had to match the frequency and the level of intensity of the tinnitus with warble tones provided via audiometer, in the range between 125-8000 Hz.

The patients were informed about the therapy steps and agreed to follow the protocol that consists in completing TFI questionnaire at the first presentation, then at 2 weeks, 1 month, 3 months, 6 months and 12 months after receiving the hearing aids.

All the patients received bilateral amplification, regardless of the fact that tinnitus was bilateral or unilateral. The decision was made based on the central auditory masking theory, that states that a sound coming from one ear is influencing the sounds perceived by the other ear, due to the simultaneous processing of the acoustic signals at the central cortical level (6). Also, there are studies showing that for many patients with unilateral tinnitus, that were provided unilateral sound therapy, the result was that tinnitus became evident in the contralateral ear, suggesting that tinnitus was in fact bilateral, but lateralized in the ear where it was louder (7).

The base amplification offered via hearing aids was prescribed by the NAL NL. NAL NL2 stands for National Acoustic Laboratories Non-Linear rationale and is the second release of the prescriptive methods created by this laboratory from Australia. The methods that are prescribing the gain as a function of frequency are called prescriptive methods. The NAL NL2 method is dedicated to hearing aids with Wide Dynamic Range Compression (WDRC).

The purpose of NAL-NL 2 is to amplify the frequencies found in the speech frequencial range, in order to obtain the maximum speech inteligibility, while keeping a confortable level for all the surrounding sounds (8).

To the gain prescription made by NAL NL2 rationale we added 10 dB gain for the main subjectively matched tinnitus frequency and for the frequencies within a 250 Hz interval below and above that (+/-250 Hz).

An important role in adjusting the amplification for tinnitus relief was played by the special setting of the compression system parameters of the hearing aids.

The purpose of any compression system is to adjust automatically the hearing aid gain, accordingly to changes in input levels. When properly implemented, the compression systems can maintain speech audibility over a wide range of input levels, resulting in improved speech intelligibility and quality while mainteining the loudness comfort (9).

The combinations we chose between compression threshold, compression ratio (CR) and times of attack and release were meant to allow enough amplification for the tinnitus region to be properly stimulated, and, in the same time, to prevent the loud sounds to become uncomfortably loud.

There are studies showing that the natural compression induced by the basilar membrane is having a CR between roughly 1.5:1 at 250 Hz and 3:1 at 1000 Hz and over (10).

These are the CRs that assure a natural hearing sensation and a proper speech understanding for a normal ear (11).

For the tinnitus ears, we decided to follow the natural model induced by the basilar membrane, in order to maximize the speech intelligibility potential. Therefore, we considered

that a one step compression ratio (CR) of 2, for the subjectively perceived tinnitus frequency and the frequencies in the +250/-250 Hz range from the main frequency, would prevent the patient to have unpleasantly loud hearing sensation, while not introducing additional distortions of the sound. For the rest of the frequency domains we used a one step CRs between 2 and 2.5.

We used syllabic compression attack and release times, because syllabic compression is fast. This means that it can fit the speech attributes, as syllables and even separate phonemes into the dynamic range of the hearing impaired patien. Therefore, using a syllabic compression helps to restore an abnormal loudness growth to normal. Syllabic compression is characterized by short attack and release times, smaller then 150 ms, a compression ratio under 4, and usually a threshold under 50 dB. (12).

We modified the syllabic compression using fixed thresholds of 60 dB for the tinnitus main frequency, for the +/- 250 Hz domain and the frequencies above that, and under 50 dB. for the lower frequencies.

The intended effects of the specifically designed pattern of amplification, beside bringing the hearing threshold in the normal range, are:

- the intense stimulation, retraining and remapping of the neural segments responsible for sound processing in the frequency area affected by tinnitus
- to provide a masking effect of the tinnitus using exclusively environmental sounds

The provided hearing aids used data logging. The patients were wearing the devices a minimum of 6 hours daily and a maximum of 17 hours daily in all kinds of hearing environments, without experimenting uncomfortable hearing issues: quiet, speech in noise, speech in quiet, music, traffic, party noise.

For tracking the changes of tinnitus perception, we used for each patient the Tinnitus Functional Index (TFI) developed in 2014 by Henry JA et al. (13).

TFI is a questionnaire calibrated for evaluation of the effects that tinnitus has on the quality of life of the patients. In its final shape, TFI includes eight subscales.

First subscale is referring to how intrusive tinnitus is felt by the patients, second about the feeling of keeping the control, third about cognitive impact, fourth about how tinnitus affects the sleep, fifth about impact on hearing, sixth about the capacity of the patient to relax, seventh about general perceived quality of life and the last one is about emotional impact of tinnitus.

Each subscale comprises three questions, with the exception of the Quality of Life subscale, which comprises four points.

We calculated the TFI score of each questionnaire according to the authors guidelines: we add the total points, then divide the sum by 25 and multiply it by 10.

Also, we used the score interpretation scale recommended by the authors of the TFI in order to established the categories of the tinnitus impact:

Not a problem: M=14 (range of score: 0–17)

Small problem: M=21 (range of score: 18–31)

Moderate problem: M=42 (range of score: 32–53)

Big problem: M=65 (range of score: 54–72)

Very big problem: M=78 (range of score: 73–100) (13).

The authors of TFI Questionnaire considered that a therapy can be considered succesful if the score after applying it comparing to the initial score is bigger then 13 points (13).

The National Institute for Health and Care Excellence (NICE) recommends, in the most recent guidelines, a difference of 18 points in order to consider a therapy succesful (NICE, 2018).

TFI is used both in clinical practice and in research studies, because its proven sensitivity to changes obtained as a result of different interventions methods. Also, TFI is an

excellent tool for evaluation of the general impact of tinnitus, because is covering the broad areas affected by tinnitus (13).

Therefore, we applied TFI questionnaires at the first visit of the patient, then at 2 weeks, 1 month, 3 months, 6 months and 12 months after initial fitting of the hearing aids.

Based on the score obtained at the first presentation, we selected and included in our study only the patients that falled into the categories: Moderate, Big and Very Big problem.

Clinical variables of the patients:

Table I. The 15 patients included in the study by gender

The 15 patients included in the study by gender		
	N	%
Female	7	46.7
Male	8	53.3

Characteristics of the study group:

We selected for our study only the patients that are feeling a strong discomfort caused by the tinnitus, with the total scores at TFI over 32 points (category Moderate Problem or above) at first presentation.

Table II. TFI scores over presentation

TFI scores over presentation				
	Mean ± SD	Median (range)	Percentile 5%	Percentile 95%
TFI score at first presentation (baseline)	77.2 ± 12.3	79(56 - 100.4)	56	100.4
Anova - Analysis of variance and covariance P = **0.0001**				

Most of the patients in our lot have also hearing loss beside tinnitus, with an average Pure Tone Threshold of 50 dB for both ears and an average tinnitus frequency of 2000 Hz. The patients were suffering with tinnitus from minimum 6 months, with an average of 12 months since onset, and tried up to 3 therapies until they addressed us.

Table III. Characteristics of the study group

Characteristics of the study group				
	Mean ± SD	Median (range)	Percentile 5%	Percentile 95%
Age of the 15 patients at the inclusion (years)	50.5 ± 17.9	48 (21 - 73)	21	73
Time from tinnitus onset (months)	17.4 ± 13.0	12(6 - 50)	6	50
PTA right ear (dB)	49.0 ± 30.5	50 (0 - 100)	0	100
PTA left ear (dB)	47.0 ± 16.9	50 (12.5 - 78.75)	12.5	78.75
Right ear average *tinnitus* frequency (Hz)	2192.3 ± 1797.4	2000 (500 - 6000)	500	6000
Left ear average *tinnitus* frequency (Hz)	2766.7 ± 1960.5	2000 (250 - 6000)	250	6000
Nr. of therapies tried before	0.9 ± 1.2	1(0 - 3)	0	3
Median = percentile 50%; Range = minimum – maximum; Minimum = percentile 0%; Maximum = percentile 100%				

RESULTS

The median score at the first presentation was 79 points. We applied the innovative amplification algorithm based on NAL-NL2 prescriptive method on first presentation, then made small gain and compression ratio adjustments based on the feedback received from the patients at 2 weeks, 1 month, 3 months, 6 months. The patients completed the TFI Questionnaire at first presentation, then 2 weeks, 1 month, 3 months, 6 months and 1 year after the first presentation, with the following distribution of scores:

Table IV. TFI scores over presentation

TFI scores over presentation				
	Mean ± SD	Median (range)	Percentile 5%	Percentile 95%
TFI score at first presentation (baseline)	77.2 ± 12.3	79(56 - 100.4)	56	100.4
TFI score 2 weeks	65.8 ± 10.7	68.4(44.8 - 87.6)	44.8	87.6
TFI score at 1 month	55.6 ± 13.3	56.4(21.6 - 74.8)	21.6	74.8
TFI score at 3 months	42.1 ± 12.8	42(10 - 63.2)	10	63.2
TFI score at 6 months	36.5±13.7	34(10 - 73)	10	73
TFI score at 12 months	26.8±10.7	26.4(2 - 46.4)	2	46.4
Anova - Analysis of variance and covariance P = **0.0001**				

We can observe a decreasing tendency of the overall score from one moment of presentation to the next one, with a significant median decrease of overall score already after the first month of therapy of 22.6 points. The score difference between the first presentation and the last one, after 12 months, is 52.6, which points to a significant improvement in tinnitus management.

Table V. Changes (decrease) in TFI scores

Changes (decrease) in TFI scores				
	Mean ± SD	Median (range)	Percentile 5%	Percentile 95%
TFI score at 2 weeks change from baseline	-11.4 ± 12.1	-11.4[(-44.8) - (-0.4)]	-44.8	-0.4
TFI score at 1 month change from baseline	-21.6 ± 14.6	-21.6[(-66.4) – (-10.0)]	-66.4	-10
TFI score at 3 month change from baseline	-35.1 ± 18.2	-35.1[(-78.0) – (-16.4)]	-78	-16.4
TFI score at 6 month change from baseline	-40.7 ± 16.3	-40.7[(-78.0) – (-18.2)]	-78	-18.2
TFI score at 12 month change from baseline	-50.4 ± 15.3	-50.4 [(-86.0) – (-29.6)]	-86	-29.6
Anova – Analysis of variance and covariance P = **0.0001**				

We analyzed the decrease in TFI scores with Anova – Analysis of variance and covariance (P = 0.0001) and with the Kruskal-Wallis rank testand observed the individual variability of the results.

Table VI. Percentage of decrease in TFI scores

Percentage of decrease in TFI scores					
	Median	Minim	Maxim	Percentile 5%	Percentile 95%
TFI score at 2 weeks change from baseline	-44.6%	-0.6%	-44.6%	-0.6%	-44.6%
TFI score at 1 month change from baseline	-22.1%	-75.5%	-14.2%	-75.5%	-14.2%
TFI score at 3 month change from baseline	-39.8%	-88.6%	-22.7%	-88.6%	-22.7%
TFI score at 6 month change from baseline	-47.4%	-88.6%	-20.0%	-88.6%	-20.0%
TFI score at 12 month change from baseline	-67.7%	-97.7%	-42.5%	-97.7%	-42.5%
Kruskal-Wallis rank test P = **0.001**					

The tendency of overall scores is to decrease. The nonlinear decrease of the score is due to the fact that tinnitus is affecting the individual in a complex manner. For our lot of patients, the pattern of the scores improvements did not correlate with the degree of hearing loss, the duration since the onset of tinnitus, the frequency region of the tinnitus or the subjective perceived loudness.

Table VII. TFI evolution intepretation

TFI evolution intepretation			
	TFI	N	%
Baseline	Not a problem: range of score: 0–17	-	-
	Small problem: range of score: 18–31	-	-
	Moderate problem: range of score: 32–53	-	-
	Big problem: range of score: 54–72	5	33.3
	Very big problem: range of score: 73–100	10	66.7
2-nd presentation	Not a problem: range of score: 0–17	-	-
	Small problem: range of score: 18–31	-	-
	Moderate problem: range of score: 32–53	1	6.7
	Big problem: range of score: 54–72	10	66.7
	Very big problem: range of score: 73–100	4	26.7
3-rd presentation	Not a problem: range of score: 0–17	-	-
	Small problem: range of score: 18–31	1	6.7
	Moderate problem: range of score: 32–53	5	33.3
	Big problem: range of score: 54–72	7	46.7
	Very big problem: range of score: 73–100	2	13.3
4-rd presentation	Not a problem: range of score: 0–17	1	6.7
	Small problem: range of score: 18–31	1	6.7
	Moderate problem: range of score: 32–53	10	66.7
	Big problem: range of score: 54–72	3	20
	Very big problem: range of score: 73–100	-	-
5-th presentation	Not a problem: range of score: 0–17	1	6.7
	Small problem: range of score: 18–31	2	13.3
	Moderate problem: range of score: 32–53	11	73.3
	Big problem: range of score: 54–72	-	-
	Very big problem: range of score: 73–100	1	6.7

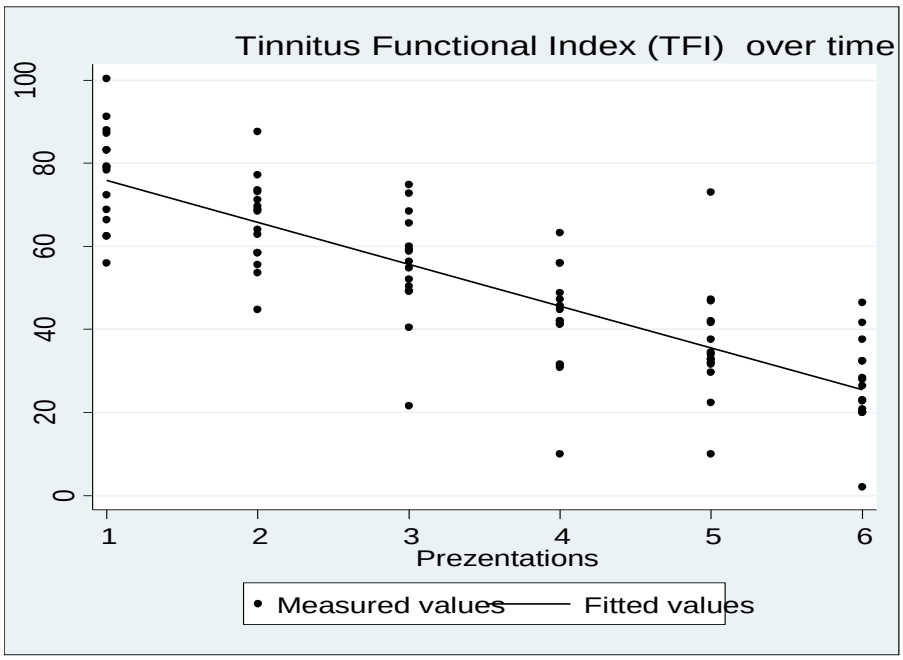

Figure 1. Tinnitus Functional Index (TFI) over time

DISCUSSIONS

Our proposed therapy is involving complex sensory and nervous structures, addressing tinnitus both by offering masking through amplifying environmental real time sounds, and by training the auditory pathways in the regions affected by hearing loss and tinnitus.

There are many studies that suggest that the atypical sensorial perceptions, as tinnitus, hyperacusis and distorted perception of the sounds, are, at least partially, the result of plastic changes at the level of central nervous system, following hearing loss or different nervous structures damage. Neural plasticity involves modified ways of processing auditory information and rerouting for transmitting it. Even more, there are imagistic proofs that neuroplasticity implies non-classical auditive structures in sound perception, creating cross-modal interactions that could explain emotional reactions of the tinnitus sufferers. (5)

Therefore, we believe that by providing additional stimulation and sound clues from the frequency region of the tinnitus, there is a possibility to decrease the tinnitus occurence, the tinnitus perceived intensity, as well as decrease the distorsion of the real sound signals and increase the speech understanding.

Our algorithm uses amplified sounds centered on the subjectively perceived tinnitus frequency, with 250 Hz above and 250 Hz below it. In this way, the masking frequency range included native frequencies of the specified domain, as well as formants of the lower frequencies, assuring a dynamic and varied composition of the masking sounds.

As the nervous plasticity and emotional response to tinnitus is different in every patient, we can also observe the variability of score improvement between individuals. All the patients that followed a full course of 12 months of therapy reported an improvement in their tinnitus management. They declared they are willing to continue to use the amplification as a longterm therapy.

CONCLUSIONS

The proposed therapy has the potential to reduce the impact that tinnitus is having on patients lives. It seems that the longer the therapy is followed, the better results are obtained. Our target for the future is to analyze the manner in which our therapy is influencing the

score for each subscale of TFI, as a function of the duration of the therapy, using a bigger lot of patients.

Acknowledgement

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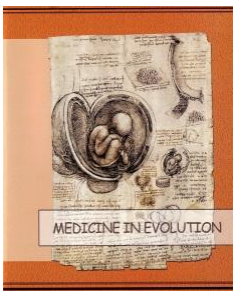
Correlations between left ventricle ejection fraction, global longitudinal strain by two-dimensional speckle tracking and pulse wave velocity in coronary artery disease



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Abstract

Cardiovascular disease (CVD) is one of the main cause responsible for mortality in the world, representing 47% of all deaths in women and 39% of all deaths in men in Europe. Atherosclerosis is the paramount corolary of CVD. There is a close interaction between arterial stiffness and atherosclerosis. The risk scores utilised on a large scale are not entirely predictive for incidence of CVD. Severe coronary artery disease (CAD) is known to lead to left ventricular (LV) dysfunction. Because LV ejection fraction (LVEF) is usually within the normal range in early stages, a more sensitive index for early-stage LV dysfunction is of great importance. Studies proved that global longitudinal strain (GLS) could detect modifications in the earliest stages. Considering their non-invasiveness, a noninvasive assessment of both myocardial and peripheral vessels through GLS and pulse wave velocity (PWV) may become a useful standard tool for early detection of CVD before development of clinical manifestations. This study aimed to establish the link between the severity of CAD, LVEF, GLS and arterial stiffness (PWV). We observed that LVEF is correlated with GLS and that GLS correlates with severity of CAD and also significantly with PWV.

Keywords: coronary artery disease, cardiovascular risk, arterial stiffness, myocardial strain

INTRODUCTION

Cardiovascular disease is associated with increased arterial stiffness and central aortic systolic blood pressure (SBPAo) [1], which is the first sign of vascular dysfunction, arteriosclerosis and atherosclerosis. Arterial stiffness can be quantified through PWV, a simple, noninvasive, and reliable measurement [2]. PWV has the advantage and potential to be utilised in the general population, thus offering an enhancement for identifying and stratifying high-risk patients for more effective CVD prevention [3]. PWV measures the distance travelled by the pulse wave over time. It has the best predictive value for cardiovascular events and the simplicity of its measurement makes it a gold standard for assessing arterial stiffness in daily practise [4]. The association of age with various arterial distensibility parameters has been described exhaustively in the literature. PWV varies with age and gender [5]. Reference values begin at 6.1 (4.6–7.5) m/s for young, healthy individuals and gradually increase with age and presence of hypertension [6]. Evidence suggests that aortic stiffness may contribute initially to the development of hypertension by preceding it [7]. Numerous pharmacological and non-pharmacological solutions can reduce PWV [8] and could offer an alternative for patients at high risk of CVD; thus, we need to assess early and take proper measures for a more favourable outcome in patients with cardiovascular risk. Left ventricular (LV) function can be assessdusing directional components of myocardial deformation or strain. As shown in several studies, global longitudinal strain (GLS) appears to be a sensitive measure of impaired LV systolic function, even better than ejection fraction at predicting cardiovascular disease events and death [9], [10]. There are only a few published studies regarding the association between the severity of coronary artery disease and GLS value [11]. A more sophisticated and noninvasive approach could offer more information about the likeliness and maybe even about the extensiveness of coronary artery disease.

Aim and objectives

The current study aimed to assess the association between the presence and extensiveness of coronary artery disease, echocardiographic and arterial stiffness parameters in coronary patients.

MATERIAL AND METHODS

We performed the current study in the Cardiology Clinic of the Institute of Cardiovascular Diseases between 2018 and 2019. We enrolled 33 consecutive patients with suspected CAD, with a positive history of angina or atypical chest pain. Exclusion criteria were: age<18 years old, lack of cooperation, overt heart failure, haemodynamic instability, atrial fibrillation or frequent ventricular premature complexes, left bundle-branch block, severe valvular disease, cytotoxic treatment, poor sonographic window. Patients underwent transthoracic echocardiography (TTE), 2-D speckle tracking echocardiography (2D-STE) and coronary angiography.

We divided the patients into two groups: group 1 (14 patients) with significant (>50%) CAD, and group 2 (19 patients) with non-significant coronary artery disease. Cardiac ultrasound was performed on a General Electric VIVID 9 equipment with a M4S transducer, with a frequency of 1.5–4.3 MHz and high frame rate (60–90 frames/s). LV volumes were traced manually at end-diastole and end-systole in apical four- and two-chamber views and LVEF was calculated using biplane Simpson's method. We assessed arterial stiffness on an accredited medical device: TensioMed Arteriograph, produced by Medexpert Ltd. Hungary. We created our database in Microsoft Excel. For statistical analysis, we used the Microsoft Excel and SPSSv17 programs. At the beginning of our study, we ran a descriptive analysis of our database by calculating the central tendency and dispersion parameters, for the numerical

variables, and a frequency table for the range and qualitative variables. We plotted, by using a histogram, the hospitalisation days and the age variable. We tested the distribution of our data by applying the Shapiro – Wilk test (n<50, n– the sample volume) and we obtained that our data was not normally distributed (p<0.001). Further on, we applied the Mann – Whitney and the Kruskal–Wallis tests, and we performed a regression analysis to study the association between LVEF, GLS LV and PWVao correlated to the severity of coronary artery disease. For the entire study, we set the confidence level at α=0.05.

RESULTS

We included 33 patients admitted to our clinic between 2018 and 2019. For all patients, we introduced information regarding the number of hospitalisation days, age, body mass index (BMI), haemodynamic parameters (systolic and diastolic blood pressure, heart rate, PWVao), blood tests results and echocardiography parameters (LVEDV, LVESV, LVEF, GLS-LV).

For the numerical variables, we calculated the central tendency and distribution parameters and for the range and qualitative variables, we ran frequency tables in SPSS for data distribution and associated percentage. The complete descriptive analysis for the numerical variables is represented in Tables 1 and 2. For the hospitalisation period and the age variable, we plotted a histogram for data distribution (figures 1 and 2).

The frequency tables showed a higher prevalence of male gender (63.3%) compared to females (36.4%). More than half (57.6%) did not have obstructive coronary artery disease, 18.2% had one-vessel CAD, 12.1% had two-vessel CAD, and 12.1% had three-vessel CAD.

Table 1. Distribution parameters calculated for BMI, systolic and diastolic blood pressure and heart rate (n=33)

Statistics	**BMI (kg/m^2)**	**SBP admission**	**DBP admission**	**HR admission**
Mean	27.78	135.76	80.15	78.76
Standard Error	0.77	3.91	2.43	4.32
Median	28	140	80	71
Mode	28	140	70	70
Standard Deviation	4.40	22.47	13.95	24.83

Table 2. Distribution parameters calculated for hospitalisation days, age, LVEDV, LVESV, LVEF, GLSLV variables

Statistics	**Hospital admission (days)**	**Age**	**LVEDV**	**LVESV**	**LVEF**	**GLS LV**
Mean	5.55	56.09	101.61	45.70	0.55	-18.35
Standard Error	0.79	2.65	4.28	3.43	0.01	0.68
Median	4	61	100	40	0.55	-18.7
Mode	3	69	90	40	0.6	-21.3
Standard Deviation	4.56	15.24	24.60	19.71	0.07	3.93

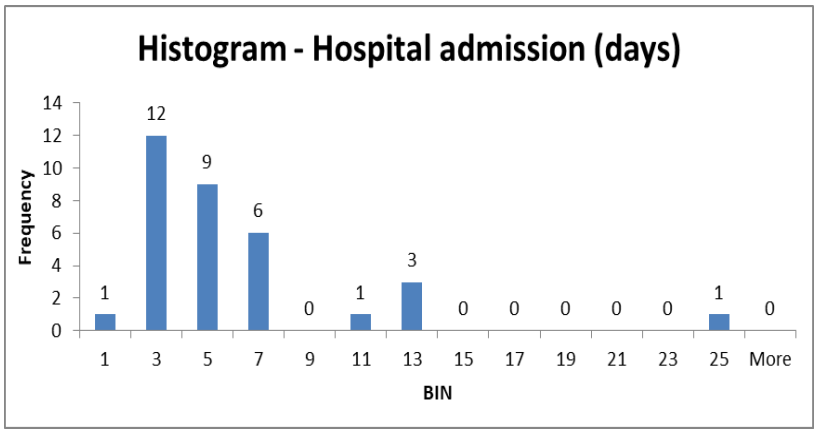

Figure 1. Hospital admission period distribution histogram (n=33)

The mean hospital admission period was 5,55+/-4,56 days. The histogram of the hospital admission period is represented in figure 1.

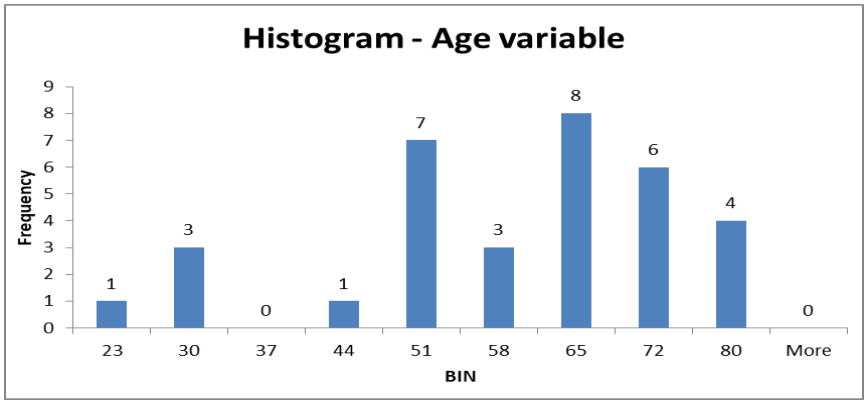

Figure 2. Age distribution histogram (n=33)

The mean age was 56,09+/-15,24. The age distribution histogram is represented in figure 2.

By applying the nonparametric Kruskal Wallis test we observed that GLS in obstructed coronary arteries decreases significantly (p=0.02) with the number of affected vessels (-18.55 for one-vessel, -18.33 for two-vessels and -14.93 for three-vessel disease).

We applied a linear regression model to analyse the association between LVEF values and GLS LV values, we observed a very significant median indirect correlation $(r = -0.52,\ R^2 = 0.27, p = 0.0016 < 0.01)$, represented in figure 3.

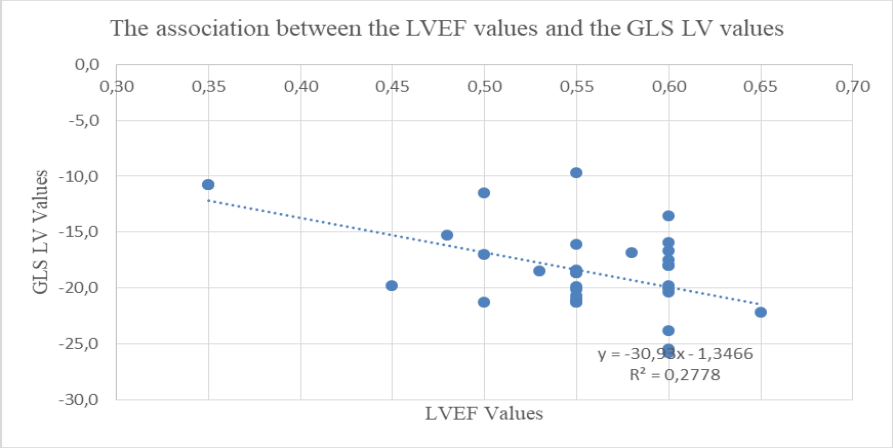

Figure 3. Correlation between LVEF and GLS LV values. Linear regression model

By applying the same regression model, we also obtained a significant strong positive correlation (p<0.001, r=0.93, R2=0.87) between arterial stiffness values and global longitudinal strain values. (figure 4)

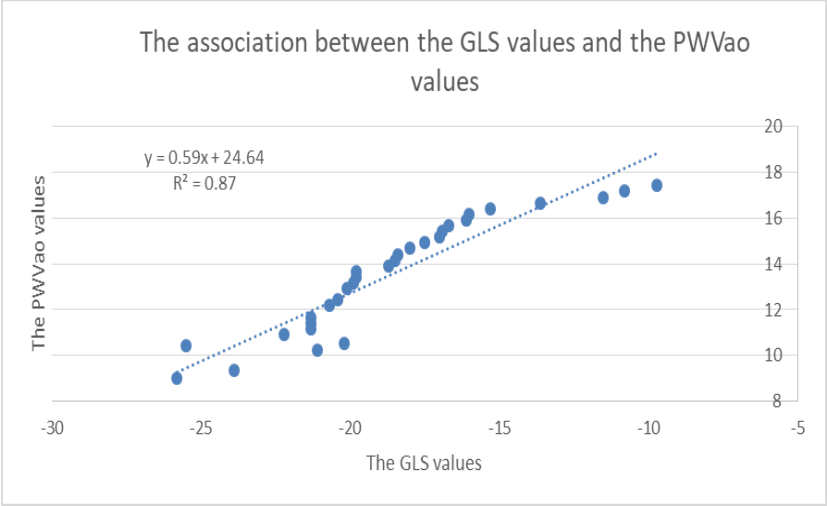

Figure 4. Correlation between PWVao and GLS values. Linear regression model

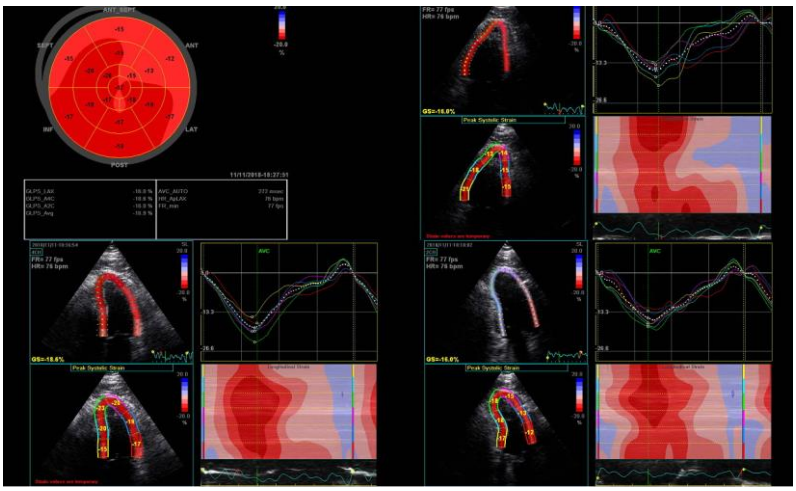

Figure 5. Example of speckle-tracking echocardiography for calculation of longitudinal strain values

An example of speckle-tracking echocardiography to calculate longitudinal strain values is represented in figure 5.

DISCUSSIONS

Coronary artery disease (CAD) is one of the leading causes of morbidity and mortality in the world [12].

More than 50% of patients currently referred for coronary angiography assessment have normal coronary arteries or nonobstructive CAD [13]. Noninvasive assessment of patients with coronary artery disease (CAD) remains a clinical challenge despite the widespread use of imaging and provocative testing.

Left ventricular (LV) ejection fraction (LVEF) assesses global systolic function and is useful in risk evaluation and management of numerous cardiovascular diseases. Nonetheless, this parameter has limitations in conditions where the ratio of stroke volume to LV cavity size is maintained [14]. Global longitudinal strain appears to be a sensitive measure of impaired LV systolic function in early stages of ventricular dysfunction, when LVEF is still normal [15].

Studies proved that measurement of global longitudinal strain using 2D speckle tracking echocardiography is also a sensitive and accurate tool in prediction of severe CAD [16]. Gaibazzi et al. proved that rest GLS had a comparable accuracy with stress-echo data for prediction of angiographically obstructive CAD, which increased furthermore when combined with clinical data, similar to stress echocardiography wall motion [17]. Interactions

between the left ventricular and the arterial systems are critical determinants of cardiovascular function [18]. Pulse wave velocity is a parameter of arterial function and an early sign of atherosclerosis. We noticed that GLS and PWV are associated, but we need larger cohorts to study ventricular-arterial coupling furthermore. This noninvasive approach could be clinically useful in the early assessment of all patients with cardiovascular risk before developing symptoms.

CONCLUSIONS

Left ventricular ejection fraction and global longitudinal strain were significantly correlated in this small study. Both left ventricular ejection fraction and global longitudinal strain by two-dimensional speckle tracking echocardiography proved useful in correlating to severity of coronary artery disease. We noticed that pulse wave velocity, as a marker of arterial stiffness, and global longitudinal strain, as a marker of left ventricular performance, were significantly correlated. Further research on larger cohorts is necessary to establish if all patients with or without symptoms of angina could benefit from speckle tracking echocardiography and arterial stiffness assessment in the early stages of atherosclerosis before significant obstruction in the arteries occurs.

Conflict of interests: The authors declare that they have no conflict of interests. Compliance with ethical standards: We undersign and certificate that the procedures and the experiments we have done respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2000 [19], as well as the national law.

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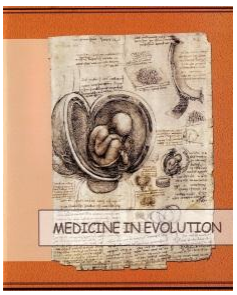
Correlations between echocardiographic parameters and cardiovascular risk factors for stroke incidence in non-valvular AF



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Abstract

Our retrospective, cross-sectional study was aimed to determine a general profile of non-valvular atrial fibrillation (NVAF) ambulatory patients, by identifying echocardiographic parameters and risk factors associated with cardioembolic stroke. 156 patients with previously diagnosed NVAF were selected from an Ambulatory Cardiology Praxis database. We applied the CHA_2SDS_2_VASC and HASBLED scores and analyzed 3 echocardiographic parameters (LAV, LVEDV and LVEF%), the presence of carotid atheromatosis and coronary artery disease and evaluated the lipidic profile and HbA1c. LAV, LVEDV and LVEF% were associated with cardioembolic stroke in NVAF (especially LVEDV), and also with ischemic heart failure (LAV in particular). Altered lipidic profile, presence of coronary artery disease and diabetes were also important indicators for incident stroke in NVAF. Further large cohort studies are necessary to develop a risk stratification chart for cardioembolic stroke based on these parameters in patients with NVAF.

Keywords: atrial fibrillation, cardioembolic stroke, echocardiographic parameters, CHA_2DS_2_VASC, lipidic profile

INTRODUCTION

Atrial fibrillation is the most frequent form of cardiac arrhythmia [1]. With the ageing population of today`s civilized countries the prevalence of this cardiac condition is estimated to double in the next ten years.[2] From the age of 40 years on the risk for developing AF is 1 in 4 for both genders.[3] AF can be triggered by common cardiovascular risk factors such as obesity, dyslipidemia and habits like smoking or alcohol abuse.[4] Heart failure followed by stroke are the main consequences of AF [5], while sudden cardiac death is the leading cause of cardiovascular death for this disease. [6]

Cardioembolic stroke is the most common complication of AF and one of the main causes of death in patients with AF. The prevalence of CE stroke is 14-30% from all stroke types with the highest mortality, especially the in-hospital mortality in patients with early embolic recurrences.[7] The Framingham Heart Study already studied the impact on mortality of AF alone, with differences on sex (1.9 in women vs.1.5 in men) but with no significant differences regarding age.[8] Due to the severe outcome of CE stroke it is very important to detect and diagnose patients with potential cardioembolic risk. For this matter CHA_2DS_2_VASC score is a potent diagnostic tool for determining which patients are eligible for oral anticoagulation therapy in stroke prevention [9], but also has some limitations linked to lack of information about cardiac structure or function that lead to thromboembolism. [10] Primary and secondary prevention measures for cardioembolic stroke could be reanalyzed by correlating CHA_2DS_2_VASC scores with certain echocardiographic parameters. These could predict the functional outcome and clinical evolution of NVAF patients, and thus help prevent cerebral cardioembolic events.

Echocardiography plays a crucial role in evaluating of certain parameters associated with thromboembolism in AF, TEE being 100% sensitive in detecting cardiac embolic sources.[11] The Framingham Heart Study published in 1994 detected echocardiographic parameters that predicted the risk for NVAF development, such as LA enlargement, increased LV wall thickness and reduced LV fractional shortening. [12] LV diastolic dysfunction determines LA enlargement, a common cause for AF. [13] LA enlargement is considered an independent predictor of heart failure and of other cardiovascular diseases [14] and together with an E/A ratio>=1,5 represent novel echocardiographic indicators of potential CE stroke.[15] While the mitral inflow velocity is variable with every RR cycle for AF patients[13], a vector velocity imaging echocardiography study in 2012 demonstrated that LA dysfunction was already present before LA enlargement in paroxysmal AF [16].

Objectives

This retrospective, cross-sectional study was aimed to determine a general profile of NVAF ambulatory patients regarding incident stroke by analyzing certain echocardiographic parameters and applying the CHA_2DS_2_VASC and HASBLED scores, evaluation of lipidic profile and HbA1c and presence of carotid and/or coronary artery disease. We analyzed the types of NVAF and the presence of chronic stroke lesions associated with cardioembolic risk factors and echocardiographic parameters to describe the general profile of NVAF patients.

MATERIAL AND METHODS

We selected 156 patients from an Ambulatory Cardiology Praxis database between October 2018-2019 with the following inclusion criteria: previously diagnosed NVAF (paroxysmal, persistent or permanent) treated with anticoagulation therapy (dicoumarin vs. NOACs). In order to establish the risk for cardioembolism we applied the CHA_2SDS_2_VASC and HASBLED scores and we analyzed 3 echocardiographic parameters (LAV –left atrial

volume, LVEDV- left ventricle end-diastolic volume and LVEF%- left ventricle ejection fraction) which were performed for every patient at their medical visit.

Patients with valvular AF and patients with other comorbidities such as systemic diseases with cardiac dysfunction, oncologic pathology, patients with renal failure and hyperthyroidism were excluded from the study. We also excluded patients with incomplete clinical data (the absence of CT, laboratory test and Doppler carotid echography). From the patients who had a history of cardioembolic stroke with hospitalization, none have received thrombolysis therapy.

The CHA_2DS_2_VASC score was calculated using the associated risk factors involved, with the following formula: Congestive Heart Failure/ LV dysfunction (1 point), Hypertension (1 point), Age >=75 years (2 points), Diabetes mellitus (1point), Stroke/ Transient Ischemic Attack/Thromboembolic events (2 points), Vascular Disease (1 point), Age 65-75 years (1 point), Sex category (female) (1 point) with a total of 9 points.[17] The HASBLED score was calculated with the following parameters: Hypertension (1 point), Abnormal renal/liver function (1 point), Stroke (1 point), Bleeding (1 point), Labile INR (1 point), Elderly age >65 years (1 point), Drug/alcohol abuse/medication with bleeding predisposition (1 point).

Echocardiographic parameters were selected according to the hypothesis that AF leads to the primary dysfunction of the left heart, which further leads to heart failure ultimately affecting ejection fraction. Paroxysmal and persistent AF were previously diagnosed in other Cardiology Ambulatory services or during hospitalization (patients had medical history attesting the diagnosis and ECG/ Holter ECG). Echocardiography was performed with Sonoscope SS1-6000 Series. Using apical 4-chamber view we calculated LVEF according to Simpson's formula as percentage of change in volumes between diastole and systole: EDV-ESV / EDV × 100. LAV was also measured from standard apical 4-chamber view at end-systole just before mitral valve opening. LA borders were determined using planimetry respecting the walls of the left atrium, excluding pulmonary veins and left atrial appendage. The following parameters were selected for the study: LAV with normal values of 18-58 ml for men and 22-52 ml for women, LVEDV 96-157ml for male subjects and 59-138ml for feminine subjects and LVEF% considered normal with values of >50% and higher, >=40% intermediate and < 40% reduced.[18] We chose the end-diastolic function of LV on the premise that AF can determine heart failure with preserved EF, in which case the systolic function of the left ventricle and the ejection fraction remain normal.[19]

Doppler carotid echography was performed in all patients included in the study prior to their medical visit at Rubio Medical Center. We used data regarding intima-media thickness (IMT) with the normal value of <0.9 and the absence/ presence of carotid plaques.

Laboratory tests were performed at specialized centers such as Medinvest Rubio Arad or Bioclinica Arad. We selected from the data available the lipidic profile with the following ranging values: total cholesterol (TC) with values of <200 mg/dl optimal;200-240 mg/dl borderline high and >240 mg/dl high, low density lipoprotein cholesterol (LDLc)= <100 optimal mg/dl,100-129mg/dl borderline optimal,130-159mg/dl borderline high;160-180 mg/dl high and ≥190 mg/dl very high, high density lipoprotein cholesterol (HDLc)= <40 mg/dl low and ≥60mg/dl high, triglycerides (TG)=<150mg/dl optimal, 150-190mg/dl borderline high, 200-499mg/dl high and ≥500mg/dl very high. Glycosylated hemoglobin (HbA1c) with normal values of 4.8-5,6%, ranging values from 5.7% to 6.4% were considered as a high risk for diabetes mellitus and from >=6.5% as diabetes.

The calculation of the ankle-brahial index (ABI) was performed with the following formula: ankle systolic pressure/ brachial systolic pressure and it was performed during the medical visit at Rubio Medical Center Arad. We considered normal values 1.0-1.4; 0.91-0.99 as borderline and <0.90 as peripheral arterial disease.

Computed tomography/ MRI of the brain were performed at specialized imaging centers during hospitalization in the Neurology Department at the Arad County Emergency Hospital or in private imaging centers such as Affidea Medical Center or Hiperdia Medical Center in Arad. We used the TOAST (Trial of Org 10172 in Acute Stroke Treatment) classification of stroke for patient inclusion.

All patients included have signed an informed consent for personal data processing at the Cardiology Ambulatory Praxis at Rubio Medical Center. The local ethics committee of the County Hospital Arad and the director of RubioMed Medical Center Arad approved the study.

Data processing was done using SPSS v17 software.

RESULTS

From 156 patients included in our study 76,3% were diagnosed with permanent AF, 15,4% patients had persistent AF and 8,3% were with paroxysmal AF.[Fig1] The echocardiographic parameters of the study group were: mean LAV 87,79ml (±33,73), mean LVEDV 136,36ml (±44,28) and mean LVEF% 45,12% (±8,15). The mean CHA_2DS_2_VASC score was 4,67(±1,68), median HbA1c was 5,75%(±0,73) and mean IMT value was 0,83(±0,33). [Table I].

