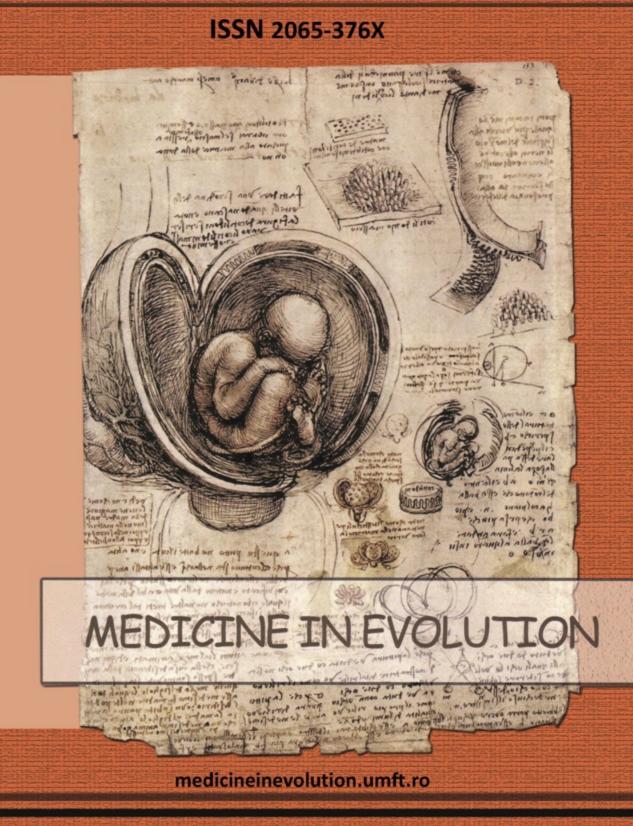
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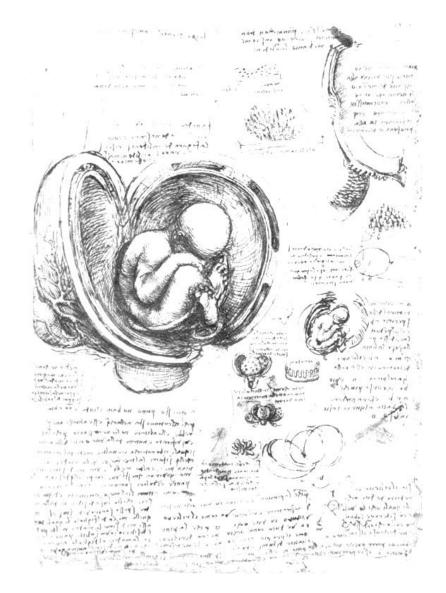


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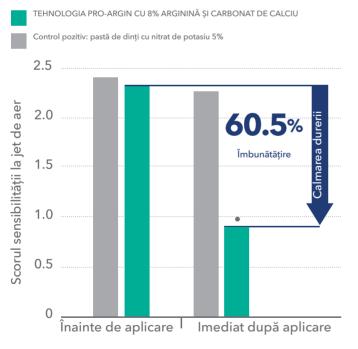
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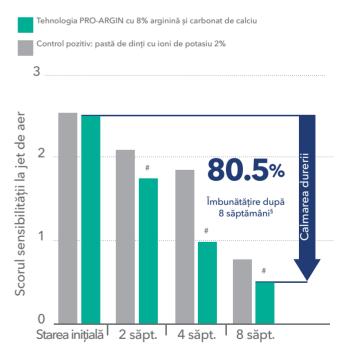
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În comparație cu starea inițială (sunt prezentate doar datele relevante)
 Semnificativ statistic (p<0,001)

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.

Gegetului 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.



Microscopic and macroscopic features of 91 basal cell carcinoma patients, observed throughout a 2 year-period



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Abstract

Basal cell carcinoma (BCC) is the most frequent skin malignancy, which has been linked over time to multifactorial causes of which the most important is prolong solar exposure. The study aims to find a link between certain age groups, sex and basal cell carcinoma subtypes, both on a microscopic and macroscopic level. The present paper relies on a group of 91 patients diagnosed with basal cell carcinoma, whom were registered in the Bucharest University Emergency Hospital's Pathological Anatomy laboratory database between March 2016, through Fabruary 2018. Values were extrapolated using Microsoft Office Excel 2013. Within certain age groups, it has been observed that basal cell carcinoma, almost regardless of subtype and patient sex, has a tendency of appearing on sun-exposed areas in people with fair skin. The nodular and ulcerated subtypes are the most common. Basal cell carcinoma is an important source of morbidity with a major impact in modern society requiring a better pathological understanding and a new approach regarding screening opportunities.

Keywords: basal cell carcinoma, skin malignancy, solar exposure.

INTRODUCTION'

Basal cell carcinoma is a malignant tumor derived from the non-keratinized cells, whose origins lay in the basal layer of the epidermis and its annexes. Basal cell carcinoma is the most common type of cancer in humans – in most cases, its origin can be traced back to ultraviolet (UV) solar radiation exposure, and in some cases is associated with PTCH gene mutations. Also, basal cell carcinoma may occur in the context of genetic syndromes such as nevoid BCC syndrome (also known as Gorlin syndrome), Rombo or Bazex–Dupré–Christol syndromes (1).

The incidence of BCC is considered more than four times higher than that of squamous cell carcinoma and about 20 times higher than that of melanoma. The incidence of BCC has important regional variation. Many studies have shown relatively few cases in Northern Europe, compared to a considerably higher incidence in Australia. Also, some statistical analyses demonstrated that BCC occurs more frequently in men than in women and commonly affects caucasian people. In Oriental population, BCC is usually pigmented. The risk for caucasian men have a lifetime risk of up to 39% to develop BCC, while for women, the values are lower ranging between 23% to 28%. (2, 3).

Although basal cell carcinoma is considered by many to be a tumor of the epidermis, it is almost unanimously accepted in the medical world as being a tumor with a predominantly follicular differentiation (4). Thus, trichoblastic carcinoma, according to some authors, could be considered to be a more appropriate name to characterize basal cell carcinoma (5).

This type of tumor represents a frequently occurring subtype of cancer within medical practice, adding up to 80% of the total malignancies with an epidermal starting point. BCC is a locally aggressive tumor and usually affects elderly patients and has an extremely wide range of histological subtypes. The most common anatomical sites of its occurence consist of solar radiation exposed areas, generally, wherever pilous follicles are being found, but it can also appear in limited-exposure to solar radiation areas, even as far as none, whatsoever. Xeroderma pigmentosum patients, with limited repair possibilities regarding solar-induced mutations, tend to develop a large number of tumors, both basal cell, as well as spincolellular carcinomas, from a young age. If left untreated, this type of tumor will countinue to invade locally, which will lead to tissue damage, compromising the affected area at a functional, aswell as cosmetical level (6). Positive diagnosis is, usually, easy to obtain and relies on: patient history (age, profession, risk factors, preexisteng lesions, long-term evolution), location (frequently on solar exposed ares, especially on the upper two thirds of the face), clinical features (pointing out the typical translucent pearls) and the characteristic histopathological examination. However, given the very wide spectrum of clinical and histopathological subtypes, the diagnosis of basal cell carcinoma can be difficult.

Aim and objectives

The study aims to provide a new perspective regarding the distribution of patients afflicted with different histological basal cell carcinoma subtypes within a certain geographical distribution and how sex and age influence said variables.

MATERIAL AND METHODS

Given the implications that the basal cell carcinoma brings with it, the purpose of this paper is to clear a pathway towards understanding which age groups are more likely to be the victims of onset and which particular subtypes can be associated with a higher incidence regarding age and sex.

The present paper is a cohort retrospective sudy that relies on a group of 91 randomly selected patients diagnosed with basal cell carcinoma, whom were registered in the Bucharest

University Emergency Hospital's Pathological Anatomy laboratory database between March 2016, through Fabruary 2018. Values were extrapolated using Microsoft Office Excel 2013. After surgical excision, the specimen samples were fixated with 10% buffered formalin and were processed by conventional histopathological methods using paraffin embedding, sectioning and Hematoxylin-Eosin (HE) staining. The final diagnosis was performed in accordance with the latest criteria of the World Health Organization concerning the histopathological evaluation and diagnosis of skin tumors.

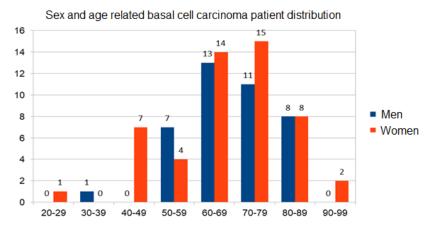


Figure 1. Distribution of basal cell carcinoma patients according to age groups and sex (n=91)

Fig. 1 Age wise, the 6th and 7th decade of life were found to be associated with the most number of BCC cases, both in men and women, alike, followed by the 8th for both sexes and the 5th and 4th. During the first 40 years and after 90 years of age, only 4 cases were registered for both genders. Women lead men in the total number of cases between 60 and 79 years of age, as well as having the only registered BCC presence in the 2nd, 4th and 9th dacade of life. Meanwhile, men lead during the 5th and 3rd decade, the 8th being tied between the sexes.

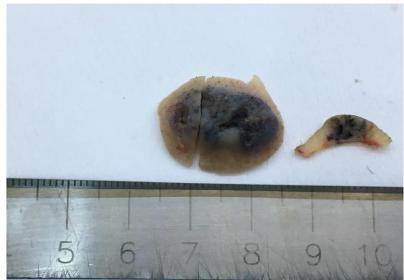


Figure 2. Gross aspect of a pigmented basal cell carcinoma after fixation with 10% buffered formalin, <u>Emergency</u> <u>University Hospital</u> of Bucharest, Pathology Department

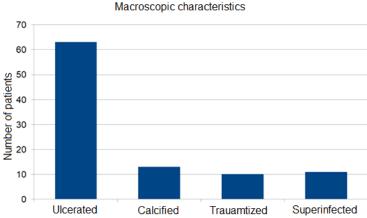


Figure 3. Macroscopic characteristics of analyzed group (number of patients); as revealed, the most common subtype of basal cell carcinoma is the ulcerated type, accounting for no less than 63 out of the total of 91 analyzed patients, followed by the calcified type with 13, superinfected, with 11 and traumatized, with 10 cases, respectively.

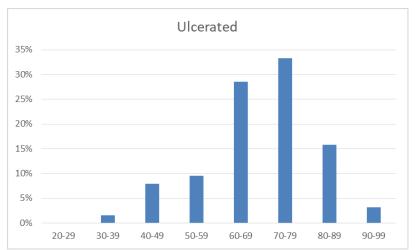


Figure 4. Frequency of ulcerated subtype of basal cell carcinoma patients related to peak age groups; it has been noticed that over 50% of the total analyzed cases were found to be associated with higher age group, the 7th decade, alone, making up over 30%, followed by the 6th and 8th. The least common finds were in the first 4 decades and during the 9th, making up less than 10% of the total number of patients.

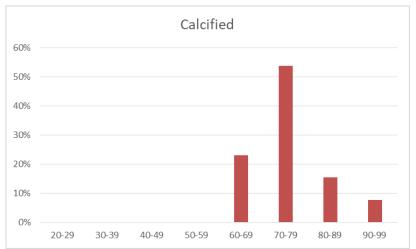


Figure 5. Frequency of calcified subtype of basal cell carcinoma patients related to peak age groups; as observed, the 7th decade registered over 50% of the cases, followed up by the 6th and the 8th decades, while the 9th took up less than 10%. Between 20 and 59 years of age, not a single case was noted in our research

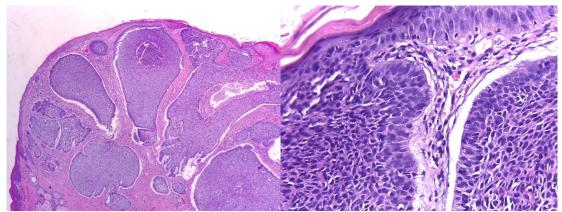


Figure 6 (left) and 7 (right). Nodular basal cell carcinoma. Solid proliferation of basaloid cells forming large tumor nodules infiltrating the superficial and deep dermis. Note the classic artefactual clefting around nodules and the characteristic peripheral palisading at the interface between the basaloid cell lobules and the stroma. Hematoxylin and eosin staining, 40x magnification (right) and 400x magnification (left).