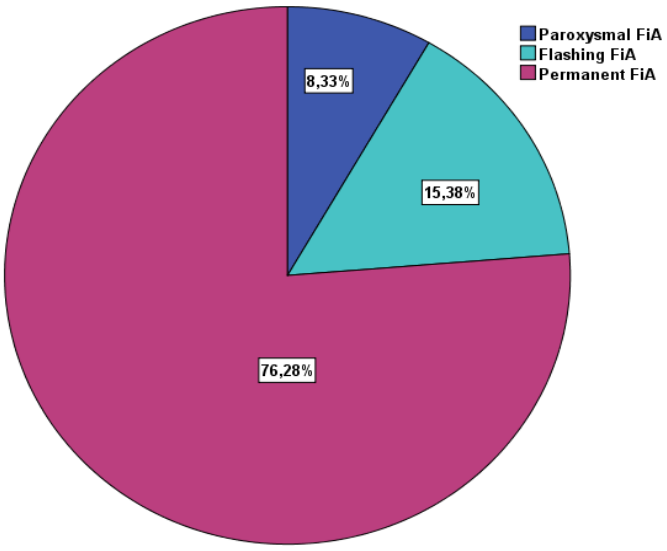


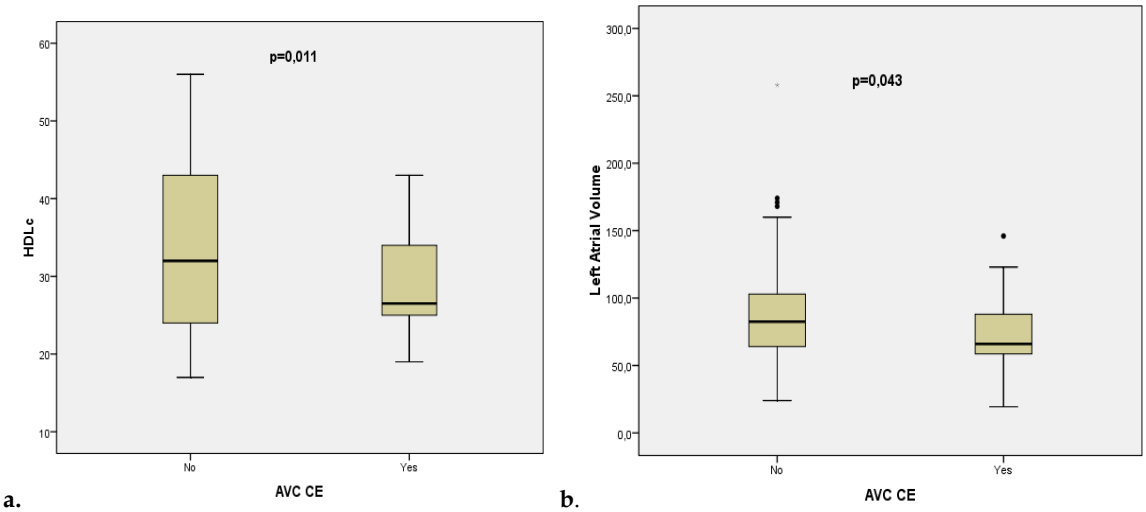
Figure 1. Percentage distribution of Atrial Fibrillation subtypes

Table I. Descriptive statistics (mean± std. deviation) for numerical variables by AF clinical subtypes (n=156)

Variable	Atrial Fibrillation			Psign Kruskal-Wallis test
	Paroxysmal (n=13)	Persistent (n=24)	Permanent (n=119)	
Age	68±10.98	68.8±10.77	72±9.19	0.084
BMI	31.9±4.55	31.3±3.28	31.3±3.55	0.718
HbA1c	6±0.75	6.2±0.72	6.2±0.55	0.474
TC	291.2±47.38	281.3±43.6	277.5±48.69	0.655
LDLc	206.6±26.3	206.5±26.01	202.7±25.98	0.856
HDLc	32.8±8.65	31.8±10.4	33.8±10.25	0.613
TGL	347.5±63.15	357.8±88.03	342.7±97.25	0.827
ABI	0.8±0.16	0.9±0.2	0.9±0.19	0.468
CHA2DS2_VASC	3.7±1.32	4.7±2.37	4.8±1.53	***0.049***^{s}
HASBLED	2.5±1.05	2.8±1.34	2.9±1.03	0.321
LAV	69±14.7	84.8±34	90.6±34.57	***0.045***^{s}
LVEDV	144.5±73.05	136.6±47.11	135.5±39.9	0.929
LVEF (%)	47±5.94	44±9.29	45.1±8.15	0.551
IMT	0.8±0.36	0.7±0.38	0.9±0.33	0.316

There were no significant differences between AF groups regarding age, BMI, HbA1c, TC, LDLc, HDLc, TGL, ABI, HASBLED score, LVEDV, LVEF and IMT. Only LAV (p=0.045) and CHA_2DS_2_VASC (p=0.049) scores varied significantly between AF clinical subtypes (nonparametric Kruskal-Wallis test). [Table I]. LAV values and CHA_2DS_2_VASC scores were significantly increased in patients with permanent NVAF vs. paroxysmal NVAF (p=0.016 in the case of LAV, p=0.017 for CHA_2DS_2_VASC, Mann-Whitney U non-parametric test).

From the total of 156 patients included in the study, 24 patients were diagnosed with cardioembolic stroke, 55 patients had lacunar strokes and 77 patients were without stroke history. When considering CE stroke as an independent variable, the study group characteristics were: mean TC 297.18 mg/dl (±44.46), mean LDLc 203.77 mg/dl (±25.57), mean HDLc 29.45 mg/dl (±6.68) and mean TGL 377.41 mg/dl (±80.26). Also median LAV was 75.94ml (±27.85), mean LVEDV was 124.88 ml (±36.70), mean LVEF% was 46.14(±6.67) and median HbA1c was 6.25%(±0.49). Significantly decreased values of HDLc (p=0.011) and increased LAV values (p=0.043) were found for patients with cardioembolic stroke compared to non-stroke (Mann-Whitney non-parametric test).[Fig.2]



a. **b.**

Figure 2. **a**. Boxplot for HDLc by comparing patients with CE stroke (n=24) vs patients without stroke (n=77) **b**. Boxplot for LAV by comparing patients with CE stroke (n=24) vs. without stroke (n=77)

The patients with lacunar stroke (n=55) had the following group characteristics: the lipidic profile with a mean TC of 283.26 mg/dl (±44.61), mean LDLc of 206.53 mg/dl (±23.56), mean HDLc of 33.42 mg/dl (±9.74) and mean TGL of 357.03 mg/dl (±90.14). The echocardiographic parameters presented following values: mean LAV 86.83ml (±38.07), median LVEDV 132.59 ml (±45.52) and mean LVEF% 44.40%(± 8.32). Median HbA1c was 6.24%(±0.61) in the lacunar stroke group. Significantly increased values of LDLc were found for patients with lacunar stroke vs. non-stroke (p=0.039, Mann-Whitney non-parametric test). [Fig.3]

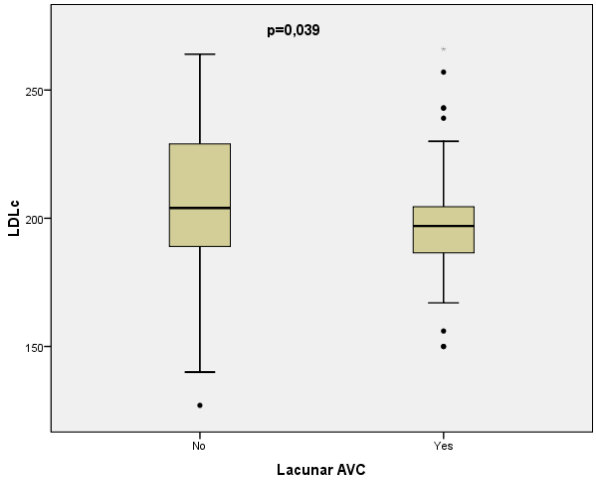
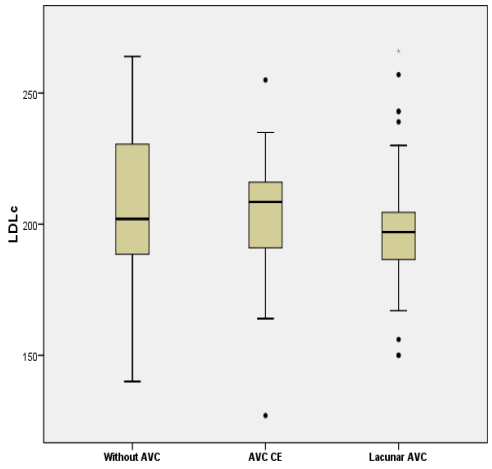


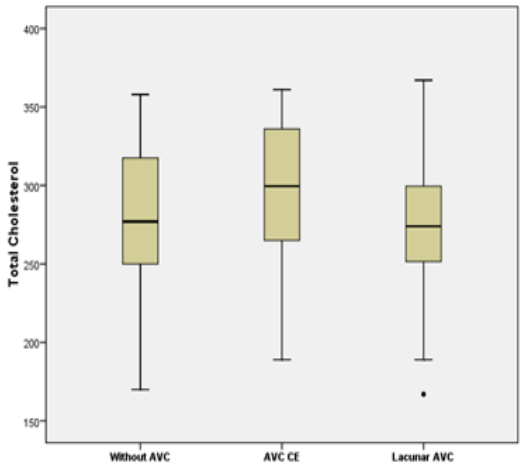
Figure 3. Boxplot for LDLc values comparing patients with lacunar stroke (n=55) vs. patients without stroke (n=77)

By comparing the 3 stroke subgroups by the Mann-Whitney non-parametric test, significantly increased values of TC (mean 297.18±44.46 mg/dl, p=0.041), LDLc (mean 203.77±25.57 mg/dl, p=0.035)[Fig.4] and TGL (mean 377.41±80.26 mg/dl,p=0.045) were present in the CE stroke group.[Fig 5a] Although both stroke groups had increased LAV, the CE group had significantly decreased LAV(mean 75.94±27.85) compared to the lacunar stroke group (mean 89.78±38.07) (p=0.032).[Fig.5b]. Regarding HbA1c there were no significant differences between stroke subgrups. (Kruskal-Wallis test, p=0.668).



p=0.041

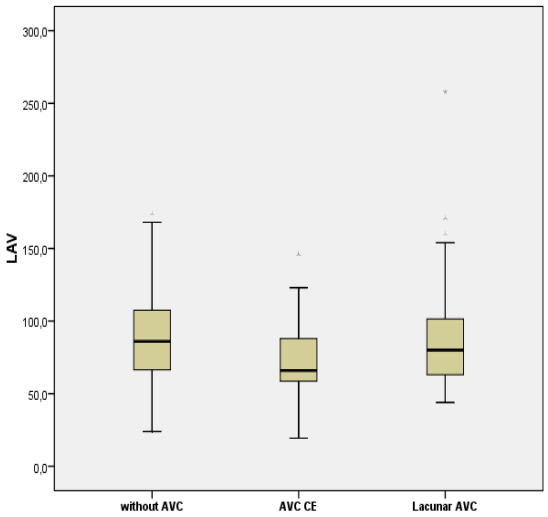
Fig.4a



p=0.035

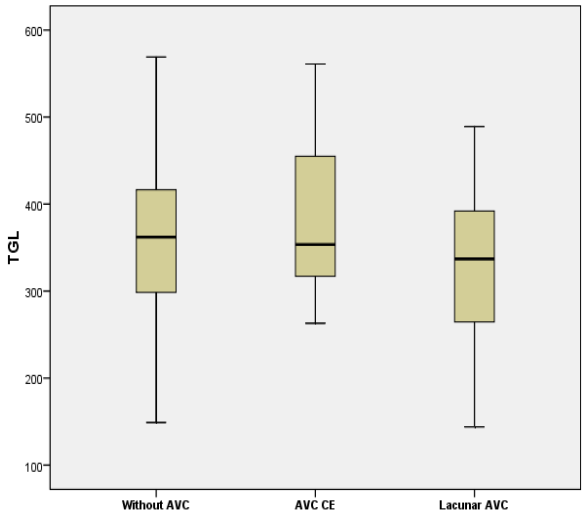
Fig.4b

Figure 4. **a**. Comparison of TC values in stroke subgroups (CE stroke n=24, lacunar stroke n=55) vs. non-stroke (n=77) **b.** Comparison of LDLc values in stroke subgroups (CE stroke n=24, lacunar stroke n=55) vs. non-stroke (n=77)



p=0.045

Fig.5**a**



p=0.032

Fig.5**b**

Figure 5. **a**.Comparison of TGL values in the stroke subgroups (CE stroke n=24, lacunar stroke n=55) vs. non-stroke (n=77) **b.** Comparison of LAV values in the stroke subgroups (CE stroke n=24, lacunar stroke n=55) vs. non-stroke (n=77)

A multivariate regression data analysis was made using stroke as an independent variable related to LAV, LVEDV, LVEF%, IMT and HbA1c. The results showed a statistically significant direct correlation with LAV (rho=0.274, p=0.015). HbA1c and IMT were significantly and directly correlated with CHA_2DS_2_VASC scores (rho = 0.246, p = 0.001 for HbA1c, and rho = 0.196, p = 0.007 for IMT). There was a positive correlation between LAV and LVEDV (rho = 0.269, p <0.001), while LAV and LVEF% were inversely correlated (rho=-0,421, p<0,001). LVEDV and LVFE% were negatively correlated (r=-0,285, p<0,001). The correlation between IMT and LVEF% was positive (r=-0,312, p=0,005). In both cases the correlations between CHA_2DS_2_VASC scores and LVEDV, respectively LVEF%, were negative (rho = -0.134 with p = 0.038 in the case of LVEDV and p <0.001, rho = -0.266 in the case of LVEF%). [Fig 6,7]

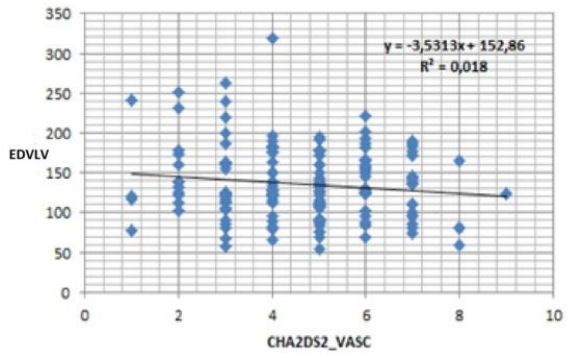


Figure 6. The correlation between CHA2DS2_VASC scores and LVEDV (n=156)

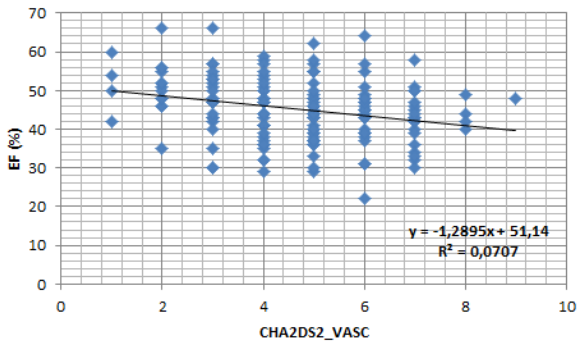


Figure 7. The correlation between CHA2DS2_VASC scores and LVEF% (n=156)

In this study we tried to analyze which parameters represented the most important risk factors for stroke in NVAF. By using Chi2 tests in the comparison of stroke vs. non-stroke patients, high values of TC (p=0.014; OR=2.51 with confidence interval of 95% 1.19;5.27), LDLc (p=0.026, OR=4.22 with confidence interval of 95% 1.13;15.78), TGL (p=0.020; OR=3.45 with 95% confidence interval 1.28; 9.29) and low values of HDLc (p=0.022; OR=2.18 with 95% confidence interval 1.12; 4.28) were found to be important risk factors for stroke incidence in NVAF. Regarding echocardiographic parameters, patients with increased LVEDV had a higher stroke incidence (Chi2 test, p=0.031; OR=2.05 with confidence interval of 95% 1.06;

3.94). Another important risk factor for developing stroke in patients with NVAF was HbA1c with values over 6,5% (Chi2 test, p=0.019; OR=2.2 with confidence interval of 95% 1.13;4.27). Stroke incidence was significantly higher for patients with coronary artery disease (Chi2 test, p=0.004).

DISCUSSIONS

Echocardiography has proven to be a very potent diagnostic tool in detecting thromboembolism in AF and some echocardiographic parameters can be strongly associated with the incidence or increased risk of cardioembolic stroke. The size of LA alone can predict the risk for developing AF by an increase of 5mm in LA diameter. The volume of the left atrium is of superior value when it comes to predicting the outcomes in AF.[20] Echocardiographic parameters related to stroke risk are increased diastolic and systolic diameters of LV, increased LA size, increased E/A ratio and reduced LVEF%.[20] It is also important to note that only 60% of all AF patients develop stroke of cardioembolic origin and that sometimes AF is clinically detected after stroke onset.[21] In this matter the correct evaluation of the embolic source is crucial, for even cryptogenic strokes can occur (7-25% of all strokes) and that covert AF and AHRE (atrial high rate episodes) are the most common causes.[22]

The ENGAGE AF-TIMI trial 48 highlighted that paroxysmal AF was associated with fewer thromboembolic events than permanent AF and that high CHA_2DS_2_VASC scores were found in NVAF patients with important impairment of the diastolic functions of the left heart [23]. In our study patients with permanent AF were more likely to develop increased left atrium volumes and have higher CHA_2DS_2_VASC scores. Also increased LA volumes were correlated with increased LVEDV and lower LVEF% values and significantly higher CHA_2DS_2_VASC scores. With these results we can conclude that AF patients with heart failure are the ones more predisposed to develop stroke. A cross-sectional study in 2018 comparing structural and functional changes of the left heart with CHA_2DS_2_VASC scores revealed that diastolic dysfunction of the left ventricular chamber could play a key role for stroke incidence. Compared to lone NVAF, patients with high CHA_2DS_2_VASC scores and more comorbidities had increased LV size and diastolic dysfunction.[24] Our results pointed towards significantly increased LAV in patients with CE stroke vs. non-stroke, but also revealed that the left atrial volume was significantly decreased for CE patients compared to the lacunar stroke group. Regarding the risk factors we analysed, patients with increased LVEDV had a higher stroke incidence.

Increased intima media thickness can be associated with cardioembolism in AF, highlighted by the direct correlation between HbA1c and IMT to CHA_2DS_2_VASC scores. Also higher IMT values were associated with lower LVEF% values. It has been previously studied that the presence of carotid atheromatosis is an important risk factor involved in the negative outcome of non-valvular AF [25]. Other studies have revealed that an increased IMT can independently predict the risk for cardio and cerebrovascular events and is associated with subclinical organ damage[26].

Studies have shown associations between a modified lipidic profile and different types of stroke, for instance large artery atherosclerotic stroke is associated with dyslipidemia, while lacunar and embolic stroke seem to present low or almost no association. [27] Both stroke groups showed a modified lipidic profile, which can be explained by a low compliance of our study population to lipid lowering therapy. CE stroke patients had significantly lower HDLc, while significantly increased LDLc was found for lacunar stroke patients. The comparison between the 3 stroke groups also revealed significantly increased TC, LDLc and TGL for patients with CE stroke. The modifications of the lipidic profile (high TC, LDLc, TGL with low HDLc) in NVAF can be considered important risk factors for stroke incidence in NVAF.

Coronary artery disease can be very common in patients with AF (17% to 46,5%) and studies have predicted that future stenting could be required to 5%-15% of patients with AF[28].Yang PS et al. studied the effect of non-CE risk factors of ischemic stroke in AF, concluding that high CHA_2DS_2_VASC scores were associated with atherosclerotic intracranial arterial stenosis, significant carotid stenosis, complex aortic plaque and a high coronary artery calcium score[29]. In the light of those clinical findings, our study detected that patients with coronary artery disease had a higher risk to develop stroke. Regarding other comorbidities, a metanalysis performed in 2018 demonstrated an important association between chronic hyperglycemia with high HbA1c levels (even for pre–diabetes mellitus) and stroke risk.[30] Another cohort study demonstrated that patients with AF and type 2 diabetes mellitus who had high levels of HbA1c were associated with a higher risk of thromboembolic events.[31] High values of HbA1c are found to be an important risk factor for stroke in NVAF patients in our study. Comorbidities such as coronary artery disease and diabetes (with high HbA1c) can be considered as important risk factors for stroke incidence in NVAF.

CONCLUSIONS

While non-valvular atrial fibrillation is still associated with a high mortality rate (especially due to sudden cardiac death and cardioembolic stroke) and is strongly associated with high cardiovascular risk[32], recent findings in clinical studies were able to determine a panel of echocardiographic parameters associated to CE stroke, some of which are also confirmed by our small retrospective study. Parameters such as LAV, LVEDV and LVEF% are associated with cardioembolic risk in NVAF (especially LVEDV), but are also useful in detecting patients more prone to develop ischemic heart failure (LAV in particular), as confirmed by the present study.

A modified lipidic profile, the presence of coronary artery disease and diabetes are important indicators for the possible outcome of stroke in NVAF. Further large cohort studies are necessary to develop a risk stratification chart for cardioembolic stroke based on these parameters in patients with NVAF.

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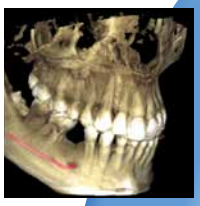

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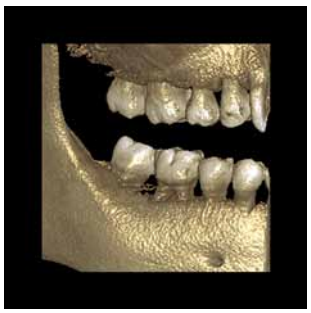

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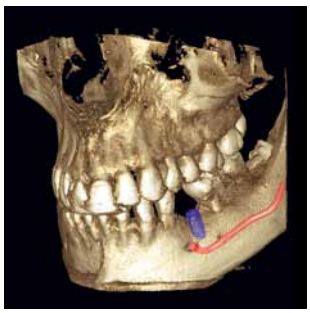

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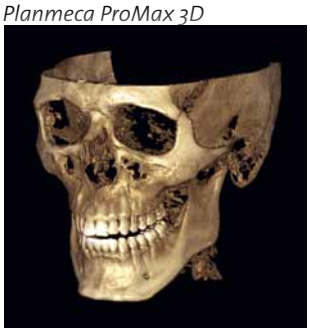

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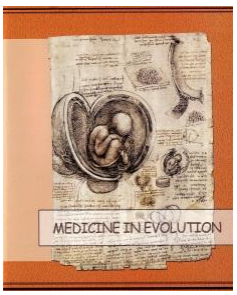
Treatment of white spot lesions by resin infiltration



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Abstract

If the tooth decay is not identified in its early stages, the restoration treatment may require complex methods of treatment which weakens the teeth and therefore the long-term prognosis of the tooth. Icon represents a relatively new product, with micro-invasive technology, whereby dental treatments can be applied without requiring anaesthesia. The purpose of this trial is to verify the effectiveness in the treatment of white spot lesions which appear following a fixed orthodontic treatment, with the help of ICON. The clinical trial was conducted for 4 months and included a group of 8 patients, i.e. 4 women and 4 men aged 19-30, from Timisoara municipality. The persons enrolled in the clinical trial have chalky white spots (demineralisations) identified after removal of brackets, located on the vestibular surfaces of the teeth.

Keywords: early caries lesion, demineralisation, chalky white spot, infiltrate

INTRODUCTION

Carious lesion is the cumulative "carious processes affecting the imbalance between calcium and phosphate ions in the dental tissue and saliva, mediated by dental plaque microorganisms and influenced by certain factors (fluorine)" [1]. At global level, "60-90% of young children and nearly 100% of the adult population suffer from various diseases related to the oral cavity" [2].

However, in the past years, the progress of early lesions seems to be slower [2], allowing the implementation of certain preventive strategies which impede their progress. Traditional method together with new methods can enhance the diagnosis of caries and help the dentist to better monitor the micro-invasive treatment [1].

There are cases where plaque accumulation can be favoured even at persons with good oral hygiene. The components of a fixed orthodontic appliance do not only align the teeth, they also influence the oral cavity by changing the microbial flora and by creating new gaps for plaque and food accumulation [3].

In the absence of a proper treatment, the evolution of tooth decay is progressive and cumulative. If the tooth decay is not identified in its early stages, the restoration treatment may require complex methods of treatment which weakens the teeth and therefore the long-term prognosis of the tooth. Icon represents a relatively new product, with micro-invasive technology, whereby dental treatments can be applied without requiring anaesthesia.

Aim and objectives

The purpose of this trial is to verify the effectiveness in the treatment of white spot lesions which appear following a fixed orthodontic treatment, with the help of ICON.

MATERIAL AND METHODS

The clinical trial was conducted for 4 months and included a group of 8 patients, i.e. 4 women and 4 men aged 19-30, from Timisoara municipality. The persons enrolled in the clinical trial have chalky white spots (demineralisations) identified after removal of brackets, located on the vestibular surfaces of the teeth. The trial was conducted in compliance with the ethical requirements for obtaining the written consent of all persons enrolled in the trial.

Icon is a product which makes the treatment of early white spots simple, painless, without affecting the healthy tissues and which requires no anaesthesia. For application of Icon, the protocol indicated by the manufacturer was observed, namely: Sanitise. Apply rubber dam; Apply Icon-Etch. Allow to work for 2 minutes; Rinse with water, 30 seconds. Dry with oil and dry air spray; Apply Icon-Dry. Allow to work for 30 seconds; check the tooth appearance (white spots should be significantly reduced when applying Icon-Dry; otherwise, steps 2-4 must be repeated, not more than 2 reps); Dry with oil and dry air spray; Apply Icon infiltrant. Allow to work for 3 minutes. Maintain the humidity of the surface treated; Air and dental floss dispersion. Photo-polymerisation lamp 40 seconds, Replace the applicator tip. Apply Icon infiltrant. Allow to work for 1 minute. Remove excess and use dental floss. Photo-polymerisation lamp 40 seconds. Polish.

RESULTS

Below we will present a few relevant photos to prove the efficiency of using the infiltrant on chalky white spots:

The first case presented is a 28 years old woman who developed chalky white spots on 3.4 and 3.5 premolars. Given that after the first application of the infiltrant spots were still

visible, a second application was required. At the end of the treatment, white spots fully disappeared as shown in the following figure.

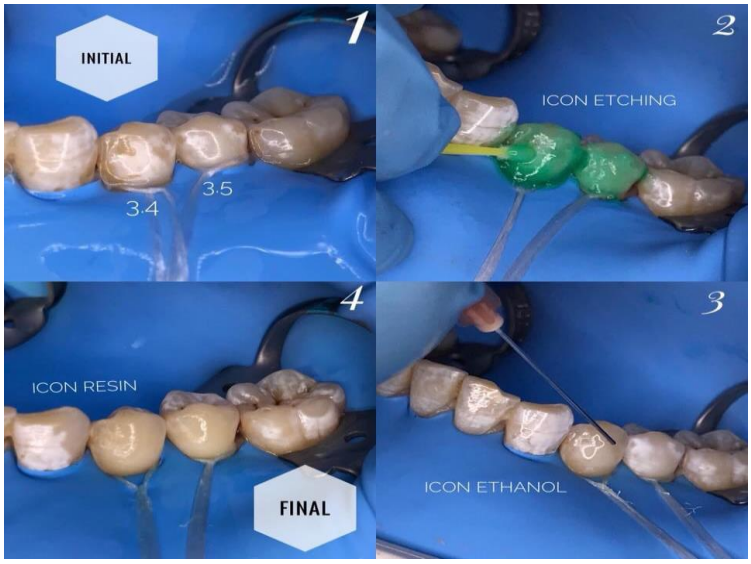

Figure 1. Stages of Icon treatment at the first patient

The second case presented is a 22 years old man. In his case, white spots were identified on teeth 1.1, 1.2, 1.3, 2.1, 2.2. Chalky white spots were successfully removed at the end of the treatment, and the patient's teeth had a healthy and nice aesthetic appearance. The second application was not required in this case.

Figure 2. Areas which require the application of infiltrant and final results

The third case which we chose to present is the case of a 25 years old woman. Her teeth had demineralisations on the vestibular surfaces of all front teeth. The results were excellent also in this case.


Figure 3. Initial and final appearance of the case

All patients who participated in this clinical trial had optimal results following the Icon treatment, and white spots fully disappeared in most of the cases.

Three out of eight patients who participated in the trial had minimum plaque deposits due to a rigorous oral hygiene. They brush their teeth at least twice a day, use mouthwash and dental floss and have regular medical checks. Patients 3 and 7 mentioned that they

included tooth brushing in their daily routine, but they do not use dental floss or mouthwash. Plaque deposits were large enough in their cases, which led to the formation of white spots on the teeth surface. Patients 1, 2 and 4 have a poor oral hygiene. They do not brush their teeth on a regular basis, never or rarely used additional oral hygiene products and do not have regular dental checks. Such patients had huge plaque deposits. In case of patients 1, 2, 3, 4 and 7 white spots appeared due to a poor oral hygiene, and for convenience they do not include dental care in their daily routine. Patients 5 and 6 have a proper oral hygiene, using all products intended for dental care, but their nutrition include unhealthy food based on many products containing sugar and fizzy drinks this being the main reason which led to the appearance of white spots. Patient 8 was the only person fully observing the dental care rules, always paying attention to her nutrition and having a proper oral hygiene. In her case, white spots appeared due to the lack of calcium.

All patients mentioned that they were not aware of this type of treatment until they were selected to participate in this clinical trial. They found the procedure as being effective and were very satisfied with the final results. From their perspective, the greatest benefit of this treatment is the lack of pain and anaesthesia. They were also happy about their problems being treated very fast, so they did not need a second visit to the dental practice for the same procedure.

DISCUSSIONS

An undesirable effect of the treatment using orthodontic brackets is the impact on the oral cavity by means of several actions: accumulation of dental plaque, which leads to the development of white spot lesions, demineralization of the enamel, change of the oral flora, including changes at gingival level (gingivitis in certain cases, even periodontitis), lesions of the oral mucosa, modifications of the bone and muscular structure movements due to the diet and, last but not least, psychological changes [4-6].

Chalky white spots caused by the teeth demineralisation during fixed orthodontic treatment must be treated even if they do not cause discomfort or pain. They are caused by the demineralisation of the tooth enamel both outside as well as inside the tooth. This type of disease can be easily treated since it is a reversible process which does not form cavities. White spots should be treated as soon as possible, immediately after they appeared on the teeth surface, if possible. If they are ignored and not treated, such spots can develop and cause the destruction of the tooth enamel thus leading to carious lesions.

Icon is considered the best treatment method, by infiltration, against white spots (demineralisation). This type of treatment offers better results than previously used remineralisation methods. It is far more effective in removing white spots than other remineralisation methods that use other types of chemical agents and that have a longer action time. If used in time, Icon prevents the formation of carious lesions due to the fact that fully repairs the tooth enamel. The infiltrating agent penetrates deeply into the demineralised enamel and restores its structure from depth to surface.

During the clinical trial conducted we used Icon DMG package containing infiltrating solutions and interproximal applicators for each patient. The package includes all items necessary to perform the treatment, except for the rubber dam. The application instructions of such technique were fully observed in order to get optimal results, and patients were satisfied with their choice. Patients were given detailed explanations of the procedure to be applied. They were informed of the benefits provided by this type of treatment and the steps to be followed after its completion in order to maintain the results obtained and to prevent other dental issues.

For optimal results, the first step of the Icon treatment applied to patients within this clinical trial consisted of the professional sanitisation of oral cavity. Then all steps indicated by the manufacturer must be fully observed.

CONCLUSIONS

Chalky white spots on teeth surface appear after teething due to demineralisation of enamel for various reasons. The failure to treat such spots may lead to carious lesions.

The best method for the treatment of chalky white spots is using the resin infiltration method which restores both the aesthetic appearance as well as the porous structure of the enamel while protecting the tooth against further acid attack. Besides being effective, such treatment is also painless, non-invasive and requires a single visit to the dentist.

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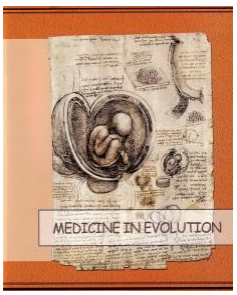
Self-evaluation of oral health: A questionnaire based survey



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Abstract

Aim and objectives: The aim of this study is to get an insight of how patients perceive oral health and to propose possible new methods of enhancing dental prevention methods and new models of education. Materials and methods: the questionnaire was created on google forms and shared through google dive Results: Through the patient eyes the absence of symptoms and the increase costs of dental treatments are the most important factors taking in account while they are considering their visit to the dental cabinet. Conclusions: Despite being largely preventable dental caries are the most prevalent health condition and is rarely seen as a priority in health policy. The current direction of oral health programs needs to be re-evaluated adding more resources and creating educative programs for kids, adolescents and adults so we can change the patient's mindset from a young age.

Keywords: self-assessment, oral health, prevention, general health, education

INTRODUCTION

Oral health is defined by the FDI as multifaceted and includes the ability to speak, smile, smell, taste, touch, chew, swallow, and convey a range of emotion through facial expressions with confidence and without pain, discomfort, and disease of the craniofacial complex [1]. In the oral cavity there is a consortium of bacteria forming the bacterial ecosystem and with the help of salivary pellicle are attached to dental surfaces. This ecosystem is present in healthy individuals but if its balance changes then oral diseases might occur [2]. Despite being largely preventable, oral diseases are affecting more than 3.5 billion people around the world (2010), thus making dental caries the most common disease globally with increasing prevalence in many low-income and middle-income countries. The most recent data from 2015 confirmed that untreated caries in the permanent dentition remained the most common health condition globally (34.1%) [3]. Also when enamel is lost can't be replaced and only incipient enamel lesions can be re-mineralised using conventional sanitizing methods like tooth brushing with toothpaste containing hydroxyapatite [4]. Behaviours like dental check-ups, toothbrushing frequency, diet and sugar consumption, dental floss use and other methods of interproximal cleaning play an essential role in the prevention of dental caries since adequate oral hygiene habits and regular use of dental services have shown effectiveness in reducing the prevalence of these diseases as in the prevention and early diagnosis of oral diseases [5]. Another important factor that influences the appearance of oral diseases, and in this case dental caries, is the usage of orthodontic fixed appliances. It has been shown that even after 2 months the salivary pH drops to a more acidic level favouring bacterial overgrowth due to bacterial plate deposit [6]. A study made by Matichescu and her collaborators showed that normal toothbrushing alone can't eliminate tartar and plague efficiently in comparison with the ultrasonic instruments in the dental office highlighting once again the importance of the visit to your dental practitioner [7]. Oral diseases don't cause only individual harm but a collective one as well. In 2010 was calculated that direct costs of dental treatments were $298B (billions) and $144B to indirect costs in terms of productivity losses due to caries, periodontitis, and tooth loss accounting $442B in total [8]. In addition patients with halitosis which might be a result from underlying disease exhibited a greater level of inadequacy, depression, anxiety, sensitivity, anger, and stress profile that tends towards neurosis, as well some subjects reported with obsession and personal sensitivity [9]. Non-resolving chronic inflammation derived from periodontal disease also impacts on diabetes control (elevated HbA1C) and complications reinforcing the importance of good oral health. Poudel et al showed in his study that majority of people with diabetes are unaware of the bidirectional link between diabetes and periodontal disease and they have limited knowledge of their risks for oral health problems. Diabetes care providers were unable to inform their patients about the association between diabetes and periodontal diseases due to the lack of their own knowledge in oral health and oral diseases [10].

Aim and objectives

The aim of this study was the self-evaluation and perception of individuals regarding their own oral health and to show an insight of what we need to change in our strategy for public oral health programs.

MATERIAL AND METHODS

The questionnaire was created on google forms and was shared through google drive links. To avoid bias, we excluded professionals working in the medical field because we wanted to establish the mindset of people without any relation or professional knowledge on the medical industry. Also an exclusion criterion was the age, accepting answers by users

over 18 years old and below 40 years old. The questionnaires were included only if 50% or more of the questions were answered. The total questions were 6 and including questions about chief complaint and intervals between visits in the dental cabinet.

RESULTS

A total of 446 questionnaires were submitted and we exclude 14 due to insufficient answering rate or due to age compliance. All the results are presented in percentages rounded up at one decimal place. In the questionnaire we had 58.9% female and 41.1% male participants. regarding the last dental check-up,49% of the participants answered they had visit the dentist in the last 6 months, 22.7% answered that they visit the dentist between 6months and a year and finally 27.3% haven't visit the dentist in over a year. The results are present in Figure 1.

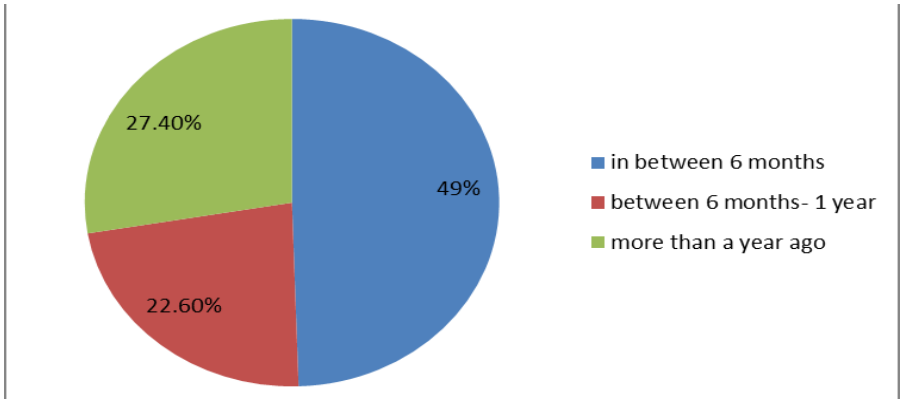

Figure 1. When it was the last time you visit the dentist?

Asking about the chief complaint of the patient 23.4% answered they visit the dentist because they had pain, 51.1% answered for a regular consultation, 2.7% due to a trauma and 22.6% answered for other reasons as it is show in Figure 2.

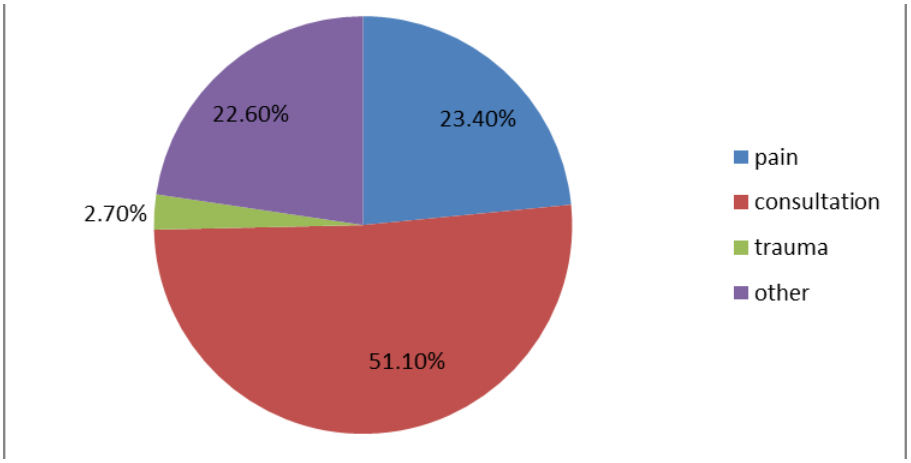

Figure 2. Chief complaint

When the participants were asked why they haven't visit the dentist 34.0% answered because they didn't have any symptomatology i.e. pain, 25.0% said because dental visits and treatments are expensive, 9.7% declared that visits to the dental practitioner it doesn't benefit them and 31.3% said that they are going in the recommended interval proposed by their dentist (fig.3).

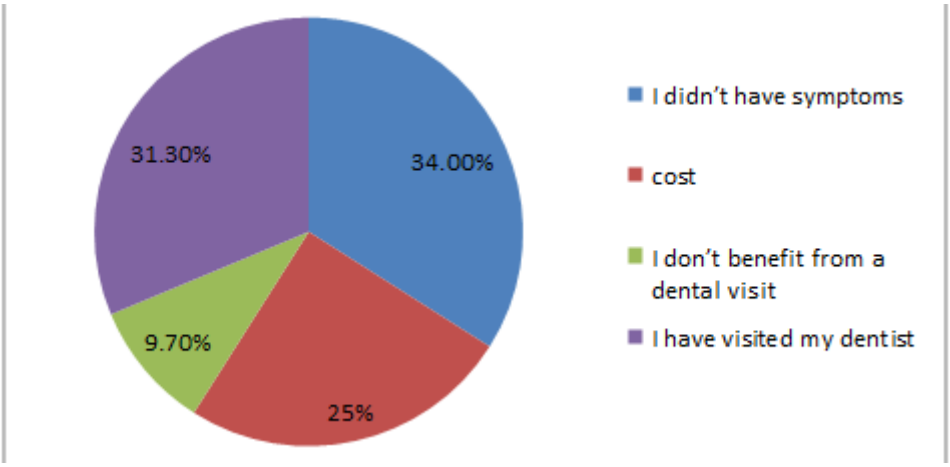

Figure 3. Reasons why I'm not visiting the dentist

Last but not least the participants were put to answer if they knew that without symptomatology there it might an underlying disease in an incipient level would you have come for consultation with 86.6% saying yes and 13.4% declaring no (fig.4).

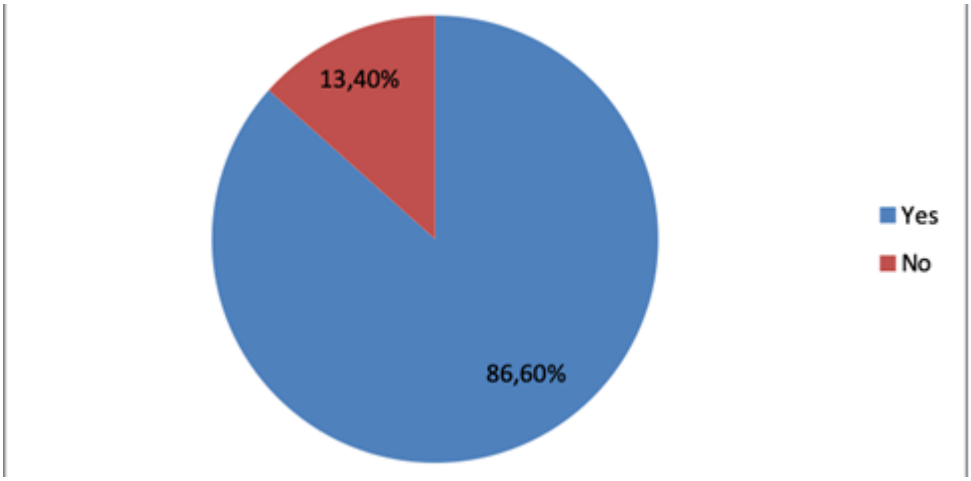

Figure 4. If you knew that without pain you might have a problem would you visit your dentist?

DISCUSSIONS

Tooth unique structure, having no nerve endings in enamel and therefore there is no pain in incipient lesions, tricks the patients on believing the absence of pain equals as absence of disease. When the patient seeks the help of the professionals it's when the pain starts as it shows in figure 3 with a 34% rate. That's imperative because oral health doesn't affect a person just physically but mentally as well. Studies showed that edentulism (consequence from an untreated carious lesion) and prostheses conjugate a significant binomial impact on the quality of life. High edentulism rates address incredulity on natural dentition, making a path for considering dental loss, natural. On the other hand, "artificial" dentition does not meet the masticatory demands, reverberating social dimensions and impacting quality of life. The difficult to adapt to jaw prostheses leads to their uncountable edentulous abandonments, causing deficient alimentation and other aesthetic, functional and psychological injuries [11]. Another study showed that oral problems, particularly tooth loss and edentulism, have been linked to the risk of depressive symptoms and deterioration in oral health and oral health–related quality of life had a negative effect on depressive symptoms among older adults, suggesting the importance of oral health as a key determinant of SWB (subjective well-being) among older adults. Strategies to improve oral health among older adults may not only have

direct benefits on their oral health but also have the potential to improve their well-being [12]. Moreover oral health issues have been associated with many other medical conditions, ranging from other severe oral pathologies to diverse pathologies such as diabetes, heart conditions, kidney disease, or even affecting pregnancy. According to Gluck and Morganstein, maintaining a good oral health in relation with the entire healthy self is important because being healthy means more than not having a medical condition. Yet, in the case of oral health, preventive measures have not been implemented to their fullest potential, even though relatively small investments would yield lifelong benefits [13]. Additionally studies showed that prevention can be beneficial in an economical point of view. The universal application of resin sealants would be a cost-effective measure in populations where the prevalence of caries in first permanent molars is high and a study in 6 states in U.S.A. showed that preventive dental services for children results in cost savings to their population [14, 15]. Health systems have significant potential to change health behaviours and to improve health and that preventive orientation can also reduce the demand for health services and the economic burden of oral diseases. A previous study on Romanian population showed that they are visiting less frequently an oral health practitioner than the Swedish and Portuguese population. One-fifth the Romanians reported having the last visit three or more years ago or never being to oral health professional. Furthermore, the chief complaint for Romanians and Swedish population was for extraction and prevention respectively. The results of this study showed that Romanian adolescents brush their teeth less frequently than Portuguese and Swedish. Also, more than half of the samples never use dental floss, this habit being less frequent in Romania [5]. This highlight the importance of Community public oral health programs could increase awareness and enhance adolescent education to encourage healthy routines and self-care. For example, if frequently observed an incipient lesion can be solved by the usage of sealants, saving the patient from all the complications of carious lesions mentioned earlier in this paper. Sealing of pits and fissures is included by WHO among the four methods of dental caries prevention, general and local fluoridation, food and oro-dental hygiene. Sealing is a method widely described in literature as a simple, safe and effective clinical procedure in terms of cost / benefit and, therefore, it is highly recommended. In Romania is rarely used and it might be because the Romanian population doesn't visit the dental office very often [5,16]. In a study by Funieru and his collaborators in preschool children in Romania on 2014 showed that there was a high proportion of untreated caries with a clear socioeconomic gradient, and a change in the school-based oral preventive strategy is needed to meet the needs of the children even though the incidence of caries was declining in comparison with previous national surveys [17]. Also, Sfeatcu et al made a 2-year pilot study to test if education on oral health has benefit in reducing the oral caries incidence. The children in the test group received 3 experiential lessons while the control group not. The prevalence of dental caries was increased in the control group by 8.58% and decreased in the test group by 1.64% showing the positive effects on oral health status, oral health knowledge and behaviour among adolescents. Other findings showed that in children's education major role play the parents as well as the teachers in term of instruction on oral hygiene [18,19]. In United states the Centers for Disease Control and Prevention, Division of Oral Health has made oral health an integral part of public health programs e in the effort to eliminate oral health disparities and improve oral health for all [20].

This study had some limitations as well. Firstly, the questionnaire was made online and it was seen only by the users available on the specific week of implementation so the results might not correspond in other settings. Moreover, this is a small sample of the population which could result in not accurate findings. Other samples might have other characteristics, due to cultural and religious differences, and might show different results, underlying that there is not a universal successful public health program but more likely a program individualised according to the needs, flaws and habits of the respective population.

CONCLUSIONS

This study is in accordance with the statistics saying that the current system, globally, regarding oral health and prevention is not working and we should reconsider our course of action. Public health education for adults, giving some lectures to kids from a very young age and encouraging the patients to come to the dental cabinet will have beneficial outcome in the upcoming years. Future studies should be made to identify in depth were the negligence of oral health comes from and ways to combat it.

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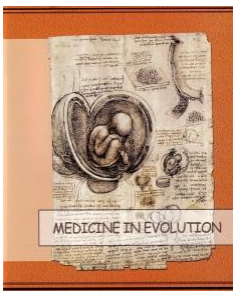
Factors that can determine children's oral health behaviour



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Abstract

The purpose of our article is to highlight the factors that determine a higher frequency of brushing teeth among children in grades 1-4. In this sense, a questionnaire was applied on a number of 1014 of pupils from Timiș County studying in urban and rural schools. To analyse the incidence of the factors on the frequency of teeth brushing in children, we performed the linear regression analysis constructed in a progressive manner. Based on a sample of more than 1000 interviewed children, our study makes an important contribution to the development of literature in the field. Based on our results we can say that girls they are much more likely than boys to have a sanogenic behaviour in relation to oral hygiene. At the same time, once again our research highlights the importance of information and prevention.

Keywords: Information, motivation, children, eating behaviour

INTRODUCTION

The literature shows that prevention, knowledge, individual belief and attitudes are considered to have an important role in oral health care and oral self-care practice. The relation between psychosocial dimension and oral health behaviour has been analysed by several different studies. The study realized by Freeman and Linden in 81 college students among 214 participants, indicate that an adequate oral hygiene behaviour has been associate with individual's attitude toward oral health and with the perceived influence of the other persons that are part of the respondent's social capital (Freeman R 1995). We consider oral behaviour not just a matter of "just tooth brushing and flossing" (Buunk-Werkhoven YA 2011), but also as a complex and multidimensional process that include instruction, motivation, a matter of doing and specifics effects.

Tooth brushing is considered to be an important method for maintaining gum health and controlling plaque formation, particularly when combined with fluoride toothpaste. For this reason, the role of tooth-brushing in the prevention of caries has long been considered self-evident. In the same time there is little evidence to support the notion that just tooth brushing action without respecting several criteria as time for brushing or instruction, could reduce caries (A. BICA 2016). Recent publications have shown that daily tooth-brushing with fluoride toothpaste and for 2 minutes, significantly reduces caries incidence compare to a control group that also brushed with a fluoride toothpaste but receive no instructions restricting rinsing (Tinanoff 2002). Another important aspect in terms of brushing teeth is the daily frequency. This point, we know that twice per day brushing with fluoridated toothpaste is effective universally recommended (Milgrom 2011). Realized twice per day, it works by disrupting the bacteria growing on the teeth and by providing a reservoir of fluoride to repair the damage caused by the acid of the bacteria.

Adair et al. found that the most significant predictors of children's favourable habits were parents' favourable attitudes towards controlling their children's tooth brushing and sugar snacking habits (Adair 2004). Studies have reported that poor attitude of parents toward oral health of infants and young children are associated with increased caries prevalence (Hinds K 1995). Young children's oral health maintenance and outcomes are influenced by their parent's knowledge and beliefs, which affect oral hygiene and healthy eating habits (Suresh BS 2016). Parent's knowledge and positive attitude toward good dental care are very important in the preventive cycle (Anamaria Matichescu 2016).

In Sweden an experiment has been done to establish a correlation between intake of sugars and dental caries. This experiment proved that restriction of sugar intake to four meals daily did not significantly increase the caries incidence, but if larger amount of sugar was given, the development of caries increased significantly (Ogawa 2018). We consider nutrition not just a matter "of eating and drinking"[1], but also a complex process that include instruction, motivation with significant implication oral health care and behaviour.

MATERIAL AND METHOD

The purpose of our article is to highlight the factors that determine a higher frequency of brushing teeth among children in grades 1-4. In this sense, a questionnaire was applied on a number of 1014 of pupils from Timiș County studying in urban and rural schools. The frequency of teeth brushing was measured with reference to the following indicators: 1. Never, 2. Once, 3. Twice or three times, 4. Once a day, 5. Twice a day, 6. Three or more times a day. In order to identify the factors that determine a lower or higher frequency of brushing, the following dimensions were introduced in the analysis: the degree of information on teeth brushing, the reason why children brush their teeth, the control over brushing, the type of

equipment and auxiliaries used, and last but not least the eating behaviour and demographic characteristics of the pupils interviewed.

In a concrete way and in a detailed perspective, the operationalization of these dimensions was measured by means of the following indicators that showed a significant correlation with the frequency of brushing[1]:

1. Information on teeth brushing
   So far, has someone told you about brushing your teeth?
   Who did you talk to about brushing your teeth? –mother or father
   Who did you talk to about brushing your teeth? – dentist
   Did one of these people show you how to brush your teeth?
   At the moment how well do you think you know how to brush your teeth?
2. The reason for teeth brushing.
   Do you brush your teeth in order to avoid bad breath?
   Do you brush your teeth in order to avoid toothache?
3. Auxiliary behaviour to teeth brushing
   After teeth brushing, do you also use mouthwash?
   After teeth brushing, do you also use dental floss?
   After teeth brushing, do you also use fluoride tablets?
   After teeth brushing, do you also use an interdental toothbrush?
4. Teeth brushing control.
   Does someone check if you brushed your teeth?
   So far you have been to the dentist at least once?
5. Eating behaviour
   Over the last week how often have you consumed candy?
   Over the last week how often have you consumed apples?
   Over the last week how often have you consumed toffees?
   Over the last week how often have you consumed oranges?
   Over the last week how often have you consumed dairy products?
   Over the last week how often have you consumed crisps?
   Over the last week how often have you consumed pears?
   Over the last week how often have you consumed carrots?
   Over the last week how often have you consumed chewing gum?
6. Socio-demographic data
   Gender
   Grade
   The prestige level of the mother's profession
   The prestige level of the father's profession

In order to highlight the relationship between the frequency of brushing on the teeth during the last week and the dimensions mentioned above, a linear regression analysis was performed, in which the frequency of teeth brushing was the dependent dimension, and all the other dimensions were independent.

RESULTS

To analyse the incidence of the above factors on the frequency of teeth brushing in children, we performed the linear regression analysis constructed in a progressive manner. Thus, in the first stage, were introduced the demographic variables and only those that

[1]The list of indicators was a more comprehensive one and can be found in the questionnaire. In this article were retained only those indicators that showed a significant correlation with the frequency of teeth brushing.

showed a statistically significant relationship were retained. In the second stage, in addition to the demographic variables, were introduced the information variables. In the same way, only the variables that maintained their significant relationship were kept, and then the variables related to the reason for brushing were introduced in the model. In the same logic, the 6 categories of factors were introduced in the model one by one, as they are presented in table number 1. Concretely, by analysing the evolution of R from one stage to another, we can understand the contribution that each category of predictors has on the ability to explain the statistical model.

Table 1. Summery model

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,122[a]	,015	,014	1,155
2	,231[b]	,053	,050	1,134
3	,273[c]	,075	,068	1,123
4	,318[d]	,101	,093	1,108
5	,336[e]	,113	,103	1,102

In order to determine the factors that determine the healthiest behaviour regarding teeth brushing per day, the socio-demographic characteristics of the respondents were the first type of factor taken into account in our analysis. Even if the bivariate correlation analysis highlighted a significant relationship of the above-mentioned dimensions with frequent teeth brushing, in the regression analysis, only the gender of the respondent remained a determining factor after the introduction of all factors in the model. Thus, the genre analysed independently in relation to the frequency of teeth brushing presents a sig=,001 and a coefficient Beta=,285, relationship that remains significant in the fifth stage of the model, at which point all other factors are introduced, and the value sig=,023 with a coefficient Beta=,190. In a concrete way, these results highlight the fact that girls have a significantly higher frequency of brushing their teeth than boys.

The analysis of the relationship between information and the frequency of teeth brushing, highlighted once again what is so well known in the specialty literature: the invaluable role of information for the development of a sanogenic behaviour. Statistical evidence has shown that when it comes to information, the power of the model is much more important and with much stronger effects than the simple information made by parents or even the dentist. Thus, it can be seen that the example of brushing your teeth has a much greater impact than just information, even if it is done by the parents or even by the doctor. This is evidenced by the level of significance sig=,001 and a Beta of,574, which makes this indicator the most important predictor of brushing. In other words, the presentation of how children should brush their teeth is the most important factor in explaining the frequency of brushing their teeth. Children who have been shown how to brush their teeth will brush their teeth much more often than those who have not been shown this.

As the results of our research show, another important factor in the information dimension is its result, materialized in the degree of knowledge of how subjects know how to brush their teeth. The initiated regression analysis showed that people who appreciate that they know how to brush their teeth, will declare that they brush their teeth much more often than people who say that they know less how to brush their teeth. This significant relationship is supported by a sig=,000 and a coefficient Beta=,304. This result highlights the fact that as children get to know how to brush their teeth, the likelihood of them brushing their teeth more often increases.

Table 2. a. Dependent Variable: q10 Over the last week, how often did you brush your teeth? (1. Never, 2. Once, 3. Twice or three times, 4. Once a day, 5. Twice a day, 6. Three or more times a day)

Model		Unstandardized Coefficients		Standard Coeff.		
		B	Std. Error	Beta	t	Sig.
5	(Constant)	6,910	,355		19,491	,000
	Gender	,190	,083	,082	2,283	,023
	Has one of these people shown you how to brush your teeth?	,574	,178	,113	-3,214	,001
	How well do you think you know how to brush your teeth now?	,304	,065	,165	-4,657	,000
	Do you brush your teeth in order to avoid toothache?	,208	,089	,083	-2,326	,020
	So far, have you been to the dentist at least once?	,106	,060	,063	-1,759	,079
	After having brushed your teeth, do you also use dental floss?	,170	,058	,105	-2,905	,004
	After having brushed your teeth, do you also use an interdental brush?	,185	,062	,107	-2,992	,003
	Over the last week, how often have you consumed crisps?	-,129	,042	-,108	-3,041	,002

The analysis of the relationship between the reason for teeth brushing and its frequency has highlighted the fact that the most important reason why the subjects of our research brush their teeth is the fear of pain. This predictor is stronger than bad breath, and the only one that remains significant in the regression model. This relationship is highlighted by a sig=0,20 and a value of the coefficient beta = 208.

Another important predictor for the frequency of brushing is the control actions on teeth brushing. Even though we initially introduced two predictors in this analysis, going to dental check-ups to the doctor and the check made by a family member, both in relation to brushing their teeth, only going to a doctor's specialist consultation proves to be a significant predictor for the frequency of teeth brushing. This relationship is supported by a relatively marginal level of significance sig=,079 and by a beta=,106.

The type of toothbrush used as well as the type of auxiliary products used to achieve dental hygiene were another dimension used for the development of our statistical model. Of all the variables presented above and introduced in the model, two of them proved to be stable predictors for the frequency of brushing. Based on the statistical results obtained, we could observe that the pupils who use dental floss (sig=,004; Beta =,170) and interdental brushes (sig=,003; Beta =,185) are at the same time much more likely to brush their teeth more often than those who do not use these auxiliary dental hygiene products.

Last but not least, in our model, the eating behaviour of children was provided as a predictor for the frequency of brushing. To understand if there is a relationship between the type of products that children consume and the frequency of teeth brushing, the consumption of a wide variety of products were evaluated from apples to toffee and crisps. Following the regression analysis, we could observe that there is a significant statistic relationship between the frequency of teeth brushing and the consumption of only one type of product: crisps. There is an inversely proportional relationship between crisps consumption and the frequency of teeth brushing. The higher the crisps consumption, the lower the frequency of teeth brushing.

CONCLUSIONS

Based on a sample of more than 1000 interviewed children, our study makes an important contribution to the development of literature in the field. Based on our results we can say that girls they are much more likely than boys to have a sanogenic behaviour in relation to oral hygiene. At the same time, once again our research highlights the importance of information and prevention. In this sense, our approach has shown that showing how to brush your teeth properly matters much more than just training on the need for brushing. As a result, the more children say they know how to brush their teeth, the more likely they are to brush their teeth more often. Also, in relation to education and prevention, the data regarding food consumption and the adjacent means of hygiene maintenance prove the importance of sanogenic education. Children who eat fewer crisps say they brush their teeth more often, and those who use dental and interdental toothbrushes are more likely to brush their teeth than those who do not use such hygiene methods. Strengthening the knowledge already known from the literature, our research showed that there is a direct relationship between the frequency of going to the dentist and the frequency of teeth brushing. Children who go to a dentist more often will brush their teeth much more often than those who tend to go less often or not at all.

Thus, based on empirical evidence, our analysis provides a solid theoretical basis for the development of future public policies on oral health. The results of our research can provide support for policy development in line with the social realities for which they are developed, while focusing on the elements that have the greatest impact.

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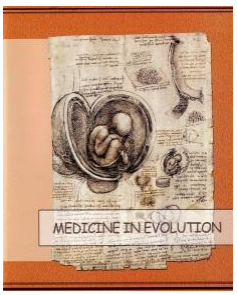
The CBCT evaluation of the resorption caused by impacted canines



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Abstract

Cone-beam computed tomography (CBCT) provides precise information regarding the position of the impacted canines, the presence and the degree of root resorption in adjacent teeth. This information is extremely important for surgeons and orthodontists in order to determine the correct diagnosis and the optimal interdisciplinary treatment plan.

The main goal of this study was the tridimensional evaluation of the position of impacted canines, as well as the frequency of the implicated factors in the root resorption of adjacent teeth. Using CBCTs, 20 impacted canines were diagnosed in 16 subjects. For the statistical analysis we used the Spearman rank correlation. In these patients, 10 canines had a palatal position (50%), 2 had a labial position (10%) and 8 had a medial position (40%). Root resorption was found in 11 lateral incisors (55%), 5 central incisors (25%), 1 first premolar (5%). Most statistically significant correlations were found in the central incisor resorption, dependent on the transversal position (-0.651 negative correlation, p=0.002). The second statistically significant correlation was found between the status of the deciduous canine and the central incisor resorption (0.457 positive correlation, p=0.043); the greater the lack of resorption of the deciduous canine, the higher the risk of resorption in the central incisor.

Keywords: maxillary impacted canines, mandibular impacted canines, CBCT, root resorption

INTRODUCTION

The CBCT (cone-beam computed tomography) pre-op examination is considered an important evaluation tool in choosing the most appropriate treatment of the impacted maxillary canines [1,2]. Amintavakoli and Spivakovsky [3] state in a study on the tridimensional position of the impacted canines that 2D images present a predisposition to errors and provide inadequate information about the position of the impacted teeth. CBCT is superior to conventional radiography because it provides tridimensional images and additional information on the dentofacial structures.

Many unidentified features of the impacted canines can be easily observed when using CBCT imagining [3]. The possibility of analysing a series of radiographic sections of the maxilla, enables the evaluation of the relationship between the impacted teeth and the neighboring teeth in all three spatial dimensions, as well as the position of the crown and the apex, and the inclination of the long axis of the tooth. This imaging method is, however, more expensive and it involves a higher dose of radiation than the conventional imaging techniques. The SEDENTEXCT studies conclude that, with respect to CBCT, there aren't solid evidence in favor of the CBCT usage as a primary imaging method in the diagnosis of root resorption [4].

Aim and objectives

The main goal of this study was the tridimensional evaluation of the position of impacted canines, as well as the frequency of the implicated factors in the root resorption of adjacent teeth. The second goal was to compare and to highlight possible correlations between these parameters. Moreover, this study endeavors to prove the importance of using CBCT in determining the correct diagnosis and establishing the most adequate treatment plan for each case.

MATERIAL AND METHODS

The study included a sample of 16 subjects, children and adults, with ages between 10 and 46 years, diagnosed with impacted maxillary and mandibular canines, with or without the suspicion of root resorption in adjacent teeth. Patients with palatal-lip cleft were not included in this study.

All the CBCT exams were performed on a limited area of the maxilla in order to maintain the radiation dose to a minimum, based on the A.L.A.R.A. principle (as low as reasonably achievable). Therefore, to achieve a correct diagnosis, the lowest dosage was used according to each particular case. In the cases where the position of the tooth was known, a 5x5 FOV (field of view) CBCT was performed. When the position of the tooth was unknown, we performed a 6x8 FOV CBCT with the following parameters: 90 kV and 6.3 mA with 27s exposure time.

The resulting sections were examined one by one in all three dimensions: sagittal, coronal and axial. When necessary, magnifying tools and digital rulers were used. The following analysis and measurements were performed for each subject:

A. The three-dimensional position of the impacted canine

Sagittal plane – position of the crown of the impacted canine with respect to neighboring teeth (usually the incisors) is classified as palatal, labial and medial. These examinations were performed in sagittal and/or coronal plane.

Vertical plane – position of the tip of the cusp of the impacted canine in relation to the long axis of the incisors. This is positioned on coronal level, in the cervical third, middle third, apical third or above the apex.

Axial plane – with the use of a ruler, we measured the distance between the tip of the canine cusp and the dental midline in mm.

B. Type of impaction – full bone impaction with or without soft tissue coverage.

C. Degree of development of the impacted canine root:

- canine with fully developed root with closed apex;
- canine with fully developed root with open apex;
- canine with ¾ developed root;
- canine with ½ developed root.

D. Size of dental follicle – using a ruler, we measured the largest diameter of the follicle, perpendicular to the impacted canine crown. These measurements were performed in the axial and the coronal plane.

E. Presence of the deciduous canine - the deciduous canine can be absent, present with in integral root or present with root resorption.

F. Impacted canine proximity or contact in relation to adjacent incisors or premolars. Proximity was defined as less than 0.5 mm from adjacent teeth. When the canines were in contact with the adjacent teeth, they were classified as follows: contact in cervical, middle or apical third of the impacted tooth.

G. Presence or absence of resorption in lateral incisors or adjacent teeth. Resorption level [5]:

- no resorption – the surface of the root is intact;
- mild resorption – half of the dentine thickness has been resorbed;
- moderate resorption – more than half of the dentine thickness has been resorbed;
- severe resorption – the resorption has determined the exposure of the pulp chamber.

The Spearman rank correlation test was used to determine the correlation between different parameters ($p<0.05$).

RESULTS

The results have been organized in Table 1 and Table 2.

Table 1. The morphology and position of the impacted canines (N=20)

Characteristics	n (%)
Canine	
Upper right	10 (50%)
Upper left	7 (35%)
Lower right	1 (5%)
Lower left	2 (10%)
Root development	
Fully developed, closed apex	14 (70%)
Fully developed, open apex	2 (10%)
¾ Developed root	3 (15%)
½ Developed root	1 (5%)
Follicle size	
<3 mm "no"	10 (50%)
>3 mm "yes"	10 (50%)
Deciduous canine	
Absent	7 (35%)

Present, resorbed	7 (35%)
Present, non-resorbed	6 (30%)
Sagittal position of the canine	
Labial	2 (10%)
Palatal	10 (50%)
Medial	8 (40%)
Vertical position of the canine	
Coronal	-
Cervical third	5 (25%)
Middle third	5 (25%)
Apical third	10 (50%)
Above the apex	-
Transversal position of the canine (mm)	
Average = 9.34; [Min-Max] = [2.5-17.2]	
Canine position in relation to the bone	
Full bone impaction	20 (100%)
Impaction with soft tissue coverage	-
Impaction without soft tissue coverage	-

Table 2. The resorption in adjacent teeth

	Central incisor	*Lateral incisor*	*First premolar*
Proximity / direct contact			
No	13 (65%)	5 (25%)	19 (95%)
Yes	7 (35%)	15 (75%)	1 (5%)
Proximity / direct contact position			
Cervical third	3 (15%)	5 (25%)	0 (0%)
Middle third	1 (5%)	3 (15%)	0 (0%)
Apical third	3 (15%)	7 (35%)	1 (5%)
Resorption			
No	15 (75%)	9 (45%)	19 (95%)
Yes	5 (25%)	11 (55%)	1 (5%)
Resorption position			
Cervical third	2 (10%)	5 (25%)	0 (0%)
Middle third	1 (5%)	2(10%)	0 (0%)
Apical third	2 (10%)	5 (25%)	1 (5%)
Resorption severity			
Mild	4 (20%)	9 (45%)	1 (5%)
Moderate	1 (5%)	3 15%)	0 (0%)
Severe	0 (0%)	1 (5%)	0 (0%)

This study was performed retrospectively on a sample of 16 subjects and it analyzed their respective CBCTs. The study evaluated 20 fully impacted canines (12 unilateral and 4 bilateral cases). The average age of the patients was 20 years, with a range between 10 and 46 years of age. Out of the 16 subjects, 7 (43.75%) were males and 9 (56.25%) were females. The three-dimensional position analysis confirms that the impacted canines are most frequently

found in palatal position (50%, 10 canines), closely followed by a medial position (40%, 8 canines) and less frequently found in labial position (10%, 2 canines).

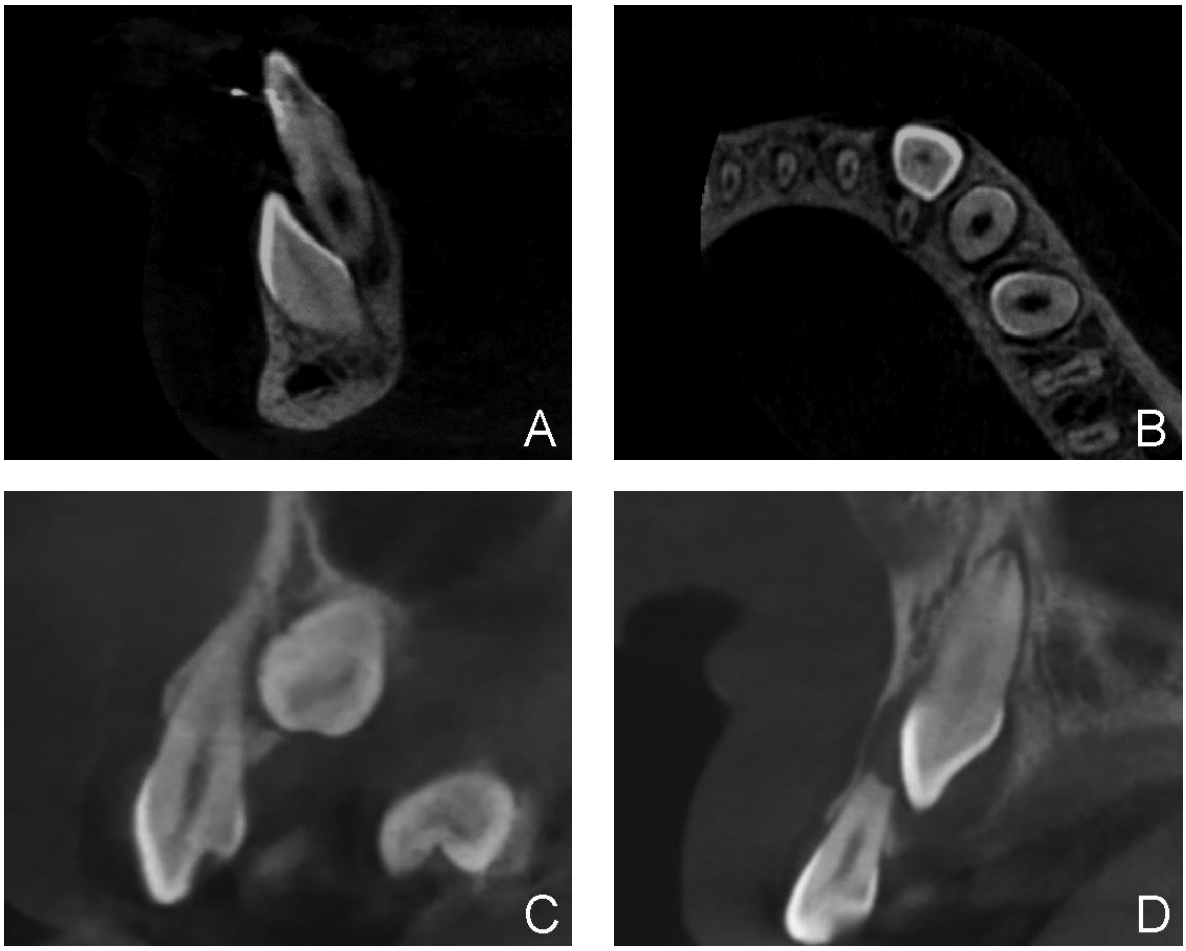

Figure 1. **D**ifferent examples of root resorptions: (A) – mild resorption of the lateral incisor; (B) – axial section, same patient as in image (A); (C) – moderate resorption of the central incisor; (D) – sagittal section, sever resorption of the lateral incisor.

Table 3. Spearman statistical analysis of the correlation between root resorption and different parameters

Parameters		**Sagitt.**	**Vert.**	**Trans.**	**Decid.**	**Prox.**	**CI Res.**	**IL Res.**	**1PM Res.**
	Sig. (2-tailed)		.102	.680	.187	.318	.852	.685	.456
Vertical position (Vert.)	Correlation Coefficient	-.376	1.000	.208	.210	-.064	-.109	.190	-.216
	Sig. (2-tailed)	.102		.378	.374	.790	.648	.424	.360
Transversal position (Trans.)	Correlation Coefficient	.098	.208	1.000	-.301	.080	-.651**	.044	.338
	Sig. (2-tailed)	.680	.378		.197	.738	.002	.855	.145
Deciduous canine (Decid.)	Correlation Coefficient	-.308	.210	-.301	1.000	-.247	.457*	.074	-.274
	Sig. (2-tailed)	.187	.374	.197		.294	.043	.757	.242
Proximity / contact with adjacent teeth (Prox.)	Correlation Coefficient	.235	-.064	.080	-.247	1.000	-.211	.359	.020
	Sig. (2-tailed)	.318	.790	.738	.294		.372	.121	.933
Central incisor resorption	Correlation Coefficient	-.044	-.109	-.651**	.457*	-.211	1.000	-.174	-.132

Parameters		Sagitt.	Vert.	Trans.	Decid.	Prox.	CI Res.	IL Res.	1PM Res.
(CI Res.)	Sig. (2-tailed)	.852	.648	.002	.043	.372		.463	.578
Lateral incisor resorption (LI Res.)	Correlation Coefficient	-.097	.190	.044	.074	.359	-.174	1.000	-.254
	Sig. (2-tailed)	.685	.424	.855	.757	.121	.463		.281
First premolar resorption (1PM Res.)	Correlation Coefficient	.177	-.216	.338	-.274	.020	-.132	-.254	1.000
	Sig. (2-tailed)	.456	.360	.145	.242	.933	.578	.281	

The strongest and most significant statistical correlation was observed in the central incisor resorption in transversal position (-0.651 negative correlation, p=0.002); the greater the value of the transversal position, the lower the risk of resorption in the central incisor.

The second statistically significant correlation was between the status of the deciduous canine and the resorption of the central incisor (0.457 positive correlation, p=0.043); the greater the lack of resorption of the deciduous canine, the higher the risk of resorption in the central incisor.

DISCUSSIONS

This study has revealed a greater prevalence in impacted canines in palatal position (50%), while the prevalence in medial (40%) and labial (10%) position was lower. Studies conducted in Switzerland and North America have shown the same increased prevalence in palatally impacted canines (51.49%-92.6%). Other studies conducted in Asia showed that the canine was more frequently impacted in labial position (45.2%) than in palatal position (40.5%). It was also postulated that enlarged dental follicles, as well as the pressure caused by erupted teeth can be determining factors for root resorption in adjacent teeth [6]. Even so, Ericson et al. [7], based on CT examination, reached the conclusion that dental follicle is not a cause for resorption in permanent teeth. Their conclusion was that the resorption of the permanent maxillary incisors is determined by the physical contact between the incisors and the canines and the pressure generated by the canines as part of their eruption process. Ectopic canines with a well-developed root, which erupt medially, on the long axis of the adjacent lateral incisors, with more than 25° angulation to the maxillary midline will determine the highest risk in root resorption of the lateral incisors [7]. Root resorption in premolars is rare [8].

This study supports previous conclusions that there is a correlation between prevalence in root resorption in permanent teeth and the proximity/contact with the affected canines. In the present study there are eleven resorbed lateral incisors, five resorbed central incisors and only one resorbed premolar.

Further observations were made on correlations between the position of the impacted canine to the midline (in transversal plane) and the resorption of the central incisor. These two parameters showed an inverse correlation (-0.651, p=0.002), namely the smaller the distance between the canine cusp and the midline, the greater the risk or resorption in the central incisor. Another correlation was observed between the presence of the non-resorbed deciduous canine and the resorption of the central incisor. This time a positive correlation, (0.457, p=0.043), namely, the greater the lack of resorption of the deciduous canine observed, the higher the risk of resorption in the central incisor.

A study conducted in Switzerland presented strong correlations with respect to the impaction of canines with full bone impaction with or without soft tissue coverage and the root resorption of adjacent teeth, the prevalence of the resorption being higher if the canine had full bone impaction (p=0.043). Moreover, there was a significant correlation between the

prevalence of root resorption and the position of the tip of the cusp in the vertical plane in relation to the long axis of the adjacent teeth [4-6].

CONCLUSIONS

It is important that the position of the impacted canines is precisely evaluated in the three special dimensions and the presence and degree of root resorption of adjacent teeth is carefully assessed, so that the surgeons and orthodontists can establish a correct diagnosis and an adequate interdisciplinary treatment plan. In addition to the clinical examination and the conventional radiography, CBCT imaging provides useful information regarding the position of the canine, the presence and the degree of root resorption in adjacent teeth. This study revealed a statistically significant correlation between the resorption of the central incisor and the position of the canine in transversal plane, as well as the resorption of the central incisor in relation with the presence of the non-resorbed deciduous canine.

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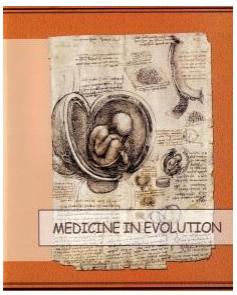
Teachers and oral health education in ROMANIA: a questionnaire based study



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Abstract

Teachers and schools have the opportunity to play an essential role in developing healthy habits in students. Their purpose is to determine behavioral patterns at this stage of a child's development. Many oral health problems can be prevented, and their early onset can be reversible. However, a considerable number of children, parents and teachers have limited knowledge of the causes and prevention of oral diseases. Oral health can be promoted by improving education and correct information about risk factors, as well as encouraging the population to adopt healthy behaviors and lifestyles.

Keywords: education, oral health, oral hygiene, program, prevention

INTRODUCTION

Students' education on oral health is crucial because healthy oral habits are developed during childhood. Hewitt C.N. talks about the importance of passing on knowledge about oral hygiene to children (infants, preschoolers or school-age children) since 1878 (1,2). Children spend a considerable amount of time in school, especially at the age where habits and behavioral patterns are formed (3,4). The school represents an effective platform for promoting oral health, as it reaches over 1 billion children worldwide (3). Teachers can play a critical role in developing healthy habits in their students. Therefore, their role during these stages of a child's development and well-being is essential. (4,5)) The need to promote health in schools is obvious and could be integrated into school curricula and activities carried out during school hours. Children can develop skills that will allow them to make healthy decisions or adopt a healthy lifestyle in the future. Many oral health problems can be prevented, and their early onset can be reversible (6,7,8). However, in many countries, a considerable number of children, parents and teachers have limited knowledge of the causes and prevention of oral diseases. Oral health can be promoted by improving knowledge about risk factors (bacterial plaque, smoking, high-sugar foods) and encouraging people to adopt healthy behaviors and lifestyles. It can also be promoted through initiatives aimed at ensuring a favorable school environment.(9,10,11,12) A stress-free environment, where smoking is prohibited, healthy foods are available so that children can benefit from adequate nutrition, can help reduce the risk of impaired oral and general health and promote a healthy and sustainable lifestyle. Running water and sanitation facilities are essential for teeth brushing and prevention of cross-infections. Schools have an enormous capacity to support programs involving preventive dentistry for children. Numerous studies have been conducted worldwide that have demonstrated the attitude, knowledge, practices and desire of teachers to promote oral health among children in schools. (9,12,13,14). Studies in Romania, China, Saudi Arabia have reported positive attitudes and knowledge about oral health among teachers and that they have expressed a desire to participate in oral health promotion (15,16,17). All of this research demonstrates that providing oral health education in schools helps children develop personal skills, provides knowledge about oral health, and promotes positive attitudes and healthy behaviors. (18,19,20)

A 2018 study don by Graca S.R. and Cuculescu M. et.all, involving 455 adolescents, demonstrates that in Romania adolescents gather their knowledge on oral health problems in a percentage of 23.9% from the Media (internet, TV), 52.2% from the dental offices (doctor dentist), 10.6% from the family and only 6.9% from school. These results raise the following questions: 1. If the Romanian schools have sufficient resources (material and human) to carry out health education for children and 2. If teachers possess enough knowledge about oral health and are interested in their own oral hygiene enough in order to be able to transmit correct information.

Aim and objectives

The purpose of this pilot study is to examine the potential of promoting oral health in Romanian schools through teachers, as well as the level of oral health knowledge held by teachers regarding the notions of oral hygiene, the degree of their involvement in educational activities for oral health and how to apply the notions of oro-dental health in schools.

MATERIAL AND METHODS

The present study was conducted on the basis of a questionnaire carried out during a time period of two weeks in September 2019, on a sample of 61 teachers, who work in public schools in Romania. The study participants were: teachers (primary school, grades 0- IV) - 42

(14 rural areas, 28 urban areas), teachers (gymnasium, grades V - VIII) - 19 (8 from rural areas, 11 urban areas). The self-report questionnaire was realised using the application "Google Forms", and the interpretation of the results using Google Sheets. The administration of the survey was made online, through specialised Romanian teacher groups by volluntary participation. The data were collected using a structured questionnaire, which assessed the dental knowledge, attitudes and practices of teachers who teach in Romanian schools, the questionnaire having a total of 43 items as closed questions. The survey was divided into 2 parts: the first referred to the oral health topics encountered and taught in the school curriculum (20 questions), and the second referred to the teacher's personal attitude and practices related to oral health (23 questions), wanting to see if the information they teach are correct and current.

RESULTS

During the implementation of the questionnaire, 61 teachers participated voluntarily. The collected data was introduced in Microsoft Excell and descriptive statistics were used to assess the results obtained from the survey. This study presents an overview that includes the knowledge, attitudes and practices of teachers in Romanian schools in relation to oral health.

Part I of the questionnaire

Socio-demographic data: Out of 61 teachers, 16.4% were men and 83.6% were women. A large number (63.9%) came from urban areas and 36.1% from rural areas; 68.9% of them thaught teaching in primary schools (grades 0-IV), while 31.1% thaught in gymnasium (Grades V-VIII).

The results were the following: according to Figure 1, most teachers mention the following topics regarding oral health to students in class: frequency of tooth brushing (43%), brushing technique (38%), dental check-ups (16%) and frequency of changing the toothbrush.

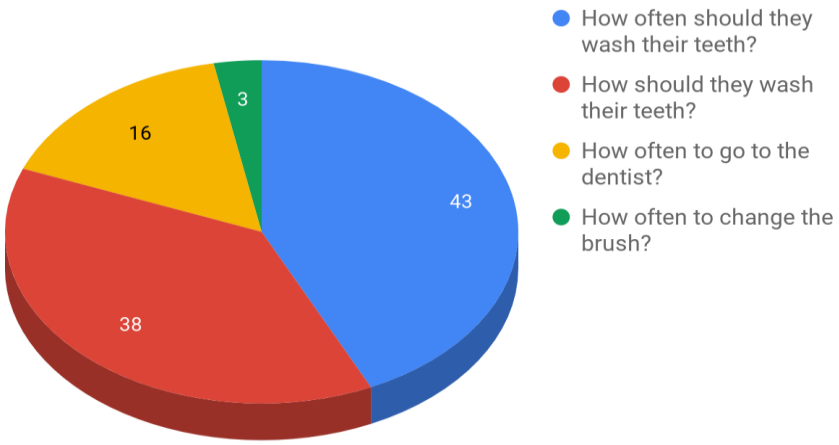

Figure 1. Which of the following oral health topics are discussed with students in the classroom? In percent

According to Figure 2, 74.5% of the surveyed teachers have reported that they noticed the absence of children from class due to dental pain, 78.7% of the children visited the dentist to solve the medical problem, and 9.8% did not. (fig.2)

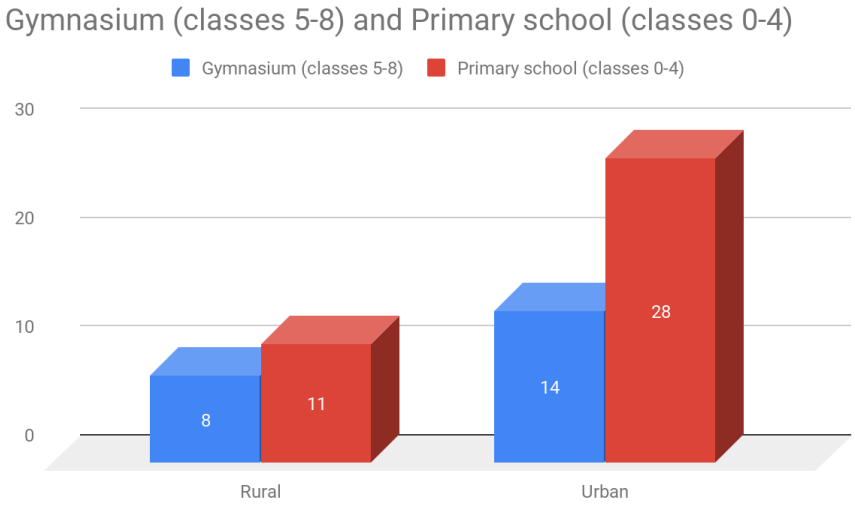

Figure 2. Figure 2. Absence of children from classes due to dental pain observed by teachers in rural and urban areas

Most teachers (59%) claim that they noticed interest from the parents regarding the dental hygiene of the child and 41% report that they did not see any interest from the parent regard.

When asked about the integration of oral health in the school curriculum, 58.3% of the surveyed teachers considered that it was poorly integrated, 35% that it was well integrated and 6.7% did not know how to answer the question.

According to Figure 3, the notions about oral health education provided were as follows.