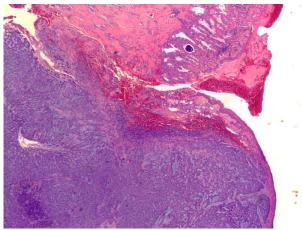


Figure 8 (left). Microscopic appearance of an ulcerated and infected basal cell carcinoma. Haematoxylin and eosin 40x magnification

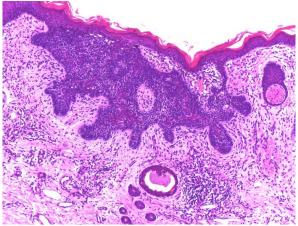


Figure 9. Superficial basal cell carcinoma: tumor nests attached in the basal leyer of the epidermis. Hematoxylin and eosin, 10x magnification

DISCUSSIONS

Regarding the peak age group for both sexes, the 6th and 7th decade of life have been observed to be the most common when it comes to basal cell carcinoma onsets, women registering slightly higher numbers than men, in accordance with the entire group split, women consisting of 56% of the entire number of studied patients. The data obtained are discordant with similar studies that have shown a higher prevalence of these tumors in women (7). The high incidence among elderly population might be explained by ithe boost of life-expectancy, the addition of cell mutations, combined with a poor education concerning solar skin damage.

On a macroscopic level, over 60 out of the 92 patients were observed presenting the ulcerated form, overwhelming the calcified, traumatized and superinfected types. All types of basal cell carcinoma can present ulceration. In some neglected cases, the ulcerations can have a destructive appearance with irregular margins, thus beeing called ulcus rodens. If left untreated it can evolve into a mordid form called "ulcus terebrans", destroying adjacent tissue structures such as soft tissue, cartilage, even bone.

Regarding the histological aspects, in hematoxylin-eosin staining, BCC has a characteristic appearance: a proliferation of medium-large basaloid cells (round or cubic cells, with a large nucleus, and basophilic cytoplasm and with a somehow monomorphous appearance), with a marginal palisadation of individual tumor cells and sometimes with an artefactual clefting between tumor nests and adjacent stroma. Mitosis are frequent. The tumor

nests are surrounded by a fibrous or mucin rich stroma. Sometimes the tumor nest can undergo cystic degeneration, calcification and necrosis. Amiloid deposition is another commonly found feature. No proliferations of melanocytes are present, but there is a pigmented subtype of basal cell carcinoma wich can contain melanin within dendritic melanocytes located inside or around tumor nests.

In our study the pigmented, superinfected, cystic, ulcerated and calcified subtypes respected the peak age groups, while the nodular type reached its peak value in the 8th decade of life, followed by the traumatized subtype, whose values were focused on the 5th and 6th decade, respectively.

There are numerous studies concerning risk factors linked with the development of BCC, the most plausible evidence being related to sun exposure (skin type, hair color, solar keratosis, sunburns in childhood, occupational hazard, high altitude, indoor tanning, high levels of serum vitamin D and photosensitizing medication) (8, 9, 10). Immunosuppression and impaired DNA repair are also linked to increased BCC incidence in elderly patients (11). The relation between HPV infection and development of basal cell carcinoma is not yet well defined (12).

Treatment options for BCC depends on a number of circumstances including the size, site and histopathological subtype, comorbidities, previous treatment history, immunological status, life expectancy and patient options. It is also crucial to acknowledge whether the intention of treatment is curative or palliative. Therapeutical options include: Mohs surgical excision, electrodessication and curettage, cryosurgery, imiquimod, photodynamic therapy, local chemotherapy (5-fluorouracil, imiquimid), radiation therapy, combination therapy and observation (13,14). Therapeutical agents tend to follow in the footprints of the progresses made in understanding the pathogenesis of BCC; as such, Hh inhibitors (hedgehog pathway inhibitors) are also a novel approach for treating BCCs, as this biochemical signaling pathway is employed in the development of the basal cell carcinoma; to date, two Hh inhibitors have been approved for BCC therapy, namely sonidegib and vismodegib (15). Consequently, the armorarium for BBC therapy is constantly developping.

CONCLUSIONS

Even though modern approaches have greatly increased the life quality and survival of basal cell carcinoma patients, we must pursue our search for better treatments, especially since the most likely ones to suffer from this affliction are having to face the cons of an aging immune system. Given these facts, non-melanoma skin cancers are a common pathology in current clinical practice, with large socio-economic implications, whose etiopathogenesis has not, yet, been completely understood. Therapeutical agents tend to follow in the footprints of the progresses made in understanding the pathogenesis of BCC; therefore, further research in this domain is always warranted and welcome.

Conflict of interests: The authors declare that they have no conflict of interests.

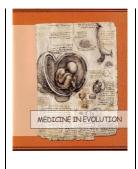
Compliance with ethical standards: We undersign, certificate that the procedures and the experiments we have done respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2000 (5), as well as the national law.

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Is ultrasound screening after tomosynthesis justified in patients with a personal history of breast cancer?



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Abstract

Aim and Objectives: To evaluate the added value of breast ultrasound to screening tomosynthesis in women previously treated for breast cancer.

Material and Method: In the study were included 100 patients with previously diagnosed and treated breast cancer. The patients were examined with tomosynthesis and breast ultrasound. BI-RADS assements were made after tomosynthesis and ultrasound and compared with the final assessment.

Results: On tomosynthesis, 97% of the patients were normal or had benign changes (BI-RADS 1 or 2) and only 3 patients (3%) had highly suspicious for malignancy lesions (BI-RADS 5). On ultrasound, 97 patients (97%) had no pathological or benign finfindings, one had possible malignant finding (BI-RADS 4) and 2 had highly suspicious for malignancy lesions (BI-RADS 5). The major differencies between tomosynthesis and ultrasound were observed in BI-RADS 1 and 2 cases.

Conclusion: if the screeing is performed with tomosynthesis, supplimentary ultrasound examination is of no benefit. Even in patients previously treated for breast cancer, ultrasound does not bring informations that would change the manegement of these patients.

Keywords: tomosynthesis, ultrasound screening, risk patients

INTRODUCTION

Tomosynthesis or 3D mammography is a mammographic technique in which sectional images of the breast are aquired and than recombined in a 3D volume. It was aproved in 2011 by the FDA for both screening and diagnosis [1]. It has a higher sensitivity and specificity compared with the 2D digital mammography, diagnosing more breast cancers and reducing the recall rate in the screening programes [2, 3]. Breast ultrasound is the most frequently used examination method in adjunct to mammography. It has major advantages: it is cheap, can be repeated any time and it has a greater compliance among the patients compared with mammography. In patients with dense breasts, for which 2D mammography has a lower sensitivity [4] it can diagnose lesions not visible on mammographic images due to the overlaping glandular tissue [5]. Despite its advantages, it can not replace mammography for breast cancer screening and it is not justified as supplimentary screening examination for all women [5].

Aim and objectives

The aim of the study was to evaluate the added value of breast ultrasound to screening tomosynthesis in women previously treated for breast cancer and to establish if suplemmentary screening ultrasound in this group of patients diagnoses more relapses or contralateral breast cancers compared to tomosynthesis.

MATERIAL AND METHODS

In the study were included 100 patients with previously diagnosed and treated breast cancer. The patients were referred by the oncologist to our departement for the regular follow-up, with indication for mammography and breast ultrasound. We included in the study only patients for which both examinations were performed in the same day.

Mammographic examinations were performed on a GE Senographe Essential, after the departements' protocol: 2D images were aquired in medio-lateral projection and 3D images were aquired in both standard projections, medio-lateral oblique (MLO) and cranio-caudal (CC).

Ultrasound was performed on a GE Logiq S8 machine, using a 8-12 MHz linear transducer.

The examinations were interpreted/performed by the same phisician and the rezults were formulated according to the ACR BI-RADS lexicon (American College of Radiology, Breast Imaging Reporting and Data System). For each patient the type of breast was mentioned (ACR a-d), the pathological findings were described, and the conclusion and recommendations were made according to the BI-RADS lexicon.

In cases with suspicious findings, BI-RADS 4 and 5, tru-cut biopsy was performed with a 14G needle and the pathology report was considered the golden standard.

From the study were excluded the patients that had only one of the two examinations performed (indication from the oncologist only for mammography or ultrasound or refusal of the patient to have one of the two examinations performed), the patients with a final BI-RADS assessment of 0 (further examinations or comparision with previous examinations needed), 3 (probably benign findings but short follow-up reccommended) and 6 (malignancy proven by previous biopsy) and the patients that refused the biopsy or for which the pathological report was not available at the time when the study was conducted.

RESULTS

Only 3 patients were younger than 40 and only 3 older than 80 years of age, most of the patients being of 50-69 years old (figure 1).

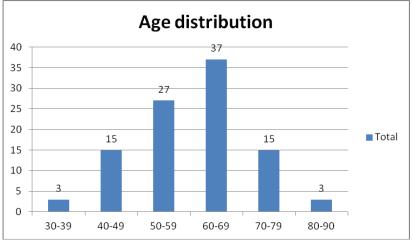


Figure 1. Age distribution of the patients

In the studied population, 57% of the patients had a heterogeneous or homogeneous breast structure (ACR c or d) while 43% had an adipose or predominantly adipose structure of the breast (ACR a or b) (table I).

Table I. Distribution of the breast types

Breast type	Number of patients	
Adipose breast (ACR a)	6	
Predominantly adipose (ACR b)	37	
Heterogeneously glandular (ACR c)	52	
Homogeneously glandular (ACR d)	5	

After the mammographic examination, 97% of the patients were normal or had benign changes (BI-RADS 1 or 2) and only 3 patients (3%) had highly suspicious for malignancy lesions (BI-RADS 5) (figure 2).

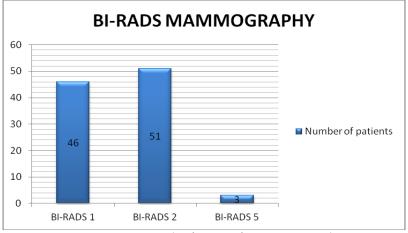


Figure 2. BI-RADS clasification after mammography

On ultrasound, 97 patients (97%) had no pathological or benign finfindings, one had possible malignant finding (BI-RADS 4) and 2 had highly suspicious for malignancy lesions (BI-RADS 5) (figure 3).

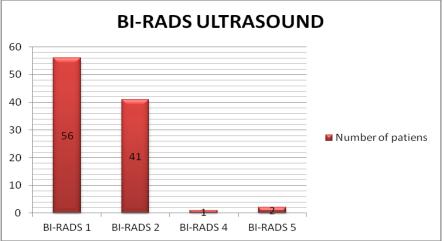


Figure 3. BI-RADS classification after ultrasound examination

After analyzing both examinations, the final BI-RADS assessment was BI-RADS 1 (normal) in 40% of the patients, BI-RADS 2 (benign findings) in 57% of the patients and BI-RADS 5 (high suspicion for malignancy) in 3 % of the patients (table II).

FINAL BI-RADS CLASSIFICATION	NUMBER OF PATIENTS			
BI- BI-RADS 1	40			
BI-RADS 2	57			
BI-RADS 5	3			

The diferencies between mammographic and ultrasound results are shown in table III.

Table III.	Comparative BI-RADS assessment
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	BI-RADS 1	BI-RADS 2	BI-RADS 4	BI-RADS 5
BI-RADS on mammography				
(number of patients)	46	51		3
BI-RADS on ultrasound				
(number of patients)	56	41	1	2
Final BI-RADS (number of				
patients)	40	57		3

DISCUSSIONS

Digital 2D mammography is the standard examination used for breast screening. In the dense breast it has a reduced sensitivity because lesions can be obscured by the glandular tissue. In the last decade, studies performed for the evaluation of the tomosynthesis have shown it's superiority over 2D mammography in diagnosing small lesions. Compared with 2D digital mammography, it depicts with 34% more cancers, at a smaller size and with higher accuracy [6]. Moreover, by eliminating the overlaping tissue, it reduces the rate of recalls by differentiating between superimposions and real lesions.