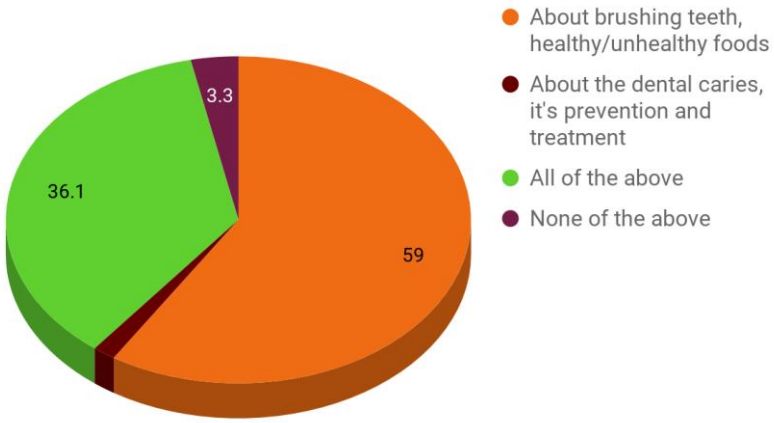

Figure 3. What kind of education did you try to offer in terms of oral health to students? In percent

Part 2 of the questionnaire

The second part of the survey refers to the knowledge and attitudes of teachers related to individual oral health and personal oral hygiene practices.

The first 4 questions inquire about the teachers' attitudes towards oral health, the following 12 about teachers' knowledge of oral health, and the last 7 about personal hygiene practices.

Knowledge:

When teachers' attitudes towards oral health were measured (Table 1), it was observed that the vast majority of teachers (88.5%) recognized that maintaining oral health is an individual responsibility. About 95 % of teachers stated that regular visits to the dentist are necessary to maintain good oral health.

However, 96.7% claim they are aware of the role that oral hygiene plays in general health. It has been noticed that these people have some erroneous information, one of the examples being the answers given to the question regarding the movements used in brushing (figure 4).

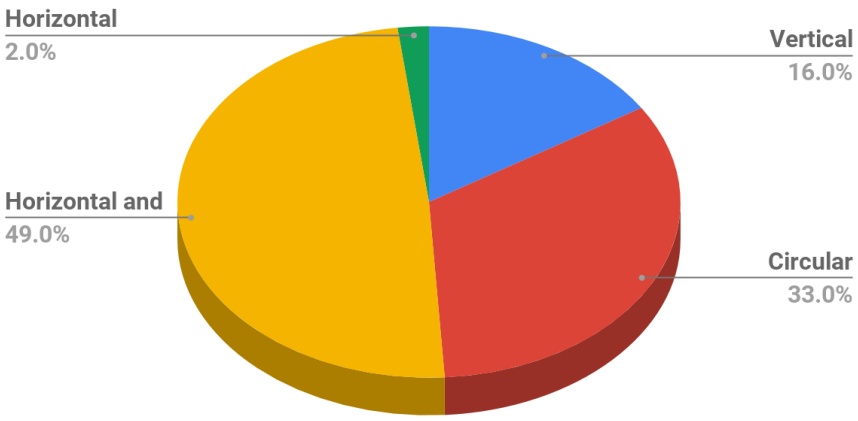

Figure 4. What movements should be used when brushing our teeth?

Almost all teachers (96.7%) knew that a clean oral cavity can prevent cavities and tooth loss, at the same time 13.1% did not know that the dentist can perform a professional hygiene procedures. Most teachers, (78.7%) know that the toothbrush should be changed once every 3 months and 3.3% do not know exactly when it should be changed. It points out that some teachers have erroneous information, and this information is subsequently passed on to students. As auxiliary means to achieve proper oral hygiene, teachers who completed the survey know the importance of the use of: mouth water (55%), dental floss (25%), toothpicks (10%), mouthwash (6.7%) and 3.3% other methods than those mentioned in the questionnair.

Only 46% of teachers were aware of the use of dental floss.

DISCUSSIONS

Primary schools and preschools have great potential to influence a child's health behavior. During this period, the child goes through active stages of development. The role of teachers during these stages of a child's development is crucial. Therefore, teachers and professors can play a major role in school-level oral health education programs. Schools have an enormous capacity to support programs involving preventive dentistry for children. (5,8,9,18)

The present study shows that the majority of teachers that participated in this study were women. This is a reflection of the demographic area of teachers in Romania, where the study took place.

Our aim in this study was to assess the knowledge and attitudes of teachers' oral health towards oral health practice by administering questionnaires. However, the use of surveys has its own limitations. Almost all teachers were aware of the importance of a healthy oral cavity. Most teachers visited the dentist if there was a problem. This vision was very similar to the study conducted by Paul Langet et al. Not all teachers were aware of the importance of regular visits to the dentist, but most of them did. This was consistent with the research by Ramroop et al and Chikte et al.

In the present study, just over half (59%) of the teachers who answered the questions in the questionnaire reported that oral health topics currently exist in the current school curriculum, but 77% of them believe that there is a possibility to improve the curriculum by introducing several notions of dental hygiene. 65.6% were trained to provide oral health education and 96.7% tried to provide oral health education to their children in school.

Slightly different results were found in the study conducted by Maganur PC, Satish V, and collaborators in "Knowledge, Attitudes, and Practices of School Teachers towards Oral Health in Davangere, India" (18), where all teachers took into account that Oral health topics were included in the school curriculum, most school teachers (83.33%) were trained to provide oral health education and (83.33%) tried to provide oral health education to children in school.

All teachers, regardless of their experience, had acceptable scores for their attitude towards oral health. This showed that some did not have good knowledge, but still had positive attitudes about their oral health. These results are similar to the previous study by Wyne et al., Ahmed and Sukhabogi et al.

Oral health education can be taught as a specific subject or as part of other subjects, addressing the physical, psychological, cultural and social determinants underlying oral and general health. The teachers, in this study, showed more knowledge about the consequences of brushing the teeth occasionally, 78.7% ticked all the correct answers to this question, 19.6% ticking only one of the 4 correct answers provided. In the study conducted by Maganur PC, Satish V, in India, a very small number of teachers correctly ticked all the correct answers 17.3%, most of them offered only one of the correct answers.

In the present study, more than 50% of teachers were aware of fluoridated toothpastes, observations which were similar to the study of teachers in South Africa (17,18) who also had adequate knowledge about fluoride. However, in contrast, around 37.3% did not have knowledge about fluoridated toothpaste in our study. This being similar to the study conducted by Ankita Moța et all and HD Sgan et al7 who reported that half of the teachers did not know about fluoridated toothpaste.

About 54% of the teachers who participated in our study has no basic knowledge about dental floss. These results indicate that there is a need to improve knowledge about the use of dental floss, as this means of sanitation helps to remove plaque and other interdental debris. Intervention to increase the knowledge and subsequent use of dental floss is essential and is in line with other studies.

This study may also have some limitations. First of all, the questionnaire was made online and was based on the volluntary cooperation of the available teachers in a time period of two weeks in which the survey was implemented. Moreover, it should be mentioned that the teachers who participated in this study are a small sample of Romanian teachers, which could also result in innacurate findings.

CONCLUSIONS

Currently, the school curriculum has topics on oral health and its importance. Teachers have the necessary reach in order to educate and motivate students in such a way as to maintain their oral health, thus efforts must be made to involve all teachers in the development of the children regarding oral health. All teachers should be trained at regular intervals on the importance of oral health and raise awareness of the promotion of oral health for their students, with the help of health staff or organizations. Even though most teachers have satisfactory knowledge of some aspects of preventive oral health, they still lag behind in terms of knowledge in some crucial parts of it. There is a clear and immediate need for teacher training programs on basic knowledge of oral health, such as workshops. Although all teachers claimed that they have visited a dentist when they needed it, not every one of them was aware of the role and importance of oral health as part of general health and not everyone knew that the dentist could perform professional hygiene procedures.

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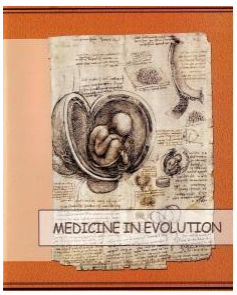
The correlation between soft tissue biotype and cortical bone thickness as succes factors in mini-implant placement – Pilot study



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Abstract

The aim of this study is to correlate two of the factors that influence the success rate of orthodontic mini-implants and establish the correlation between soft tissue biotype and the underlying cortical bone thickness. Material and methods: 2 patients (one with a thick and one with a thin biotype, according to TRAN technique) were selected. Clinical and radiological measurements were performed in order to determine the soft tissue and cortical bone thickness. The soft tissue thickness was measured using a periodontal probe with an endodontic stopper, and the cortical bone thickness was measured using a CBCT scan. Results: The thin biotype was correlated with thin cortical bone, while the thick biotype was correlated with a thicker cortical bone. Conclusion: The correlation between the gingival biotype and cortical bone thickness would allow the clinician to select the optimal mini-implant design and to ensure a more predictable outcome.

Keywords: tissue biotype, cortical bone thickness, mini-implants, cbct.

INTRODUCTION

Orthodontic mini-implants have gained popularity among orthodontist due to their multiple advantages: they provide absolute anchorage, easy to insert, low cost. The failure rates for orthodontic mini-implants are less than 20%, which means that the success rate is high. [1,2,3,4] The research area in this field is mainly focused on the factors that influence the success rate and reduce failure.

Orthodontic mini-implant's stability is mainly mechanical, by the interlocking of the mini-implant's threads with the cortical bone. [5] Primary stability is determined by mechanical retention due to the tension–compression state generated at the bone–screw interface. This retention, is affected by the characteristics of the insertion site, the proximity to the root, the geometric design of the screw, the soft tissue, the operator technique, and magnitude and loading time of the orthodontic force, which is particularly dependent on the thickness of the cortical bone [6,7,28].

The focus of this study will be on only two factors that influence primary stability, trying to establish a correlation between them: cortical bone thickness and soft tissue biotype. The cortical bone thickness is considered to be a decisive factor in the overall success/failure rate of the mini-implant. The increase in cortical bone thickness in the alveolar bone of maxilla and mandible has been shown to significantly increases the primary stability of the mini-implant.[8,9].Similary, Marquezan et al, the meta-analysis showed positive correlation between the stability of the mini-implant and the amount of cortical bone.[10] Meta-analysis data indicate that higher failure rates (2.5 times more failures) were observed at insertion sites with a cortical bone thickness less than 1 mm (21.3%;8,3%; for ≥1 mm) concluding that cortex thickness is an important factor in ensuring primary stability, with a thickness of at lest 1 mm being required.[11,12]

For the soft-tissue stability component, Cheng et al. reported that the absence of keratinized mucosa around mini-implants significantly increased the risk of infection and failure (71% failure rate). [13] It is therefore recommended that the mini-implant be placed in the attached gingiva, adjacent to the muco-gingival junction of the upper and lower arches. Kim HJ et al reported that different areas of the buccal attached gingiva had different soft-tissue thicknesses. If orthodontic mini-implants with the same length are used in areas with different soft tissue thickness, the length of the implants inserted in the bone will be different. Therefore, soft tissue might be one of the key factors for successful implantation [14]

Fu JH et al reported a moderate association between the thickness of the labial gingiva and the underlying bone radiologically. [15]. Claffey and Shanleydefined the thin tissue biotype as a gingival thickness of <1.5 mm, and the thick tissue biotype was referred to as having a tissue thickness ≥ 2 mm. [16]

Studies have reported several methods used to measure the soft-tissue thickness of the oral mucosa. These include direct measurement using a needle or periodontal probe, [17], probe transparency (TRAN)[18]or an ultrasonic device such as ultrasonic gingival thickness meter.[19] Other methods are indirect, using computed tomography(CT), [19,20] or cone beam computed tomography (CBCT) [21].

In the direct method, the thickness of tissue was measured using a periodontal probe. [22] When the thickness was≥ 1.5 mm, it was categorized as a thick biotype. When the thickness was <1.5 mm, it was considered a thin tissue biotype. In the TRAN technique, the gingival biotype was considered to be thin when the outline of the periodontal probe was shown through the gingival margin from inside the sulcus. [23] The biotype was considered to be thick if the probe did not show through the gingival margin.

Aim and objectives

This study aims to correlate two of the factors that influence the success rate of orthodontic mini-implants and establish the link between soft tissue biotype and the underlying cortical bone thickness.

MATERIAL AND METHODS

Two different patients were chosen: one with a thick and one with a thin biotype, according to TRAN technique. (Fig.1) If the outline of the underlying periodontal probe could be visualized through the gingival margin, it was classified as a thin biotype; if the outline of the underlying periodontal probe could not be visualized through the gingival margin, it would be classified as a thick biotype. [23].

The study area selected was the lateral maxillary region, on the buccal side, at the most common mini-implant site placement: first and second premolar, second premolar and first molar and between first and second molar. Measurements were taken at the same level both at the muco-gingival junction (MGJ) and the buccal bone plate (BBP).

Clinical measurements: the soft tissue thickness was evaluated, using a direct method with the periodontal probe and an endodontic stopper. (Fig.2). After local anesthesia, the periodontal probe struck the soft tissue perpendicular to the cortical bone. The endodontic stopper is in contact with soft tissues. After removal of the periodontal probe, the thickness of the soft tissue shall be indicated by the stopper position. (Fig 3). Measurement were made at the muco-gingival junction, being already stated that keratinized gingiva presents a lower risk of developing hypertrophic tissues and inflammation.

CBCT measurements: Cone Beam Computed Tomography scans using Cranex Sordex were carried out, in order to obtain radiographic measurements of the thickness of the cortical bone. CBCT scans have been imported into 3-dimensional analysis software as digital imaging. (On Demand 3D dental app).Cortical bone thickness was measured at the same spots like the soft tissues (Fig.4)

Figure 1. TRAN technique

Figure 2. Soft tissue measurement

Figure 3. Soft tissue thickness

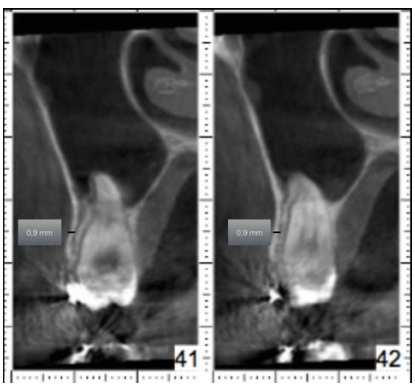

Figure 4. Cortical thickness measurement

RESULTS

The thin biotype characterized by thin soft tissue was correlated with a thin cortical bone and the thick biotype, was correlated with a cortical bone. The thickness of soft tissue at the insertion site should be taken into account when selecting the appropriate length of mini-implants and consideration should be given to individual patient variations in soft tissue and cortical bone prior to insertion of any mini-implants [24,25]. Placement within the attached gingiva, where proper soft tissue sealing can occur, has been associated with fewer soft tissue complications and failure risks compared to placement in the movable mucosa [26].

DISCUSSIONS

The stability of the mini-implants depends on the quality and quantity of the cortical bone. The main objective of an orthodontic mini-implant is to achieve maximum stability by placing it in areas with a thick cortical bone (for mechanical retention) and a thin, keratinized soft tissue (to avoid inflammation).

Before selecting the mini-implant, the soft tissue thickness at the insertion site should be measured and this procedure requires local anesthesia, delaying the selection until just before the mini-implant insertions procedure. The design of the mini-implants varies depending on the thickness of the soft tissue, therefore it implies for the orthodontist to have a wide range of mini-implants.

Kim HJ et al. reported that cortical bone had the same pattern as the soft tissue. [14] Similarly, Jia-Hui Fu et al. concluded that the gingival biotype had a moderate association with the underlying bone radiologically. [27]

CONCLUSIONS

The correlation between gingival biotype and the cortical bone thickness would allow the clinician to select the optimal mini-implant design, to ensure a more predictable outcome.

This study is the first step in future research that seeks to correlate these parameters in a greater number of patients in order to provide more reliable data.

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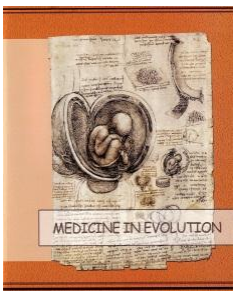
Dentoalveolar compensation assessment using PA cephalograms in orthodontic asymmetry patients



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Abstract

Asymmetry patients have various degrees of discrepancy between skeletal and dental relationships that are subject to the observation and correction of orthodontic or interdisciplinary teams of specialists. Dentoalveolar compensation is a system that helps maintain a state of occlusal balance in the maxillo-facial segment. *Aim*: The purpose of the present study is to assess the degree of dental compensation through dental midline shifting in patients with facial asymmetry. *Material and Methods*: 20 postero-anterior cephalograms of orthodontic patients with clinically visible facial asymmetry were studied using the Svanholt and Solow analysis. *Results:* Six of the patients included in this study presented both a maxillary and mandibular skeletal midline shift. Dentoalveolar compensation, defined by the shifting of the dental midlines was observed both in the upper and in the lower arch. *Conclusion:* Dentoalveolar compensation assessment is a necessary step of orthodontic diagnosis and treatment planning.

Keywords: orthodontics, postero-anterior cephalograms, asymmetry

INTRODUCTION

Malocclusions are three dimensional conditions and all orthodontic patients should have a three dimensional diagnostic approach. But the true benefit of anteroposterior cephalometric analysis is evident in patients with transverse discrepancies: functional mandibular shift, dental and skeletal lateral crossbites or facial asymmetries. [1,2] Fischer defined symmetry as the correspondence of parts on opposite sides of a plane or point. Asymmetry of the dentofacial complex can be unilateral or bilateral, as well as anteroposterior, supero-inferior, or mediolateral.[3]

During the diagnostic stage of the orthodontic treatment in non-growing patients the orthodontist should measure the amount of skeletal asymmetry, while taking into account the degree of dental compensation. [4,5] Dental compensation is a means of maintaining a state of occlusal balance in the maxillo-facial segment aiming to camouflage various skeletal patterns.[6] This kind of compensation usually follows the plane of the skeletal discrepancy thus it can be transversal, in arch dimension and midline shift to compensate for transvers skeletal discrepancies, vertical, in the excess or lack of dental eruption, to compensate for vertical skeletal discrepancy, and antero-posterior, in the inclination of frontal teeth to compensate for anteroposterior skeletal discrepancies.[7] When treatment using the movement of dental components is chosen, treatment objectives will include compensatory changes in the position of teeth relative to the basal bone. [8] When orthognathic surgery is the desired approach, treatment objectives include the elimination of pre-existing dentoalveolar compensation in order to obtain correct dental and skeletal relationships when the jaws are moved into the natural position in relation to the cranial base and to each other.[9,10]

PA cephalogram studies in literature include accuracy or assessment of head posture studies [11,12], calculating normal values for different groups of patients or populations [2,13,14,15] or quantifying transversal modifications during growth [16]. Many proposed PA cephalometric analysis focus on setting norms with adjustments for different age groups [17], comparing right and left triangular measurements [18] or the determination of harmonious proportions [19]. Svanholt and Solow (1977) proposed a method suitable for the assessment of skeletal and dental midline discrepancies. [20]

Aim and objectives

The purpose of the present study is to assess the degree of dental compensation (upper and lower midline shift using the method of Svanholt and Solow - 1977) in patients with facial asymmetry in order to provide a complete diagnostic information and obtain aesthetic final orthodontic treatment results.

MATERIALS AND METHODS

The study included 20 postero-anterior cephalograms of patients who met the following inclusion criteria: visible facial asymmetry upon clinical examination, non-growing patient, no prior orthodontic treatment, dental extractions or anodontia. Patients with trauma or surgery that affected the face, as well as patients with cranial diformities and genetic syndromes were excluded from the study. The patients were chosen sequentially from a private dental clinic in Timisoara, Romania. The mean age for the group was 25,6 years. Thirteen patients were women and seven were men.

The PA roentgenographs were made under standardized conditions and were traced using a computer software by a single investigator (orthodontics specialist). Linear and angular parameters of the dental and skeletal midline position were obtained. Values were measured using online angle and distance measurement computer software.

In this paper, to assess the relationships between the midlines of the jaws and the dental arches, the Svanholt and Solow analysis was chosen. The anthropometric points and reference planes are presented in Tables 1 and 2.

Table 1. Reference points used in PA cephalometric analysis

Reference POINTS	
Lo	*latero orbitale*
om	*orbitale midpoint*
mx	*maxillary midpoint*
Ag	*antegonion*
m	*mandibular midpoint*
Isf	*incisior superior frontale*
Iif	*incisior inferior frontale*

Table 2. Reference planes used in PA cephalometric analysis

Reference PLANES	
ORP	*orientation plane*
CLP	*compensation line*
MLP	*mandibular plane*
MXP	*maxillary plane*

The amount of movement of the midpoint of the dental arch away from the symmetry line within the jaw towards the compensation line (CPL) defined the degree of dental compensation. The following parameters were taken into consideration: transverse maxillary position (mx-om/ORP), transverse mandibular position (m-om/ORP), transverse jaw relationship (CPL/MXP), upper incisal position (isf-mx/MXP), lower incisal position (iif-m/MLP), upper incisal compensation (isf-mx/m) and lower incisal compensation (iif-m/mx). According to Svanholt and Solow, these variables were designed to be zero in symmetrical subject, and all the midpoints, dental and skeletal, should be on the same line.

RESULTS

After the clinical examination needed to determine the facial asymmetry for the patients in the study, a dental Class III molar relationship was observed in 50% of cases, 20% of cases presented a Class II molar relationship and 30% were in Class I molar relationship. PA cephalograms were analysed after being traced. Measuring of the parameters revealed mandibular skeletal midline shift in 60% of cases. Maxillary midline deviation with no mandibular deviation was observed in two of the cases included in this study, while both mandibular and maxillary skeletal midline shift was observed in 30% of the cases. Dental and skeletal findings are presented in Table 3.

Table 3. Percentage of skeletal asymmetry and dental compensation in the study group

Parameter	**% of cases**
Transverse mandibular shift	90
Transverse maxillary shift	40
Upper incisor compensation	70
Lower incisor compensation	60

Skeletal mandibular midline deviations towards the right side were recorded in 60% of cases. Maxillary midline shift followed the direction of the mandibular deviation. In the two cases of maxillary midline deviation without mandibular deviation, the shift was towards the right side of the patients. Complete dental compensation (when the dental arch midpoint reaches the compensation line) was more common in the upper arch, while the lower dental midpoint showed either incomplete compensation (when the midpoint of the dental arch

does not reach the compensation line) or no dental compensation at all (Figure 1). No displacements of the midlines of the dental arches in the direction opposite to the direction from the jaw symmetry line to the CPL were observed in this study.

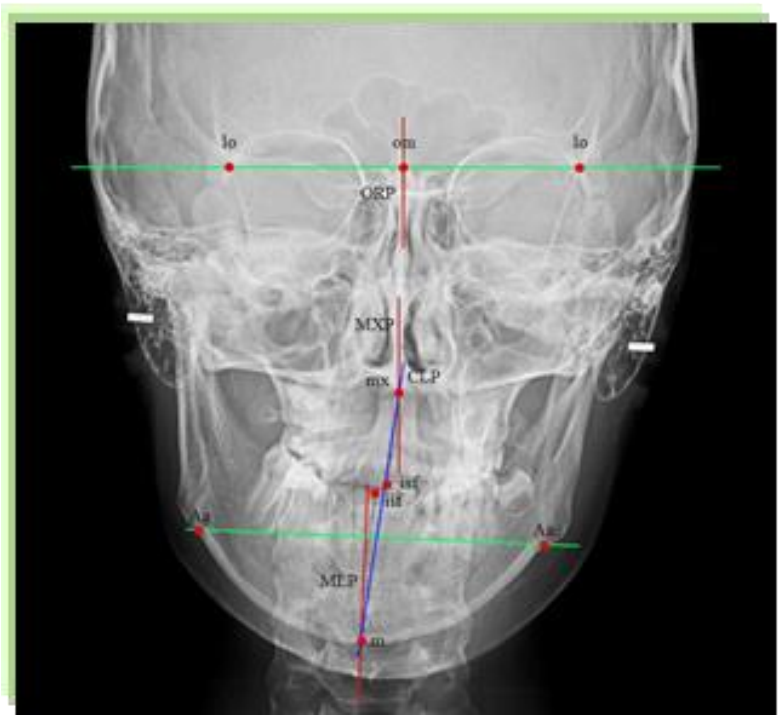

Figure 1. Transversal assessment of midline discrepancies: PA tracing of a facial asymmetry patient following the model of Svanholt and Solow (1977) showing complete upper arch dental compensation and lower arch incomplete dental compensation

DISCUSSIONS

Skeletal asymmetries were assessed using PA cephalograms. This radiological tool is valuable in the study of left and right structures because they are at a similar distance relative to the film and x-ray source. Two consequences of these characteristics would be less distortion and reduced effect of unequal enlargement. Even so, the geometric error of PA cephalogram analysis is even lower when dental and skeletal midpoints are compared to one another. The Svanholt and Solow method used in the present study excludes many sources of error that are evident when comparing lateral facial areas. Even so, the suggested method is vulnerable to incorrect head position in the cephalostat.[11]

Patients included in this study were selected sequentially and met inclusion criteria of clinically detectable facial asymmetry. Clinical examinations showed a majority of dental Class III malocclusions which is in accordance with other studies found in literature linking this kind of malocclusion with skeletal asymmetry [21,22]. Our study also revealed a prevalence of mandibular asymmetry which can be the effect of two factors: the mandible grows longer than the maxilla and so is more prone to deviation and the fact that the maxilla is connected rigidly to other skeletal structures, while the mandible is mobile.[23]

Adult patients with a skeletal discrepancy can be treated with orthodontic camouflage or orthognathic surgery, in which either dentoalveolar compensation or decompensation is required for a functional and aesthetic treatment result.[24,25,26]

There was a correlation between the degree of dental compensation and maxillary and mandibular midline position, tooth position being a camouflage for the underlying skeletal abnormality. Complete dental compensation was noticed in cases with the most mandibular shift, indicating that the dentoalveolar compensation was affected by the discrepancy in the opposing jaw, which is in accordance with the findings of other studies found in literature.[4]

Dental midlines are an important part of smile esthetics, especially the upper midline. Studies have shown that people without a dental education background are able to detect upper midline shift of 1mm and above.[27] Although a person can still have a beautiful smile even with a deviated upper midline, beauty is a subjective parameter and should be discussed at the beginning of the orthodontic treatment in cases where the dental midline shift could be a camouflage for underlying skeletal discrepancies.

CONCLUSIONS

Determining anterior dentoalveolar compensation is one of the main factors that can make a difference between a successful and an unsuccessful orthodontic treatment. The concept of facial aesthetics is based on subjectivity and should always be addressed in asymmetry orthodontic patients. The PA cephalogram analysis has been a valuable and accessible tool in providing complete information in transvers abnormalities and more research should be done using 3D technologies to further improve this type of investigation.

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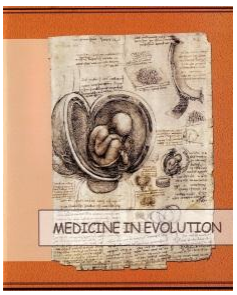
Quality of life evaluation of symptomatic TMJ patients during and after occlusal split therapy



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Abstract

Objectives: Temporomandibular disorders is a pathology that involve temporomandibular joint and masticator muscle. Numerous studies showed that TMJ pain is the second most common chronic musculoskeletal condition after chronic low back pain. In patients with TMJ pathology splint are used very often to release the pain and to put the mandible in centric relation.

Materials and methods: For evaluation of the impact of splint therapy in the patient's quality of life we have investigated 26 adult patients. We decided to use the qualitative statistical approach to evaluate the changes in the patient's quality of life, since it is a qualitative perception rather than a quantitative one.

Results: We compute the mean value m_1 of the patient's evaluation at question number 1 at each appointment. This parameter allows as to check the progress of the treatment and consequently the improvement of patient condition. We noticed a significant improvement of symptomatology.

Conclusion: Patients that experience moderate pain at the beginning of the treatment are wearing the splint for more than 16 hours per day (grade 7 average), and those with severe pain for more than 20 hours per day (grade 9average).

The most important thing is that on 90% of these cases, with severe and moderate pain, the pain disappears completely after 8 weeks.

Keywords: Temporomandibular joint pain, temporomandibular disorders, splint, disc displacement

INTRODUCTION

Aim and objectives

Temporomandibular disorders is a pathology that involve Temporomandibular joint TMJ and masticator muscle. Pain is the most prevalent symptoms in TMJ disorders and difficult to evaluate because of individual difference that could appear.

Since 1934 when ENT doctor Costa related TMD to dental malocclusion splint therapy is considered to be an effective treatment for temporomandibular disorders. [1]

The temporomandibular mandibular joint is a synovial joint and involves two separate synovial joints with upper and lower compartment which must act in unison. [2]

There can be a significant difference in the occlusion when it is dictated by the teeth versus when it is dictated by the condyles. In diagnosis and treatment planning for orthodontic patients CO-CR discrepancies are very important and they can change completely the treatment plan [3]. Different studies suggest that could be a direct correlation between CO-CR discrepancies and the probability that a patient will develop TMD pain [4,5] in the facial region is associated with temporomandibular disorder (TMD) in 70% of the time. [6]

The temporomandibular joints (TMJs) it is used in mastication and jaw mobility, and in verbal and emotional expression. Temporomandibular disorders (TMDs) include several disorders that can lead to orofacial pain symptoms. [7]

Numerous studies showed that TMJ pain is the second most common chronic musculoskeletal condition after chronic low back pain. TMJ pain can interfere with individual's daily activities, psychosocial functioning, and quality of life. It is important to accurately diagnose these complex temporomandibular disorders in order to provide the best clinical care. Both clinical history and examination, augmented as indicated with imaging, are needed for excellent TMJ intra-articular diagnoses. [8]

In cases of persistent and recurrent pain, TMD may follow a chronic course. In these cases, although TMD is not a life-threatening disease, the patients' quality of life may be reduced. [10]

TMD disorders are classified using the research diagnostic criteria (RDC) for temporomandibular disorders (RDC/TMD). The most prevalent sign and symptoms for TMD disorders are: TMJ pain and clicking, reduced range of motion, mandibular deviation during opening and closing. [8] TMD could be associated with headache, ear-related problems or cervical spine dysfunction. Temporomandibular clicking is reproduced by a distinct sound of cracking and appear when the condyle hits a mechanical obstacle. Also, it is important to make a differential diagnostic of the pain in cervical-facial region. In case of facial pain due to TMD, pain is increased during mastication. [3]

Okesson (2008) classified orofacial pain as physical (Axis 1) and psychological (Axis 2).[8]

Epidemiological studies showed that TMD are very common among adults but also in pediatric patients. Patients with joint problems complain about pain in the joint and ear regions, whereas patients with muscular pain usually describe pain in a more generalized area [9].

A stable TMJ joint is defined as that in which both the right and left condyles sit in the uppermost position in the temporal fossa with the disc in between while the upper and lower teeth are in maximum intercuspation with multiple equal contacts between tooth. [11]

Orthopedic instability which means that centric relation does not coincide with centric occlusion is main cause of pain in the cervical-facial pain. Since pain in the cervical region could be generated by many pathological conditions, we would focus in our study on pain caused by disfunction at the level of temporomandibular joint.

For patients with facial pain it is very important to establish a multidisciplinary approach for a successful treatment.

Many TMJ pain are related to the discrepancy between centric occlusion CO and centric relation CR. TMD treatment protocol for the pain related to CO-CR discrepancy can be performed with 3D printed splint which has to be adjusted every week in order to let the condyle reposition in the most anterior and superior position at the level of TMJ. This is a full coverage splint, suggested by Roth in 1983, with full contact on molars and premolars, with 0.005 shim stock clearance in the mandibular canine and incisor regions. [12] 3D printing is a new technology with a particular resonance in dentistry which will become an important tool for all dental fields. In patients with TMJ pathology splints are used very often used to release the pain and to put the mandible in a centric. [13]

The qualitative study reported here focuses on treatment goals and outcomes of importance to patients, and device acceptability, contextualized within individuals' experiences of their specific medical condition.

MATERIALS AND METHODS

Data for this study were collected from a survey conducted at our clinic (during 2018–2019) with adults and adolescents, more than 16th years old, who were treated with occlusal splint therapy. Qualitative approaches are well suited to the investigation of pain, inclusion criteria were patients 16 years old with TMD associated with pain. They all have discrepancy between centric occlusion and centric relation and TMJ instability. Patients present a TMJ disfunction with pain or clicking or both of this symptom. Participants were selected to be able to give informed consent.

A number of 26 patients were evaluated by a single examiner who was trained and calibrated for diagnosis according to criteria of Axis I of the Research Diagnostic Criteria for TMD (RDC/TMD). After evaluation we made a proper diagnosis and a treatment plan. In our study all of the patients were treated with splint therapy.

Our orthodontic treatment protocol of the TMJ instability includes:

1. Precise diagnostic using extra oral pictures, end oral pictures, CBCT, MRI, mounted models, clinical evaluation by an orthodontist.
2. Treatment plan was done according to precise objectives for facial aesthetic, dental aesthetic, periodontal health, TMJ, evaluation of the airways. Treatment plan was done with splint, which was adjusted every week, followed by orthodontic treatment.
3. Every 2 weeks patients received a questioner with 5 questions, and they have to respond with number from 1-10.

According to Barros et al., orofacial pain has a great impact on the quality of life of individuals with TMD, with no difference between genders. However, there is a clear correlation between the severity of TMD and the impact on the quality of life of individuals with TMD seeking treatment. [14]

For evaluation of the impact of splint therapy in the patient's quality of life we have investigated 26 adult patients. We decided to use the qualitative statistical approach to evaluate the changes in the patient's quality of life, since pain it is a qualitative perception rather than a quantitative one. In order to use such methods, as described in [15] the first necessary step is to quantize the qualitative representation and transformed it in a numerical representation on which traditional statistical method may be applied for evaluation.

At the beginning of the treatment as well as every 2 weeks, the patient is requested to evaluate the change in their quality of live by answering the following questions:

1. Do you hear a click noise in the TMJ area? Evaluate from 1 to 10 where 1 means very powerful noises and 10 means no noise.
2. Do you feel any pain in the cranio-cervical area? Evaluate from 1 to 10 where 1 means strong pain and 10 means no pain.

3. How long during the day did you wear the splint? Evaluate from 1 to 10 where 1 means did not wear it at all and 10 means 24 hours/day
4. How do you evaluate the improvement regarding the cranio-cervical pain from the last appointment? Evaluate from 1 to 10, where 1 means in changed in bad, and 10 means in changed in good.
5. Please evaluate your satisfaction regarding the ongoing treatment. Evaluate from 1 to 10 where 1 means very unhappy w and 10 means excellent.

We centralized all data and we constructed a matrix A, where each element a_{ij} represents the patient evaluation of the question ***i*** at the appointment ***j.*** Having these elements, we further proceed with statistical analysis and interpretation of the collected data.

RESULTS

1. Improvement of TMJ click sound

We compute the mean value m_1 of the patient's evaluation at question number 1 at each appointment. This parameter allows as to check the progress of the treatment and consequently the improvement of patient condition.

$m_1 = \Sigma_{i=1}^{N} a_{i1}/N$, where N is the total number of patients

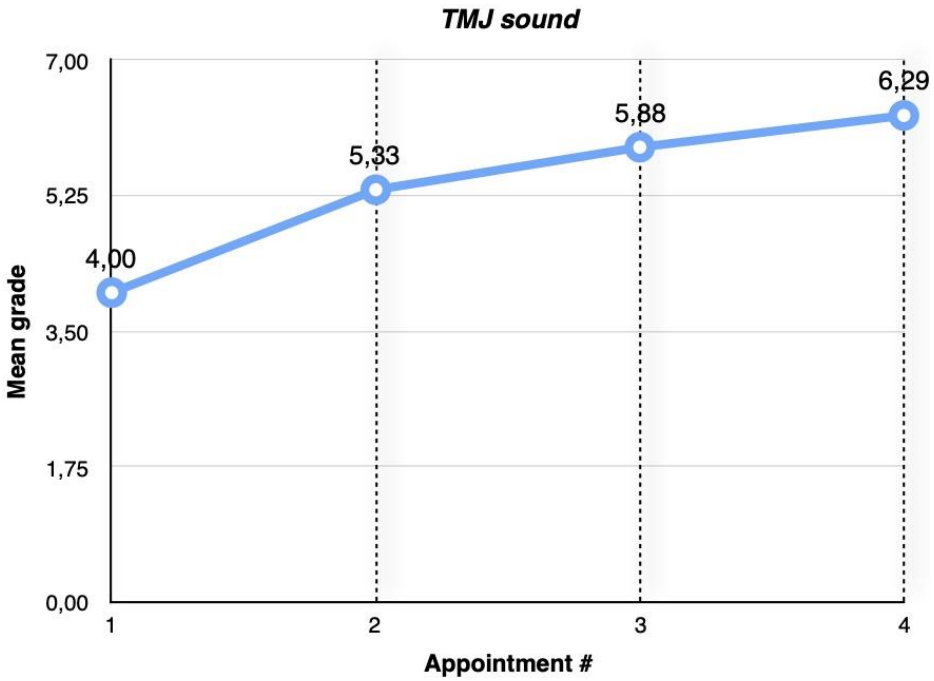

Figure 1. TMJ sound evaluation

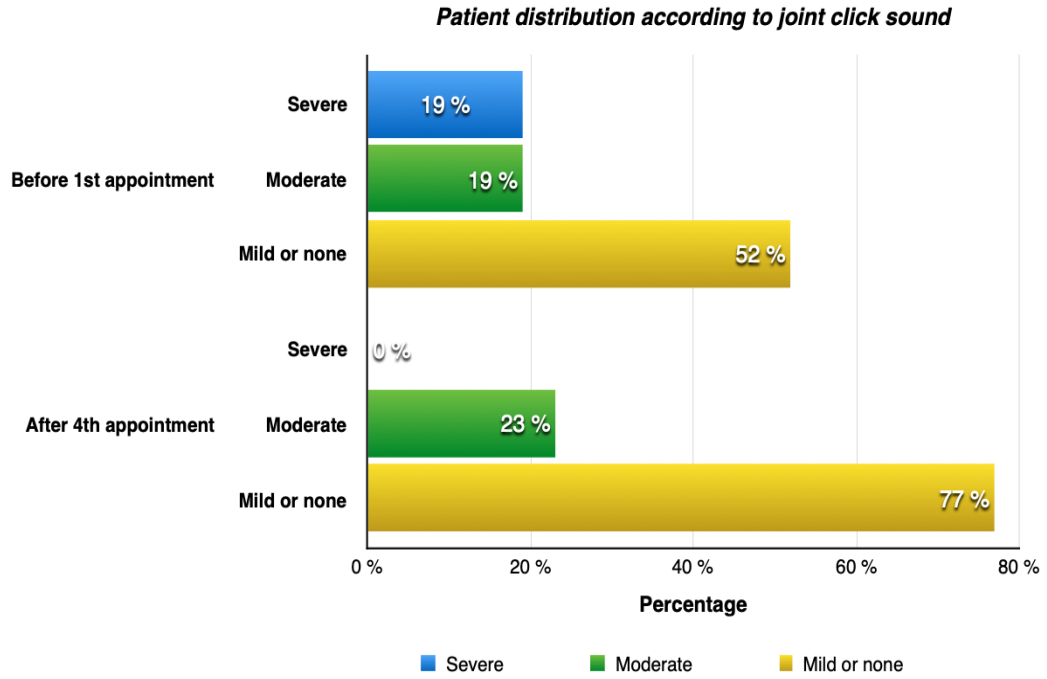

Figure 2. Patients distribution according to joint sound level

The results are presented in Figure 1. We can notice a significant improvement on the average patient perception about the TMJ click sound during mastication and speech. Patients who presented a late click at the beginning experience the best improvement at the click. In some patients with a late joint sound the click disappeared but in other patients with an earlier joint sound clicking was still present.

We are also interested to evaluate how the treatment has improved the quality of live on the investigated group of patients, and more precisely how many patients have a better perception over the TMJ sound improvement. In this context, we have established 3 levels of joint sound:

- **Severe** - corresponding to scoring from 1 to 3
- **Moderate** - corresponding to scoring from 4 to 7
- **Mild and no sounds** — corresponding to scoring from 8 to 10.

We evaluated each patient answer to question 1 before the first appointment and after the 4th one and classified them according to the 3 groups above. The percentage of patients in each group have been evaluated at the beginning of the treatment and after 4th appointment. The results are presented in Figure 2, and we can observe a dramatic improvement, in the group of patients with severe sound, the clicking has disappeared after 4 appointments and the group of patients with mild or no sound has increased significantly from 52% to 77% of all patients.

2. Pain evaluation

We compute the mean value m_4 of the patient's evaluation at question number 4 at each appointment.

$m_4 = \Sigma_{i=1}^{N} a_{i4}/N$, where N is the total number of patients.

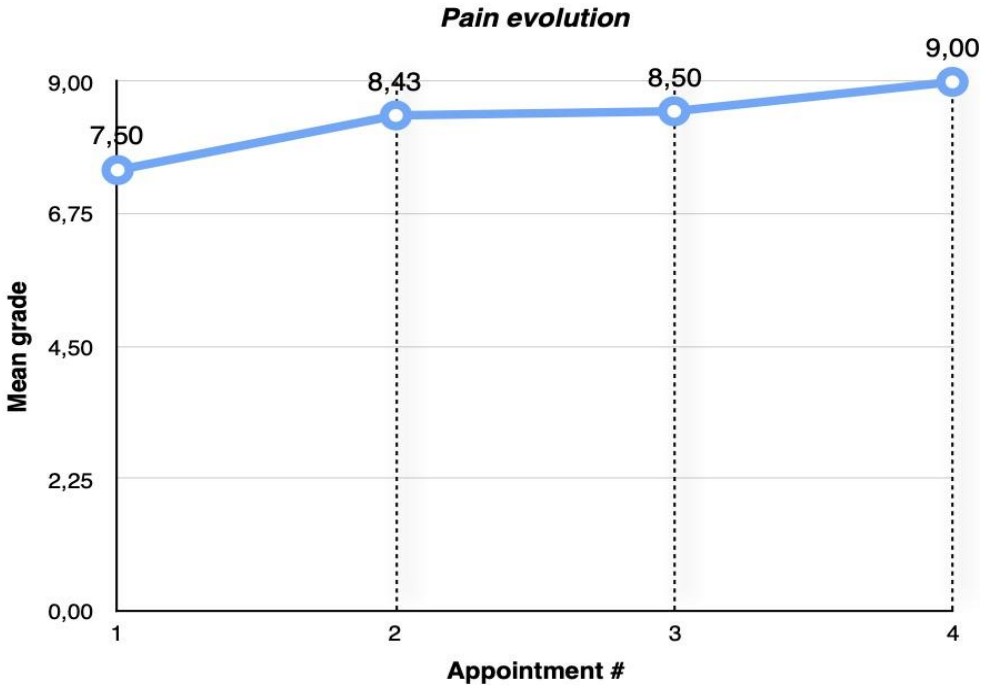

Figure 3. Pain evolution

Results are presented in Figure 3. We can clearly see that the perception of pain is much less after just 4 appointments, from a moderate pain on average to mild-no pain value on average. Pain is the most important factor in degradation/improvement of the patient quality of live and therefore the result clearly show that the split therapy drastically decreases the pain level on symptomatic TMJ patients.

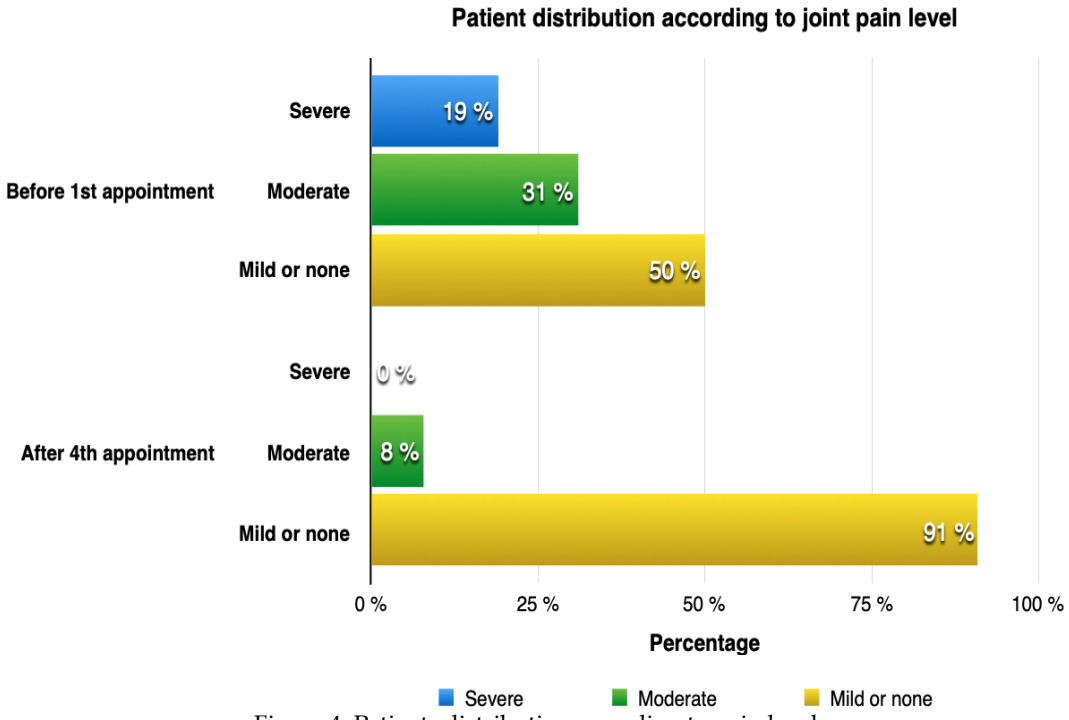

Figure 4. Patients distribution according to pain level

Were also interested to evaluate the effect of the therapy on the quality of live on the investigated group of patients, and we investigated how many patients have a better perception over the pain after the treatment. In this context, we have established 3 levels of pain level:

- **Severe** - corresponding to scoring from 1 to 3
- **Moderate** - corresponding to scoring from 4 to 7
- **Mild and painless** — corresponding to scoring from 8 to 10.

We evaluated each patient answer to question 2 before the first appointment and after the 4th one and classified them according to the 3 groups above. The percentage of patients in each group have been evaluated at the beginning of the treatment and after 4th appointment.

The results are presented in Figure 4, and we can observe again a dramatic improve, the group of patients with severe has pain disappear after 4 appointments and the group of patients with mild or no pain has increased significantly.

3. Patient satisfaction

During and after the therapeutic phase the patient satisfaction is the ultimate indicator of the treatment success. In this respect we evaluate the average patient satisfaction with the treatment by computing the mean value m_5 of the patient's evaluation at question number 5 at each appointment.

$m_5 = \Sigma_{i=1}^{N} a_{i5}/N$, where N is the total number of patients

The results are shown in Figure 5, where we can notice a significant improvement over the patient satisfaction during the 4 appointments. After the first appointment this indicator is rather low because of the initial discomfort cause the splint wearing, combined with a rather small decrease of pain and joint sound at this stage of the treatment. At the 4th appointment we can notice a high increase of patient satisfaction because at this stage, the improvement on general state (much less pain and less joint sound) has much bigger impact on the patient well-being than the discomfort cause by splint wearing.

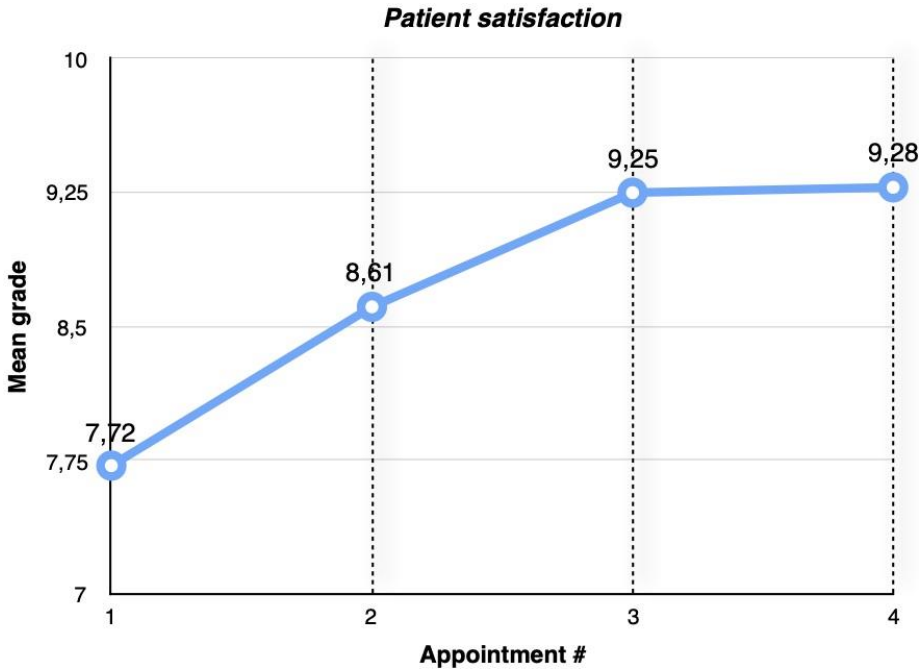

Figure 5. Patient's satisfaction evaluation

DISCUSSIONS

The purpose of this study was to evaluate patient's satisfaction after splint therapy.

CO-CR discrepancy can produce TMD and pain. Current literature stated that anteroposterior condylar position might be related with TMD. In a previous study, the

condyle was positioned more posteriorly in Class II, division 2 patients, and this might cause severe TMD by more physical loading. [16] Previous study demonstrated that adequate temporomandibular space would be necessary to avoid excessive compression of the disc. [17]
In this study authors demonstrate that pain and joint sound could be improved with the use of splint therapy as shown in other studies before. Also, that quality of life of patient treated Another study suggests that TMJS should be investigated for orthodontic patients to prevent TMD. [18]
For patients who have TMD pain or an unstable musculoskeletal position, orthodontists can consider resolving the TMD symptoms before any orthodontic treatment has begun. Internal derangement of the temporomandibular joint (TMJ) can be treated using a full-arch maxillary stabilization splint. [19.20]
Deprogramming splint therapy followed by occlusal equilibration treatment could improve symptoms in patients with TMD.
TMD pain could interfere with everyday activities like speaking and eating. Pain could be located in the ear region, could be muscular pain at the temporal zone or in the cervical aria. Splint therapy is the first choice in improving this type of patient quality of life.

CONCLUSIONS

The splint therapy protocol requires that earring time to be 24 h per day except the when brushing and cleaning the teeth. However, this recommendation is not respected fully by all patients and we want to evaluate in our study the impact of splint wearing time on the TMJ pain amelioration.

First conclusion we quickly saw was that in the case of patients that experience mild to no pain at TMJ level at the begging of the therapy (pain scoring from 8 to 10) the splint wearing time is in average 4.8, meaning less than 12 hours per day. For these patients the discomfort caused by the splint wearing is more important since the pain does not exists. On the contrary the patients that experience moderate pain at the beginning of the treatment are wearing the splint for more than 16 hours per day (grade 7 average), and those with severe pain for more than 20 hours per day (grade 9 average).

But the most important thing is that on 90% of these cases, with severe and moderate pain, the pain disappears completely after 4 appointments.

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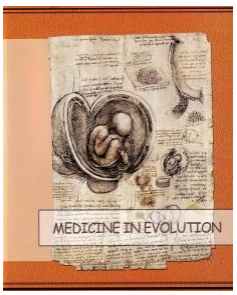
Smoking behaviour among a group of adolescents. A 2-year longitudinal study



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Abstract

Aim. The aim of the study was the assessment of the changes in smoking frequency during a twoyear monitoring program among a group of adolescents.

Material and method. The 2-year longitudinal study evaluated a group of 61 schoolchildren, 13-16 years-old, enrolled in the Com4You Oral Health Promotion Program in Bucharest, Romania. The behaviour assessment was performed using a self-administered questionnaire regarding oral hygiene, diet, dental services utilisation and smoking, applied every 8 months, 4 times in total. The subjects were delivered during the program 3 oral health educational lessons using experiential learning, with different oral health-related aspects approached at each lesson and smoking was part of the last one, with the final assessment at 2 weeks after the last lesson.

Results: The frequency of smokers increased gradually from 11,5% at baseline to 41% at the end of the monitoring period. When the sample was divided by age, results showed that the increase in frequency of smokers was greater among the 15-16 years-old group, from 19,4% at baseline to 48,4% at the final assessment, who also increased with time the number of cigarettes used per day, compared to 13-14 year-olds, from 3,3% to 33,3% and who kept smoking only occasionally during the study. Moreover, boys were more attracted by smoking than girls, the increase in frequency of smokers among boys was from 12,5% at baseline to 62,5% after two years, compared to girls: from 11,5% to 33,3%.

Conclusion: in the studied group, adolescents smoked already from 13 years old, and the frequency of smokers increased fast with age, around 15 years they already smoked daily, with boys being more prone to smoke than girls.

Keywords: oral health promotion, adolescents'oral health

INTRODUCTION

Smoking is a global concern for public health since one third of global population have this harmful habit that is responsible for the death of half of the all lifetime smokers, most of them dying in their middle age [1].

Many health issues are induced or complicated by smoking, including oral diseases. Periodontal disease, oral cancer and poor wound healing are the most frequently met oral health issues associated with smoking and dentists play an important role and smoke cessation [2]. However, even if health risks of smoking are widely known, smokers find it hard cu quit, despite of their will, because of the highly addictive nicotine present in cigarettes [1].

Many adults start smoking during their adolescence [3], and a report of World Health Organization and Tobacco-Free Initiative published in 2002 [4] showed that for the adolescents between the ages of 13 and 15 years the mean global frequency of current smokers was 13,9% and the frequency of those who ever smoked cigarettes was 33,3%, most of them being attracted by this habit early in life since 23,9% of teenagers declared they tried their first cigarette before the age of 10 [4]. Unfortunately, compared to adults, teenagers develop nicotine addiction after less cigarettes and less time [5]. Therefore, when aiming to reduce the prevalence of smoking in global adult population, preventing measures targeted to adolescents is mandatory.

Since smoking is a common risk factor for both general and oral diseases, promoting smoking prevention or cessation is recommended and supported by WHO either in large communities, through oral health promotion programs, or individually, in the dental offices through behaviour change counselling for a healthy lifestyle [1,2].

Aim and objectives

The aim of the present study was to assess the frequency of cigarette smokers among a group of adolescents and at what extent it changes with time, age and sex during a 2 years period.

MATERIALS AND METHODS

The 2 year-longitudinal study was developed as part of the Erasmus+ "Youth Community-Based Oral Health Learning Model" (Com4You) program, that included oral health promotion measures targeted to adolescents and that took place between 2015 and 2017. The extensive research in the afore-mentioned program enrolled at baseline 120 teenagers, 13-16 years-old, from 3 schools in Bucharest, Romania, who were divided in a test group, with 76 subjects and who received oral health education using 3 experiential learning lessons, and a control group of 44 subjects who were offered traditional learning and only 1 oral health lesson. The sample selected for the present study was part of the test group from which 13 subjects dropped out during the two years period of study and thus, the final sample was formed by 61 subjects who went through all the phases with the recurrent interventions and assessments. The assessment of the smoking behaviour was assessed using a self-administered questionnaire that included, as well, other aspects regarding oral health-related behaviour. The same questionnaire was deliver at baseline and every 8 months, 4 times in total. The 3 oral health promotion lessons were all different, each of them approaching the main topics: oral hygiene behaviour, caries-protective vs cariogenic eating habits, regular dental check-ups and professional preventive treatments, and smoking. Taking into consideration that smoking behaviour and its influence on oral health was approached in the last lesson, and that the last questionnaire was applied two weeks after this last lesson, and also that the smoking-related behaviour needs time to reverse, the influence of the

lessons on smoking avoidance or cessation among the subjects enrolled was minimal. The final sample was represented by 6 graders, thus a subgroup of 13-14 years-olds (30 subjects), and 9 graders, a subgroup of 15-16 years-olds (31 subjects). The results were analysed using age and sex as independent variables and the behaviour was analysed as evolution through all the 4 recurrent assessments as it follows: baseline (initial), at 8 months, at 16 months, and 24 months (final).

RESULTS

The mean age for the entire group was 14,52 ± 1,44 years. When divided by age, in the 13-14 year-olds group (30 subjects, 49,19%) the mean age was 13,10 ± 0,30 years and the majority was represented by 13 year-olds (90% (N=27)), while in the 15-16 year-olds group (31 subjects, 50,81%) the mean age was 15,90 ± 0,30 years, and the majority was represented by 16 year-olds (90,3% (N=28)). Divided by sex, boys represented 26,2%(N=16) of the entire group.

The frequency of adolescents who smoked increase constantly and rapidly during the 2 years monitoring period from 11,5% at baseline to 19,7% after 8 months, to 31,1% after 16 months and to 41% at the final assessment at 24 months. Of those who smoked, the highest percentages were of those who smoked only occasionally (except for the assessment at 8 months, when number of daily smokers was double of those who smoked occasionally). Starting with the third assessment, after 16 months of monitoring, there were observed adolescents who already increased their number of cigarettes smoked to more than 10 per day, but the frequency of these category of smokers was very low (Figure 1).

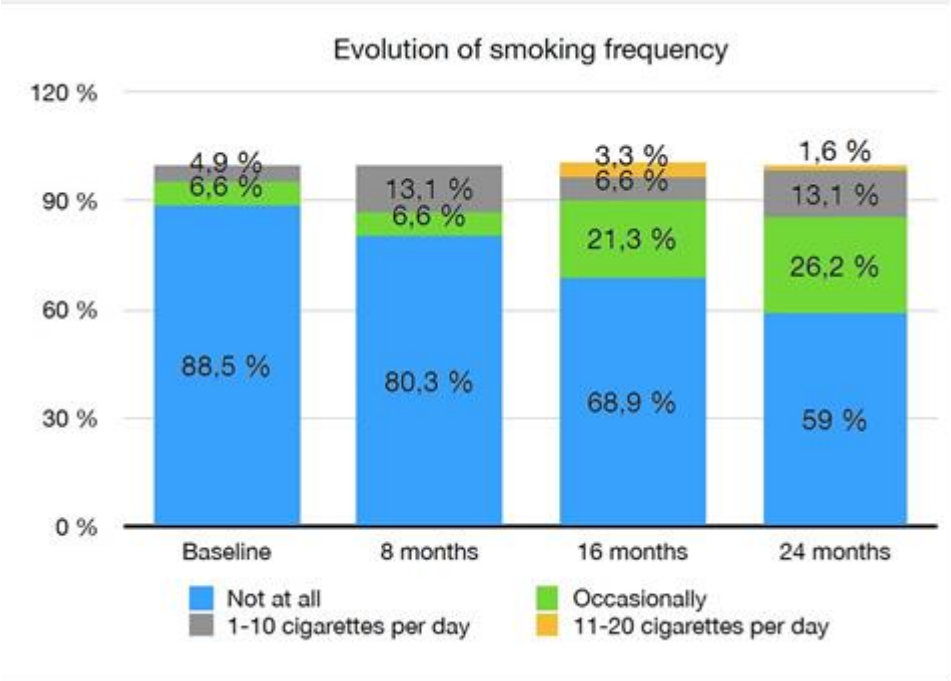

Figure 1. Evolution of smoking frequency

When the analyse was performed separately by age, the results showed a more rapid and unfavorable for adolescents who were 16 years-old at the beginning of the study (9 graders) compared to those those who were 13 years-old at the beginning of the study (6 graders).

For the 6 graders group, at baseline only 3,3% smoked, after 6 months none of the subjects declared smoking while at the 16 months assessment 13,3% smoked and at the final evaluation, at 24 months, by the time they got 15 years, already 33,3% were smokers. All of

the smoker subjects in this age group declared that cigarette smoking was only occasionally (Figure 2).

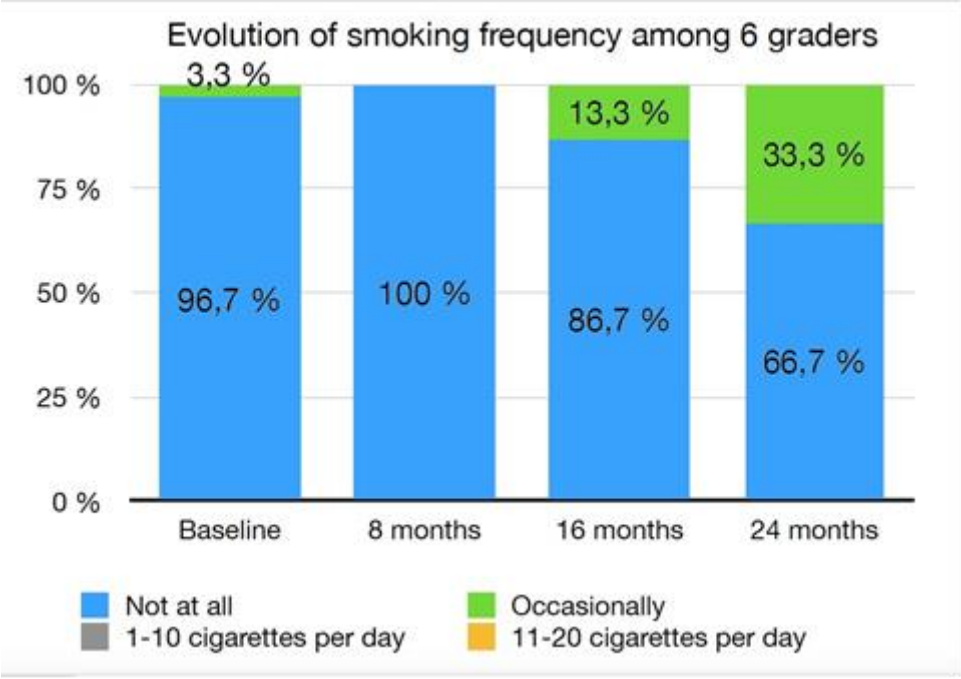

Figure 2. Evolution of smoking frequency among 13-14 year-olds

For the 9 graders, at baseline 19,4% adolescents smoked, in equal proportion daily smokers and occasionally smokers, and in only 8 months the frequency of smokers doubled, then continued increasing in the next 8 months from when the frequency stabilised until the final assessment. And not only the frequency of smokers increased, but also the frequency of cigarettes used per day. Thus, among daily smokers those who used 1 to 10 cigarettes per day were observed even from the baseline and starting with the 3rd assessment, after 16 months, there were observed adolescents who increased the number to 10-20 cigarettes per day (Figure 3).

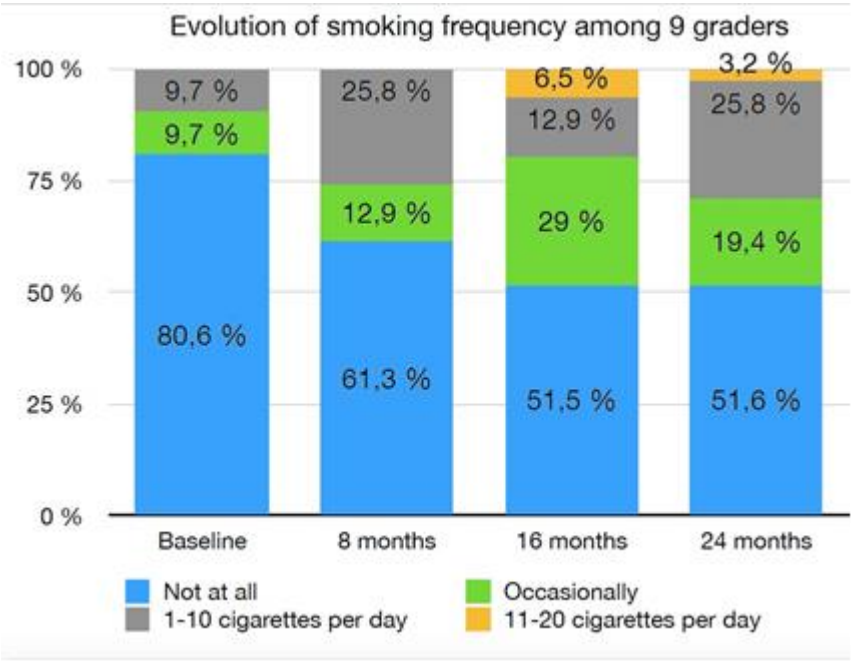

Figure 3. Evolution of smoking frequency among 15-17 year-olds

When the group was divided by sex, the results showed that the evolution was similar in the first 8 months. For girls, the increased was dramatical between the assessments at 8 months and 16 months, from 20% to 35,6%, from when the frequency stabilised until the end of the study. For boys, the increase was slow between baseline and the assessment at 16 months and sharp in the last 8 months of the study, from 18,8% to 62,5% (Figure 4).

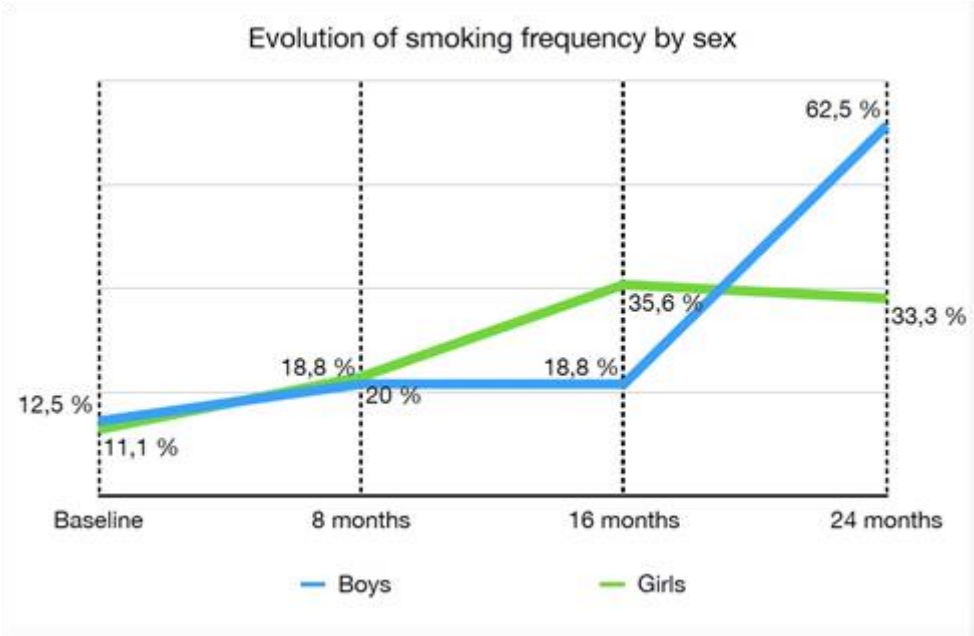

Figure 4. Evolution of smoking frequency by sex

DISCUSSIONS

The smoking behaviour among the group assessed in the present study is poorer compared to global level. In a international report of the 2013-2014 Health Behaviour in School-aged Children survey developed by WHO published in 2016, at the European level, the frequency of smokers at the age of 13 years of 4% for boys and 3% for girls, respectively at the age of 15 of 12% for boys and 11% for girls [5]. Also, in a report published by the US Department of Health and Human Services, in 2015 the frequency of cigarette smokers at the US level was 1,3% among 8 graders, 3% among 10 graders and 5,5% among 12 graders and by 2017 the frequency decreased to 0,6%, 2,2%, 4,2% respectively [6].

CONCLUSIONS

Adolescents assessed in the present study showed an improper smoking-related behaviour, at the age of 13 already 1 in 20 teenagers smoking occasionally and by the time they get 15 years one third of these teenagers having this habit. Moreover, 16 year-old adolescents already smoked daily, 1 in 10 smoking between 1 and 10 cigarettes per day and by the time they get 17 some of the adolescents smoke more than 10 cigarettes daily. In addition, boys are more prone to start smoking.

Acknowledgement

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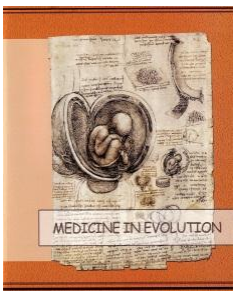
Oral health status of kindergarten children with special needs



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Abstract

The purpose of this retrospective study is to find out in what extent disabilities may have an effect on the oral health, in contrast to healthy children between three to six years of age from. Leverkusen, Germany. Three children enter the treatment room at the same time, this procedure being the most efficient. The evaluation of the patients made use of the dmft-index according to its definition. The specific dmft value that was found, is represented in percentage compared to all the others. Out of the total of disabled children, 16 showed the dmft value of 0, compared to the 82 children without disabilities found with a dmft of 0 However, comparing those two values in percentage, it is clear that the overall expectancy is rather different, since 44.44% of all disabled children in this study were caries free, compared to 63.57% in the healthy group of children. Furthermore, it is evident that extreme values are more frequent to be found in the group among disabled children. The results of this study show, that the average tooth of a child with special needs affected by the dmft index was always higher than compared to healthy children.

Keywords: DMFT, oral health, children, disabilities

INTRODUCTION

Today, around one billion, or around 15% of the world population in the year 2018 fall under the definition of some kind of disability. [1] They are often characterized by having poorer health condition than others, the ability to receive higher educational levels may be harder, or even unreachable to obtain, and higher rates of poverty itself and less interaction on social basis may be evident. [2]

The ICF [3] (International Classification of Functioning, Disability and Health) differentiates the word "Disability" in three subcategories. The "impairment" is a problem in body functioning or a modification of the body structure. The "limitation in activity" results in difficulties in the execution of activities. The "Restriction of participation" results in problems that involve any area of life on daily basis.

The disability results by the concurrence of one, two, or all three of these areas.

Nearly 200 million people in the world fall under category of severely impaired (physical or mental) and require special help in order to keep up with basic tasks of life.

There are two major ways on how a person can become disabled. One way is a congenital disability, which means it is either due to inheritance or chromosomal abnormality, or prenatal injury. The other way can be an acquired disability which is a result of perinatal damage, a disease, body injury, or by the aging process.

It is a fact that the ability to take care of themselves, young people with a physical or mental impairment, is either limited, or not given at all. The result very often is a less than optimal hygiene. Especially the combination of shortcoming in oral hygiene, proper nutrition, in combination with the lack of prevention and treatment options regarding children with special needs, results in an increased risk of dental problems in the oral cavity. [4]

However, there have been all kinds of studies with different results all over the world.

The studies of Tesini and Fenton [5], or the results of Nunn and Murray [6] showed no significant disparity in the prevalence of caries in children with, or without a disability.

On the contrary, in Germany there have been different studies that pointed out, that not only the occurrence of decays were more common in handicapped people, but also gingival or periodontal problems in combination with caries were very frequent. [7] [8] [9]

Storhaug and Holst [10] presented a higher than average caries incidence in disabled Norwegian children.

Strübig and Rosendahl [11] executed a study in which they compared disabled children with healthy children in the same group of age. Their result was that the caries prevalence was even double, compared to the healthy children.

Since children with special needs cannot take care of themselves, detection and prevention regarding the oral hygiene often is neglected. Due to physical or mental impairment, the food that is being eaten, or food residues stay longer in the mouth and may be cariogenic to the teeth. Also, anticonvulsive drugs may induce gingival hypertrophy, followed by gingival inflammation. Those two reasons are the most common causes why the only treatment option for a disabled person will be the removal of the affected teeth.

Notably, due to revised and in this area untrained nursing staff, especially regarding home care, and the lack of flexibility of attentive care, will prevent effective early detection and therapy of oral diseases from the patient and caregiver side. [12] The result is, that the child will only be taken to the dentist when it is absolutely necessary, which usually means that it is too late. Also, inadequately equipped facilities and untrained doctors contribute to that problem. [13]

Dentists that are confronted with a child that presents special symptoms or an anatomical anomaly, usually feels overburdened because they neither have the required special training in this field, nor experience. The treatment options very often are limited,

since cooperation for an extended period of time, or even simple interventions will be very hard to obtain.

Children without disability often fear the visit to the dentist. They come to the office with an overall bad attitude, rejecting a treatment before it even started. This mind-set intensifies in disabled children. It is proven, that regular check-ups can help them to cope with their fear. Nicola Dreher [14] showed in her study, that this also applies to children that are handicapped. She based her study on prevention and treatment on a big group of disabled children and young adults and pointed out, that repeating patterns eases this group of people. If a patient was not able to cope with a treatment, they met up to three times and started the treatment after showing the instruments and explaining the approach of the procedure.

It is needless to say, that this approach is only feasible on patients with a minor or mild mental retardation. In patients that show severe signs of mental impairment, or serious physical disability, usually extraction therapy, or therapy under general anaesthesia is the only option left for them.

The condition may be congenital, developmental, or acquired through disease, trauma, or environmental cause and may impose limitations in performing daily self-maintenance activities or substantial limitations in a major life activity. [15]

The oral conditions of children with disabilities are reported to be worse, either due to the existing disability or due to medical, economic or social reasons. [16]

The oral health problems that might be encountered most often are: Tooth decay, periodontal disease, malocclusion, damaging oral habits, oral malformations, delayed tooth eruption, trauma and injury. [17]

Aim and objectives

The purpose of this retrospective observational study was to find out in what extent disabilities may have an effect on the oral health, in contrast to healthy children between three to six years of age.

For this reason, an investigation containing a total of 165 children was done and carried out between 2013 until 2018, within a free of charge agreement and non-profit cooperation between a kindergarten and dentistry.

MATERIALS AND METHODS

This study was performed as a retrospective analysis of the ongoing clinical investigation throughout the years between 2013, until 2018, in Leverkusen, Germany, on a group of 3-6 years old children. All children represented in this paper were provided by a non-profit contract between a particular dentist and a kindergarten which includes the informed consent and al the ethical approvals. This kindergarten has a specific focus on children with special needs. Compared to other day-care centres, it is known for a high concentration of people with all different kinds of disabilities and specifically trained staff, regarding that matter. The kindergarten has six different groups, containing approximately ten children each. All groups come one after another to the office and wait in the waiting room until it is their turn. The waiting room contains all different kinds of toys for young kids, so they can distract themselves, which decreases anxiety.

Three children enter the treatment room at the same time. After doing this procedure for already a couple of years, it was decided that this method was the most efficient one. One child takes place at the dental chair, while two others of the same group (preferably) sit next to him/her on small stools, so they can observe, what the dentist does to the one, sitting on the dental unit. Also, this measure was found to be effective in decreasing anxiety and stress of especially young children, who have never been to the dentist before. If there were more people in the room, it would have been too crowded and negative behaviour like screaming,

actively denying check-up, or others, would easily influence the other children. This would severely harm the procedure of dental charting and evaluation of the oral cavity. Afterwards, the child from the dental unit goes back to the waiting room, so he/she can explain that nothing bad happened, while the next child moves up from the stool to the dental unit, or from the waiting room to the treatment room, respectively. While the last children of a group are being checked, the following group enters the office. This approach appeared as the most efficient regarding effort and time that had to be spent with around 50 children in a dental office. Also, the staff of the dental office, as well as from the kindergarten agreed to this method because it is the least stressing, while still being efficient in the use of time.

The evaluation of the patients made use of the dmft-index according to the definition of the dmft-index.

The following criteria had to be fulfilled:

- The child had to be present
- The child had to present a signed consent that agrees to being part of the check-up program between the kindergarten and dental office.
- The child´s age had to be between 3 and 6 years of age. Otherwise it was excluded from the specific evaluation of this study.
- The child had to be cooperative in order to be able to determine the dmft value. Otherwise it was excluded from the specific evaluation of this study.
- All children being affected by some kind of disability had to be pointed out by staff of the kindergarten, in order to be able to place the dmft result under the category "disabled". Furthermore, this step is necessary, since very mild degrees of a disability might not be detected at first glance (e.g.: autism)

RESULTS

The main purpose of this clinical observational study, was to determine whether a disabled child is more prone to have an increased dmft, or if they have the exact same value compared to a child without disability.

When analysing table 1., it can be seen, that the distribution of patients throughout the five years of study is not equal. Generally speaking, there were much more healthy children in that study, than disabled ones. Overall, this study over the five years of observation contains 129 healthy and 35 disabled children. The distribution of children between age, sex and the physical or mental state is uneven.

Table 1. Exact numbers of children, either healthy or disabled, that took part of the observation

	2018	2017	2015	2014	2013
Healthy Girls	11	18	4	10	14
Healthy Boys	18	14	9	21	11
Healthy Chil.	29	32	13	31	25
Disabled Girls	0	1	3	3	4
Disabled Boys	9	9	4	0	3
Disabled Chil.	9	10	9	3	7
All together	37	41	20	34	32

The year 2013 was the first year, in which the dental office was part of the program in which the kindergarten and the dentist worked together. Out of 32 participants, 14 (43.75%) or were girls without disabilities, 11 (34.38%) or were boys without disability, 4 (12.50%) were disabled girls and 3 (9.38%) were disabled boys. The total dmft score was 44, 29 (65.91%) of healthy children and 15 (34.09%) of disabled children having dmft scores higher than 0, resulting in an almost even distribution of throughout all children from that year.

2014 consisted of 34 participants, with only 3 8.82% being disabled girls, while the healthy children were represented by 10 (29.41%) of girls, and 21 (71.76%) boys. 2014 is the

only year in which the mean dmft value of healthy children is higher than compared to the value of disabled children, being 1.33 of disabled girls compared to 1.6 to healthy children. However, combining healthy girls and boys and comparing them to all disabled children of that year, the mean dmft per capita results in 1.33 to 0.97, meaning that the disabled ones are still worse in comparison.

The year 2015 gave rather different results, compared to the others. Just 20 children were part of the program, but only 65% or 13 of them were healthy. 9 or 35% were disabled, being split up into 3 girls and 4 boys. Due to the highly uneven distribution of dmft counts, the mean average dmft of disabled girls is 5.33, resulting in the highest value observed in this study. The mean value of healthy boys was 0.22 and the one of disabled boys was 1.

The year 2017 showed similar results like the following year. There were 41 participants, 32 healthy and 10 disabled children. 18 boys and 14 girls that were healthy, 9 boys and one girl that were disabled. When analyzing the mean dmft of 2017 regarding the boys, the healthy ones present a mean dmft of 0.86, whereas the disabled ones have a mean dmft of 4.22. This is a huge increase of caries prevalence and general status of the oral situation. Both genders together however, result in a mean dmft of 3.8 to 1.51 meaning it is twice as high and not so extreme anymore.

The year 2018 had 37 participants visiting the dental office. 29 of them were healthy and only 9 had some kind of disability. Only disabled boys were participants in that year because no girl with special needs were present. Considering all the dmft values from this year, 55 teeth in total were counted that fall under this category. Even though the distribution of healthy and disabled children were so uneven, meaning there were more healthy children in contrast to disabled ones, the percentage distribution of all dmft´s was 50.91% (29 children) to 49.09% (9 children). Considering the mean dmft split up to healthy and disabled regardless the gender of the observed children, it can be seen, that the prevalence is 1 (healthy): 3 (disabled), meaning disabled children had a three times higher caries incidence than the others.

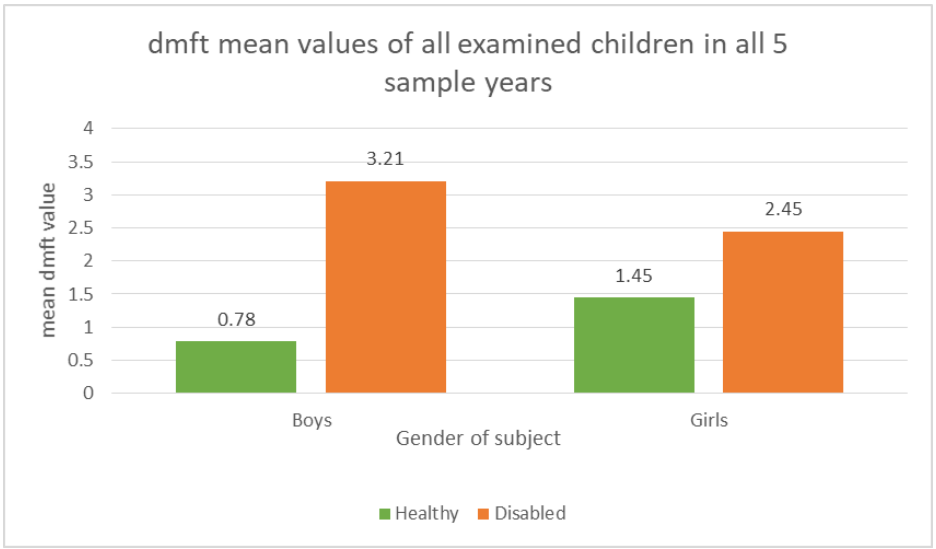

Figure 1. Conclusive chart from all the 5 years in which observation took place, in order to get an average of all the values, presented in the previous charts

According to figure 1 it is clearly evident that the total number of dmft value, being split up equally per observed children (not factoring in the gender or age), is generally higher for disabled children, than compared to the ones that are healthy. This statement is underlined when considering table nr. 12. It shows a conclusive chart which presents the results of all 5 observational years by comparing the mean dmft distributed to all healthy and disabled children, not factoring in the age or gender. Considering all children of this study

and distributing all the dmft values per individual, divided into healthy and disabled, the result of this study shows that the average healthy child between the age of three to six years, has around one tooth affected by caries, a missing, or filled tooth, according to the afore mentioned definition of dmf in 2.2.4., and a disabled child between three to six years, has 2.65 affected teeth, that are considered by the dmft score.

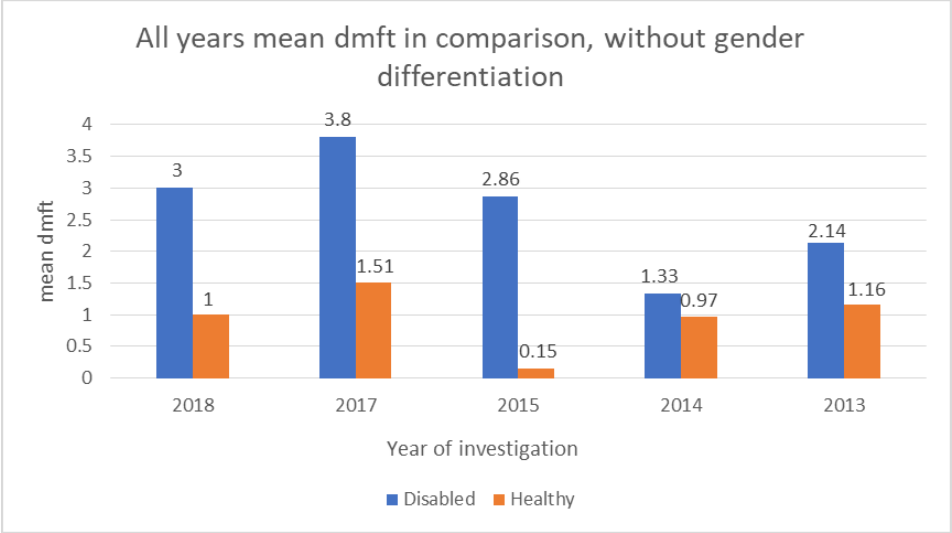

Figure 2. Conclusive chart presenting the results of the 5 years in which observation took place, without gender and age differentiation. A clear differentiation between the mean dmft of healthy and disabled children can be seen

Figure 3 focuses on the age of the individual and the dmft without considering the gender, differentiating only in healthy and disabled of the observed children. As well as in the other afore mentioned tables, it is evident in how the observed disabled children had a significant increase in their mean dmft value throughout the age of three to six years. Whereas the mean value of healthy children with the age of three years was relatively low with 0.22, disabled children had a mean value of 2.14. An increasing tendency can be observed when considering disabled children with the age of 4. They have a mean value of 3.2, compared to 0.72 of healthy children. The observed healthy children with the age of 5 had an increase to 1.55, while disabled children had a slight decrease to 3.08. Children observed with the age of 6 further decreased the mean value to 1.39 for healthy ones and 2.83 in disabled children respectively.

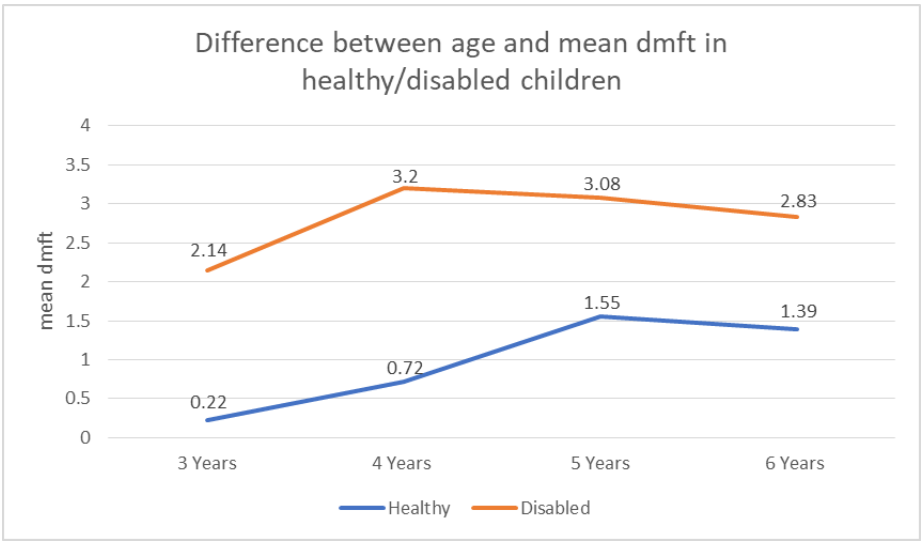

Figure 3. Conclusive chart presenting the results of the 5 years in which observation took place, pointing out the mean dmft in relation to the age of the patients

To get a better understanding and to mitigate the problem of the uneven distribution of healthy to disabled children, the specific dmft value that was found, is also represented in percentage compared to all the others. The number of disabled children was uneven, 16 children showed the dmft value of 0, which compared to the 82 children found without a problem, seems rather small. However, comparing those two values in percentage, it is clear that the overall expectancy is rather different, since 44.44% of all disabled children in this study were found caries free, compared to 63.57% caries free in the healthy group of children. Having a look onto all children with one tooth affected by caries, 3 disabled children compared 11 healthy ones, it is very interesting to see that percentagewise they are almost even, being 8.33% to 8.55%. However, the trend from that point onwards is decreasing since the majority of the disabled children had either zero or only one affected tooth. Children with more extreme scores are observed more frequently now. As an example, in the healthy children group, the dmft value of 4 was only observed one time, meaning 2.33%. In contrast, this value was found 7 times in disabled children, meaning 19.44% were found with a dmft value of 4. This trend continues when considering the following values regarding disabled children. Furthermore, it is evident that extreme values are more frequent to be found in the group among disabled children. Regarding table nr.14 it can be seen, that (except for three children) the worst dmft value obtained from healthy children was 5 and this is considering all 129 children. Compared to the disabled children, worse dmft values (6, 7, 8, 10 and 16) can be found rather often. Concluding, from 36 children, 8 (22.22%) children alone make up of 65,38 % of all teeth affected by the dmft value which is extreme.