Even with tomosynthesis, in patients at high risk (>20%) of developing breast cancer (BRCA positive or patients with lymphoma and mediastinal radiotherapy), anual magnetic resonance imaging (MRI), performed in adition to mammography is recommended [7].

Patients with a history of breast cancer are also considered risk population but they are in the low risk group (<15%) and they do not have indication for MRI screening [8].

Ultrasound is the most used supplementary investigation, especially in women with dense breasts. Among other risk factors, the density of the glandular tissue is by itself a risk factor of developing breast cancer [9]. This is why more and more clinicians, when recommend a breast evaluation, recommend both mammography and ultrasound. If this aproach is justified in patients with risk factors and dense breast, performing both examinations for all groups of patients is time consuming and leads to higher costs with no real benefits for the patients.

In our study, we wanted to evaluate if supplementary ultrasound depicts more breast cancers than tomosynthesis in patients with a personal history of breast cancer. In the studied population, more than 50% of the patients had a dense glandular breast tissue (ACR c and d) which, combined with the personal history of breast cancer could be a rationale for indicating supplementary ultrasound examination to the annual screening mammography.

If tomosynthesis diagnosed three breast cancers that were corectly assessed as BI-RADS 5 lesions, on ultrasound only two of the three cases were assessed as BI-RADS 5 and one assessed as BI-RADS 4 due to the round shape and partially well defined contour. The lesion had same morphology on 2D mammography but on the 3D images the contour could be more clearly evaluated as ill defined and the associated architectural distorsion was observed.

The differencies between tomosynthesis and ultrasound were observed in BI-RADS 1 and 2 cases. These differencies are explained by the ability of ultrasound to diagnose small cystic lesions, not visible on mammography and by the visualisation of benign calcifications on mammography, calcifications not depicted, in most of the cases, by ultrasound. Anyway, these benign findings are not important for the manegement of the patients, cases assesed as BI-RADS 1 or 2 having the same indication for regular screening mammography.

CONCLUSIONS

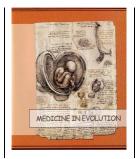
Even if our study group was small, the results suggest that if the screening is performed with tomosynthesis, supplementary ultrasound examination is of no benefit. Even in patients previously treated for breast cancer, ultrasound does not bring informations that would change the manegement of these patients.

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Progressive multifocal leukoencephalopathy (PML). A case report and review of literature.



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Abstract

Progressive multifocal leukoencephalopathy (PML) is a disease that produces neural demyelination in the central nervous system caused by reactivation of a DNA virus that remains dormant in immunocompetent individuals, known as John Cunningham virus (JCV) occasioned by a prior HIV infection with immunosuppression.

We present the case of a 21 years old HIV positive individual with diffuse muscular weakness, dysarthria and severe ataxia and impossibility of maintaining neck and head upward position. Magnetic resonance imagery revealed in the white substance of bilateral cerebellar hemispheres and brainstem extensive T1 hypointense and T2/FLAIR hyperintense lesions, accompanied by discrete water restriction diffusion of water restriction and insignificant contrast substance outlet. Thus, a PML diagnosis was established on radioimagistic grounds.

Keywords: progressive multifocal leukoencephalopathy, brain, magnetic resonance, immunosupression

INTRODUCTION

Progressive multifocal leukoencephalopathy (PML) is a demyelinating disease of the central nervous system caused by reactivation of John Cunningham virus (JCV) - DNA virus, genus Polyomaviridae, Papovaviridae family - in severe immunosuppressed individuals, characterized by typical histopathological and non-radiological changes (1). This is associated with both the both HIV virus types 1 and 2 (3.4). Thus, HIV infection is responsible for approximately 85 % of the cases and the prevalence in the population is of 4 to 5 % (5,6,7). It is one of the pathologies that define the status of AIDS in immunocompromised patients. This pathology has been confirmed also in correlation with the treatment with monoclonal antibodies, however in a much lower percentage (8). Below the age of ten years the vast majority of the population is already infected by John Cunningham virus (JC), but manifests extremely rare (5). Those who develop the disease are more likely to submit a deficient immune system, such as those infected with HIV/AIDS, patients diagnosed with leukemia or Hodkin lymphoma but also those who receive immunosuppressive medication (8).Overall mortality rate raises to 30-50% in the first months of the diagnosis, but fluctuates proportionally with the evolution of disease and indicated treatment. Survivors may experience some neurological sequelae. No correlation has been conclusive between JCV structure and its neurovirulence (9). Symptoms are variable with each case, among we are mentioning the following: loss of coordination and memory, aphasia, visual disturbances, personality disorders and muscular hypotonia in the limbs. Paraclinical examinations contributing in the disease diagnosis are: computer tomography, nuclear magnetic resonance, documenting the presence of the JC virus in cerebrospinal fluid, electroencephalogram and, in selected cases when benefits are above risks, cerebral biopsy (10,11). Upon the date of elaborating this article no significantly effective treatment has been shown yet. Thus, the only way to alleviate or to halt the progression of the disease consists in maintaining a favorable immune status. Imaging of CNS changes represent an important argument in supporting a PML diagnosis, especially if it remains presumptive in the absence of brain biopsy or JCV identification through CSF - PCR techniques. Nuclear magnetic resonance remains the gold standard because it succeeds in detecting brain damage even during early stages; meanwhile CT examination may reveal normal findings proving useful only in established cases, with obvious clinical symptoms. The advantage of MRI over CT is to use a selection of parameters for visualization and detection of lesions (12).

CASE REPORT

We present the case of a 21-years-old patient diagnosed with HIV infection two years prior to hospital presentation on the occasion of a prolonged febrile syndrome. Objective examination revealed no neck pains, however, without being able to keep a sitting position, difficulties in maintaining a head position, also unable to walk more than a few steps accompanied by diffuse muscular atrophy, dysarthria and severe ataxia. The CD4+ lymphocytes count is 196/mmc.

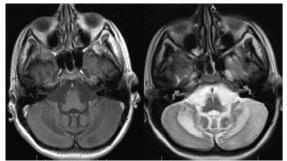


Figure 1. Lesions in hyposignal on T1 and hypersignal on T2 sequences at the level of bilateral cerebellar hemispheres

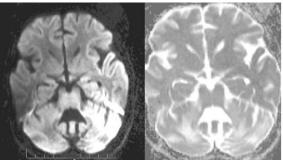


Figure 2. Diffusion sequences in the patient diagnosed with progressive multifocal leukoencephalopathy

Thus, an interdisciplinary medical committee agreed the perform a nuclear magnetic resonance cerebral examination that revealed T1 hypointense and T2/FLAIR hyperintense extensive lesioned areas, accompanied by discrete diffusion of water restriction, with insignificant outlet for the contrast substance. These lesions are highlighted at white substance level of bilateral cerebellar hemispheres as well as the brainstem level. Lesion areas located at the level of bilateral cerebellar hemispheres are part of the criteria for the diagnosis of HIV related PML.

DISCUSSIONS

Reiterating, imaging of CNS changes represent an important argument in supporting PML diagnosis, especially if it has presumptive value in the absence of brain biopsy nor of JCV detection through CSF - PCR techniques. Nuclear magnetic resonance imaging investigation represents the gold standard in such cases, because it succeeds in highlighting the brain tissue damage during earliest stages, in spite of a normal aspect on computer tomography, the latter being useful only in cases where lesions are already established when conspicuous clinical symptoms are already present.

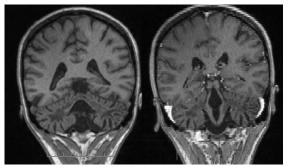


Figure 3. Lesions in T1 sequences in the coronal plane before (left) and after administration (right) of the contrast substance

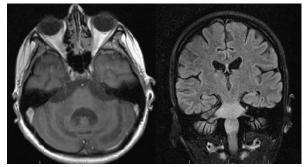


Figure 4. Axial T1 sequence with contrast substance and FLAIR sequence in the coronal plane for the presented case

The advantage of MRI versus CT is the ability of using additional selection of parameters for visualization and detection of lesions (12). In this pathology nuclear magnetic resonance reveals a multifocal, asymmetric periventricular involvement, but also at the subcortical level. However, gadolinium MRI does not have any mass effect or enhancement, but it useful in assessing the U fibers involved mainly in the region of parieto-occipital tissue. Furthermore, it may reveal corpus calosum body involvement in some cases (13-29). In T1 sequences, involved regions are usually in hyposignal while T2 sequences are in hypersignal. The presence of enhancing lesions to certain patients implies a favorable evolution in time.

Lesions, usually, shows peripheral diffusion restriction (13-29). On MRI spectroscopy sequences the decrease of N-Acetyl-aspartate and lactates may be noticed, with concomitant rise of choline and lipids, thus guiding the diagnosis in favor of progressive multifocal leukoencephalopathy (13-29).

CONCLUSIONS

Immunocompromised patients presenting neurological complications in the late stage of the PML disease may have a precise diagnosis through cooperation between doctors. Therefore, in case of health damage admixed with biological constants modification, the attending physician may take in account the indication for further imaging investigations, in selected cases the most reliable being magnetic resonance that would reveal lesions which can support the diagnosis, preferably, without any subsequent risky and difficult cerebral biopsy, just as in the case we have presented, when, through interdisciplinary management a quick, comprehensive diagnosis was feasible without any further biopsy procedure.

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Ethical issues

We have received the ethical board consent within our institution for clinical data acquisition, clinical study publication of and this article.

Conflict of interests

The authors declare no conflict of interest of any kind

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Myoepithelial cells of the lacrimal gland



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Abstract

Myoepithelial cells (MECs) are found in different exocrine glands, which include the lacrimal gland. However, although the MECs are functionally relevant for the function of this gland, few studies characterised them by means of immunohistochemistry. We therefore aimed at checking the molecular phenotype of the MECs in the lacrimal gland. For this study were used archived paraffin-embedded samples of lacrimal glands. Primary antibodies were applied: D2-40, alpha-smooth muscle actin (α -SMA), Ki67, the smooth muscle myosin heavy chain (SMM), cytokeratin 5 (CK5), and CD117/c-kit. MECs of the lacrimal gland expressed D2-40 (podoplanin), α -SMA, SMM, CK5 and, scarcely, c-kit. Ki67, the proliferative marker, and c-kit, were scarcely expressed in basal cells of the secretory units. Therefore, podoplanin should be added to the specific panel of markers specifically identifying the MECs of the lacrimal gland.

Keywords: podoplanin; immunohistochemistry; exocrine gland; orbit; markers.

INTRODUCTION

Myoepithelial cells (MECs) are found in multiple glandular organs such as the salivary, lacrimal, mammary, harderian, sweat, and prostate glands (Makarenkova and Dartt, 2015). However, the profile of MECs varies considerably from gland to gland (Nagato et al., 1980). The MECs of the exorbital lacrimal gland of rat are stellate with many thin radiating processes with tapered ends that terminate freely (Nagato et al., 1980).

The MECs characteristically present a stellate cell body with many ramified cytoplasmic processes lying on a basal membrane of acinar cells (Lemullois et al., 1996). They equally possess a cytokeratin network and a highly developed network of alpha-smooth muscle actin (α -SMA) (Lemullois et al., 1996). Therefore, the ultrastructural pattern of the MECs include cytoplasmic myofilaments which run parallel to the basal lamina and display focal densities along their course, pinocytotic vesicles and hemidesmosomes (Chaudhry et al., 1983).

In the lacrimal gland MECs synthesize the basement membrane and form a functional network around the acinar and ductal cells separating them from the basement membrane and the glandular stroma (Makarenkova and Dartt, 2015). The MECs maintain the glandular structural integrity and transport metabolites to secretory cells (Makarenkova and Dartt, 2015).

In spite of the proposed importance of MECs for the function of the lacrimal gland, they are lesser studied than in other exocrine glands (Makarenkova and Dartt, 2015). We therefore aimed at checking the molecular phenotype of the MECs in the lacrimal gland.

Aim and objectives

The aim of this study is checking the molecular phenotype of the MECs in the lacrimal gland.

MATERIAL AND METHODS

The immunohistochemical study was performed retrospectively on archived paraffinembedded samples of lacrimal glands (six cases). The age of patients ranged from 49 to 57 years. The patients' written informed consent for all medical data to be used for research purposes, provided the protection of the identity is maintained, was obtained. The study was conducted in accordance with the general ethical principles of medical research.

The paraffin-embedded samples were processed with an automatic histoprocessor (Diapath, Martinengo, BG, Italy) with paraffin embedding. Sections were cut manually at 3 µm and mounted on SuperFrost® electrostatic slides for immunohistochemistry (Thermo Scientific, Menzel-Gläser, Braunschweig, Germany). Histological evaluations used 3 µm thick sections stained with hematoxylin and eosin. Internal negative controls resulted when the primary antibodies were not applied on slides.

There were used primary antibodies for D2-40 (clone D2-40, Biocare Medical, Concord, CA, USA, 1:100), alpha-smooth muscle actin (α-SMA, mouse monoclonal, clone D33, Biocare Medical, Concord, CA, USA, 1:50), Ki67 (mouse monoclonal, clone MM1, Biocare Medical Concord, CA, USA, 1:100 – 1:200), smooth muscle myosin heavy chain (SMM, mouse monoclonal, clone S131, Novocastra-Leica, Leica Biosystems Newcastle Ltd, Newcastle Upon Tyne, U.K., 1:100), cytokeratin 5 (CK5, rabbit monoclonal, clone EP42, Biocare Medical Concord, CA, USA, 1:100), CD117/c-kit (rabbit monoclonal, clone Y145, Biocare Medical, Concord, CA, USA, 1:100).

Tissues were deparaffinized and rehydrated, then endogenous peroxidase was blocked using Peroxidazed 1 (Biocare Medical, Concord, CA, USA). For the heat induced epitope retrieval we used the Decloaking Chamber (Biocare Medical, Concord, CA, USA) and retrieval solution pH 6 (Biocare Medical, Concord, CA, USA). Background Blocker (Biocare Medical, Concord, CA, USA) was used to reduce non-specific background staining. The primary antibody was then applied. Different HRP-based detection systems were used: for α-SMA, Ki67, SMM, CK5, and D2-40 was used MACH 4 (Biocare Medical, Concord, CA, USA), and for CD117/c-kit was used MACH 2 (Biocare Medical, Concord, CA, USA). A HRP-compatible chromogen (DAB) was applied. Sections were counterstained with hematoxylin and rinsed with deionized water. For the washing steps we used TBS solution, pH 7.6.

RESULTS

The normal features of the human adult lacrimal gland were accurately identified on histological slides stained with hematoxylin and eosin. Myoepithelial cells expressed the smooth muscle myosin (**fig.1**). The α-smooth muscle actin was detected in MECs, as well as in pericytes and vascular smooth muscle cells (**fig.2**). CD117(c-kit) labelled myoid periendothelial cells, such as vascular smooth muscle cells and pericytes, as well as the MECs of the lacrimal gland (**fig.3**). Interestingly, expression of c-kit was also encountered in the membranes of basal acinar epithelial cells with a high nucleocytoplasmic ratio (**fig.3**). Octopus-like MECs also expressed cytokeratin 5 (**fig.4**) and D2-40 (podoplanin) (**fig.5**). Scarce basal acinar cells expressed Ki67 (**fig.6**).

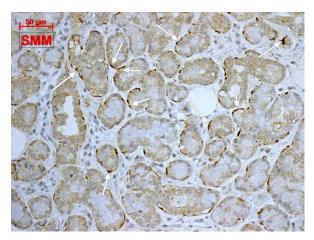


Figure 1. Immunohistochemical expression of myosin is detected in myoepithelial cells of the human adult lacrimal gland (arrows)

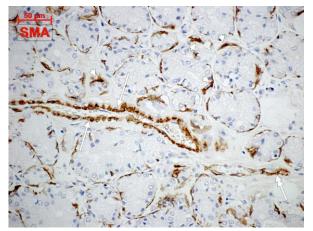


Figure 2. Immunohistochemical expression of α-smooth muscle actin is detected in myoepithelial cells (arrowheads), vascular smooth muscle cells (arrows), and pericytes (double-headed arrow) of the human adult lacrimal gland

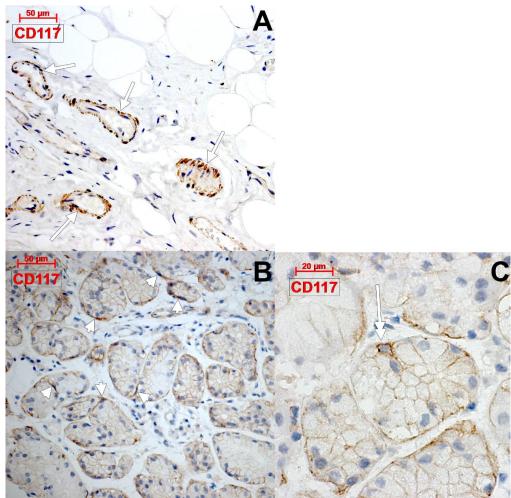


Figure 3. Immunohistochemical expression of CD117 (c-kit) was found in vascular smooth muscle cells (A, arrows), in myoepithelial cells (B, arrowheads), and, scarcely, in basal epithelial cells of the acini (C, double-headed arrow).

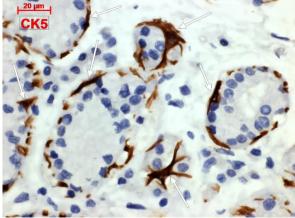


Figure 4. Immunohistochemical expression of cytokeratin 5 in myoepithelial cells (arrows) of the human adult lacrimal gland

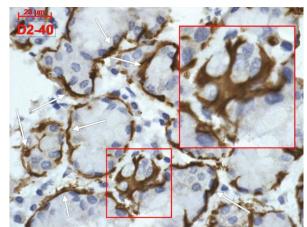


Figure 5. Immunohistochemical expression of D2-40 in myoepithelial cells (arrows) of the human adult lacrimal gland. The octopus-like appearance of the myoepithelial cells is detailed (magnified inset)

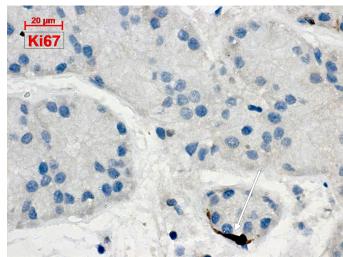


Figure 6. The proliferative marker Ki67 is scarcely expressed in an acinar cell resting on the basal lamina (arrow)

DISCUSSIONS

The peculiar morphology of MECs was assessed previously in the rabbit lacrimal gland by three-dimensional reconstructions which indicated that they have an octopus-like appearance with long cytoplasmic projections (Ding et al., 2005), such as we found here on bidimensional cuts.

Expression of podoplanin was previously detected in myoepithelial cells of salivary glands (Amano et al., 2011), as well as of lingual glands (Noda et al., 2010). It was suggested that the expression of podoplanin in the acinar epithelial cells and the MECs of the submandibular and sublingual salivary glands could be related to the mucous saliva excretion (Hata et al., 2008). However, although the orbit was checked for the expression of podoplanin to identify lymphatics (Nakao et al., 2012), few studies documented the expression of this lymphatic marker in MECs of the lacrimal gland (**Table 1**).

Markers	Tissue	Reference	
podoplanin	salivary glands	(Hata et al., 2008, Tsuneki et al.,	
		2013)	
EGFR	mammary tissue	(Gama et al., 2009)	
P-cadherin	mammary tissue	(Gama et al., 2004, Reis-Filho et	
		al., 2003)	
alpha-smooth muscle actin	mammary tissue, lacrimal	(Corben and Lerwill, 2009,	
	gland	Kivela, 1992)	
calponin	mammary tissue	(Corben and Lerwill, 2009,	
		Sanchez-Cespedes et al., 2013,	
		Batistatou et al., 2003, Foschini	
		et al., 2000)	
smooth muscle myosin heavy	mammary tissue	(Corben and Lerwill, 2009,	
chain		Batistatou et al., 2003)	
cytokeratin 5	mammary tissue, lacrimal	(Kivela, 1992, Deugnier et al.,	
	gland	2002)	
cytokeratin 13	lacrimal gland	(Kivela, 1992)	
cytokeratin 14	mammary tissue, lacrimal	(Reis-Filho et al., 2003, Kivela,	
	gland	1992, Sanchez-Cespedes et al.,	
	-	2013)	
CD10	mammary tissue	(Sanchez-Cespedes et al., 2013)	
L2E3	salivary glands	(van den Oord et al., 1993)	

Table 1. Expression of several markers in myoepithelial cells. EGFR: Epidermal Growth Factor Receptor. L2E3: a monoclonal antibody directed against liver metallothionein. GFAP: Glial Fibrillary Acidic Protein

Markers	Tissue	Reference
p63	mammary tissue	(Reis-Filho et al., 2003,
		Batistatou et al., 2003)
maspin	mammary tissue	(Reis-Filho et al., 2003,
		Deugnier et al., 2002)
S-100 protein	mammary tissue, lacrimal	(Reis-Filho et al., 2003, Kivela,
	gland	1992)
heavy caldesmon	mammary tissue	(Batistatou et al., 2003, Foschini
		et al., 2000)
CD109	mammary, salivary, and	(Hasegawa et al., 2007)
	lacrimal glands	
vimentin	lacrimal gland	(Kivela, 1992)
GFAP	lacrimal gland	(Kivela, 1992)

In this study was assessed the scarce expression of Ki67 in basal cells of the glandular acini. However, the proliferative marker Ki67 was neither expressed in MECs, nor in acinar cells. On the other hand, scarce basal cells of the acini expressed the progenitor marker c-kit. This results support previous findings in murine lacrimal glands of nestin-, and Ki67-expressing proliferating cells which are a source of stem cells intermingled among acinar cells and MECs (You et al., 2011). It was suggested that such stem cells enter an epithelial-mesenchymal transformation to generate mesenchymal stem cells which, in turn, generate glandular epithelial cells via mesenchymal-epithelial transition (You et al., 2012). But MECs could also supply the epithelial niche, as it was demonstrated that MEC-derived progenitors of the surface epithelium progressively extinguish α -SMA expression while adopting a basal cell phenotype (Lynch et al., 2018). In these regards, the c-kit-expressing MECs we found in the lacrimal gland could just be cells which switched to a progenitor phenotype.

CONCLUSIONS

Podoplanin is expressed in MECs of the lacrimal gland, thus it should be added to the already known specific markers of these cells.

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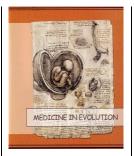
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Characteristics of the technical steps required to obtain a ceramic restoration in the frontal and posterior area



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Abstract

Aesthetics is one of the main factors of success for a dental restorations. Nowadays patients claim more and more -besides longevity – to receive esthetic restorations that blend harmoniously with the surrounding teeth and tissues. The successful application of different all-ceramic materials is dependent upon clinicians' ability to match the ceramic materials to the manufacturing techniques and cementation or bonding procedures. The aim of our study was to present the technical steps for a special clinical case due to bruxism, for which the choice of restoration was metallic post-cores in order to insure optimal mechanical properties and with milled zirconia crowns.

Keywords: ceramic reconstructions, CAD-CAM, ceramic layering.

INTRODUCTION

Aesthetics is one of the main factors of success for a dental restorations. Nowadays patients claim more and more -besides longevity- to receive esthetic restorations that blend harmoniously with the surrounding teeth and tissues [1]. Ceramic reconstructions are gaining ground and are gradually replacing the PFM (porcelain fused to metal) restorations. Many clinical cases are complex and require the use of a core/framework which has an overwhelming influence on the prosthetic outcome. For a ceramic restoration, the greater the translucency of the core, the more the colors of the deeper layers of the tooth are transmitted to the surface [1]. When we use cores with high translucency, the reflected light will have the dominant color of the dentin, creating a natural-look. The translucency and color of a ceramic restoration depends on the various characteristics of the core and veneer ceramics [2]. The light which is passing through the ceramic layers is influenced also by the thickness of the ceramic layers to and by light scattering [3]. The last mentioned parameter is also depending on some factors, such as: refractive indexes of ceramic phase, voids and porosities, high number and size of the crystalline particles phase. Zirconia and alumina ceramics, are thus because of their high crystalline content, more opaque, but also more resistant to fracture [3].