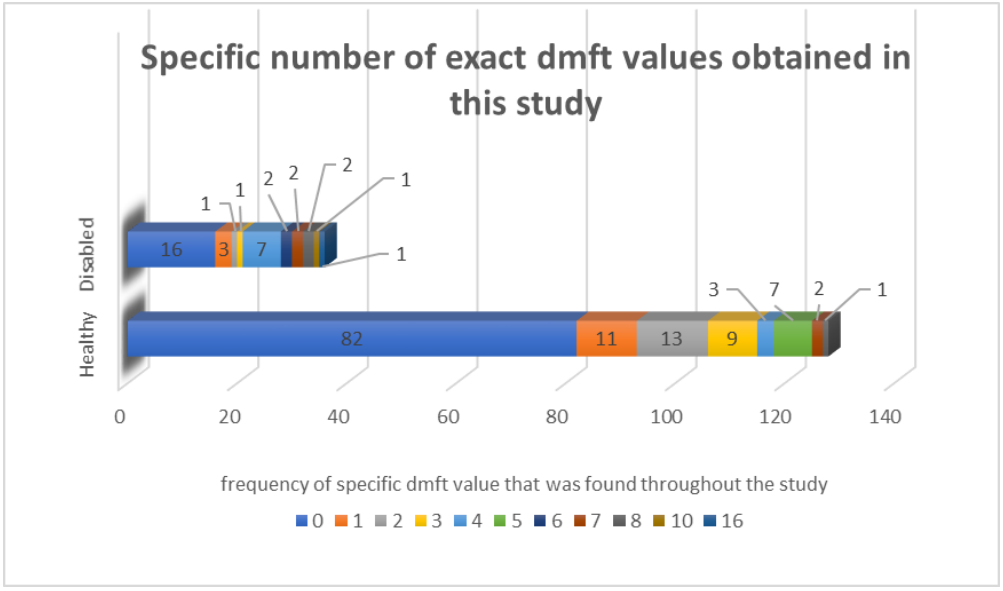

Figure 4. Bar diagram showing the specific number of dmft values obtained by the observation of 129 healthy and 36 disabled children

DISCUSSIONS

This retrospective observational study assesses the prevalence of oral health in disabled children compared to healthy ones from the year 2013 until 2018. The results from the yearly check-up of every individual child were accumulated until the last year of observation in order to be able to make a comparison.

Since there was no even distribution of children in regard to gender, age and especially to numbers of healthy und disabled children throughout the study, there is no possibility in making a definitive conclusion. However, the results presented in this study shows clear evidence that children with special needs, who were observed in this study, actually do have an increased dmft index value.

Other studies came to the same conclusion, like the one done by Donay, who pointed out that people with special needs are limited in their maintenance of oral hygiene due to restriction in movement, malnutrition throughout prolonged timespans and improper prevention. [32] Storhaug and Holst [10] conducted a study in Norway which also came to the same conclusion. Strübig and Rosendahal [11] had a survey and found a caries prevalence in disabled children which was even twice as high, compared to healthy children in the same age. However, this study was done only in children with moderate to severe disabilities. Furthermore in 1980, the general oral health situation was worse than it is nowadays, almost 40 years later. A well-respected German journal reported back in 2014, that an average twelve years old child had a dmft of 0.7, compared to 7, 30 years ago. [33] Anyways, there are also studies that claim that there is no significant difference in caries prevalence in children with special needs compared to healthy ones. [5] [6]

The author thinks that children with special needs definitely are more susceptible of being affected with bad oral health than others, due to the aforementioned reasons. However, depending on the severity of the disability, a child of the age of 6 can be in perfect condition with the dmft of zero. This can also be seen in this study, where 44% of the disabled children observed had exactly this score, when not considering the age. On the other hand, extreme cases can be found on both sides. Factors of nutrition and habits, like sweetened drinks in a bottle over nigh can play an important role and may lead to ECC (Early Childhood Caries, etc.)

Although the DMF index has been a well-established index in the evaluation of the dental epidemiology for more than 80 years, it may present limitations. It is said, that there can be a significant amount inter-observer bias and variability. [31] The resulting value does neither provide true indication for treatment needs, nor does it point out what specific tooth has to receive immediate action. Furthermore, the indices give equal amount of equal needs to untreated decay, missing, or well-restored teeth. [31] Also, teeth lost due to reasons other than decay are no accounted for.

The average dmft value is higher in disabled children because oral hygiene might be harder to perform, especially for severe handicapped individuals, leading to extreme results regarding specific dmft values,. The following decrease of mean dmft values in healthy and disabled children might be due to the reason, why parents realize that there might be a problem with the oral hygiene and they start to look for help of a dentist to prevent future worsening of the situation.

During this study we realized that, even though there were many disabled children present, most of them were able to cope with the investigation of the dentist. Furthermore, the majority of the children with special needs were only mild or moderately affected by their disability. This includes the disabilities like autism, attention deficit hyperactivity disorder (ADHD), cerebral palsy for mild disabilities and Down syndrome, epilepsy, spine bifida or intellectual disabilities for moderate levels of disability. The lower severity of those disabilities eases the contact between child and dentist which is very important because very often, children and especially children with special needs are in fear and have high levels of anxiety. As mentioned in the methodology, we grouped children together with their friends so the by standing friends can observe that nothing bad is happening to them. During the (normally) three year's period of stay of each individual child in the kindergarten, each child had the possibility to be part of our program at least three times. The result was that children that were taking part, got a better understanding of the procedure of investigation and improved their attitude towards the "unusual" situation of being in a dental chair and getting investigated by the dentist. A decrease of their anxiety and fear was very noticeable and improved cooperation with the dentist was achieved. Throughout the years and generally speaking, we found about 60% of the disabled children´s behaviour good enough to cope

with and receive the treatment. 20% of the children with moderate and severe disability however failed in cooperating and following instructions of the dentist. The last 20% were severely disabled and completely failed to follow instructions of the dentist. Those include disabled children with severe retardation and malformations leading to uncontrollable or involuntary movements of the patient. The only option of treatment in severe cases leads to the necessity of general or full anaesthesia. Those findings are on par with other investigations of other authors, who were also conducted on children with special needs. Cichon [9] for example showed that around 40% of his patients with disabilities were able to receive normal dental treatment without any special interventions like general anaesthesia or medical relaxants. Dreher [13] observed 50% of her patients with good cooperation towards the dentist, leading to a positive outcome. 60–100% even resulted in the best possible outcome of the treatment. However, her test subjects were mainly mild to moderate disabled children and teenager under controlled supervision in a special care centre. Regarding the fear and anxiety, Martin et al [36] stated that in his study it was evident, that 40% of the patients with mental retardation showed a higher-than-average prevalence and concluded that this fear and anxiety can be reduced by having the patient coming to the same dental office more often, so he or she can get used to the new environment.

Since primary teeth of children start to erupt at the age of 6 months, proper oral hygiene has to be maintained by the caregiver. Often this goal can be hardly achieved because children are known for not being very cooperative when it comes to this topic. Furthermore, children with special needs can be extra challenging. They have extreme anxiety, they may not have the understanding of the necessity of dental hygiene and may exhibit resistant behaviour. [37, 38] Due to this reason the caretaker should pay special attention in providing the child with a non-cariogenic died. Meaning that tooth decay can be prevented my minimizing the frequency and the amount of sugary drinks and foods. After the intake of those, regular brushing with fluoride toothpaste is highly indicated. Once the children are capable and old enough, they should start with brushing their own teeth under the supervision of the parents. Also, from that point on, prevention with the help of the dentist should be taken into consideration. Regular check-up can reduce anxiety to a minimum. Furthermore, the dentist has the possibility to treat caries in an early stage after detection and prevent other caries from forming. With the use of sealants, prominent fissures and pits can be closed, which greatly reduces the risk of decay forming in exactly those areas. [37] The use of topical fluoride is also very advisable in children with tendency towards bad oral hygiene because the manifestation of caries is reduced.

All in all, it is evident that children with special needs are more susceptible to caries and worse oral hygiene compared to their healthy counter parts. However, if prevention is started from early on and good oral hygiene is being maintained by the caregiver with the help of a dentist, the diagnose does not have to be worse than the one healthy children might receive. Even though that a disability can be challenging, oral hygiene is an important factor that must not to be neglected and has to be taken special care of in order to decrease the difficulty and severity of treatment which might follow on a long term.

CONCLUSIONS

The results of this study show, that the average dmft index of a child with special needs was always higher than compared to healthy children. Especially when considering the individual´s age, it was evident that children with special needs throughout the study had worse outcomes than their healthy counterpart. It was evident that the severity of the disability, meaning how serious the child physically and mentally was affected, definitely had an impact on the outcome.

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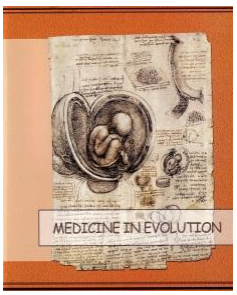
Prognosis evaluation in dental aesthetic rehabilitations using 2 types of ceramic veneers in a Romanian study group



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Abstract

Aims and Objectives. The objectives of this study are the comparaison of survival rate of feldspathic and pressed lithium-disilicate ceramics veneers, survival analysis, failure types, clinical factors that may influence their lifespan in a Romanian study group.

Materials and methods The materials used were VITA VM7 (VITA Zahnfabrik, Germany) and E.max (Ivoclar Vivadent AG, Liechtenstein). Patient demographics, treatment and any subsequent failure dates were recorded. 170 patients with 507 veneer-treated teeth were divided into 2 groups: patients with and without therapeutic failures.

Results 48 veneers failed. Most failures were fractures (35.36%), followed by debonding and chipping. The most affected veneers in general were the feldspathics (19.9%) compared to lithium disilicate (8.8%) at 10 years.

Conclusion Regardless of their superior aesthetics, feldspathic veneers are less mechanically resistant than pressables, but other clinical parameters must also be considered such as the age of the prosthetic rehabilitation or the number of teeth involved. Since study results are consistent with current literature data, Romanian patients can be considered in the international context of veneer treatments.

Keywords: feldspathic, pressable, veneers, failure, Romanian

INTRODUCTION

Aesthetic rehabilitation is one of the most common demands in the modern dental practice and involves multiple psycho-social factors [1]. If until the mid-1980s the main reason for coming to the dental office was dental pain, towards the end of the 20th century and the beginning of the 21st century a rise in aesthetic requirements was observed, mainly due to the media which was increasingly promoting „the perfect smile" [2,3]. The great challenge that dentists are facing at the present moment is to successfully combine the patients' aesthetic requirements with the achievement of all functional objectives in restorative treatments, while simultaneously respecting biological parameters [4]. An important contribution in achieving these goals is represented by the digital technological advances that allow better communication between the dentist and the dental technician, and also permit the patient to witness the estimated treatment outcome [5,6]. Minimally invasive treatments have become accessible in restorative dentistry due to the association of adhesive techniques and restorative materials with translucent properties [7]. Materials such as lithium-disilicate ceramics have properties similar to natural teeth, thus increasing the chances of an aesthetically favourable result [8]. The success of the treatment is conditioned by a series of factors and steps that must be strictly carried through in order to allow optimal completion[9].

Aim and objectives

The objectives of this study are the survival rate of feldspathic ceramic veneers compared to those of pressed lithium-disilicate ceramics, survival analysis, failure types, taking the clinical factors that may influence their lifespan into account.

MATERIALS AND METHODS

The present study is an analytical, observational and retrospective study, which took place in 2019, using the database of a private dental clinic in Cluj-Napoca. The observation charts of patients that were treated between 2008 and 2019 with ceramic veneers reconstructions, both feldspathic (VITA VM7, VITA Zahnfabrik, Bad Sackingen, Germany) and pressable lithium-disilicate - e.max (Ivoclar Vivadent AG, Schaar, Liechtenstein), respectively, were used. The inclusion criteria for our study were: adult patients, clinically healthy - without comorbidities, without periodontal disease and with proper oral hygiene. Applying these criteria, we established a study group of 170 subjects, 139 female subjects (82%) and 31 male subjects (18%), including a number of 507 teeth which were restored with dental veneers. At the first presentation in the dental clinic, each patient completed an observation chart that included personal data, general physiological, pathological and dental history, and patient chief complaint. Observation sheets were stored in the clinic's archives and were later on completed with further interventions in case of an accident or treatment failure. To conduct the study, we collected data on the patients' age, gender, occupation, the materials used for the veneers, the date of treatment completion, and any accidents and/or complications that occurred later and the time elapsed in-between. In case of failures, we recorded the time interval between the time of application and moment of accident occurrence (measured in months). Subsequently, we classified the failures as follows:

1. veneer fracture;
2. veneer chipping;
3. veneer debonding;
4. veneer cracking;
5. accidents recorded during bonding;

6. changes in colour;

7. failures due to non-compliance of the patient with the instructions given by the dentist and with the recall schedule;

8. other types of failures.

Depending on the success of the aesthetic rehabilitation treatment, the studied group was divided into two subgroups: a first subgroup with patients without therapeutic failures (85.3% of the subjects), also called control group, and a second subgroup of subjects with therapeutic failures (14.7% of patients), also called study group. The two subgroups were comparatively observed regarding clinical parameters: gender, age, number of visits to the dentists, time elapsed from initial intervention until occurrence of the registered failure, the number of teeth involved in the aesthetic rehabilitation, the restorative material used and its influence on the treatment prognosis.

Statistical analysis was carried out using the Statsoft Statical 12 software program. Quantitative data was characterised by the median and the arithmetic mean±standard deviation (SD) with a confidence interval (CI) of 95%. Qualitative data was expressed as frequency and percent. Comparisons between groups were performed using the Mann-Whitney or chi-squared tests, whenever appropriate. Spearman's ρ (Spearman's rank correlation coefficient) was used for examining correlation between continuous variables. The level of statistical significance was established at $p<0.05$, while $p<0.1$ was noted to show a tendency towards statistical significance.

RESULTS

The subjects included in the therapeutic failures group showed a number of recorded failures between 1 and 5 (median=1), with an average of 2.05±1.7 (95% CI: 1.7 - 2.45).

Among female subjects, 13.6 % had at least one therapeutic failure, while the percentage was higher amongst men, 19.3%, respectively.

Table 1. Therapeutic failure depending on the gender distribution of the group

Gender	**With therapeutic failure**	**Without therapeutic failure**	**Total**
Female	19 (13.6%)	120 (86.4%)	139 (82%)
Male	6 (19.3%)	25 (80.7%)	31 (18%)
Total	**25 (44%)**	**145 (56%)**	**170**

Upon statistical analysis, no association at statistically significant values between gender and the presence of therapeutic failure was identified (p=0.548).

The clinical indicators measured in this study and their presence in the study group are found in table no. 2.

Table 2. The main clinical indicators studied

Variable	**Minimum and maximum recorded values**	**Mean ± SD**	**CI of 95%**	**Median**
Age	19.9; 62.4	37.1 ± 9.9	35.7 → 38.6	36
No. of visits	1; 15	2.1 ± 1.8	1.9 → 2.4	1

Variable	Minimum and maximum recorded values	Mean ± SD	CI of 95%	Median
Recorded failures	1; 5	2.05 ± 1.7	1.7 → 2.4	1
Time elapsed from bonding	1; 131	53.9 ±33.1	48.9 → 58.9	61
Average time elapsed until 1st failure	1; 92	26.6 ± 24.1	20.8 → 32.4	19
Average time elapsed from last corrective intervention	1; 47	16.91 ± 15.6	9.4 → 24.4	14
No. of teeth treated/patient	1; 13	2.96 ± 2.0	2.6 → 3.3	2

The age of the patients included in this study was between 19.9 years and 62.4 years (median = 36), with a mean age of 37.15±9.9 years. Subjects who showed no therapeutic failure were aged between 20.5 and 62.2 years, with a mean age of 36.77±9.5 years (95% CI: 34.8 - 38.60). In the group that registered therapeutic failure, the age of the subjects was between 19.9 years and 62.4 years, with an average of 37.64±10.4 (CI 95%: 35.2 - 40.05). The age difference between the two groups was 0.88 years, with no statistical significance in correlation with the presence of therapeutic failure. Patients who received e.max veneers had a mean age of 35.73±9.81 years, lower than patients with feldspathic veneers (38.6±9.77), with no statistical significance (p=0.058) between them.

The number of visits to the dental office was between 1 and 15 visits, with an average of 3.44±2.0 for the study group and 1.15±0.5 for the control group, with a statistically significant value (p=0.001).

The ceramics' age varied between 1 and 131 months, with a total average of 53.93±33.9 months, and with an average of 46.06±34.0 months for the control group and an average of 64.27±28.9 months for the study group, the difference being statistically significant (p = 0.001). In the study group, the time elapsed from the moment of bonding until the first failure was recorded to having occurred between 1 and 92 months, with an average of 26.63±24.1 months (95% CI: 20.8-32.42). The time elapsed since the last repair was between 1 and 47 months, with an average of 16.91±15.6 months.

The number of teeth involved in the prosthetic rehabilitation varied from one patient to another, ranging between 1 and 13 teeth, with an average of 2.96±2. For the control group, the average of teeth rehabilitated with dental veneers/patient was 3.39±2.4, and for the study group that had registered failures was 1.92±0.9 teeth, without this difference having a statistically significant value.

Female patients had fewer visits to the dental office (an average of 1.82±1.56 for women compared to 2.22±1.84 for men), and fewer failures/patient (an average of 1.76±1.18 for women and 2.08±1.69 for men) when compared to male patients. The statistical analysis did not reveal any significant difference between the two genders regarding the parameters listed above. The average number of teeth involved in prosthetic rehabilitation/patient did not differ according to gender (2.89 for women and 2.91 for men). The average time elapsed between the application of veneers and first incidents was 26.27±23.74 months for men and 28.5±27.13 months for women. Therefore, male patients presented failure earlier than their female counterparts, but the difference between the two was small.

Regarding the material used for the veneers, 53% of the patients received feldspathic veneers and 47% pressable ceramic veneers. For feldspathic ceramics, the failure rate at 10 years was 19.9%, and in the case of pressable ceramics, failure rates were found at 8.8% (table no. 3), a statistically significant difference (p=0.002) associated with a favourable prognosis for patients receiving pressable lithium-disilicate ceramic veneers. From a total of 31 men included in the study, 16 of them had feldspathic veneers and 15 received e.max veneers. The distribution of restorative ceramics in the 139 female patients was as follows: 74 received feldspathic ceramics and 65 pressable ceramics.

Table 3. Failure rate according to the type of ceramic used/patient

Type of ceramic/patient	With failure (no. of patients)	Without failure (no. of patients)	Total
Feldspathic	18 (19.9%)	72 (80.1%)	90 (53%)
e.max	7 (8.8%)	74 (91.2%)	80 (47%)
Total	**25**	**145**	**170**

The values of clinical parameters observed in relation to the material used can be found in table no. 4. They indicated a statistically significant correlation between the age of the treatment and the material used (p=0.000), in the sense that the feldspathic veneers had a longer average age than that of the e.max veneers, but this is due to the fact that e.max was later introduced in the clinic's current practices. The average age of patients with feldspathic ceramic veneers was greater than the age of patients with pressable ceramic veneers, but this finding indicated only a trend in this regard (p=0.05).

Table 4. Correlation between the material used and the observed clinical parameters

Clinical parameters (average values)	e.max veneers	Feldspathic veneers	P
Patients' average age	35.73±9.81	38.65±9.77	p=0.05
No. of failures/patient	1.6±2.09	1.9±1.3	p=0.532
No. of visits/patient	2.17±2.11	2.12±1.42	p=0.240
No. of treated teeth/patient	3.18±2.42	2.73±1.56	p=0.673
Veneer average age (in months)	42.54±31.69	65.72±30.37	p=0.000
Time elapsed from bonding until failure	27.82±27.01	25.66±21.80	p=0.714
Time elapsed from last repair	17.83±16.68	15.88±15.26	p=0.794

The total number of teeth treated and included in our study was 507, out of which 268 received feldspathic veneers and 239 received pressable ceramic veneers. Out of these, 48 veneers had accidents or failures throughout the studied period. The incidence of different types of failure, depending on the material used, can be found in table no. 5. Most accidents are represented by veneer fracture (35.36% of the total failures), especially in the case of feldspathic ceramics (24.99%), followed by debonding and chipping. The most affected veneers were feldspathic ceramics, proving the low stress resistance of these veneers

compared to those made out of pressable ceramics. Also, colour changes are more common in feldspathic veneers rather than in pressable veneers.

Table 5. Incidence of failures/type of material

Type of failure	No. and percentage of total failures	Feldspathic veneers (pcs./percent)	e.max veneers (pcs./percent)
Veneer fracture	17 (35.36%)	12 (24.9%)	5 (10.4%)
Chipping	5 (10.4%)	3 (6.25%)	2 (4.16%)
Debonding	12 (24.99%)	10 (20.83%)	2 (4.16%)
Cracking	4 (8.33%)	2 (4.16%)	2 (4.16%)
Accidents during bonding	3 (6.25%)	3 (6.25%)	0 (0.0%)
Colour changes	3 (6.25%)	3 (6.25%)	0 (0.0%)
Patient error	1 (2.08%)	1 (2.08%)	0 (0.0%)
Other causes	2 (4.16%)	1 (2.08%)	1 (2.08%)

DISCUSSIONS

Nowadays, ceramic dental veneers are an excellent therapeutic alternative in cases with outstanding aesthetic requirements, especially in the anterior area [10]. Having an excellent marginal fit, ceramic veneers manage to restore the teeth's natural appearance and improve the patient's smile. They are especially indicated in cases of discolouration and shape modifications, implying only minimally invasive interventions and having good predictability over time [11].

According to this study, we found that the demand for veneer treatments is higher among female patients than among male patients, demonstrating women's increased interest in aesthetics, but also in maintaining oral health, according to data found in the literature [12].

Male patients required more visits after bonding the veneers, indicating a predisposition of male patients to accidents, due to lifestyle and working conditions, but also their lower interest in protecting aesthetic treatments. Similar results were obtained by Della Bona A. et al. in their study conducted in 2010 on 1177 subjects who were treated with 2562 ceramic veneers, proving the influence of gender on the survival rate of the restorations [13].

In our study, the average age of patients who were treated with ceramic veneers was 37 years, proving that young patients have a greater interest in aesthetic restorations, and that they also prefer minimally invasive interventions that preserve the natural dental structures.

The 10-year survival rate of veneers varies according to the study design [14]. In two studies from 2012 which were carried out in Austria [15,16] and which reported similar data, the survival rate of veneers at 10 years was 93.5%, a value greater than that of our study (90.53%), but the number of teeth included in their study was smaller (318 compared to 507 teeth), and the veneers included in the study were made only out of pressable ceramics. For the latter, our recorded survival rate was of 91.2%. Furthermore, one must consider the differences/similarities of medical cultures in these 2 countries. Other data on the overall survival rate of veneers in studies published to date are 94.4% at 12 years in M. Fradeani's study [17], 91% at 10 years in H. Dumfahrt's study [18] and 97.5% in D'Arcangelo's study [19] at 5 years post-bonding.

Furthermore, the results of this research, similar to other data found in literature, indicate a more frequent use of feldspathic veneers due to their superior aesthetic quality (close to that of the natural appearance when compared to the e.max [20]). However, feldspathic ceramics prove to be more susceptible to accidents due to various causes (87% for feldspathic ceramics, compared to 94.6% for pressable ceramics in our study), demonstrating once more the lower resistance of this type of veneers in comparison with e.max [21]. The survival rate of feldspathic ceramic veneers is estimated in the literature to be between 64% and 95% at 10 years [22]. However, a meta-analysis published in 2012 indicated a survival rate at 5 years with statistically significant differences between the two types of veneers, aesthetic rehabilitation success being conditioned by multiple other factors besides the material used [23].

Following this research, we found that most failures occur due to veneer fracture, followed by debonding and chipping, similar to data already reported in the literature [24,25]. Blunck U. et al. managed to demonstrate in vitro in 2020, that after 3 million masticatory cycles, the frequency of failures changed: cracks were more frequent than fractures (22 cracked veneers out of the total of 80, depending on the thickness of the preparation [26]), indicating the involvement of clinical factors in defining the success rate of veneers. All failure indicators were higher for feldspathic veneers compared to e.max veneers in our study, one explanation being the average age of these veneers, 65.7 months, respectively, compared to 42.5 months for e.max veneers.

Underline new, important aspects of the study. Do not repeat in detail data which have been presented in previous sections. Include implications of revealed aspects and their limitations, including implications for future studies. Connect your observations to other relevant studies. Relate the results to the aim proposed for the study. [Book Antiqua, 11 point, normal, justified alignment].

CONCLUSIONS

The present study proves that, despite the fact that aesthetic parameters are superior for feldspathic veneers, mechanical resistance is superior for pressable veneers, but it is also conditioned by other clinical parameters such as the age of the prosthetic rehabilitation or the number of teeth involved. Among the registered failures, the highest incidence was veneer fracture, followed by debonding and chipping, but their incidence was low, which rendered ceramic veneers as an optimal alternative for aesthetic restorations, especially in the anterior area. As can be observed, our results are consistent with data already published in the literature in the field. Therefore, the importance of the study results is the inclusion of Romanian patients in the global context of ceramic veneer treatments.

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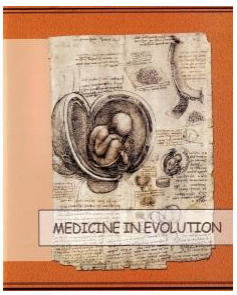
Biomaterials currently used in pulp capping treatments



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Abstract

Dental pulp capping is a treatment for deep carious lesions that affect a great part of the enamel and dentin structure, although the pulp remains vital. Failure of pulp capping leads to loss of pulp vitality and endodontic treatment. Therefore, the need for dental materials that can induce tertiary dentin formation, are biocompatible and can obtain an efficient seal, is obvious. A material that has all these properties can lead to a greater success rate for pulp capping treatments. Does it exist? What does the scientific literature say about this topic?

This article provides information about 4 modern biomaterials used for pulp capping treatments: Calcium Hydroxide, TheraCal LC, MTA and Biodentine, aiming to aid the practitioner in choosing wisely between materials.

Keywords: liners, pulp capping, biocompatibility

INTRODUCTION

A biomaterial is a natural or artificially induced material that once introduced in a living tissue acts like a medical instrument. [1] It is used to guide and control a therapeutic action into the tissue that makes contact with, alone or part of a more complex system. [2]

Materials with unique properties that can be used in direct contact with the living tissue without rejection from it, can be considered biomaterials. [1] They are used in all medical fields including dentistry, from oral surgery to paedodontics.

During dentistry's history, biomaterials have been of great focus. Some decades ago, amalgam was considered a promising biomaterial, now we can talk about materials that can induce healing of pulp inflammations.

The research community's concern regarding biomaterials has changed through time. The attention was varying between durability, aesthetics, toxicity. Nowadays one of the most asked questions is: which has a greater biocompatibility?

Biomaterials possess properties that advocate for minimally invasive dentistry by preservation of hard dental tissue and pulp. [3,4]

Calcium Hydroxide pastes, TheraCal LC, Mineral trioxide aggregate (MTA), Biodentine are among the most used biomaterials in pulp capping. The current paper will focus on these four liners, on their properties, advantages and disadvantages. According to an accepted definition, the liner is a cement or a resin covering layer, of approximately 0.5 mm, that acts as a barrier against bacteria and has also has a therapeutic effect. [5]

Calcium Hydroxide - $Ca(OH)_2$

First proposed as a liner in 1930, by Hermann, this material was used before only for root canal treatments, having antibacterial properties. Hermann noticed its potential of forming dentin bridges and advocated then the idea of using calcium hydroxide as a pulp capping material.

Since then, calcium hydroxide has been considered the golden standard in vital pulp therapies. [6,7] It has a proven antibacterial effect, stimulates tertiary dentin formation and it is biocompatible in relation to the dental pulp. Until now, it is the most frequently used liner.

Chemically speaking, this material is a strong base, obtained by heating calcium carbonate until it transforms into an oxide. Pure calcium hydroxide is a white powder with a high pH (12.6), that dissolves in water. Research has shown that a basic pH neutralizes the lactic acid from the osteoclasts, thus stopping the demineralization process of the dentin. Meanwhile, the same pH activates the alkaline phosphatases that are responsible for hard tissue formation. [8] Calcium hydroxide's effect on dentin has been proved to be the formation of mineral crystals in the dentin tubules. [9]

Calcium hydroxide properties reside in the interaction of its dissociated ions with the tissues and bacteria. Hydroxyl ions destroy the cytoplasmic membrane of the bacteria cell, stimulates protein denaturation and destroys the bacterial DNA. Its high pH is usually associated with the antimicrobial effects. [3,7,10]

Holland et al. suggested that this material acts the same way upon dentin as it acts on pulp tissue.[9] Because of its low molecular mass, $Ca(OH)_2$ can penetrate through the dentin tubules and can reach the pulp, explaining its effects even in indirect pulp capping.

The most known form of presentation is as a paste, but the powder and saline water formula is considered to be more efficient.

The newer light cured calcium hydroxide pastes are trying to overcome some of the old paste's disadvantages like reduced compressive strength, dissolution, adhesion to other materials. These pastes also contain resin so the scientific literature did not agree on its beneficial status over the conventional $Ca(OH)_2$ paste.

$Ca(OH)_2$ main disadvantages are [3,4,7,8,11,12]:

- Reduced compressive strength
- Low elastic modulus
- Thermal conductivity when set in a thin layer as in capping
- Needs a second material as a base to cover it up, besides the final restorative material
- Water and acid high solubility
- Its properties disappear in time
- Dissolution in time
- Does not adhere to most of the other dental materials it takes contact with, or dentin
- When used in primary teeth, it may produce a faster root resorption
- Does not inhibit the formation of bacterial biofilm
- Some of the formed dentine bridges are discontinued or have defects, tunnels fail to provide a hermetic seal leading eventually to pulp inflammation.

TheraCal LC

TheraCal LC (Bisco, USA) is a light cured resin modified silicate, being considered a formula between $Ca(OH)_2$/MTA/resin light cured $Ca(OH)_2$. Though most practitioners associate it with $Ca(OH)_2$ pastes, its composition is more similar to that of MTA.[13]

It is composed of the primary mineralogical phases of Portland Cement type III, thickening agents, resin, bismuth oxide, barium sulphate. It is considered a 4th generation calcium silicate and according to ISO 9917-2017 part 2, clause 4.1 – a class II cement. [12]

It is commercialized in syringes as a single paste, and it does not require mixing. This format allows for easy handling and it does not have a short working time, being a light-cured material.

Because of its unique composition, a combination of calcium hydroxide and Portland Cement to which resin is added, the material can not fit in any of these categories. However, there are many debates on this product. One of the most significant debates is about the resin component that can produce a harmful amount of heat, that makes it unwise to be used near or in contact with the living pulp tissue. The manufacturer conversely insists that the heat generated by the resin is in a small amount and is not dangerous to the pulp if it is placed in layers of 1 mm, light cured for 20 seconds each. Those that endorse the use of TheraCal LC claim that the newest composition of the material does not contain Bis-GMA monomer, the monomer that is actually harmful to the pulp. [12]

TheraCal LC has a remineralizing potential. This property makes it useful in the partial caries removal techniques used in minimally invasive dentistry nowadays. The potential to form crystals similar to hydroxyapatite advocates also for a chemical bond between the material and dentin that can secure a safer seal of the dentinal tubules. [14] It protects against demineralizing agents reaching the pulp tissue or remaining dentin layer underneath. [15] The dentin bridges are considered to be better organized than in calcium hydroxide pastes cases.[16]

According to Voicu et al., once TheraCal LC sets, it shows a smooth surface, most likely due to its resin component.[17] This aspect makes it convenient for the upper layer while also securing a better bond to the final restauration material, such as composite resin. Meraji and Camilleri endorse the idea that the bond between TheraCal LC and resin composites is better than between glassionomers and composites. [18] It is radiopaque and can be easily traced on X-Rays underneath other materials, showing the liner's durability in time.[12]

The liner has an antibacterial potential that is similar to that of calcium hydroxide on *Streptococcus mutans*, but less efficient on *S. Salivarius* or *S. sanguinis*.[19] It releases an increased amount of calcium ions, a property associated with antibacterial effects. This release

is shown to be greater than of calcium hydroxide pastes, but less than of tricalcium silicate-based materials. The alkaline pH also promotes its bactericide effect, keeping its high level for a long time. [12]

It has unique hydrophilic properties that make it a more stable and durable composition, being far less soluble than calcium hydroxide paste. The producers advise for the material to be placed on a rather humid dentin in order to maintain all its properties.

Among the disadvantages of TheraCal LC are [15,19,20, 21, 22]:

- Insufficient humidity of the dentin may cause the material not to reach its full potential
- The harmful potential of the resin contained in the liner
- The heat generated by the lamp may produce irreversible changes in the pulp
- Low cytocompatibility

Mineral trioxide aggregate (MTA)

MTA is a cement that derives from Portland Cement, and the main constituent phases are tricalcium and dicalcium silicate, and tricalcium aluminate. This formula can also contain other components, depending on the commercial product, that are meant to enhance its properties.

There are two main categories of MTA on the market: grey and white, with the difference being the presence of iron in the composition of the first one.

MTA cements are bioactive materials that increase the healing potential of the tissues they interact with, being considered a veritable biomaterial. In contact with the tissues they release calcium ions, stimulating the cellular proliferation and adhesion and having an antibacterial effect. [6,7,] The release of calcium ions is considered greater than that of calcium hydroxide or TheraCal LC. [23,29]

MTA ensures an alkaline pH that stimulates the production of cytokine, inducing cell formation. By stimulating dentin bridges formation, the cement can be used successfully in root perforations, apexification, and direct pulp capping. Several studies pointed out that the dentin bridges formed by MTA are superior to those obtained by calcium hydroxide liners. [11,24,25]

The cytotoxic potential of MTA is very low.[7] It is highly biocompatible. That is why it is indicated in vital pulp therapies for both temporary and permanent teeth. It does not stimulate root resorption. Several researchers stated more than 10 years ago that the cement was considered promising for vital pulp therapies. [26-28] Since then, the scientific literature attested this fact by numerous clinical trials with long follow-ups, the success rate being close to or even 100% in most of the studies. [4,7,9,13,14]

It is a radiopaque cement. It can be easily traced on x-Rays.

Its level of solubility is low (if mixing with a greater amount of water than specified), ensuring a tight and durable seal of the tissue that it covers.

It can be covered by almost any restoration material, while also being compatible with the tooth structures.

MTA's main disadvantages are [7,11,25,27,28]:

- Time consuming technique, a big disadvantage when considering a child patient
- The long setting time of the material implies two treatment sessions on the tooth
- Difficult handling, requires sometimes special instruments for a good manipulation
- High costs for both the material and the instruments needed.

Biodentine

One of the newest biocompatible material on the market, it is promoted by its manufacturer as the most suitable dentin replacement. Reportedly it has the same or similar

properties with dentin. According to the liner's definition, Biodentine doesn't really fit in this category, but Kaur et al. claims the material as being the first to accomplish the roles of a liner, a base and a temporary filling/interim restauration altogether. [25]

Biodentine appears to overcome MTA's and calcium hydroxide's disadvantages.[29]

From a chemical point of view, it is a mixture of powder and liquid, together in a capsule. The powder is formed of tricalcium silicate (80%), dicalcium silicate, calcium carbonate, zirconium oxide and iron oxide. The liquid is calcium chloride - setting accelerator, hydrosoluble polymer and water. The company that developed Biodentine did not state the specifics of the composition, that is why when related to it, the literature shows slightly different opinions.[25] The reaction between the powder and the liquid leads to the formation of high pH cement, with calcium, hydroxyl and silicate ions. The pH and the ions release stimulate mineralization, dentin bridge formation and a high-quality seal for the dentine tubules or for the pulp tissue. Caron et al. found out in their study that the mineral part and the sealing are superior to MTA cements.[30]

According to some of the articles reviewed in the current paper, this material has higher compressive strength and is more elastic then MTA and calcium hydroxide. [25,31] As for the biocompatibility, the balance inclines also for Biodentine. [32]

Regarding dentin bridge formation potential, it seems to be similar to MTA.[33]

Catala et al. observed that Biodentine is a material with an adequate cytocompatibility on stem cells and that it stimulates cell proliferation on a higher level than the other cements that were included in their study – MTA Repair HP and NeoMTA Plus. [34]

Having properties so similar to that of dentine, Biodentine seems at least in theory the most suitable material to be used in both direct and indirect pulp capping. It can also be used as an interim material, suitable for two-step approaches in capping.

It is a rather easy to manipulate material, it is not time consuming and with costs lower than those for MTA but higher than those for calcium hydroxide. The setting of the material takes about 7 minutes

Biodentine's known disadvantages are [35]:

- Weak restorative material in its early setting phase – makes it preferable to delay the final restoration for 2 weeks in order to allow the material to reach optimal properties
- Relatively high costs.

CONCLUSIONS

Calcium hydroxide paste, despite its disadvantages, is still the most used liner worldwide by practitioners. The use of TheraCal LC in capping techniques is still debatable, studies reporting different results with respect to pulp vitality preservation. While in indirect capping or as a base liner the indications seems to be pertinent, the literature mostly agrees for no use of the material in contact with the pulp. MTA is considered by some the new golden standard, taking calcium hydroxide's place, but the aforementioned issues of cost and setting makes it less used in everyday practice. Longer clinical trials are needed to assess Biodentine's supremacy over other biomaterials in pulp capping, though some may have already stated it.

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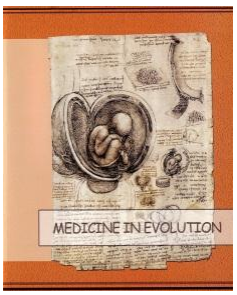
Biomimetic restoration of dental trauma in the frontal area



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Abstract

Aim and objectives: Dental trauma to the anterior teeth may involve only enamel or enamel and dentin, and in more severe cases may be found pulpal involvement which complicates the initial treatment. In these situations the affected teeth require an extended period of regular monitoring

Material and methods: A 12-year-old patient presented to the dental office with coronary fracture class II Ellis at the level of the left upper central incisor. The relevant history of the etiology of the injury was accidental fall during recreational activities.

Taking into account the fact that the patient was a 12-year-old child and the fractured coronary fragment was recovered, it was decided as a treatment solution to reattach the fractured fragment to the remaining coronary tooth.

Results: The technique of reattaching the recovered dental fragment respects the principles of biomimicry and allows obtaining a natural result, in terms of the optical characteristics of the future restoration

Conclusions: In the recall session, after a week, it was found that the restoration fits perfectly in the remaining dental tissues, requiring only minimal finishing touches in order to individualize the relief and surface texture, in accordance with those of the intact analog tooth and application of polishing operations

Keywords: biomimetic, trauma, fragment

INTRODUCTION

Coronary fracture is a shape disharmony that primarily affects the upper central incisors due to their position and the fact that they are the most proeminent teeth of the aesthetic area.

The therapeutic objectives in the case of dental traumas include: restoring oro-dental health, restoring functions, and finally obtaining a favorable aesthetic result for both the doctor and the patient.

There are situations in which the patient or relatives recover the part of the fractured tooth; in these cases an attempt is made to use the fragment which can be reattached to the remaining coronary abutment.

MATERIALS AND METHODS

Patient R.V., 12 years old, presented to the dental office with coronary fracture class II Ellis at the level of the left upper central incisor. The anamnesis of the relevant etiology of the lesion: accidental fall during recreational activities (Figure 1).

Figure 1. Rest position of the lips

The objective examination showed in addition to the absence of a portion of the crown of the central incisor and the existence of a post-traumatic wound healing, in the lower lip, which was sensitive to palpation and during functions.

Radiographic examination revealed an intact periodontal ligament, and the cortical bone had a typical, solid appearance; also, the integrity of the pulp chamber was found -at least in a two-dimensional image- (Figure 2).

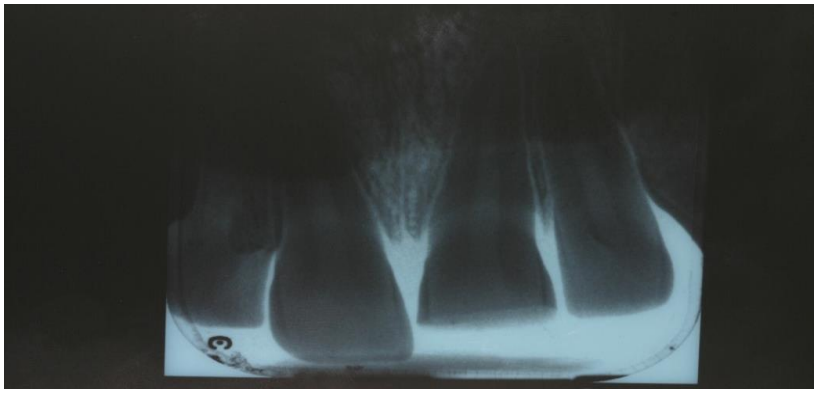

Figure 2. Retroalveolar radiography reveals the integrity of the pulp chamber and the absence of bone involvement

Vitality tests performed to establish a definite endodontic diagnosis revealed the presence of tooth vitality, while ruling out the existence of irreversible pulpal inflammation.

The presence of biofilm and tartar on the tooth surfaces indicates that the patient does not achieve a rigorous and correct oral hygiene, which led to the appearance of an incipient plaque gingivitis (Figure 3).

Figure 3. Fracture line at the incisor 2.1. the presence of plaque gingivitis and dyschromia of local, extrinsic etiology

Prior to the start of treatment, a professional hygiene was performed. Taking into account the fact that the patient was a 12-year-old child and the fractured coronary fragment was recovered, it was decided as a treatment solution to reattach the fractured fragment to the remaining coronary abutment.