Aim and objectives

The present case was selected for our study because of the specific clinical situation: teeth 1.4 - 2.5 with 4th degree abrasion with major aesthetic and functional changes. Due to bruxism, the choice of a restoration with high mechanical properties [3-10] was necessary. On the other hand aesthetics is also required due to the frontal-bicuspid area which needed restoring. Our decision was to use metallic post-cores for the restoration of the abutments, covered with milled zirconia crowns.

The successful application of different all-ceramic materials is dependent upon clinicians' ability to match the ceramic materials to the manufacturing techniques and cementation or bonding procedures, to adequately customize a treatment plan [11]. All ceramic systems have their contraindications and limitations. For example clinical situations with reduced interocclusal space, in case of nanic teeth, deep vertical overlap, excessive cervical-occlusal dimension of the teeth in the opposing arch, or severe bruxism or parafunctions have to be thoroughly analysed and are due to be resolved only by more resistant systems (such as zirconia) [12].

Although zirconia was used in orthopaedics during the late '60's, applications expanded only in the '90s in dentistry for endodontic posts, implants and implant abutments, orthodontic brackets, cores for crowns, and fixed partial denture prosthesis (FPDP) frameworks [13-15.] Strengthening of ceramic (e.g feldspatic ceramic) with other various materials started with Al₂O₃ and was followed by Zr2O₃ for reducing brittleness, crack propagation, improving low tensile strength, and wear resistance and marginal accuracy[16], [17].



Figure 1. a. initial state; b. reconstructed abutments; c. duplicated cast (after wax up and mock up); d. mock up

MATERIAL AND METHOD

First set of impressions used PVS and a study cast was made. Next, a wax-up was manufactured on the study cast, followed by duplication of the cast. The cast was sent in the office, were a mock-up was made, by using the Scutan technique. After obtaining the patient's consent, being satisfied with the aesthetic aspect, another set of impressions was taken. The full arch impressions were disinfected with Silosept and extra-hard type IV plaster (Klasse 4) was poured, using the Zeiser system to obtain the working cast.

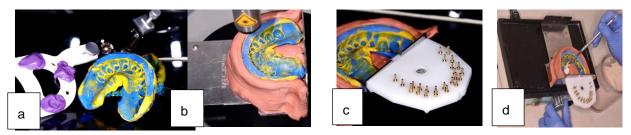


Figure 2. a. final impression of the upper arch; b.light spot projected in the impression of each abutment for marking and making the drills; c. Pins inserted into the pastic base of the future cast; d. Pouring plaster into the impression

An Amman Girbach Artex AG simulator was used for the mounting of the casts.



Figure 3. a. mounting the maxillary cast by means of the bite fork; b. upper and lower cast mounted into the simulator; c. digital impression; d. administrative data

Cutting the dies was not necessary at this stage, because a digital impression was also recorded by using a intraoral scanner (Omnicam, Sirona) and sent to the lab.

The patients data and treatment plan was inputed in the CAD software (Inlab 15.0, Sirona) before the scanning of the casts, namely the specification of abutments (1.1-2.2; 2.3, 2.5) and the types of frameworks: copings 1.1-2.2 /2.3-2.5 FPD (KATANA ZIRCONIA) and feldspatic ceramic layering.

After the initial scanning of the casts using a blue-light scanner (Sirona InEos X5), the working cast was edited by cutting off the parts that did not match our area of interest (Trim Model). By means of the registered occlusion, inter-arch relationships were checked so that necessary space for prosthetic restorations was provided. Next the alignment of the casts was made according to the midline of the upper and lower cast and, in the end, the curves of the arches were drawn and in respect to these lines, the position of each tooth was registered.



Figure a. edit model stage; b. checking of the occlusion; d. aligning the cast and establishing the model axis; d. drawing the curves of both arches and establishing the each tooth's position

The limit of the preparation was set with help of the draw Margin function. The insertion axis on all abutments was drawn so that to obtain as few retentive areas as possible. The Remove Undercuts function was used to eliminate the retentive areas where the milling

machine cannot reach. Next, the actual design stage started by establishing the shape, morphology and size of the copings and framework according to the oral situation as well as the previously gathered data (providing enough space for layering, accordingly to the mock-up) (Fig 5).

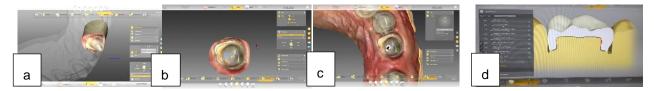


Figure 5. a. trim model function; b. drawing the preparation limit; c. drawing the insertion path of each abutment; d. setting the parameters of the restoration.

A vestibular reduction of 400 μ , 600 μ lateral reduction (in order to provide space for ceramic layering), luting cement space: 40 μ occlusal, 60 μ on the axial walls, and the minimum thickness of 700 μ was also established. The shape and parameters of the frameworks being set, the restoration was sent to a milling center. The chosen block was KATANA, Kuraray (Noritake company). Try-in followed and then the frameworks were sent back to the lab. (Fig 6).

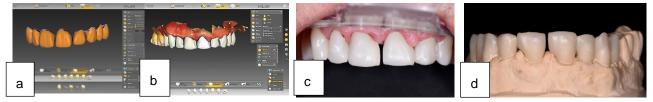


Figure 6. a. initial default morphology; b. buccal reduction for providing space for layering; c. try-in of the copings; d. copings on the working cast

It has been shown that the incidence of gingival inflammation increases around clinically deficient restorations, particularly those with rough surfaces, subgingival finish lines, or poor marginal adaptation. [15]. Because the central incisors presented a hypertrophic interdental papilla (mesial to 1.1 and distal to 2.1), the limit of the preparation was exposed by creating the access to the cervical area. Prior to the ceramic layering, ZirLiner was applied and sintered to enhance ceramic adhesion to the zirconia framework. Fracture of the veneering layers is the most common complication and needs complete restoration of the prosthetic construction [19][20].

A thin glaze film was applied onto the sub-structure and dentin powder (color A2) was then spread on the surface of the copings and bridge framework. Sintering was carried out at 950° C.

In this stage, the individualization of the layers was done by internal staining. In the middle third A + dye was applied for an increased saturation and sintering was carried out. A2 dentin was used to restore the anatomical shape of the teeth, followed by cut-back for dentin reduction in the incisal third and modelling of the lobes. (Fig 7).

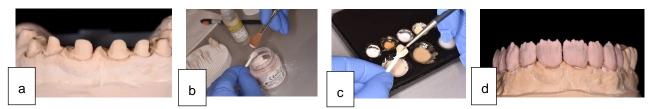


Figure 7. a. exposing the cervical limit by grinding the plaster of he gingival area; b. scattering dentin powder onto a thin glaze film for obtaining the foundation; c. internal staining; d. cutback of the dentin layer prior to sintering

After the aplication of the dentin, translucent and transparent enamel layers for increased light absorption have been overlayed between the lobes. On the incisal edges and the distal angles, a specific ceramic for reproducing the halo effect was used. In the areas of maximum convexity, ceramic paste which permits increased light reflection was applied and sintered, in order to enhance the brightness effect. The final effect was a controlled balance between light absorption and reflection. After sintering, a new layer of neutral ceramic was applied and sintered for rendering a natural effect of the veneering ceramics (Fig 8).

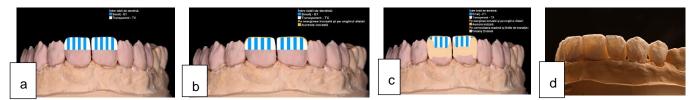


Figure 8. a. Enamel layer in the (incisal third); b area where halo effect is targeted; c. Alternative layering in the incisal third with Enamel E1, Transpatent TX, and Creamy Enamel for obtaining the halo effect; d. Restorations after correction and sintering

Finishing was achieved by using the hand-piece associated with diamond burs, stones and polishing wheels. The morphology re-contoured ensuring a clear landmark of the lobes and the transitional ridges, both vertical and horizontal, thus highlighting the limits of buccal surface. The aim of the micro-texture was to reproduce the growth centers and perikymata. By achieving this surface texture, a reflection of incident light similar to that of natural teeth was obtained. Manual polishing using various forms of abrasive diamond rubber was used to prepare the ceramic surface for glaze. The entire surfaces of the restorations were covered with an even glaze film. (Fig 9).

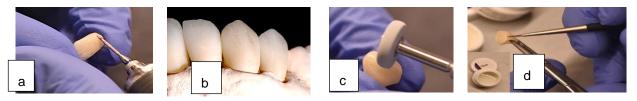


Figure 9. a. using diamond burs for micro-texture; b. details of the accomplished micro-texture; c. polishing; d. glaze film deposited with the brush

In the incisal third, the gray and blue stain was used to enhance translucency. In the cervical third stain A+ was used to enhance the hue of these areas followed by sintering (Fig 10).



Figure 10. a. grayish blue in the incisal third and. stain A+ in the cervical third; b. Final aspect of the restorations on the cast; c,d. Final intra-oral aspect of the restorations

Polishing was conducted for a glossy effect, the most visible areas being the most convex ones, with a diminished texture, and on the flat areas were less shine is required, the micro-texture was enhanced. Sandblasting with 75 μ aluminim oxyde was used in order to obtain an internal clean surface, ready for luting.

CONCLUSIONS

Milled monochromatic restorations are more likely to achieve a lower degree of individualization, by comparison to the other ceramic techniques which do not require a core. The opaque porcelain required for masking a metal substrate is responsible for reflecting light and decreasing translucency. The chosen parameters for the milled coping (framework) and the space left for veneering will have a tremendous influence upon the final shade of porcelain restoration.

On the other hand, the use of multi-shade blocks, along with enough space to provide layering and a skilled technician to perform the ceramic layering, can obtain excellent aesthetic results that are also characterized by higher mechanical strength, compared to the previous mentioned techniques [4].

Zirconia ceramics are reported to have the highest mechanical properties (4)(21)(22). The strength of ZrO_2 ceramic frameworks makes them suitable to be used even in the posterior area, for multiunit FPDs [4], replacing thus in many cases the metallic frameworks required for PFM restorations.

Acknowledgement

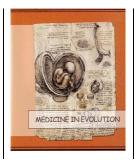
All authors have the same participation in this study. Technician: Steliana Andreea Domnita.

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A model of experiential learning for teenagers' caries-protective diet



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Abstract

Teenagers' reluctance to learning in general and their demand for non-traditional, interactive leaning methods, on one hand, and the difficulties in changing the oral health-related behaviors, on the other hand, represent a permanent challenge for oral health educators. Experiential learning was developed by David Kolb and promotes the concept of learning by doing, and with better chances for teenagers to get engaged in the educational process using as learning cycle: concrete experience ("Do"), observation and reflection ("Observe"), forming abstract concepts ("Think"), testing in new situation ("Plan"). As part of the "Com4You" oral health promotion program, Department of Oral Heath and Community Dentistry from Faculty of Dentistry, UMF "Carol Davila", Bucharest, designed educational lessons using experiential learning and applied them in small groups of teenagers in schools. The present article describes the two activities used in Com4You program for promotion of cariogenic food compared to control group (traditional learning) as shown by the results of a 2 -year longitudinal study. The activities performed in small groups (5-10 subjects) and with a medium duration of 15 minutes each, aimed to raise the awareness on the proper eating behavior in preventing dental caries and to offer a better understanding of the food products characteristics that makes them cariogenic/caries-protective.

Keywords: oral health education, adolescents, diet.

INTRODUCTION

Oral health promotion remains one of the priorities of the World Health Organization due to the fact that dental caries affects half of the global adult population even though it is mostly preventable through optimum life-style and oral health behavior [1,2].

Thus, proper education should start early in life in order for children and adolescent to have enough information and to be encouraged to practice the proper oral health- related habits to prevent dental caries as future adults [3]. Applied to oral health education, experiential learning shows improvements in teenagers' oral health status and behavior, as shown on a 2-years longitudinal study that took place in Bucharest, Romania [4].

Aim and objectives

Teenagers' cooperation for education represents a challenge regardless the subject but when it comes to oral health changing their habits such as oral hygiene, dental check-up attendance or diet, the challenge is even tougher [5]. Diet is the most difficult oral healthrelated behavior to be changed [6]. Apart from that, children and adolescents nowadays demand methods of education that imply interaction, active participation, critical thinking and practical activities. Experiential learning was developed by David Kolb and promotes the concept of learning by doing. This method has good results for all age ranges but it is proper for adolescents who are mostly reluctant [7].

MATERIAL AND METHODS

The Experiential Learning activities for this oral health educational lessons offered to the teenagers enrolled in the program were developed by the research and teaching staff in the Department of Oral Heath and Community Dentistry from Faculty of Dentistry of "Carol Davila" Medicine and Pharmacy University in Bucharest, Romania, guided by trainers from TES Association, that activate in non-formal education of teenagers and young adults. The lessons were designed accordingly to the base principles of experiential learning (Kolb's experiential learning cycle): concrete experience ("Do"), observation and reflection ("Observe"), forming abstract concepts ("Think"), testing in new situation ("Plan"). The team created two activities that aimed to offer the teenagers the clear image of how the diet influence the risk of dental caries, to reflect on their eating behavior and to motivate them to make the right decision regarding the food consumption that prevent cavities.

These activities were performed in small groups of teenagers at a time (5-10 subjects 13-16 years old), with a duration of 15-20 minutes each, in the classrooms of the schools selected for the program, and coordinated by one of the faculty staff who were trained and calibrated prior to the program applied in schools. During all the lessons held, all the participants were willing and interested in engaging in the activities proposed and also pleased by the content and method of learning, as declared at the end of the lesson in the feedback forms.

Activity 1. Role of diet on dental caries development

Aim: Raising awareness of the proper eating behavior in preventing dental caries Method of education: Take-a-stand

Description of the educational process:

Teenagers are asked to stand in the center of a free area in a classroom that are divided by an imaginary line in two sectors accordingly marked as "FOR" and "AGAINST". Teenagers will be informed by the coordinator (trainer) that they are to be read 10 statements related to diet (Table 1). After each statement each of them move on one of the FOR/AGAINST sector depending on their opinion and own habits regarding the statement presented (in order to stimulate them to reflect and assume). After all of the teenagers chose their position, the coordinator randomly selects 2-3 of them to express the reasons for their stand (on one hand in order for specialist to understand not only if the teenagers have enough or the right information about oral health but also what is the motivation behind children oral health-related behavior; on the other hand, in order for peers to stimulate their active listening and critical thinking, to discover other perspectives without being judgmental). After the argumentation of each participant chosen, no discussion or comments are made by either the coordinator or the other participants. After all of the 10 statements are read, the coordinator discusses each statement, validates the proper habits, reinforces right arguments given by the participants and offers easy to understand reasons why the improper habits could lead to dental caries or corrects the wrong arguments heard).

Table 1. Activity No.1 - Statements

- 1. After a meal, it is good to eat hard food like peanuts or pistachio
- 2. When I eat chocolate I use to it square by square
- 3. I drink acidic beverages, for sure it will remove the dental plaque
- 4. I don't eat milk products because they affect my teeth
- 5. I need energy, I have to eat something sweet
- 6. Fresh juices are healthy, for sure they don't affect my teeth
- I brush my teeth after every meal, for sure this will reduce the dental caries development
- 8. I like to chew gum until it gets hard
- 9. I like to snack a lot between meals
- 10. When I eat something hot, I cool my teeth with cold juice

Activity 2: Caries-Protective food vs. Cariogenic food

Aim: Getting to know the food that protects against or favors dental caries

- Method of education: Brainstorming, debate
- Description of the educational process:

Teenagers are divided into groups of 5 participants and each group are offered a set of 47 cards with different food products (Table 2). They are informed that they have 5 minutes to work together and separate the cards in two categories: food that protects against dental caries (or it has a neutral effect) and food that favors the initiation and evolution of dental caries. At the end, two participants chosen by the group are asked to represent the categories and expose the results as decided by the team: the composition of the aforementioned categories and the reasons why each food product is protective or harmful. When there are two parallel working groups, one participant from one group presents the caries-protective food while one participant from the other group presents cariogenic food. When there are divergent opinions between groups regarding one product, participants are encouraged to present concise arguments to support the different perspective. The coordinator assists during the presentation and moderates the debate and at the end of the discussions between participants validates the right answers and arguments, enforces the correct decisions made by the participants and corrects the wrong arguments heard. Moreover, in order to stimulate the teenagers to make judicious decision, the coordinator invite participants to reflect and reason how the carious risk changes when we change some characteristic of certain food products, for instance: tea or coffee without/with added sugar, milk without/with chocolate corn flakes, homemade yogurt with fresh fruits /prepackaged fruit yogurt wit added sugar, eating a bar of chocolate at a time / eating a small square of chocolate at a time but repeatedly during the entire day. At the end of the activity teenagers should remain with the key message that cariogenic food is represented by acidic, sweetened, rich in processed carbohydrates, starchy products consumed in high quantity or frequently during the day and not followed by oral hygiene. Moreover, for a clear final message with a visual impact, the coordinator writes down on the whiteboard, on 3 separate columns, the absolute cariogenic products, absolute caries-protective products and relative products (that change their potential for caries-development depending to the context). On the other hand, teenagers should be stimulated to consume during snacks products such as fruits, rich in fibers, solid and drink water when thirsty.

le 2. Activity No. 2 - Cards				
Pastry	Bread	Pasta	Potatoes	
Cereals	Whole grains	Corn	Cocktails	
Water	Coke	Fresh juice	Sweet chewing gum	
Caramel	Candies	Cakes	Dark chocolate	
Minty chewing gum	Whipped cream	Honey	Cheese	
Cheese	Milk	Butter	Oranges	
Citric fruits	Bananas	Quince	Forrest fruits	
Carrot	Celery	Apple	Popcorn	
Walnuts	Peanut	Almonds	Hazelnuts	
Pistachio	Pork meat	Beef meat	Fish	
Coffee	Fruit yogurt	Fast food	Potatoes chips	
Tea	Energizer	Mineral water		

Table 2. Activity No. 2 - Cards

RESULTS

Seventy-six adolescents who took part at "Com4You" Oral Health Promotion Program and attended all of the 4 lessons offered using experiential learning, improved their eating habits by avoiding cariogenic food. Thus, the daily consumption of milk chocolate or toffees decreased from 44,3% to 27,9%. Also, sugary and starchy food such as cakes or biscuits were consumed at least once a day by less teenagers at the end of the program: 32,8% compared to 39,3% at baseline.

The greatest improvement was observed regarding the sweetened drinks like tea, coffee or milk: more than half of the adolescent who used to add sugar to their drinks became aware of its impact on the dental integrity and avoided it (decrease from 57,4% to 24,6%). Beverages were consumed daily by a low percent of subjects (13,1%) and the results showed only a small decrease (11,5%).

Moreover, these result become more satisfactory when we take into consideration that, compared to this test group, the subjects in control group, who were offered only one oral health educational lesson, through traditional learning-oral presentation, increased the consumption of all these cariogenic food, except for sweetened drinks.

DISCUSSIONS

The experiential learning method was applied in Com4You program as a pilot study but, due to the promising results related to the behavioral changes obtained, and also the satisfying cooperation and feedback from the participant teenagers, the Department of Oral Health and Community Dentistry that initiated the program continued to apply the method and lessons designed on more children communities as part of the practical activities with the dental students during the semesters. However, the research team consider a follow-up study to assess the stability in time of the results obtained taking into consideration that behavior related to diet is difficult to change. The research team recommends this method for oral health promotion among teenager but proper training is mandatory to perform the experiential education lessons.

CONCLUSIONS

Experiential learning for oral health promotion in general, and for teenagers' education for caries-protective diet in particular, had satisfying feedback and promising results. The lessons designed and proposed as a model in the present article are recommended to be applied in community dentistry.

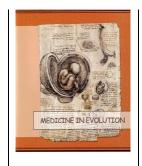
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Comparative technical steps in obtaining implant supported reconstructions using computer aided manufacturing and ceramic layering



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Abstract

SLS is an additional technique that allows generating a complex three-dimensional structure, by consolidating and successively selecting the layers of metal powder, and bonding layer by layer one above the other, using thermal energy provided by a focused laser beam. Our study presents the technical steps in manufacturing the metallic part of the implant supported over-structures in two different clinical situations, both using SLM for obtaining the frameworks and is highlighting the differences between the followed technological stages in each case. The presented clinical situations have specific features, depending on the type of used materials (alloy and ceramics), on the characteristics of each clinical case, as well as on the habit and custom technical skills developed over time by each technician. Both cases met the targeted aesthetical and functional features and enhanced re-establishing the morphologic and functional integrity of the arches.

Keywords: implant, SLM, ceramic layering

INTRODUCTION

A biomaterial is defined as an engineered material used in a medical device, intended to interact with the biological systems. Biocompatibility has been defined as the ability of a material to perform with an appropriate response in a specific application [1]. The oral implant is an alloplastic biomaterial surgically inserted into the maxillary alveolar bones for functional or aesthetic purposes, serving as a prosthetic support [2]. For a rigorous treatment plan, various factors have to be considered: first of all a decision has to be made regarding the use of endosteal, transosteal, or subperiosteal implants depending on the patient's profile. In regards to the design, screw-retained restorations are mostly used, followed by cylindrical or combined implants [3], whereas the most used material for manufacturing implants is titanium (Ti), titanium alloys and ceramic or ceramic-like calcium phosphate compounds (HAs) as coatings [4]. Different surface modifications or coatings are the methods used to improve biological properties of medical devices using the minimization of protein adhesion onto the surface of medical devices [5].

Another significant consideration relates to the intraoral restorations. The important factors are: the abutments' design, location, and the type of connection between the abutment and the implant body, the prosthodontic aspects of the determined occlusion, the load magnitude and load direction specific to each reconstruction. Regarding the loading, multiunit splinting, especially in irregular angle (unit-to-unit) and cross-arch configuration, tends to dissipate the forces into multiaxial orientations, a combination of bending and torque [6][7][8]. Most critically, the timing of significant intraoral loading plus the prosthodontic occlusal scheme determines the forces which will be transferred and dissipated during the tissue-healing period [4].

Various methods are available nowadays for manufacturing of the frameworks of the over-structures. Classical methods, such as casting, are often replaced in modern treatments with computer aided design and computer aided manufacturing workflows. Some of them are based on subtractive manufacturing or milling [9][10][11], others on additive techniques (SLM- selective laser melting, SLS- selective laser sintering).

Aim and objectives

Selective laser melting (SLM) replaces conventional metal alloy casting and is an additive manufacturing technique that allows generating a complex three-dimensional structure, by successively stacking layers of metal powder, and bonding each layer on top of another, through the use of thermal energy provided by a focused laser beam. It allows manufacturing of complex designs for fixed prosthetic infrastructures and prosthetic structures on implants, by having a high degree of biocompatibility and optimal marginal fit [12], far superior to the metal frameworks manufactured by conventional processes (e.g.: casting)[13]. The metallic powder used in our study (Co-Cr Starbond COS Powder) does not contain beryllium and nickel. High density of 8.8 g / cm³ and the CTE (coefficient of thermal expansion) of 14.0 μ m /m^oC are factors that ensure the perfect compatibility with the ceramic layers used in the PFM (porcelain fused to metal) reconstructions [14].

Our study aims to present the laboratory steps required to manufacture the metallic structure of implant supported over-structures in two different clinical situations, by using the SLM technique.

MATERIAL AND METHODS

Two clinical situations have been considered, as follows: case 1- female, age 41 years, with missing teeth 4.6, 3.6, 3.7; case 2- male, age 36 years, male, with missing teeth 2.4, 2.6 and 2.7 in the upper jaw and 4.6 and 4.7 in the lower jaw. The prosthetic solution was -for both

cases- implant supported PFM reconstructions, with the metallic frameworks manufactured through the SLM technique and manual layering of ceramic, for the aesthetic reconstruction.

Impression

For the first case, standard trays and silicone (Zetapluss, Oranwash) have been used for taking the impressions (Figures 1- A, B), while in the second case, the impression material was Xantopren (Figure 1- C).

For the second case, preliminary casts (Moldano type III plaster) have been poured in order to manufacture the light cured custom trays (Evo Plaque) (Figures2- A,B).