In order to improve the fracture resistance of the complex to be restored (tooth-composite-reattached fragment), the fractured fragment was rehydrated by immersion in saline solution for 30 minutes.

Dam isolation was performed, which in addition to preventing intraoperative contamination, increases visibility on the operating field and provides comfort to the doctor (Figure 4).

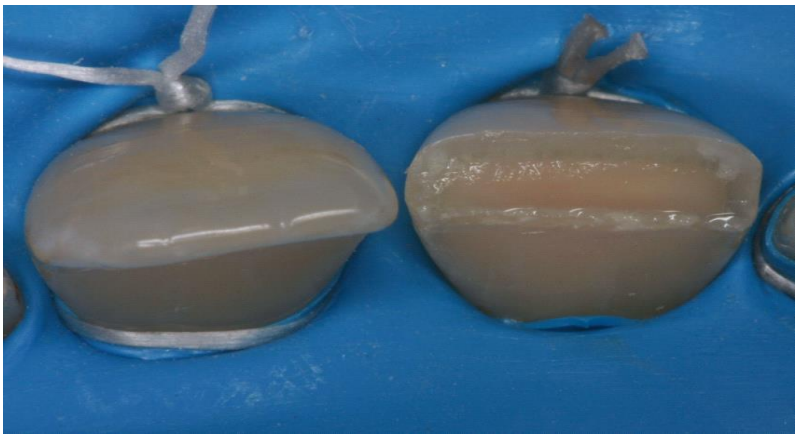

Figure 4. Fracture surface in the occlusal view

The next step was to make the adhesive substrate for both the tooth and the fractured tooth fragment. The technique of selective engraving was practiced, followed by the application of self-etching adhesive both at the level of the engraved enamel and at the level of the dentinal wound (Figure 5a, Figure 5b).

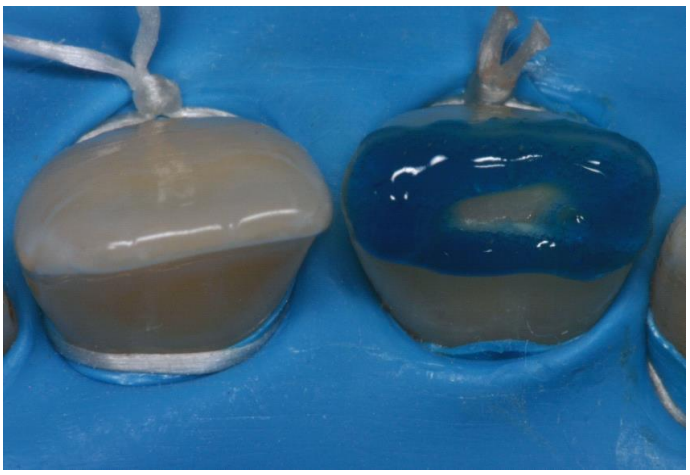

Figure 5a. Selelctive etching technique

Figure 5b. Etching enamel and dentine on the fractured fragment

The adhesive system used is of the latest generation - Scotchbond Universal Adhesive by 3M

The acid etching was done for 15 sec, and the adhesive was applied in abundance, stirring it for 20 sec, both at the level of the enamel and of the dentinal wound, from the level of both surfaces involved in the adhesion.

The next step was to reattach the fractured fragment to the remaining dental abutment using a composite flow resin; FiltekTM Ultimate Flowable (3M Espe) shade A2 was used, which was applied to the fracture surface of the tooth.
The fractured segment was carefully placed at the tooth using light digital pressure; the excess composite material was removed, after which it was photopolymerized for 40 sec from the vestibular and oral, taking care that during the polymerization reaction no positioning changes occur (Figure. 6).

Figure 6. The tooth after adhesive reattachment with Filtek™ Ultimate Flowable (3M Espe)

To strengthen the reattachment, a circumferential biconcave-concave bezel was made along the fracture line, approximately 1 mm wide; for this, a globular, fine-grained diamond cutter was used. On both sides of the bevel, both vestibular and palatal, the preparation of the enamel in the form of skirting was practiced, in order to extend the adhesion surface at the amellar level (Figure 7). The entire surface of the enamel prepared in the form of a bevel and skirting was finished with polystyrene with fine grain, to make the presence of the future restoration imperceptible optically.

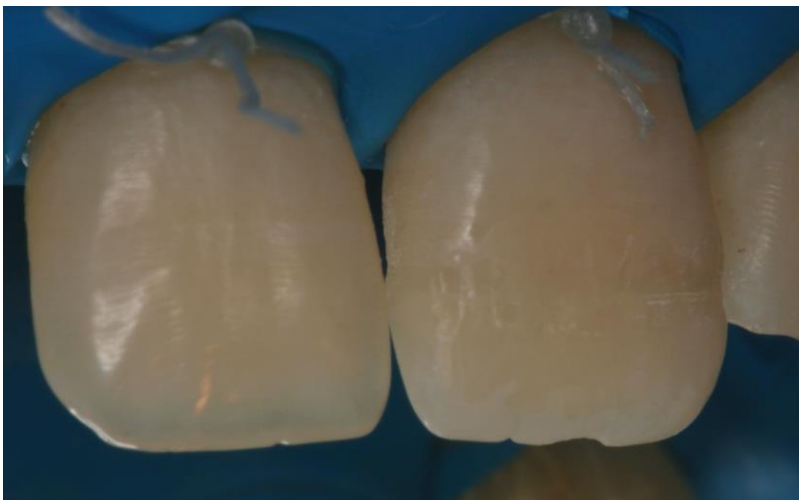

Figure 7. The buccal aspect of the enamel preparation

The tooth thus prepared was acid etched again, then the adhesive was applied, and after light curing a layer of resin with amelular translucency was applied - shade A2E, at the level of the circumferential preparation applied in enamel along the adhesive joint line.

This partial plating was done with FiltekTM Ultimate Universal (3M Espe), a high-performance nanocomposite that provides excellent aesthetics for restorations in the anterior area (Figure 8)

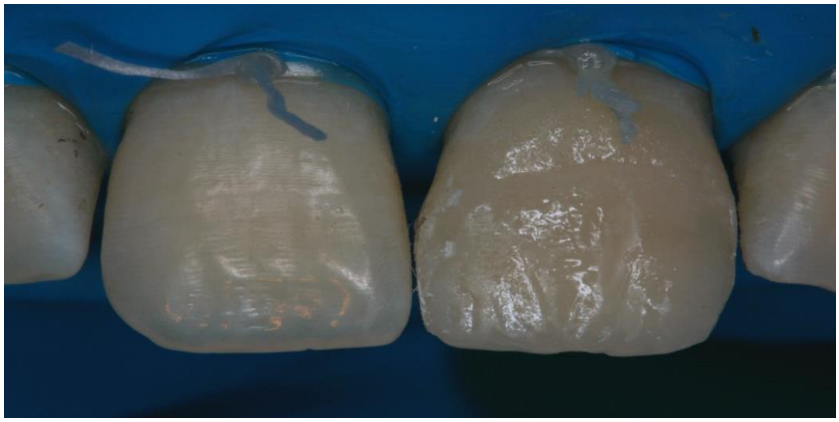

Figure 8. Tooth aspect after strengthening the adhesive reattachment with Filtek™ Ultimate Universal (3M Espe)

In the recall session, after a week, it was found that the restoration fits perfectly in the remaining dental tissues, requiring only minimal finishing touches in order to individualize the relief and surface texture, in accordance with those of the intact analog tooth and application of polishing operations (Figure 9).

Figure 9. The semi-profile view of the central incisors indicates similar surface and chromatic characteristics

Finishing and polishing the composite filling are the final stages of the treatment that ensures the desired aesthetics and longevity of the final result. These steps are necessary not only for the long-term stabilization of chromatics, but also to ensure oral health by reducing the accumulation of biofilm (Figure 10).

Figure 10. Oclusal view: morphological similarity between the two central incisors

One week after the end of the treatment, the disappearance of the edema from the lower lip is observed together with the healing of the abrasions (Figure 11).

Figure 11. The smile with the harmonious integration of the resoration at the level of the composition

The images in Figures 11 illustrate the restoration of dental aesthetics that is in harmony with the cleft lip and the smile line.

The patient will return to the dentist's office for regular check-ups in order to monitor the vitality of the tooth and, possibly, to make a splint to wear when practicing sports (to minimize the occurrence of other post-traumatic dental injuries).

RESULTS

The clinical results obtained demonstrate that the working technique is not difficult to perform, benefits from a lower cost price than other dental treatments and allows the restoration of the aesthetics and functionality of the tooth. This technique also eliminates the need to make the silicone shaper used to create the palatal surface when it is necessary to layer the composite material.

From a conservative and aesthetic point of view, the technique of reattaching the dental fragment is superior to prosthetic treatments for making veneers or other types of fixed

prosthetic restorations. Using this technique it is easy to obtain optimal long-term retentivity and adequate mechanical strength of the remaining tooth-fractured dental segment complex.

DISCUSSIONS

Reattachment of the dental fragment in case of trauma is described as a conservative and effective technique to restore the function and aesthetics of a patient who has been subjected to such an injury. This technique is advantageous because it preserves the original characteristics of the dental structure and maintains the occlusal stops which are sometimes difficult to reproduce when performing a restoration in the anterior area [1].

The success of this therapy is also dictated by the choice of adhesive materials that provide by their composition mechanical properties suitable for restoration and are biocompatible with dental and periodontal tissue [2]. It is important that during the restoration work, the insulation is of the best quality so as not to compromise the final results, so it is mandatory that during this procedure the dental dam is not missing from the operating field.

In all cases where patients have benefited from the technique of adhesive reattachment of the fractured dental fragment to the remaining coronary abutment, the importance of long-term monitoring is of utmost importance. Initially, the evolution will be monitored monthly through clinical and paraclinical examinations in order to detect any complications that may occur; subsequently, boosters may be reduced, their frequency also depending on the availability of patients. [3]

This restoration technique gives the patient emotional stability and social reintegration due to the fact that his dental tissue is preserved and integrated in both dental and facial harmony. The patient and relatives are finally satisfied that the recovered fragment could have been integrated into the restoration.

When choosing. as a final decision, in order to reattach the fractured fragment, it is important not to omit the conditions that allow such treatment: extension of the fracture line, recovery of the fractured dental segment, conditions for the use of the recovered dental fragment, aesthetics, prognosis of the final result and possibilities economic benefits of the patient [4].

The final success of the restoration largely depends on the adhesive properties of the materials that currently make a strong connection between the remaining tooth and the tooth fragment recovered from the fracture. However, the materials selected for the treatment to be performed should not be chosen solely in terms of mechanical properties; it is necessary to take into account their biocompatibility as well as the possibility to achieve an interface as closely adapted as possible between the remaining dental structure and the dental fragment to be attached, without subsequently allowing infiltrations to occur at the level of restoration. [5]

CONCLUSIONS

Post-traumatic dental fractures affect the patient, pigs from an aesthetic point of view and exposure in society. Given the fact that this type of injury is found mainly in children and adolescents, being the consequence of accidents that occur during recreational activities. [3]

The technique of reattaching the recovered dental fragment respects the principles of biomimicry and allows to obtain a natural result, in terms of the optical characteristics of the future restoration. The adhesive reattachment between two fragments of the same tooth provides remarkable aesthetic, functional and psychosocial results which justifies the use of this therapy to create an appropriate morphology of the tooth that has been traumatized. [6]

Both the clinical case and the data from the literature demonstrate that, when the dental fragment is reattached in a relatively short time, it is possible to maintain the vitality of

the pulp tissue. The exclusion of the need to practice additional preparations that would involve an additional sacrifice of dental structure and obtaining a quality adhesion using only the adhesive technique demonstrates the ultraconservative nature of the treatment.

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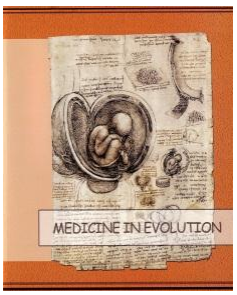
A model of experiential learning for teenagers' oral hygiene habits



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Abstract

While regarding oral hygiene remain the most important habit in preventing carious disease, teenagers might represent a vulnerable group because of tendency to adopt risky behaviors and neglect their health. On the other hand, teenagers represent a challenging group for educators involved in oral health educational program because of the difficulties for adolescence to respond to traditional learning methods. Aiming to educate adolescents through interactive and active participation regarding not only the basic tooth brushing but also the secondary means for oral hygiene, Com4You oral health educational program designed and applied activities using experiential learning. Accordingly, to this concept developed by David Kolb, participants learn by doing using the cycle: concrete experience ("Do"), observation and reflection ("Observe"), forming abstract concepts ("Think"), testing in new situation ("Plan"). The Department of Oral Heath and Community Dentistry from Faculty of Dentistry, UMF "Carol Davila", Bucharest, started applying the oral health lessons using experiential learning in a pilot longitudinal study between 2014 and 2017, in 3 public schools in Bucharest, with small working groups of 5-10 teenagers and a working time of 10-15 minutes per activity. The results of the research showed a proper feedback from participants and a significant improvement regarding oral hygiene-related knowledge and behavior.

Keywords: oral health promotion, oral hygiene, adolescents' oral health

INTRODUCTION

Proper oral health depends on proper oral health-related behavior and habits regarding the oral hygiene should be developed, adopted and maintained early in life. In community dentistry, the main oral promotion programs are targeted to priority and vulnerable population groups [1]. And while children are the priority group most frequently involved in oral health promotion and preventive programs [2], teenagers represent a vulnerable group because of their tendency to adopt risky behaviors [3], including those related to oral health such as smoking and increased consumption of sweets and beverages, or neglect their heath, including oral health - such as tooth-brushing and use of interdental cleaning products [4].

Traditional learning used in oral health education implies verbal presentations and/or video materials and this could only increase oral health-related knowledge and unfortunately it has a low impact on behavioral improvement. On the other hand, experiential learning is a didactic method which offers the opportunity to learn from own experience, so called "learning by doing" [5]. David Kolb developed the concept in 1984 and proposed a learning cycle formed by 4 phases: "Do", "Observe", "Think" and "Plan" which aims for the participant to first get involved in a concrete experience, then to reflect back on that experience and to identify weaknesses of flaws, then next to figure out solutions for improvement and last to design a plan to apply the solutions. The plan is tested and the cycled is resumed.

When experiential learning was applied in an oral health promotion for teenagers in a 2-years longitudinal pilot study in Bucharest, Romania, results showed that not only the level of knowledge regarding the oral hygiene was raised but also behavior was improved. Moreover, compared to the control group that was educated using traditional learning, the test group in which experiential learning was applied, the improvement was clearer and reflected in the dental plaque level revealed through clinical examinations. After the experiential learning educational lessons planed in the Com4You program, the frequency of adolescents brushing twice daily increased from 72,1% to 80% (compared to traditional learning group: from 71,4% to 74,3%), while for flossing the increase in frequency of subjects who use it daily was from 47,5% to 62,3% (compared to control group: from 40% to 45,7%). Moreover, at the end of the program the awareness on the role of fluoride in toothpaste raised, so that the frequency of subjects who know it raised from 32,8% to 83,6% (compared to control group: from 31,4% to 51,4%). And while in the test group there was observed in a decreased in mean plaque index from 1,32 to 1,12, in the control group there was an increase, from 1,15 to 1,79 [6].

MATERIALS AND METHODS

The following proposed activities using experiential learning were first applied between 2014 and 2017 in a pilot study as part of Com4you program, and were designed by the Oral Health and Community Dentistry Department ("Carol Davila" Medicine and Pharmacy University in Bucharest, Romania) and TES Association and were applied to a test group of 61 students enrolled in 3 public schools in Bucharest. Working groups were formed by no more of 10-15 students and with a duration of around 15 minutes per activity. All the 4 activities described in the present article were part of the lesson that had as a main theme oral hygiene and aimed both to raise awareness about the frequency and characteristics of products used in oral hygiene and to improve teenagers' skills in using the correct techniques of tooth brushing and dental floss. Moreover, one of the activities focused on the etiology of cavities, in order for teenagers to understand the contribution of their own oral hygiene habits on the development of dental caries.

Activity 1. Formation of dental caries - decisional tree

Aim: To be aware of the causes of dental caries

Method of education: decisional tree and facilitated discussion

Description of the educational process:

Teenagers are mentioned that they are going to be given a question at which together, both students and coordinators (educators) have to work to find the answer. And the coordinator writes on the white board the question "What happens with our teeth after we eat?" (Figure 1). All answers offered by the students are noted on the table but the coordinator has to facilitate, through the guidance of the discussion, the answer "dental plaque" and also has to offer clear and simple description of its mean. Then, students are invited to offer possible decisions that could be made by a person regarding the dental plaque on the teeth. The discussion is facilitated so that the answers obtain from the students to be the main two decisions: to maintain or to remove the dental plaque from the tooth surfaces. Then students are asked to make future decision for each of the two scenarios chose. On the scenario with the removal the dental plaque the coordinator should guide the discussion so that the answer be the methods used for cleaning the tooth, both at home and professional. For the daily oral hygiene, the discussion, based on the answers from the participants, should stress out that brushing twice daily is mandatory but not enough to clean properly so that products for interdental cleaning are helpful to complete the oral hygiene. Mouthwash, as well, are to be noted as another important answer for additional products, accordingly to individual risk and need. For the professional cleaning, the discussion should be conducted so that students recognize the preventive role of regular cleaning in the dental office in order to complete what is performed with the home-care regime. And so the destination of this path is healthy teeth. On the scenario with the maintained dental plaque in the tooth surface, the discussion should be facilitated so that the students be aware that the level of bacteria in the biofilm increase and produce acids. Then the coordinator should invite students to think about the chemical process, that they learn in theory from the chemistry, that happens between a product that contains minerals (that being the tooth) and an acid solution (the acids produced by the biofilm). And thus once the enamel loses minerals and the process continues, cavities are formed, which is the destination at the final of the path if this scenario is chosen. Once all the answers are noted on the table and remain written for both scenarios, the coordinator should summarize the how a student could get healthy teeth or cavities depending on his/her habits and own decisions (Figure 1).

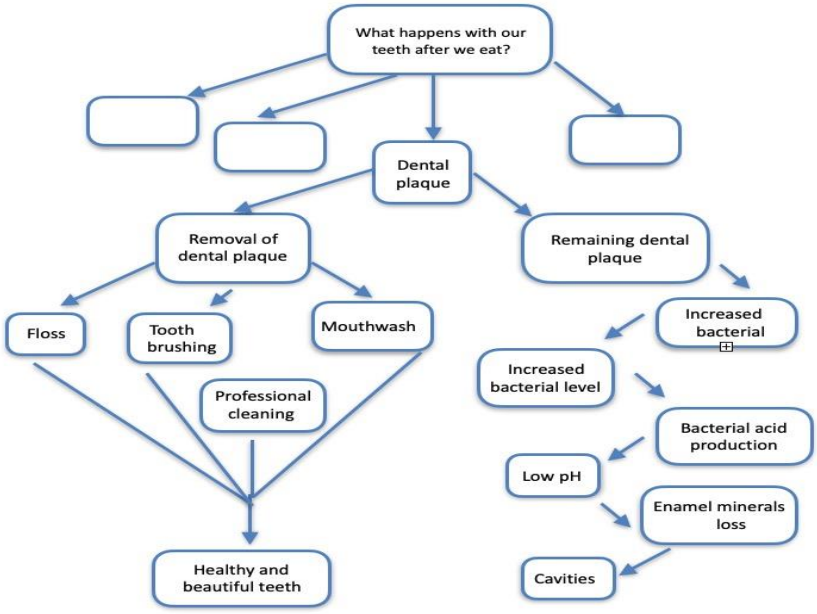

Figure 1. Formation of dental caries - decisional tree

Activity 2: Oral hygiene risk factors vs. protective factors

Aim: Getting to know the correct and incorrect habits related to oral hygiene

Method of education: Brainstorming, debate

Description of the educational process:

Teenagers are divided in small working groups formed of not more than 5 participants. Each group are offered a set of 26 cards with different products or habits related to oral hygiene (Table 1). Participants are offered a working time of 5 minutes to collaborate and separate the cards in two categories: correct habits/proper products and improper habits/risky products. After 5 minutes, the coordinators invite two students to represent the group and revel their decisions their team made regarding the classification of the cards. Also, they are asked not only to mention in which category considered each card but also to offer the reasons behind the decisions. If there are two parallel working groups, one participant from one group presents the protective factors while the participant from the other group presents risky factors. In case of divergent opinions between groups are mentioned regarding one factor, participants are encouraged to debate with pertinent pros and cons. The coordinator monitors the discussion and facilitates the debate and at the end validates the right answers, opinions and reasons, enforces the correct decisions made by the teams and corrects the improper arguments heard, if any. At the end of the activity participants should remain with the take-home message that proper oral hygiene is represented by the rigorous home-care regime with both tooth brushing and interdental cleaning, plus regular dental check-ups and professional cleaning in the office and that the frequency and the timing of the oral hygiene should be also accordingly to the eating habits. As a final summary, the coordinator should note on the whiteboard, the two columns with the two categories: oral hygiene protective and risk factors.

Table 1. Activity No.2 cards

Oral hygiene risk factors	Oral hygiene protective factors
DENTAL PLAQUE	REGULAR DENTAL CHECK-UP
UNCLEAN TEETH	TWICE A DAY TOOTHBRUSHING
SWEETS	FLUORIDE TOOTHPASTE USE
STARCHY FOOD	SCALING
BEVERAGES	RISK AWARENESS
SWEETENED DRINKS	DAILY FLOSSING
FREQUENT SNACKS	FLUORIDE MOUTHWASH USE
WORN-OUT TOOTHBRUSH	CHEWING GUM
ONCE A DAY TOOTHBRUSHING	PROFESSIONAL POLISHING
LACK OF INFORMATION	CHEESE
VISITS TO THE DENTAL OFFICE FOR DENTAL EMERGENCIES	HARD FOOD (WALNUTS / CARROTS)
SWEETENED TEA	NO FOOD/DRINKS CONSUMPTION AFTER THE LAST TOOTHBRUSHING OF THE DAY
SWEET FRUITS	TOOTHBRUSHING AFTER SWEETS CONSUMPTION

Activity 3: Steps of a proper tooth brushing

Aim: Getting to know proper technique of tooth brushing (Modified Bass technique)

Method of education: Brainstorming, demonstration

Description of the educational process:

To a group of 13 participants are offered a set of 13 separate and mixed cards with steps during the tooth brushing, a model of dentate arches, toothbrush and toothpaste (Table 2). The cards are distributed to participants so that each student have a randomly chosen card. They are given a working time of 5 minutes in which they should collaborate and put the steps in the correct order. After they set out their order, they are asked to sit in a row in the order accordingly to the card they hold. Also, each of them are asked to read and demonstrate on the model, if it applies, the step written on his/her card. The coordinator assists at their demonstration and if he/she detects a mistake in their order, the children are asked to rearrange themselves until the coordinators approves the order set. Moreover, if the coordinator observes an improper move during a step on the model, another participant is asked to do the correct move and invite the participants to give their opinion on how the move should be performed. At the end, participants are asked again to set the order and demonstrate properly without coordinator's intervention.

Table 2. Activity No.3 cards

Apply toothpaste on the toothbrush
Hold the toothbrush in your hand with support on the thumb
Open your mouth
Place the toothbrush on the molar area with the bristles parallel to tooth surface
Redirect the tip of the bristles toward the gingival margin on 45 degree angle
Rotate the toothbrush from gingiva to the tooth margin
Brush all the tooth surfaces
Place the bristles perpendicular to the inner surface of the frontal teeth and move the toothbrush from gingiva to the tooth margin
Move the toothbrush with circular horizontal moves on the biting surfaces of teeth in the posterior area
Do 8-10 moves of the same type on each surface of all teeth
Brush the tongue surface from the back to the tip with 3-4 moves
Rinse your mouth with water with vigorous moves and spit the water
Clean your toothbrush under the water flow

Activity 4: Steps of proper use of dental floss

Aim: Getting to know proper technique of flossing

Method of education: Brainstorming, demonstration

Description of the educational process:

To a group of 9 participants are offered a set of 9 separate and mixed cards with steps necessary when flossing, a model of dentate arches dental floss. The cards are distributed to participants so that each student has a randomly chosen card. They are given a working time of 5 minutes in which they should collaborate and put the steps in the correct order. After they set out their order, they are asked to sit in a row in the order accordingly to the card they hold. Also, each of them are asked to read and demonstrate on the model, if it applies, the step written on his/her card. The coordinator assists at their demonstration and if he/she detects a mistake in their order, the children are asked to rearrange themselves until the coordinators approves the order set. Moreover, if the coordinator observes an improper move

during a step on the model, another participant is asked to do the correct move and invite the participants to give their opinion on how the move should be performed. At the end, participants are asked again to set the order and demonstrate properly without coordinator's intervention.

Table 3. Activity No. 4 cards

Take 45 cm of floss
Roll the floss around the middle fingers of both hands and keep a 2 cm long free part of floss between the two fingers
Handle the free segment of floss with pointer fingers for lower teeth
Handle the free segment of floss with pointer finger for internal end and thumb for the external end when placed between upper teeth
Place the free segment of floss in tension between the two adjacent teeth and push carefully to pass the contact between teeth
Adapt the floss on the contour of each of the two adjacent teeth and move the floss on vertical direction , up and down repeatedly
Repeat on each lateral surface of teeth
Use a clean free segment for each inter-dental space
Dispense the floss in the bin after all the spaces have been cleaned

DISCUSSIONS

The experiential learning approach showed an increased interest from teenagers and the results at the end of the 2-years program the results confirmed that this activity had greater impact on behavioral change compare to traditional learning, that most of the participants adopted proper oral hygiene habits, reflected in the lowered plaque index. Thus, based on promising results obtained the research team encourage oral health educators to use this learning method and offer as models the activities applied and described in this article. A possible limitation of the study is that the proper techniques for tooth brushing and flossing were performed on the model and not directly on student's oral cavity, when working conditions differ. Thus, the recommendation for future research is to apply a part of these activities in the dental office of the schools where there are proper conditions for such an intervention.

CONCLUSIONS

Applied in oral health promotion programs in general and targeted to teenagers in particular, experiential learning approach show good results in oral hygiene related behavioral change. The activities described in the present article represent a model recommended for use in oral health education initiatives.

Acknowledgement

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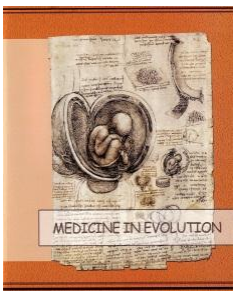
G Tongue In Adults And Children



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Abstract

Geographic tongue is a benign oral condition with a migratory pattern of the dorsal tongue. Aim and objectives: This paper aims to emphasize the etiology, epidemiology, pathogenesis and associated factors of geographic tongue, in an effort to improve the means of misdiagnosed and overtreated cases in adults and children. The variable clinical features of this condition are described. Moreover, geographic tongue can be an oral manifestation of psoriasis, thus further investigations are necessary. Recent data on oral microbiota, salivary changes and treatment strategy are also presented.

Keywords: Geographic tongue, migratory glossitis, oral psoriasis

INTRODUCTION

Geographic tongue (GT) is an oral condition with various names in the literature such as benign migratory glossitis, erythema migrans, annulus migrans, benign wandering glossitis, exfoliatio areata linguae, or transitory benign plaque of the tongue [1]. GT has a benign behavior and with an unknown etiology and pathogenesis. An inherited pattern may be involved [2]. Its clinical appearance is variable in size and location on the tongue surface (Figure 1, A-E). GT can be associated with fissured tongue in 50% of cases (Figure 1D, E, F). The onset time may be in the early age-first weeks or months of life [3]. It disappears over time (with adulthood) or reappears periodically **[4].**

The clinical lesions are observed on the tongue, mainly dorsal and lateral areas (Figure 1 E, F). These are red patches frequently limited by white areas represented by hyperplastic, regenerating filiform papillae, keratin and neutrophils [4]. These geographical map-like areas are multifocal and surrounded by normal areas of the mucosa. In evolution, GT changes its position on the tongue, healing without scars and then reappearing in another region (a migratory pattern). This explains the migratory term used as an alternative of GT. Being most oftenly asymptomatic, the condition only comes to attention by its spectacular clinical pattern. Thus, the aesthetic aspect may easily confuse patients and doctors.

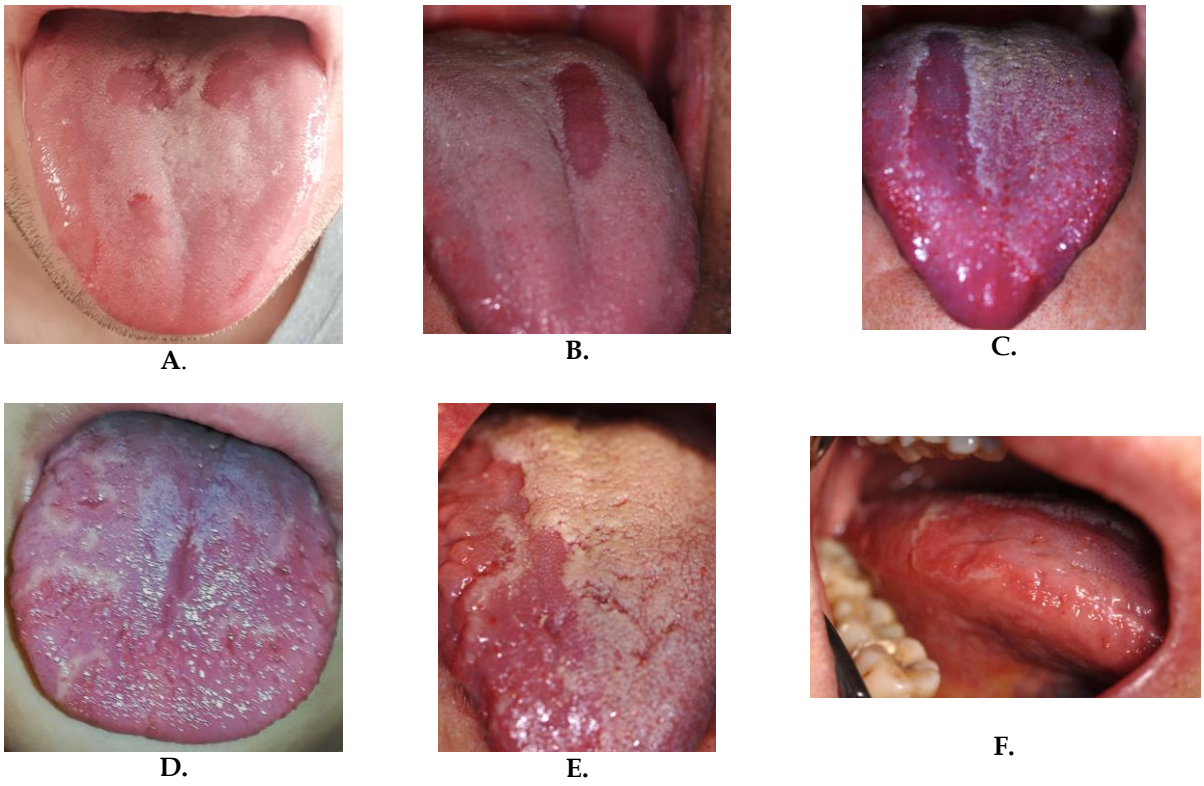

Figure 1. Different types of geographic tongue: A, B mild, C moderate, D severe, E, F moderate GT dorsal and lateral tongue of the same patient

In some cases a spectacular clinical pattern (Figure 1D) or the absence of the serpiginous white areas (Figure 1 A, B) can raise diagnostic difficulties.

In most of the cases GT is an asymptomatic condition and does not require medical intervention. But there are some patients with disturbing symptoms who need therapy. The treatment options vary from recommendations to avoid spicy, salty foods and acid beverages to medication and laser interventions [1]. The general treatments used are antihistamines, anxiolytics, corticosteroids and nutritional supplements. The topical therapeutic options

include ointments or rinses with anesthetics, antihistamines, corticosteroids, vitamins [5]. But a systematic review analysing the GT treatment in adults and children concluded that there is no clinical evidence for a specific treatment option in symptomatic GT [5].

Aim and objectives

The paper aims to emphasize the possible causative and associated factors of geographic tongue in adults and children, in an effort to improve the means of misdiagnosed and overtreated cases.

MATERIALS AND METHODS

Epidemiology

The benign geographic tongue is reported to appear in a percentage of 1 to 2.5 and even 3% of the population [2,4]. A Spanish study shows the prevalence of this oral mucosa variation had risen in time, from a value of 1-3% before 2002, to 4.9% and 9.08% in studies from different regions of Brazil in 2004[3]. More recently, between 2004 to 2016, several studies showed that the migratory glossitis has a prevalence of 2.15% in Europe, 1.62% in Africa and 2.79% in the American Regions (South, Central and North), meaning a higher prevalence in the American territory than anywhere else [6].

Concerning age and gender, it is affirmed by some authors that this tongue condition is more frequent in female subjects, in childhood or puberty [7], whereas other authors report an increased prevalence in adults, demonstrating its persistence [8]. According to J. Banoczy the gap between the prevalence of different age groups suggests that the etiology of the benign migratory glossitis might actually not be genetic, but a multifactorial cause. A few studies note that in almost 1 out of 2 cases, the geographic tongue is usually associated with fissured tongue, also known by the name of scrotal tongue[4].Analysing the prevalence of oral mucosal conditions in children in the latest World Workshop on Oral Medicine, geographic tongue results of 17 clinical studies had an overall relative frequency of 1.29% and a pooled relative frequency of 2.08%[6].

Etiology and pathogenesis

The main assumptions related to the etiology of this variation of lingual mucosa include local factors, genetic factors, hormonal disturbances(pregnancy), allergic conditions, systemic diseases, psychological factors, nutritional deficiencies and a special association with psoriasis [9]. Other correlations between GT are done with Down syndrome, diabetes mellitus, Reiter's syndrome, and medications such as oral contraceptives and lithium carbonate [10].

The genetic implication is one of the most popular theories, supported by several scientists. Eidelman and Redman suggest a polygenic mode of heredity based on the fissured tongue association in 50% of cases [2]. Another study which proves this theory reports a higher prevalence of GT among first degree relatives of the GT group and among the study group and general population [9].

Hormonal disturbances might also be a causative agent. The present theory is demonstrated by a study of GT patients and oral contraceptives medication, which determined that the lesions were most severe on the 17th day of the cycle [11].

An allergic mechanism is allegedly at cause for this condition in the studies of Marks and Miloglu that have found a higher prevalence of GT in patients with asthma, allergic rhinitis and high levels of immunoglobulin E (86% of the patients presented geographic tongue) versus patients unaffected by the mentioned diseases (37% of the control group)[11]. Akdis's theory also supports the allergenic mechanism associated with patients with personal or family history of atopic dermatitis such as allergic rhinitis and asthma, these patients have an immunological alteration that causes an IgE-mediated sensitization with the dysfunction of the epithelial barrier [12].Moreover, Marks and Simons found that the prevalence of the

HLA antigen B15 was significantly elevated in cases with geographic tongue when compared to a normal population [9]**.** Furthermore, Mclendon and Jaeger show a significant percentage of patients with cow's milk allergy (true milk allergy and not just lactose intolerance) presented geographical tongue. Even though there is a certain relationship between allergies, atopy and migratory glossitis, there are not enough reasons to consider that these diseases are the etiological cause of GT.

Geographic tongue and psoriasis association

Although much more common as a skin condition, psoriasis can sometimes have oral manifestations. These are clinical lesions very similar in appearance to migratory glossitis. Oral psoriasis often goes undiagnosed because the clinical signs may go unnoticed without careful examination. Thus, compared to the cutaneous manifestation of the disease, which presents a characteristic picture with red erythematous plaques, covered with pearly white scales located mainly on the scalp, elbows or knees, oral psoriasis requires further investigation for a correct diagnosis [13]**.**

Regarding oral psoriasis, at present, in the literature the opinions are contradictory. While some authors deny its existence mainly due to histopathological non-confirmation of most reported cases, there are others who argue that, although oral involvement is rare, it cannot be denied [13,14]. Usually, oral forms of psoriasis have been observed especially in the context of skin subtypes such as pustular or erythrodermic psoriasis [15]. The first documentation of a case of oral psoriasis, diagnosed on clinical and histopathological criteria, was mentioned in 1903 by Oppenheim. Since then and so far over 60 other fully investigated cases have been reported in the European medical literature [13].

From a clinical point of view, oral psoriasis is often polymorphic, and because of the similarity to other oral conditions the diagnosis is quite difficult. The presence of skin lesions guides the clinician in establishing the therapeutic strategy. Oral manifestations may be in the form of erythematous plaques, with diffuse edges and white-gray outlines. Sometimes mixed clinical forms may be observed with vesicular or ulcerative lesions. Clinical lesions change their aspect and location carrying a course of periods of remission and exacerbation. The evolution of oral lesions is consistent with that of skin lesions. The most common location is the buccal and lingual mucosa. The hard palate and gingiva are only exceptionally interested. Extralingual lesions are frequently observed and are named migratory stomatitis, ectopic geographical language or erythema circinata migrans [15]. There are also situations in which the oral manifestation of psoriasis is reduced, in the form of limited lesions of migratory glossitis. These are integrated in the general pathological context of mucocutaneous psoriasis or may go unnoticed in the absence of a complete history of the patient's medical history [13]. They are discovered by chance because most of the time they are asymptomatic, producing only transient discomfort and burns when eating sour foods [15,16].

Although the first clinical observations on GT were mentioned by Reiter in 1831, even to this day its pathogenesis has not been clarified. The association with psoriasis has been reported in many studies. Thus, research has shown that GT is the most common oral manifestation in psoriasis, and between the two pathological entities, there are many similarities in etiological, clinical, and histopathological aspects. The existence of a common genetic marker, HLA-Cw6 [17], was also proven.

The characteristic clinical picture in the context of skin lesions and sometimes family history are suggestive elements that guide the clinician to the diagnosis of oral psoriasis. The clinical and histopathological similarities between psoriasis and geographical language are arguments that support that there are indisputable correlations between the two. However, histopathological examination reveals important elements to support the clinical diagnosis. This is important for the complete assessment of the disease and to exclude other similar conditions. The histopathological criteria are slightly different in the cutaneous location from the oral one. Thus, for psoriasis with oral involvement, no clearly histopathological criteria

are defined. The varied aspects of clinical lesions and cyclical evolution are factors that make the diagnosis difficult [18].

As a differential diagnosis, oral psoriasis must be distinguished from other oral conditions with a similar clinical appearance. Of these, various inflammatory or infectious diseases are most often involved.

Unlike skin forms, the treatment of oral psoriasis has different directions depending on the severity of the symptoms accused by patients. Many of the oral manifestations are a little annoying and often do not require treatment. For symptomatic forms, depending on the extent of the lesions, local treatment with corticosteroids, immunosuppressants such as tacrolimus, or retinoids may be recommended. They have favorable effects and relieve painful symptoms and functional disorders. In extended or refractory cases, local treatments are useful and systemic medication imposes [15,17].

Although at present the cutaneous psoriasis knowledge, as well as the general concern about its treatment are at a high standard, for oral manifestation data are limited. Responsible for this is the epidemiological context, namely the low frequency of oral psoriasis, and the fact that often the lesions have a transient nature and reduced symptoms. However, there is a need for interdisciplinary studies to investigate this topic and draw the attention of clinicians to the oral manifestations of psoriasis. Thus, patients diagnosed with cutaneous psoriasis will need to be examined for oral lesions, even reduced oral psoriasis [15]. Also, patients with GT need a referral to a dermatologist. The anamnesis information on the family history of psoriasis is recommended. Recent studies have shown that there is a close association between the fissured tongue and GT, on the one hand, and psoriasis [16]. Some authors even claim that the GT could be an oral manifestation of psoriasis and also an index of its severity, imposing the need to include oral changes in clinical diagnostic criteria. Thus, more and more lately, GT is considered the most common oral lesion in psoriasis, because histopathological, immunohistochemical, and genetic similarities were observed between the two diseases [17].

Regarding the association of psoriasis in children with or without GT, it has been observed that psoriasis children with GT have an earlier onset, a severe form of the disease and present a family history of psoriasis [19].

Microbiota

The oral cavity is one of the richest human regions in the presence of microorganisms. It contains more than 500 to 1,000 different types of bacteria. In patients with low oral hygiene over 100 million bacteria are found on a single tooth surface [4]. Amal Dafar, from Sweden, has studied the differences between the microbiota of patients with GT (microbiota on the lesions and surrounding the lesions) versus a control group of subjects without this condition. This cross-sectional case-control study included 35 GT subjects and 22 control group subjects. Patients with oral lesions such as aphthous ulcers, oral lichen planus or under antibiotic treatment, use antibacterial oral rinses or consume tobacco were not included in the study. The anamnestic data of these patients (19 males and 16 females) revealed 5 hypertension and 4 associated psoriasis cases. The samples were taken in pairs, from the healthy surface of the tongue and from the erythematous area. The samples were used for DNA extraction, polymerase chain reaction and sequencing, sequence analysis and statistical analyses (univariate analyses of the relative abundance, the overall richness, and the Shannon and Simpson diversity indexes and multivariate analyses) [20]. The results showed that *Sphingomonas, Acinetobacter*, and *Delftia* (part of Proteobacteria phylum) are far more prevalent in both lesional and healthy areas of GT than in the control group. The greatest prevalence of Firmicutes (*Mogibacterium* and *Catonella*), Actinobacteria, Bacteroidetes *(Capnocytophaga)* was detected in the control group. Comparing the microbiota of the same patient in different tongue regions, the red areas presented higher levels of *Mogibacterium* and a significantly increased prevalence of the phylum Spirochaetes than in the healthy regions of the tongue [20]. The major finding of this study shows higher richness (more bacterial taxa) but not

higher bacterial density in the lesional sites than in the healthy sites of the migratory glossitis. This could be explained by the naturally protected niches at the papillae base pole which increase the bacterial density by preventing the bacteria from being removed by the salivary flux. Conversely, in the erythematous areas, the loss of filiform papillae is a direct cause of the dysbiotic states of tongue microbiota causing chronic inflammation. Dysbiosis is caused by three mechanisms: loss of beneficial bacteria, expansion of pathogenic bacteria, and changes in the diversity of the microbiota [21]. The constant variations of the regions affected by this condition make it difficult to re-establish a normal ecology of the microbiota, thus emphasizing the difficulties of finding the right treatment for this mucosal behaviour.

Treatment strategies

Although defined as an asymptomatic inflammatory disorder with unknown aetiology, in some cases, GT is disturbing. In non-symptomatic cases, no treatment is needed. Some patients complain of pain, burning sensation and a specific sensibility against garlic and all products containing garlic. Also taste reduction while ingesting spicy or sour foods, carbonated drinks, citrus fruits and derivatives can be present. In these cases, treatment is necessary in order to soothe the discomfort, but no curative treatment has been found.