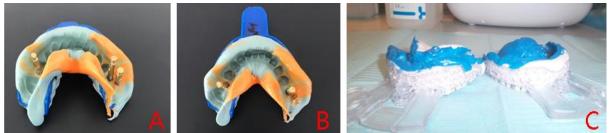


Figure 1. A, B- standard trays, and two consistency silicone material used for the impression in case 1; C- silicone impression in standard trays –case 2

Final impressions were recorded with putty and fluid silicone (Xantopren), by using the custom trays for both jaws.



Figure 2. A- custom tray on the preliminary cast- case 2; B- upper and lower custom tray mucosal side-case 2

Dental casts

After positioning the Dentis Global analogs on the transfer abutments in the first case, namely the Osstem analogs for the second case, Gingifast Rigid (Zhermack) silicone was applied around the analogs with a dispencer. This addition silicone suitable for gingival masks, offers precision and dimensional stability. Its role is to render the marginal gingival area and due to accessibility of detachment, it ensures checking of the correct position of the abutment on the analogue and finally of the over-structure, while also giving a satisfactory working space during the technical stages.

The working cast was obtained using the Giroform system and type IV plaster (Alligator, Shera) for the first case (Fig. 3.A) and Convertin Hart type IV plaster for the second case (Figure 3. B).



Figure 3. A- Master cast for case 1 B- master casts for case 2

Mounting on the articulator was achieved by using an Artex CN (Amann Girrbach) in the first case (Fig. 4.A) and respectively an Artex CR (Amann Girrbach) for the second case (Figure 4. B).

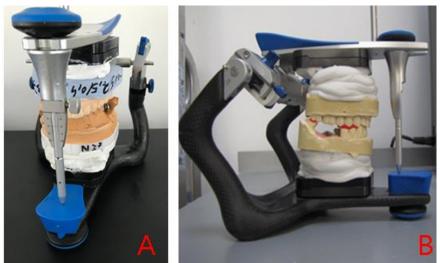


Figure 4. Cast mounted in the Artex CN articulator for case 1 (A) and in the Artex CR for case 2(B).

Abutment preparation

Once the casts have been mounted onto the articulator, the correct types of abutments (height, diameter) were inserted, obtaining thus an appropriate finishing line design and position in regard to the gingival margin. For the first case (Figure 5 A), Dentis Implant abutments with 15^o angulation were used whilst for the second case Mis standard screwed abutment with a 15 ° angulation were used (Figures 5 B, C). The abutment was positioned so as to correct the implantation axes. The silicone mask (Figure 5 D) was removed to obtain more space along with a clearer image, and all the surfaces were checked by means of a surveyor milling machine. By milling the axial surfaces up to the cervical margins with the surveyor, the parallelization was obtained and a suitable insertion axis of the copings achieved.



Figure 5. A- Dentis Implant abutments on cast- case 1; B,C- Mis standard abtuments placed on the casts- case 2; Dcorrection of implantation axis by means of a surveyor milling machine.

Scanning and design

Prior to scanning, any excess or impurity was removed and Omega Tech Spray (case1)/Heli Spray (case2) was used to mask the abutments. This avoids glossy surfaces, provides optimum light reflection, facilitating easy scanning of the work area.

Open Technologies Smart Big scanner and the Exocad software was used in case 1 and CORiTEC i3Dscan 2.0 scanner and built-in software for case 2.

For the first case, a new patient record was created, and the virtual chart was completed by selecting the antagonists, neighbours and abutments. The first scan was the one of the casts positioned in MI in the articulator to record the intermaxillary relationship. Next, the antagonists and the master cast were scanned. The last scan was the one of the abutments which was the most detailed (Figures 6 A, B).

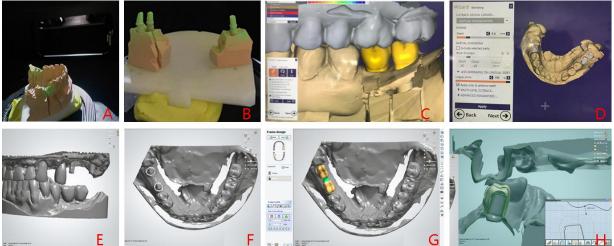


Figure 6. A,B-scanning the dies by using stump profile-case 1; C,D- design stage in Exocad software-case 1; E,Fvirtual models for case 2; G,H- proposed design for case 2 in 3Shape design software

After scanning, all components have been aligned to a reference point, which in this case was the master cast. After removing the mouth floor and the palatal area, the remaining virtual model consisted only of neighboring teeth and the marginal periodontium. The base of the removable dies (of prepared teeth) and the gingival margin were also excluded in order to have direct access to the preparation limit.

The data gathered by scanning of the casts was used in the design stage and all original information has been saved and remained in an unmodified form. The mesh-conversion step from point cloud to 3D file followed, employing the same profiles used for scanning.

Once the data has been exported to the Exocad design software, the preparation limit was drawn and the insertion axis established. The virtual reconstruction was placed with the help of the tooth placement function. The Shrink / Reduction stage ensured correction of the copings by designing a proper thickness of the metallic framework, reaching thus the optimum result for providing space for the ceramic layering (Fig.6 C, D). All saved data was exported and sent to the CAM (Computer Aided Manufacturing) software of the SLM machine.

For case 2, a 2D picture of the working cast has been taken, on which the area of the future prosthetic reconstruction was selected. As landmarks, the mesial and distal interproximal contacts of the prepared abutment were selected. After scanning all areas of interest (Fig.6 E, F), the software calculated the position of each element separately. In the end the verification of the virtual cast was done. The next step was to scan the antagonists. The scanning of the occlusion was performed by positioning the antagonists over the working

cast, whose base remained fixed on the table of the scanner. Then, data retrieved from the scanner was saved on the hard disk.

In the 3Shape Dental Manager design software, our previously created case was loaded, together with the saved image of the virtual casts. When creating the patient's file, the arch with the prepared teeth was specified, along with the material to be sintered (Co-Cr alloy). The future insertion axis of the reconstructions was established as well as the buccal and oral limit of the cast. The software allows -after the automatic delimitation of the finishing line, a manual correction of the limit of the preparation. Next, the space required for the luting cement was established.

After designing full contour reconstructions, the future framework was reduced to a 0.5 mm thickness and the connectors were designed (Figures 6 G, H). The software detects if these connectors are not of the right size and draws the attention of the operator to areas where there is an increased risk of fracture. The proposed design of the restoration to be sintered had a natural appearance from a morphological point of view, in accordance with the patient's original teeth. Because of the automatically modelled anatomic structures, at the end of all technical steps, after the ceramic layering, physiological contacts, with both adjacent and antagonistic teeth as well as a perfect fit on the abutments was obtained.

CAM file preparation

For both cases, the STL (Standard Triangle Language) files of the generated frameworks were imported into CAM (Computer Aided Manufacturing) software of the SLM machine (3Shape Cambridge). The role of this software is to position the virtual designs on the working surface of the sintering machine, with the occlusal/incisal surface towards the working surface and at a level that is as close as possible to this plane. Also, the objects will be placed in a position as flat and low as the plane, to have a smaller number of layers as possible. Between the working surface and the restorations there will be a space of at least 3mm - space which will be occupied by the supports and that allows the technician to remove the restorations from the working surface after printing, with a disc or saw. The supports that will be attached to the restoration have the role of keeping the occlusal surface away from the working surface and are assisting in the construction and support of the object during the printing process. The supports dissipate the internal tension which forms in the printed object during the software.

SLM machine preparation and post-processing

Before each manufacturing cycle, the SLM machine (MySint100, Sisma, Italy) (Figure 7A) is prepared by the technician. For this purpose, the build plate is placed inside the machine and fixed by means of a screw, the reservoir is filled with Co-Cr powder (Starbond COS 30), the coater which spreads small quantities of metallic powder over onto the build plate is calibrated and the laser lens is cleaned with a microfiber pad. The working chamber is now closed and the inertisation of this chamber is performed with nitrogen, until the oxygen content in the chamber drops below 0,5%. The CAM file is then loaded and the sintering process begins (Figure 7B).

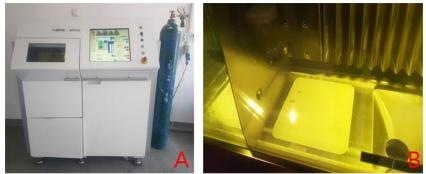


Figure 7. A- Sisma MySint 100 SLM machine; B- Sintering process

After the completion of the loaded work cycle, the chamber is opened and the excess metal powder is wiped away into the excess reservoir by means of a brush, in order for it to be re-used. The build plate is removed and placed inside of a conventional furnace to perform the heat treatment. A heat treatment at 850 °C of the completed framework was done to reduce internal tensions, porosities and micro-fissures. After sintering, the restorations are cut away from the build plate by means of a vertical electric saw. Only a minimal mechanical finishing of the frameworks (Figure 8A, B) with extra-hard burs was required before sending the frameworks to the dental office for try-in.

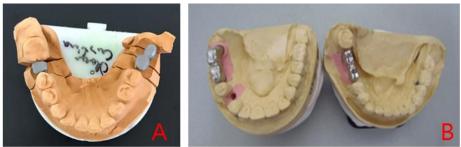


Figure 8. Metallic framework for case 1(A) and case 2(B)

Ceramic build-up

After receiving the metallic frameworks from the try-in session, the necessary adjustments are performed and the framework is sandblasted with Al_2O_3 (25 µm), at a pressure of 5 bars. The frameworks are steamed cleaned afterwards.

Ceramic layering started with the oxidation cycle of the frameworks, which is performed at 950°C for 1 minute. Afterwards, another sandblasting with Al₂O₃, at a pressure of 5 bars and steam cleaning was performed.

The opaque foundation was the placed onto the frameworks. For case 1, Vita VM 13 ceramic was used, and the color for the opaque layer was OP2 (chosen with Vita 3D Master). The first opaque layer, the wash opaque was sintered in the Ivoclar Vivadent Programat EP 3010 oven, at 890°C. The second, more consistent opaque layer enabled the complete masquing of the greyish color of the framework (Figure 9A).

The layering of the dentine began in the cervical area by placing 3M3, 2M3 and 2M2 base dentine, offering good coverage and shade for the limited space of the present case. Transpa dentine 3M3, 2M3 and 2M2 was used for rebuilding the complete tooth shape followed cut back of the occlusal 1/3 for the enamel layers (Figure 9B)

To complete the morphology, small amounts of enamel were applied in the occlusal third, slightly oversized to compensate the contraction during sintering. Window effect was used in the end to enhance the required translucency to the occlusal third (Figures 6c, 6d, 6e). The pre-drying time was 6 minutes, during which time all water molecules present in the ceramic paste evaporated. Starting temperature V1 was 500° C, rising 55° per minute until it reached 879° C, when the vacuum pump stopped and V2 reaches 880°C. After the cycle was completed, the oven lid opened gradually within 1 minute to prevent sudden cooling of the restorations.

Due to the contraction, corrections with dentine base in the cervical and the middle third, transpa dentine, enamel and window in the middle third and the occlusal third were necessary (Figure 9C). Second firing implied 6 minutes drying time, at 500° C, followed by increasing the temperature with 55°C per minute of until reaching 869°C, when vacuum pump is switched off and the firing is carried out at 870°C. after sintering, opening of the oven lasted 1 minute for gradual cooling. For individualization Vita Akkzent Plus kit was used (Figure 9D). Glazing, carried out in the Vita Vacumat 40T oven in atmosphere, prevents the absorption of oral fluids and renders the restorations a natural gloss.



Figure 9. Case 1: A- Layering of Base Dentine; B- Application of Transpa Dentine; C- Completed morphology before 2nd firing; D-External individualization

Drying the glaze paste for 1 minute, was followed by a temperature rising with a pace of 80°C per minute up to 500°C and afterwards to 866°C, were actual sintering took place. Gradually lowering of the temperature, like in previous firing cycles was followed by complete cooling at room temperature (Figures 11 A, B).