The first step is to evaluate the mycological infection. If Candida infection is detected, the antifungal treatment is needed. Topical steroids, retinoic acid, cyclosporine, antihistamine, tacrolimus, immune system regulators, vitamin B and Vitamin D supplements are used in proposed treatment plans for GT. Until present, no treatment proved specific for this tongue condition. Najafi of Tehran University concludes in a study that the combination of triamcinolone and retinoic acid was not shown more effective than triamcinolone alone in symptomatic GT [22]. In another Japanese study, topical corticosteroid ointments to reduce strong pain in GT lesions was proven ineffective, on the other hand, applying topical tacrolimus the lesions have healed and improved course [23]. Helfman also reported GT improvement with tretinoin and partially improved state with vitamin A therapy [24]. Although their efforts, the results do not prove the therapy efficacy, not detecting the difference between the natural course of the condition (the migratory feature) and the actual improvement induced by the medication. It is important to remember that GT is a non-pathogenic condition of the dorsum tongue mucosa, with no significant damage to the general or local health of the patient, being mostly asymptomatic. Several authors have reported mouth rinsing with a topical anaesthetic soothes the discomfort for the symptomatic GT [9] as well as properly educating the patients about their condition and suggesting them to avoid ingesting sensitizing foods (spicy, sour, acid, hot, heavily salted). Another possibility for symptomatic GT is phototherapy by use of a laser. It was reported effective for GT with pain or burning sensation but there is still a lack of long term evidence of stable results [25].

DISCUSSIONS

The most frequent condition with which GT is misdiagnosed is oral candidiasis. There are clinical differences between these disorders: oral candidiasis has 2 two main forms: pseudomembranous and erythematous. Moreover, in candidiasis the lesions are painful and cause more discomfort compared to GT. Limited forms of oral yeast infection may involve hard palate, dorsal tongue, angular areas. In case of unclear differential diagnosis, one simple method is the mycological exam. Candida species can be isolated in about 50% of healthy persons [26] without clinical signs of infection (Candida carriage). It was encountered in a variable percentage between 20% [27] to 40% of GT patients [26].

Another oral disease which can raise misdiagnosis with GT is burning mouth syndrome. This condition is described as a persistent, burning sensation of the oral mucosa in the absence of visible lesions. It affects mainly the tongue. Its diagnosis and therapeutic approach is complex and includes a general and local evaluation. It can be associated with GT but the pain features are distinct [4].

Because of this frequent misdiagnosis, patients are prescribed antifungal treatment. More complicated cases are noticed in children with no complaints. Parents observe the atypical aspect of the GT and they refer to general practitioners or to the dentist.

Vitamin B12 and iron deficiency can play an important factor in the epithelial homeostasis, probably associated with formation of filiform papillae. As the atrophy of lingual filiform papillae is present in GT, Khayamzadeh et al. investigated the salivary level of zinc in GT patients. They found lower values in GT patients compared to controls but in zinc serum level no difference. Regarding vitamin B12 there were no differences between GT group and controls [28].

Analysing the levels of calprotectin and IL-8 in the whole saliva of both GT patients and controls, a recent study determined that there was a significant and positive correlation [24].

A recent research detected that the salivary level of alpha-amylase in GT patients was slightly, but not significantly, higher than that of controls (non GT patients) [10]. Same study investigated the anxiety levels in GT patients and found a slightly increased level when compared to controls, but not statistically significant [10].

CONCLUSIONS

Geographic tongue is a benign oral condition with various aspects and self-limited evolution. Its etiology is still unknown. There are differences in oral microbiota and salivary content. Although it is an asymptomatic condition, in cases with persistent complaints a treatment can be used, but it is not specific. Moreover, migratory glossitis is considered the most common oral lesion in psoriasis, because histopathological, immunohistochemical, and genetic similarities were observed between the two diseases.

Conflict of interests statement

All the authors declare that they have no financial or other conflict of interests regarding the present study and the data and devices involved in this article.

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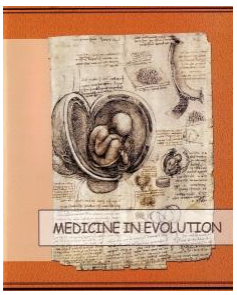
Effects of Topical Fluoride Applications on Caries Risk In Patients With Fix Orthodontic Appliances



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Abstract

The outcome of orthodontic treatment is usually aesthetically and functionally satisfactory. Caries is an undesirable side-effect of treatment with fixed orthodontic appliances. So pathogenic microbes like streptococcus mutants and lactobacillus gather, multiply and ferment the carbohydrates and sucrose. Therefore, it is crucial to understand how orthodontic treatment and different professional fluoride treatment affect caries risk and individual risk factors.

Keywords: fluoride varnish, caries risk, oral health, fix orthodontic appliance

INTRODUCTION

The multiband appliance facilitates food retention and aggravates the cleaning ability of the teeth. Studies have indicated that plaque levels increase during treatment with fixed appliances [1]. As a result white spot lesions can easily develop [2].

Caries forms through the dissolution of hydroxyapatite due to the process of bacterial fermentation in the presence of biofilm or plaque. A triggering factor is crowding. Other predilection sites for soft debris and plaque accumulation are related to the dental anatomy: occlusal deep fissures/pits, gingival margins, interproximal spaces and tooth restorations.

Another parameter of importance for caries development is exposure to fluoride (F), which can inhibit demineralization and enhance remineralization [3]. The main target of fluoride varnishes is to prevent the tooth surface to develop carious cavities by helping to remineralize the enamel with fluoride and prevent the surface from losing minerals. It is utilized as a primary preventive measure in patients with high to moderate caries risk. They exist with low fluoride concentration for long exposure and high fluoride concentration for a shorter exposure. Experimental studies indicate that fluoride affects the oral bacteria in several ways, by affecting their metabolism. It has been suggested that the uptake of fluoride by oral bacteria are pH dependent and that the fluoride reduces the acid tolerance of the bacteria.

Antimicrobial varnish is used to control and reduce the acidic outcome produced by the fermentation of soft deposits and plaque on the tooth surface. As a result, the bacterial balance shifts to a healthier level by inhibiting microbial growth [4, 5]. As a second positive effect, the demineralization reduces. Additionally, it minimizes the inflammation of gingival tissue caused by bacteria.

Previous studies have indicated that topical application of different solution with fluoride content reduced acidogenesis of the dental plaque. Other *in vivo* studies reported that fluoride rinsing resulted in a significantly reduced plaque index and a significant inhibition of acid production [6].

Aim and objectives

The purpose of the study is the evaluation of the outcome, including the advantages and disadvantages of professional fluoride administration on caries risk in patients with orthodontic treatment.

MATERIALS AND METHODS

The study took place during the period of October 2016–December 2019. 18 patients enrolled were asked to participate in the study (or a parent approved if the patient was less than 18 years of age).

The following inclusion criteria were used: patients between 12 and 20 years of age, scheduled for treatment of both the upper and lower arches with fixed appliances. The exclusion criteria were adults older than 20 years of age and children younger than 12 years of age, treatment in only one jaw or treatment with removable appliances and patients who declined to participate in the study.

The patients were divided randomly in 2 groups: the control group including patients that were instructed to brush their teeth twice a day, using standard toothpaste (1450 ppm F) and varnish group patients that were receiving topical fluoride application (5% natrium fluoride) every 3 months for a period of 1 year.

The first step of the clinical study was to inform the patients wearing fixed orthodontic appliances about the ongoing procedure and patient consent.

Procedures performed were: consultation, staining with toluidine blue, ultrasonic scaling, brushing with a slow speed handpiece in order to remove staining.

For each patient, general data and observation were gathered. The present teeth and their status were noted in a chart. For the qualitative plaque change the Silness- Löe Plaque Index (1964) was noted with the Mira-2-tone dye from Hager Werken by direct application to record the soft debris thickness and plaque deposits. The patients received oral health instructions, where and how to brush more precisely by showing them with a mirror the visualized stained surfaces. They received the explanation, that the multi -dye plaque agent stains the old and thicker plaque accumulation in blue which is older than three days, whereby the younger and thinner plaque is stained in red/pinkish colour. After removing the plaque and tartar by professional tooth cleaning with professional toothpaste and if necessary, the use of the scaler, it followed measuring the Silness-Löe Gingival Index (1963).

After recording the gingival health, the dental surfaces were dried with air and the varnish was applied with a small brush or applicator on the cervical tooth part and around the brackets.

For each of the patients included in the study Cariogram evaluating individual caries risk, described as 'the chance of avoiding new cavities', and illustrated in a pie chart was performed (figure 1). For all the patients the variable 'clinical judgment' was, retained at its normal setting.

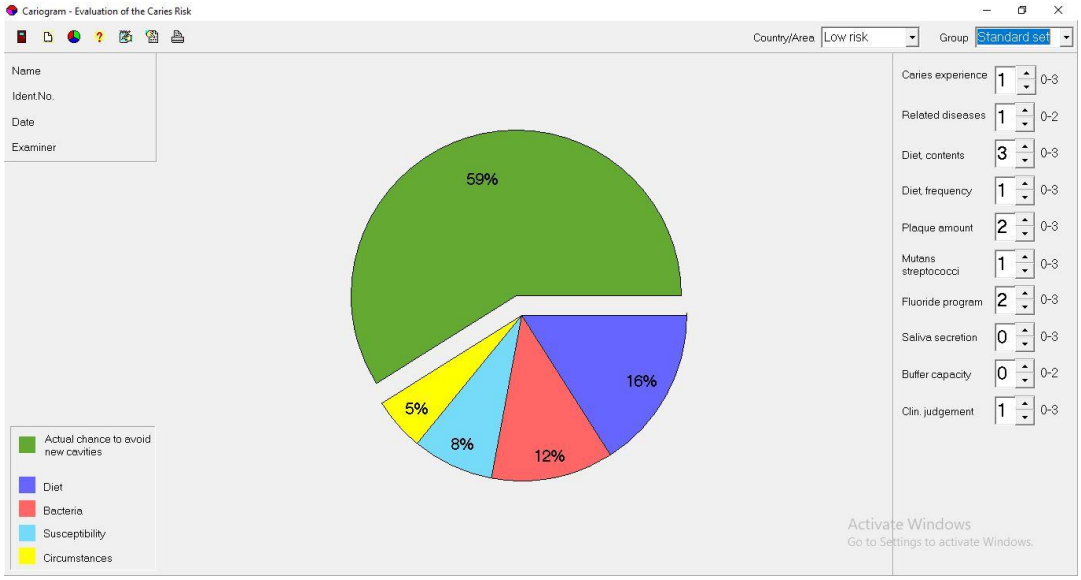

Figure 1. The figure illustrates a Cariogram which expresses to what extent different etiological factors of caries may affect the caries risk for that particular patient

RESULTS

The outcome variables were related to caries risk (assessed at baseline and after one year of treatment according to the Cariogram) and the numbers of cariogenic bacteria (counts of MS and LB in the oral cavity, assessed at baseline and after 1 year).

The oral hygiene was unsatisfied and soft deposits on the tooth and the gingival margin was even visible with the naked eye. The value of the plaque and the value of the gingival index correlate to each other in most cases. Having a mean of 1,04 for the initial PI and 0,91 for the initial GI calculated for all the 18 patients registered, these values indicate a general mild inflammation of the gingiva with plaque accumulation on the free gingival margin and adjacent areas (Figure 2,3).

The caries risk increased statistically significantly in the control group after 1 year with the fixed appliance compared to the risk at baseline ($P < 0.0001$). There were no statistically

significant differences in the caries risk at baseline between the two groups. However, there was a statistically significant difference in the caries risk between the 2 groups after 1 year with the fixed appliance ($P < 0.05$) (Figure 4).

The mean numbers of cariogenic bacteria (LB and MS) increased statistically significantly in the control group after 1 year with the fixed appliance in place ($P < 0.0001$).

The level of dental plaque, related disease, and the frequency of food intake did not change significantly in the control group after 1 year with the fixed appliance, as compared to the respective levels at baseline ($P < 0.0001$).

There were no statistically significant differences in the mean levels of plaque between the 2 groups, either at baseline or after 1 year with the fixed appliance (Figure 5). Regarding the frequency of food intake, the control group showed a statistically significantly higher baseline value than varnish group ($P = 0.029$). However, the frequency of food intake decreased significantly ($P < 0.05$), as compared to baseline levels, in both groups after 1 year with the fixed appliance.

Figure 2. Dental plaque identification at baseline- teeth stained with Mira 2 tone dye

Figure 3. Clinical view after professional cleaning and topical fluoride application

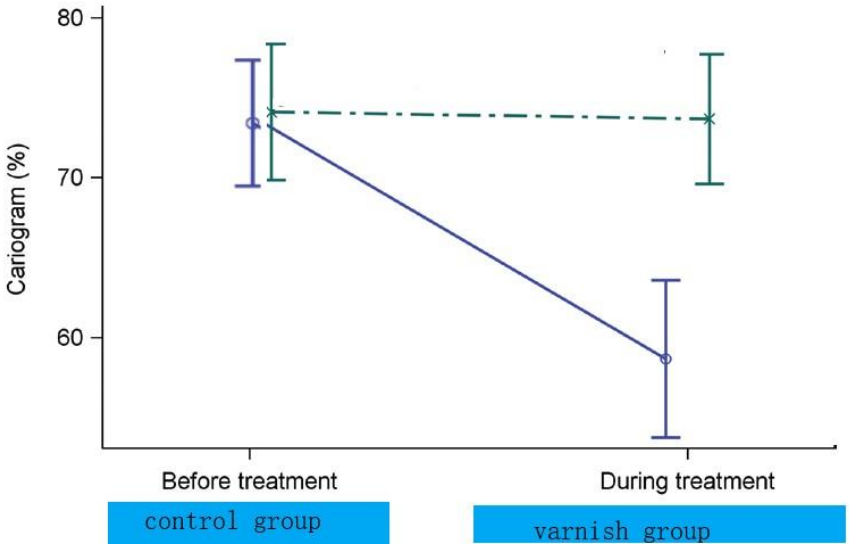

Figure 4. Mean values for Cariogram (95% confidence interval) for the control and studied group before treatment and after 1 year

DISCUSSIONS

The aim of the present study was to evaluate the impact of topical fluoride treatment applied during orthodontic treatment on caries risk and caries risk factors.

Additional fluoride brings a positive effect on caries risk, in the studied (varnish) group the caries risk was unchanged due to the additional fluoride and the decreased food intake frequency. The caries risk increased significantly in the control group, due to a significant increase in the numbers of cariogenic bacteria and a lack of supplementary topical fluoride treatment, since both the food intake frequency and the levels of plaque were not significantly changed. This is also mentioned in other studies that have demonstrated an increase in the number of cariogenic bacteria due to the presence of fixed orthodontic appliances [7]. It has been suggested that oral bacteria vary regarding their levels of sensitivity to fluoride [8].

The impacts of fluoride on the physiological features and metabolic functions of the bacteria may play a more important role than the actual number of cariogenic bacteria. Prevalently recommended for professional application are topical fluoride solutions, gels, or foams. In spite of that, they are less effective than fluoride varnish. However, the focus of this work is specifically on the application of varnishes and on the investigation of the resulting advantages and disadvantages. As the concentration of varnishes is higher, a smaller quantity is necessary as in gels. Although, the use is ascribed to professional health personal only. Varnish is a solution of natural gums and resins in a suitable solvent. A thin coating is applied over the surfaces of the cavity preparations before placement of restorations and is used to protect the teeth. They consist of a film former, which is a high molecular polymer or a low molecular resin. The second part is the biocompatible solvent as water, ethanol, acetone or esters. It also consists of auxiliaries' additives and other additional ingredients. Induration can be archived by two mechanisms, chemical and physical.

Plaque tends to accumulate near the gingival margin and in close proximity to the orthodontic bands, brackets and attachments, which often leads to increased plaque accumulation.

A significantly lower values of plaque indices was found in a test group that used toothpaste and fluoride varnish, as compared to a control group that used only fluoride toothpaste [9]. In this study, however, the amount of plaque did not increase significantly as a result of the orthodontic treatment. There are strict criteria regarding good oral hygiene and low caries activity in order to be accepted for orthodontic treatment, which probably explains the good oral health among the subjects. Also the plaque levels were not affected by the fluoride treatment.

The importance of food intake during orthodontic treatment with a fixed appliance is sometimes described as consistent and sometimes described as inconsistent. Is desirable to have a decreased frequency of food intake and this is in accordance with the results from the varnish fluoride group in the present study. The improved diets may could be explained to the fact that orthodontic patients are often restricted in certain foods or they avoid them for protecting the brackets from debonding. On the other hand, the food habits were unchanged in the control group, indicating that food habits can be persistent.

The Cariogram variables are weighted differently according to a built-in algorithm. Hypothetical calculations have been performed to ensure that the observed results for differences in caries risk are primarily due to the fluoride regime used and not the food intake frequency.

Limitations of the present study: the number of the subjects included in the present study is low and the subjects are not representative for the entire age group population. The study results may be different in a group with higher levels of cariogenic bacteria and higher caries prevalence.

CONCLUSIONS

During orthodontic treatment any additional fluoride treatment (other than daily toothbrushing with fluoride toothpaste) is highly recommended in order to minimize the risk for developing new caries lesions.

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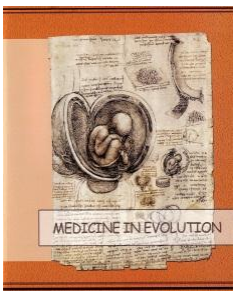
Digital vs conventional workflow in fixed prosthodontic restorations



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Abstract

Aim and objectives: This study will try to emphasize the differences between different materials and technologies currently used for dental crown manufacturing.

Materials and methods: We performed 4 different types of dental crowns, using different materials and technologies, on the same preparation, on 4 different duplicate models, and we examined the marginal adaptation and the surface quality, using a HD camera.

Results: The worst results, both in marginal adaptation and surface quality, were found to be present in the crowns manufactured in the traditional casting and waxing manner.

Discussions: The traditional procedures, which involve casting and waxing, are many times subject to human error and are also affected by many physical factors, which are harder to control.

Conclusion: Regardless on the material chosen – metal, ceramic or zirconia, the CAD-CAM technology offers better properties to the final restorations and, thus, more safety to the clinician and to the dental technician.

Keywords: Fixed restorations, digital workflow, marginal adaptation

INTRODUCTION

One of the biggest challenges in dentistry is the marginal sealing of fixed restorations. This problem not only involves clinical management and protocols, but also different technological procedures. First problem that researchers have to overcome is how to determine precisely the quality of the crown-abutment marginal interface. As Noor A. Nawafleh[1] et al. point out, in their literature review, there is a substantial lack of consensus relating to marginal adaptation of various crown systems due to differences in testing methods and experimental protocols employed. However, direct view technique was the most commonly used method of reproducible results.

Tooth preparation is very important in order to obtain a good quality prosthetic restoration, especially regarding the marginal adaptation, but also a good biological response from the surrounding tissues[2, 3, 4, 5]. From a clinical perspective, the preparation step should always be done using strict guiding protocols, such as the silicone keys[2] to obtain the best possible outcome. Regarding the type of preparation, there is a debate in the international literature, whether or not the finish line design affects the overall outcome, depending on the protocols and materials used. While some authors[6] have found little or no difference between different preparation types, there are articles who suggest that the finish line can influence the marginal fit of the crown[7, 8, 9, 10]. As Comlekoglu et al.[8] wrote in the conclusion of his study, the preparation design should always relate to the material and technology used for the final crown: „Although the feather-edge finish line resulted in lower absolut marginal opening and marginal opening values, with its proven mechanical disadvantage, it cannot be recommended in clinical applications of zirconia crowns. This type of finish line has acted solely as a control group to test the null hypothesis in the current study. For better marginal adaptation, both shoulder and mini-chamfer finish line types could be suggested for zirconia crowns."

Impression is also a very important topic when it comes to crown adaptation. When dealing with traditional impression methods, the depth and the width of the gingival sulcus play a vital role in obtaining a correct and well fitted crown[11]. When it comes to optic impression techniques, the results may vary depending on the brand and/or protocols that are being used[12].

Aim and objectives

The aim of the study is to determine the factors that can influence the overall quality of a fixed prosthetic restoration. From clinical procedures related to tooth preparation, the impression material/protocol or the technological steps, all these factors contribute to the final outcome and have to be taken into consideration, but the main focus of the present study will be on the technological procedures and protocols.

MATERIALS AND METHODS

For the experimental part, four types of crowns were made, using different materials and technologies on a cast. All of them were done on the first upper molar, which was previously prepped using the chamfer finish line design. The first type of crown is a metallic infrastructure, obtained through the classical casting technique. Since our main aim is the marginal investigation, there was no use in adding the ceramic on top. The next 3 types of crowns were milled using the CAD-CAM technology: a metallic infrastructure initially milled in wax, a computerized milled zirconia and a computerized milled pressed ceramic infrastructure.

In order to minimize errors, all the crowns were made in the same dental laboratory, by the same dental technician and all steps were strictly recorded and documented.

Creating and duplicating the working casts with removable abutments

Firstly, the working cast will be duplicated, using the two component duplication silicone from Feguramed (Fig. 1). A class IV super hard gypsum from GC Fuji Rock was used for models' casting.

Figure 1. The cast's duplication

In order to create the working casts with removable abutments, the cast was poured, then, to insert the pins, the wells were drilled, using the Pindex system. Double pins with sheath were used, which were attached with superglue. To prevent the cast's gluing to the socle, the cast was isolated, using a gypsum-gypsum insulating agent. After that, a vertical preparation was performed and the abutments were sectioned, using the Model Cut device. Afterwards, the different materials and techniques were used to manufacture the crowns, as it follows.

Metal crown made using casting and waxing procedure:

The die spacer varnish, from Durolan company, was applied on the abutments. After it has dried, the abutment was isolated with a gypsum-wax insulating agent, which facilitates the wax template's removal from the cast.

After the abutment's isolation, it has been introduced into a wax immersion bath, in order to obtain the infrastructure's wax template. A 2 mm diameter sprue and a wax ball, which will serve as an alloy tank during the investing stage, were attached to the infrastructure (Fig. 2). Then, the entire structure was attached to the casting cone.

Figure 2. The sprue's attachment

The casting cone and the template were inserted into a conformer. Previously, on the template was applied a tension easer. Next, the investment material was chosen, the powder from Bellavest SH and the liquid from BegoSol HE, and prepared, according to the manufacturers' instructions. To obtain the best results, the vacuum-mixer was used for mixing the powder with the liquid.

After the investment material has strengthened, the pattern was introduced into a preheating oven, at 1000ºC, for wax removal (Fig. 3).

Figure 3. Preheating the oven

After the wax removal from the pattern, the next step is the metallic alloy's casting process. Co-Cr is the alloy used for metallic infrastructure's casting. The alloy was melted at 1450ºC, using the Power Cast automatic centrifuge from Heraeus-Kulzer.

The pattern, in which the metal was casted, is left for cooling. The next steps are the devesting, in order to clean the metal piece, and sandblasting (Fig. 4 & 5). By sandblasting, microretentions are created, to increase the contact surface with the polymer. Using a rotary instrument, the metallic substructure was cut from the sprue, followed by the processing and adaptation of the infrastructure to the cast.

Figure 4. Unpacking of the metal infrastructure

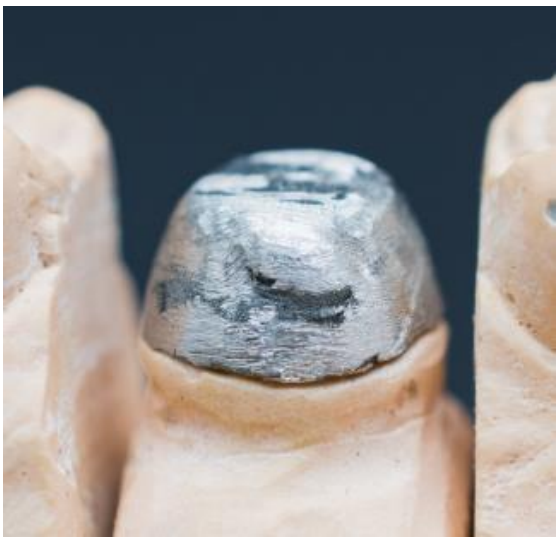

Figure 5. Infrastructure on the working cast

For the rest 3 restorations, the **digital protocol** was used, so, the casts were scanned with a laboratory scanner, to obtain the virtual casts (Fig. 6 & 7).

Figure 6. Mandibular virtual cast

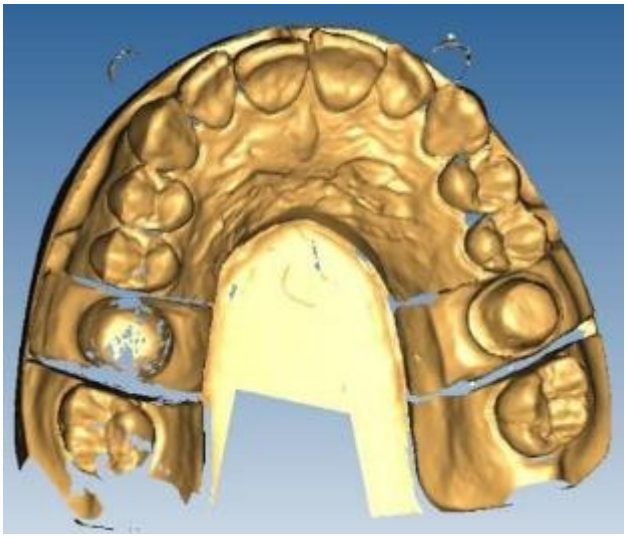

Figure 7. Maxilary virtual cast

The restorations' design were made using the Ceramill Mind program. After selecting the abutment teeth, the preparation's boundaries were set in order to obtain a both, functional and biological restoration, but also to have the best fit possible (Fig. 8 & 9).

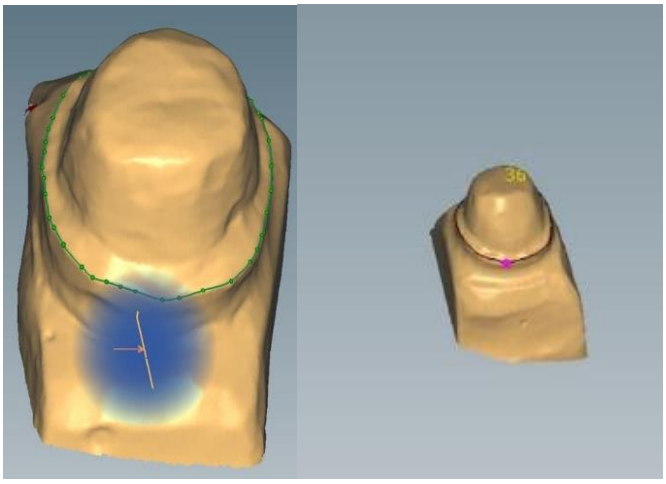

Figure 8,9. Setting the preparation's margins

The first digital restoration created was a full pressed **ceramic** crown, initially milled in wax. After obtaining the wax template using the CAD-CAM, the next step was the investing. A 0,4 mm diameter sprue has been attached to the pressed ceramic infrastructure's template. The materials used were investing mass from IPS Press Vest (Ivoclar Vivadent, Lichtenstein), liquid for investing mass from Ivoclar Vivadent and distilled water. The powder-liquid dosage was performed according to the manufacturer's instructions. Initially, the powder and the liquid were mixed with a spatula, to obtain homogenization and after, the mixture was introduced into a vacuum-mixer to achieve the optimal consistency. Then, the paste was carefully casted, until the ring was filled, without deforming the template.

After being kept in the same position for 40 minutes, the assembly was placed into a preheating oven, at 700^{o}C, for about 40 minutes (Fig. 10).

Figure 10. The preheating oven

When the preheating was complete, the assembly was pulled out from the oven. The ceramic ingot was inserted into the ring, and above the ingot, the pressing cylinder was placed. Next, the final assembly was positioned into the ceramic pressing oven Programat EP3010 from Ivoclar Vivadent, at 710^{o}C, for 15 minutes.

The next steps are the devesting and sandblasting, before checking the fit on the cast (Fig. 11 & 12). At the end, the pressed ceramic infrastructure can be individualized for better aesthetic outcome.

Figure 11. The sandblasted crown

Figure 12. The crown's check up on the cast

The second digital restoration was also a **metal** crown. After realizing the digital design, a wax pattern was milled using the CAD-CAM. For milling procedure of the metal infrastructure, a unit with 5 axes Ceramill Motion 2 from Amann Girrbach was used. After obtaining the pattern, the rest of the technological steps were done as previously described to finish the metallic infrastructure (Fig. 13).

Figure 13. The final infrastructure

The third and last digital restoration was a **zirconia** infrastructure. The milling was also done with the 5 axes milling machine Ceramill Motion 2 from Amann Girrbach. Being a substractive system, the process was realised with a zirconium oxide disk. After finishing the milling, the zirconia restoration was inserted into the sintering oven, at 1500^{o}C, for 7 hours. Afterwards, the check up was done on the cast (Fig. 14). At the end, the zirconia infrastructure will be individualized for better aesthetic outcome. Through the same method a full zirconia crown can be manufactured, where no layering is done.

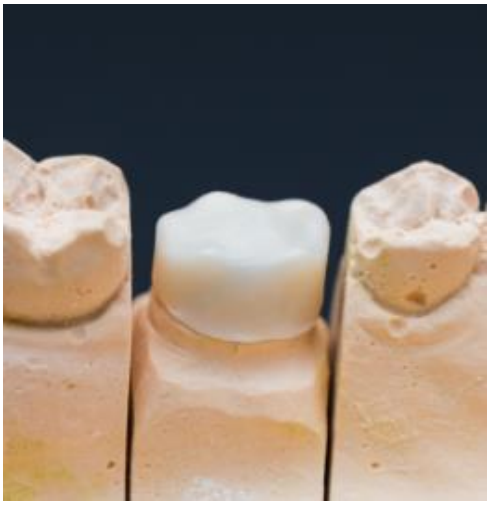

Figure 14. The final zirconia infrastructure

RESULTS

All 4 restorations were completed and multiple HD pictures were taken from all angles to observe the marginal fitting and to spot any defects on/in the materials.

The restoration with most observable flaws was the conventional metal infrastructure done through the waxing and casting procedure.

The main defects, observed in a close-up image on the buccal side of the infrastructure, were two gaps at the cervical finish line and multiple porosities (Fig. 15).

Figure 15. The defects on the metal infrastructure

All the rest of the crowns made for this study, regardless of the material, had insignificant observable differences between them, regarding marginal fitting and surface

status. Moreover, all of the 3 restorations done with CAD-CAM technology needed shorter lab time to complete, compared with the one done through conventional means.


Figure 16. CAD-CAM metal


Figure 17. CAD-CAM ceramic

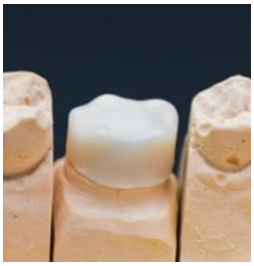
Figure 18. CAD-CAM zirconia

DISCUSSIONS

Taking in consideration the limited number of samples of the present study, but also the time efficiency during lab work, it is clear that digitalization has a positive impact on the workflow of dental technicians and, thus, on the overall outcome of the clinician. Having the possibility to obtain both the design and the milled wax pattern or straight away the final restoration in just few minutes, the dental laboratory saves a lot of time. This doesn't only make it more profitable, but also reduces the chances of human errors.

While using the very time consuming conventional procedures, many factors may interfere and affect the final restoration, such as: properties of the materials that are used, the skill and knowledge of the dental technician and, of course, the little errors that might appear from the multitude of steps that sometimes go unnoticed until the clinical phase.

It is also important to mention the fact that even though the metal crown done using the digital protocol went through the same conventional technological procedures once the wax pattern was digitally conceived, the chances of error are still smaller. That's due to the proprieties and qualities of the CAD CAM milled wax pattern, compared to the handmade version; the thickness, the morphological features and the cervical margins are all under strict control of the dental technician with the help of the digital design.

CONCLUSIONS

Within the limits of the present study, we can conclude that the digital workflow has numerous advantages compared to the conventional one, from time saving to profitability and, of course, the quality of the final restorations.

The marginal fit can be controlled much better and easier by establishing the restoration's margins, digitally, prior to the design. In other words, the dental technician can see with great magnification exactly where the preparation stops and, also, if there are any retentive areas that could pose problems. This will ensure that the final restoration, done through digital means, will have the proper and correct fit on the abutment.

The limitation of the manufacturing steps also reduces the chance of human error. While the conventional protocol takes a lot of time and skills, the CAD-CAM machine does most of the work by itself. The thickness of the material, the marginal fit, or the occlusal anatomy can all suffer variations from on dental technician to another, or even from crown to crown made by the same dental technician, while using the digital protocol, most of these problems go away. Of course, there's a learning curve to begin with, but the efficiency and benefits are worth the effort.

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The paper will be edited according to international editing rules for manuscripts. The title will be written in capital characters and it will be followed by the name and surname of the author (authors), followed by their place of work (place where the paper has been elaborated). Studies and researches will be followed by a brief abstract, followed by 3-4 key-words.

The body of the paper will be structured on the following chapters: introduction, aim, objectives, material and method, results and discussions, conclusions. The references will be presented alphabetically and in conformity to the Vancouver Convention, including:

- for articles: name of the authors and surname initials, title of the article in the original language, title of the journal according to the international abreviation system, year of issue, volume, number, pages;
- for books: name of the authors and surname initials, volume, publisher (editors), city of publishing, year of issue.

Citation of references inside the body of the paper will be put between brackets, Harward style (author, year) or Vancouver style (number in square brackets or superscript). Cited reference titles will be selected, maximum 6 for studies and case presentations and 12 for general reviews. Acceptance, rejection or the need of alterations in sent materials, or in inconography, will be comunicated to the authors in due time. For this, the authors will indicate the person and address for corespondence (phone number, e-mail address). Given the less pleasant experience of the editorial board with some articles being rejected because they did not meet publishing criteria, we decided to support those who intend to publish in this journal by detailing the way such a paper should be elaborated, as well as our requirements.

Except some particular aspects concerning this journal, the following details are general requirements asked or imposed by other journals as well. Conditions to be met in order to propose a paper for publishing. The main author has the responsability to make sure the article has been approved by all the other authors. The journal will have copyright

for papers accepted for publishing. The editorial board reservs the right to change the style and dimensions of an article (major changes will be discussed with the main author) and to decide the date of issue.

2. FIRST PUBLICATION

The editorial board will not consider a paper already reported in a published general review or described in a paper proposed to or accepted by another journal. This does not exclude papers which have been rejected by other journals. Also, papers which have been presented at a scientific meeting will be accepted for discussion if they have not been entirely or partially published in a similar publication. „Multiple" publishing of the same study is seldom justified. One of the possible justifications is publishing in a second language but only if the following conditions are met:

- Editors of both journals involved are fully informed;
- Priority of the initial publication will be respected by a minimum publishing interval of two weeks;
- For the second publication, a shortened version will suffice;
- The second version strictly reflects data and interpretations in the first;
- A footnote may state: „This article is based upon a study initially published in [title of the journal]".

3. PATERNITY

Paternity must reflect the common decision of the coauthors. Each author must have participated enough to take public responsability for the content. A paper with collective paternity must have a key person responsable for the article.

4. COPYRIGHT

In order to reproduce materials from other sources, written agreement from the copyright owner must be obtained:

- photographer – for unpublished photographs;
- hospital where the photographer (physician) is employed – for unpublished photographs performed during the employment period;
- initial publisher – for a table, picture or text which have previously been published elsewhere.

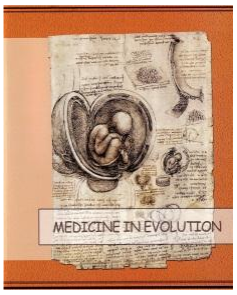
5. ETHICAL ASPECTS

Do not use name of patients, initials or hospital observation charts numbers. If a photograph of a body part which could allow direct or deductive recognition of the patient needs publishing, then the paper must be accompanied by the written consent of the patient and clinician, as well.

6. PRESENTING THE MANUSCRIPT

6.1. CONTENT OF THE PAPER - INDICATIONS FOR ORIGINAL ARTICLES

Paper title [Book Antiqua 20, bold, left alignment]



Surname N.[1], Surname N.[2] [Book Antiqua, 14, bold]

[1] *Author Affiliation (DEPARTMENT, FACULTY, UNIVERSITY, CITY/COMPANY) [10, italic]*
[2] *Author Affiliation (DEPARTMENT, FACULTY, UNIVERSITY, CITY/COMPANY) [10, italic]*

Correspondence to:
Surname Name: [10, italic]
Address: [10, italic]
Phone: +40 [10, italic]
E-mail address: [10, italic]

Abstract [Book Antiqua, 12, bold, justify alignment]

Recommendations for original studies

Original studies must include a structured abstarct of maximum 150 words, containing the following titles and informations: Aim and objectives; Material and methods; Results; Conclusions; Key words: give 3-5 key words; The abstract will be translated into an international circulation language.

Keywords: Innovation, technology, research projects, etc. [Book Antiqua 9].

INTRODUCTION [Book Antiqua, 11, bold, left alignment]

Introduction presentation of general aspects, in the context of the approached theme.

Introduction include **Aim and objectives –** Define the aim of the article. Briefly expose the rationale of the presented study or observation. Make strictly pertinent referals and do not exhaustively review the subject. Do not include data or conclusions from the paper.

There is a limitation of 4/6 pages. All pages size should be A4 (21 x 29,7cm). The top margins should be 2 cm, the bottom, right, margins should be 2cm and left margins should be 2,85 cm. All the text must be in one column and Book Antiqua font, including figures and tables, with single-spaced 10-point interline spacing.

Aim and objectives [Book Antiqua 11, bold italic, left alignment]

The text included in the sections or subsections must begin one line after the section or subsection title. Do not use hard tabs and limit the use of hard returns to one return at the end of a paragraph. Please, do not number manually the sections and subsections; the template will do it automatically.

[Book Antiqua, 11 point, normal, justified alignment].

MATERIAL AND METHODS [Book Antiqua, 11, bold, left alignment]

Describe the selection of observations or subjects for the experiment (including controls). Identify methods, equipments (with the name and address of the manufacturer in brackets) and give sufficient details on procedures. Give references for the selected methods, including statistical methods; offer details and brief descriptions for previously published methods which are not well known; describe new or substantially modified methods, justify their use and assess their limitations. Precisely identify all used drugs and chemicals, including generic names, dosage and administration ways. Describe statistical methods with sufficient details for reported results to be verified. Whenever possible, quantify discovered aspects and present them with appropriate measurement indicators for the uncertainty or error of measurement (such as confidence intervals). [Book Antiqua, 11 point, normal, justified alignment].

RESULTS [Book Antiqua, 11, bold, left alignment]

Present results in a logical succession as text, tables and illustrations. Emphasize or briefly describe only important observations. [Book Antiqua, 11 point, normal, justified alignment].

DISCUSSIONS [Book Antiqua, 11, bold, left alignment]

Underline new, important aspects of the study. Do not repeat in detail data which have been presented in previous sections. Include implications of revealed aspects and their limitations, including implications for future studies. Connect your observations to other relevant studies. Relate the results to the aim proposed for the study. [Book Antiqua, 11 point, normal, justified alignment].

CONCLUSIONS [Book Antiqua, 11, bold, left alignment]

Organize conclusions which emerge from the study. In the end state: a) contributions to be acknowledged but which do not justify paternity right; b) thanks for technical support;

c) thanks for financial or material support. [Book Antiqua, 11 point, normal, justified alignment].

REFERENCES [Book Antiqua, 11, bold, left alignment]

A numbered list of references must be provided at the end of the paper. The list should be arranged in the order of citation in the text of the publication, assignment or essay, not in alphabetical order(according to the Vancouver rules). List only one reference per reference number. It is very important that you use the correct punctuation and that the order of details in the references is also correct.

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Internet Documents - Standard format - #. Author A, Author B. Document title. Webpage name [format]. Source/production information; Date of internet publication [cited year month day]. Available from: URL. [Book Antiqua, 10 point, normal, justified alignment].

[1] _____
[2] _____
[3] _____

6.2. CONTENT OF THE PAPER - INDICATIONS FOR CASE REPORTS

Content of the paper for case report will respect indications for original articles.

Themes may be selected from all medical fields. Manuscripts which offer a special gain for daily activity will have priority. The title must be clearly, precisely stated. It may be completed by a subtitle. It is advisable to include in the key words of the title the main message, the special element which may be observed from the case evolution. The content of a case report must be divided into three parts:

Introduction – It must include a maximum of 15 typed rows (half page). Here, the main medical problem is summarized in order to place the case in a specific domain.

Case report – It contains essential specific information on the case. In order to make a logical, chronological and didactical case report the following 5 chapters are needed:

I. Anamnesis;
II. Clinical examination data;
III. Laboratory data;
IV. Additional paraclinical investigations;
V. Treatment and evolution.

Discussions – The reason for the case report must be stated. The report must be patient-centered. Occasional deviations from typical (characteristic) evolutions, nosologically important facts must be presented in such a manner to expose the clinical picture as completely as possible. The case report must not appear as an appendix of a general review. Dimensions of a case report: maximum 6-8 typed pages, 30 rows of 60 characters/page.

6.3. MEASUREMENT UNITS, SYMBOLS, ABREVIATIONS

All measurements must be expressed in International System (IS) units. Abreviations must be fully explained when first used.

6.4. TABLES

Tables are noted with Roman figures and they will have a brief and concise title, concordant with their content.

6.5. ILLUSTRATIONS

Number all illustrations in Arabic figures in a single succession. Apply a label on the back side of every illustration, containing its number and an arrow indicating the upper side. Coloured illustrations may be accepted but it is the choice of the editors, according to particular technical abilities of each journal issue, or it may involve a fee in special cases.

6.6. EXPLANATIONS FOR DRAWINGS AND GRAPHS

Explanation for drawings and graphs must be clear and in readable dimensions, considering the necessary publishing shrinkage.

6.7. PHOTOGRAPHS

Offer glossy, good quality photographs. Any annotation, inscription, etc. must contrast with the ground. Microphotographs must include a scale marker.

6.8. ILLUSTRATION LEGENDS

Include explanations for each used symbol, etc. Identify the printing method for microphotographs.

7. COPIES FOR PUBLISHING

In order to accelerate publishing, the main author will send a set of printed sheets presenting the final version of the paper, as it will appear in the journal. It is really helpful that texts to be also sent on electronic support, diacritic characters mandatory.

8. REJECTION OF PAPERS

If a paper does not meet publishing conditions, whatever these may be, the editors will notify the first author on this fact, without the obligation of returning the material. Original photographs or the whole material will be returned only if the author comes to the editor and takes them.

Papers submitted for publishing will be addressed to:

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