For case 2, the framework was sandblasted with Al_2O_3 (25 µm), at a pressure of 5 bars, cleaned and degreased with a hot water-steamer jet. Because of the poor quality of the oxide layer of Cr-Co alloys, bonding (Chrom-Kobalt Bonding, Bredent) was applied to enhance the metal-ceramic bond. Before the layering of the ceramic, the cast was cleaned by means of a steamer, and insulated to avoid drying of the ceramic paste by moisture absorption into de gypsum of the cast. Absorbing the excess of distilled water is accomplished by using blotting paper.

Ivoclar IPS Classic Ceramic has been used. The application of the opaquer layers to cover the metallic component was achieved by the two-step method, the first layer being applied thinner, while the second layer which covers the first was uniform as thickness and more consistent, ensuring an even masking effect of the metallic framework (Fig. 10A). Sintering took place at 960° C for 6 minutes under vacuum conditions. Base dentine, dentine, transparent and enamel were used to reproduce shape and morphological elements, of the axial walls and occlusal surface (Fig. 10B-D). Drying time was 5 minutes followed by the raising of the temperature at 750 ° C for creating the vacuum and again rising during 6-7 minutes, up to 960 ° C were sintering took place.

Finishing was performed with diamond burs which aided in achieving the required form as well as the right texture of the ceramic surface. During the try-in, both static and dynamic contacts were checked. A creamy consistency of glaze paste was prepared and was used to cover all faces, excess being removed so that in the end an even, thin film of glaze covered the entire surface. In order to perform the individualization, a brown pigment was used for the occlusal surface, and pink hue in the cervical area. Sintering was accomplished in atmosphere at 930°C, for 2-3 minutes (Figure 11 C,D)

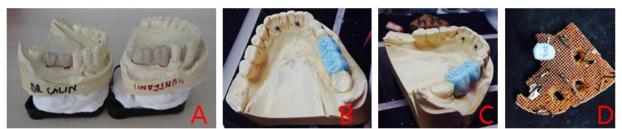


Figure 10. A- aspect of the restorations after the opaque firing; B-. Application of base dentine, dentine and C-Enamel; D. aspect of the restoration before sintering

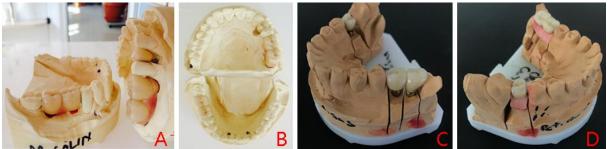


Figure 11. A- Final aspect of the restorations-case 1; B- occlusal aspect of restoration-case 1; C- Final aspect of restorations-case 2; Aspect of restoration with the applied silicone mask-case 2

DISCUSSIONS

It is a well known fact that selective laser melting technology has reported numerous instabilities that increase the surface roughness and volumetric porosity of the manufactured parts. Identifying the optimal parameters of the energy intensity and the phenomenon of heat transfer allows stabilization of the thermal processes and avoiding the misfitting of the manufactured restorations [15]. Selective laser melting is a process developed to manufacture objects with dense structures and homogeneous distribution of the material, a process in which no significant changes of the physical and chemical properties of the materials occur [16]. Among the benefits of selective laser melting are the ability to create complex geometries, which by conventional methods would be very difficult to manufacture and the ability to use a wide range of metals and alloys. The most noticeable benefit of selective laser melting is the principle on which SLM operates - complete metal powder melting, which offers the possibility to manufacture objects with the same thermal conductivity as the material from which they are made [17].

CONCLUSIONS

Altough we used the same technology in order to obtain the final restorations, the 2 presented situations have specific features, depending on the type of used ceramics, on the characteristics of each clinical case, as well as on the habit and custom technical skills developed over time by each technician. Both cases met the targeted aesthetical and functional features, and were perfectly integrated by the patients, because of the perfect fit and marginal adaptation.

Acknowledgement

All 4 authors have the same contribution in this study.

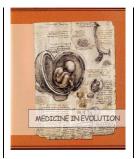
The reconstructions were manufactured by the technicians Belgiu Patricia, Damian Camelia (Imprint Scan Dent).

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Non-syndromic relative generalized microdontia



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Abstract

The dental anomalies of volume occur during the stages of morphological differentiation or during the organic matrix apposition and include micro and macrodontia. Relative generalized microdontia is characterized by the disproportion between the normal-sized teeth and the overdeveloped jaws, as a result of crossed inheritance. This case report describes the treatment approach using fixed orthodontic appliances and the evolution in the case of a young male patient diagnosed with spacing (diastemata and tremata), Class I malocclusion and deep bite. The treatment objectives were to obtain a good static and dynamic occlusion and optimal esthetics. At the end of the treatment all the functions of the dento-maxillary system were improved, with adequate intra and inter-arch relationships. When localized in the anterior region, microdontia affects the aesthetic function and, consequently, the patient's psychosocial behavior, which often dictates his treatment choice – orthodontic, restorative or multidisciplinary treatment.

Keywords: non-syndromic, Angle Class I malocclusion, relative generalized microdontia, orthodontics.

INTRODUCTION

The dental anomalies of volume occur during the stages of morphological differentiation or during the organic matrix apposition. This type of anomalies includes microdontia and macrodontia. Microdontia can be isolated or generalized. It can also be classified as relative microdontia, when the sum of the upper incisors is within normal limits (28-35 mm), as a result of crossed heredity and absolute microdontia, when the sum of the upper incisors is less than 28 mm, associated with tremata, diastemata and deep bite.

These anomalies can be found in cases with normal general development (being the expression of a disorder during the morphogenesis of the dental system) or can appear as symptoms in certain genetic syndromes (e.g. Gorlin–Chaudhry-Moss, Williams, Turner, Patau, Hallermann-Streiff).

Boyle [1] stated that the teeth in general microdontia are small and characterized by short crowns, frequently without interproximal contacts.

Shafer, Hine, and Levy [2] classified microdontia into three categories: localized microdontia, when it affects a single tooth, relative generalized microdontia (associated with wide jaws) and true generalized microdontia (when all the teeth are affected). Very few cases of true generalized microdontia were reported in the literature, in healthy subjects, except from its occurrence in some cases of pituitary dwarfism and Fanconi's anemia [2].

The etiology of microdontia is linked to hereditary, genetic, epigenetic and environmental factors [3].

Aim and objectives

The aim of this paper was to highlight the orthodontic therapeutic approach using fixed orthodontic appliances in a case of relative generalized microdontia, in order to improve the functions of the dento-maxillary system.

CASE REPORT

I. Anamnesis

The patient had normal stature, weight and height, without any growth or development related disorders. No abnormalities were found when examining the head, hair, eyes, limbs, hands, skin and nails of the patient. Intellectual capacity, social skills and scholar performance were also normal. The personal medical history was unremarkable. The family medical history showed no significant signs of dento-maxillary anomalies.

II. Clinical examination data

The extraoral examination showed a brachycephalic skull, a slightly convex profile, no visible facial asymmetry and no TMJ disorders (Figure 1).





Figure 1. Extraoral clinical exam: a) frontal view; b) lateral view

The intraoral examination (Figure 2) showed no signs of pathological lesions, with healthy soft tissues and the teeth had relatively normal shape and size. The jaws were wide and overdeveloped and spacing (tremata and diastemata) was observed in both arches. Class I malocclusion with neutral canine and molar relationships and anterior deep bite were also noticed.



a) c) Figure 2. Intraoral clinical exam: a) lateral view (right side); b) frontal view; c) lateral view (left side)

III. Paraclinical investigations

On the orthopantomography we observed inadequate root parallelism. The cephalometric examination revealed a normodivergent skeletal Class I pattern. The analysis of the study models corroborated the results of the clinical examination (Figure 3).

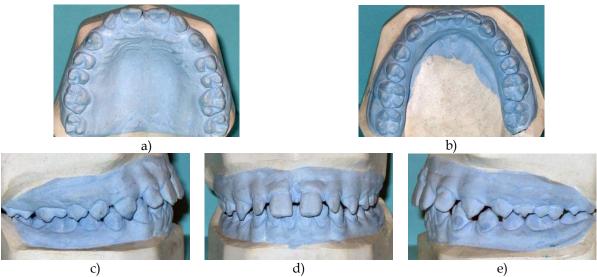


Figure 3. Study models: a) upper arch; b) lower arch; c) lateral view (right side); d) frontal view; e) lateral view (left side)

IV. Diagnosis

Based on the clinical and the complementary exams, the patient was diagnosed with relative generalized microdontia in the permanent dentition, the patient having no other relevant general clinical sings. The most plausible etiological factor involved in this case was the crossed inheritance, the child having relatively normal-sized teeth and overdeveloped jaws.

V. Treatment and evolution

Treatment objectives

The treatment aimed to maintain the bilateral molar and canine Class I relationships, to obtain an optimal alignment of the upper and lower midlines and to close the interproximal spaces, in order to achieve a good static and dynamic occlusion.

Treatment stages

The straight-wire technique was used, with a Roth prescription of GAC brackets with a slot size of 0.022-inch (Figure 4). In the alignment phase we used 0.012-0.016-inch x 0.022-

inch NiTi arch wires and in the correction and finishing phase we used Sentalloy and stainless-steel arch wires. Bilateral mushroom loops were used for space closure in the upper arch (Figure 5).

At the end of the treatment all the functions of the dento-maxillary system were improved, with good intra and inter-arch relationships (Figure 6).

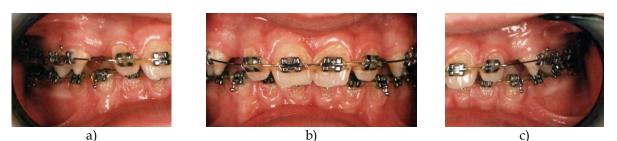


Figure 4. Interim treatment stage: a) lateral view (right side); b) frontal view; c) lateral view (left side)



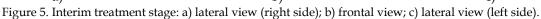




Figure 6. Final result

DISCUSSIONS

The factors implicated in the complex etiology of relative generalized microdontia are still debated. Microdontia has a direct and strong impact on esthetics and tooth alignment, thereby it interferes with the development of normal dental arch relationships and sometimes generates malocclusions [4].

Studies found that this type of anomaly is often located in the maxilla, rather than in the mandible and the most affected teeth were the canines, not the lateral incisors, as it was previously known [5].

Most often, teenagers and adults with microdontia, demand a perfect smile in a short time, therefore an increasing number of patients affected by this anomaly choose dental restorations, either direct ones (resin-based composite systems) or indirect ones (all ceramic or metal-ceramic crowns and porcelain laminate veneers with a high color stability and abrasion resistance) [6,7]. Furthermore, their superior surface properties, form and individual characterization of color makes this treatment option extremely attractive, yet expensive [8].

An excellent treatment strategy for the esthetic restauration of the anterior teeth affected by microdontia is the direct resin-based composite bonding, which is a conservative technique, where the composite can be placed directly on the teeth, most of the times without any loss of dental tissue. Therefore, the selection of a restorative technique, such as free-hand, full direct or semi-direct (e.g. using a silicone guide), should be considered in order to

preserve the natural tooth structure, but it also depends on the particularities of each individual case, as well as on the experience of the practitioner [9,10].

CONCLUSIONS

Depending on the amplitude and on the region in which it occurs, microdontia disturbs the dento-alveolar and occlusal balances. When localized in the anterior region, it affects the aesthetic function and, consequently, the patient's psychosocial behavior, which often dictates his treatment choice – orthodontic, restorative or multidisciplinary treatment.

Declaration of patient consent

Through his legal representative, the patient consented for his clinical data and his images to be reported under anonymity for scientific research and medical purposes.

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Frequency analysis of Bolton's discrepancy in a group of patients with orthodontic treatment need



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Abstract

Objectives: This study evaluates the frequency of the Bolton discrepancy in a group of patients with orthodontic treatment need, establishing the existence or the absence of any correlations between this discrepancy and its location as well as the sex of the patient.

Materials and method: A total of 40 patients were included in the present study. Measurement of the mesiodistal widths (between contact points) located at the equator of the dental crown, have been performed using a precision digital caliper. The measurements were taken on the study models.

Results and conclusions: The measurements performed on the study models, before the orthodontic treatment was applied, identified that 15 (37.5%) of the 40 participants in the study have Bolton discrepancy. No significant differences were reported when comparing the arches or the anterior and overall ratio.

Keywords: Bolton's Discrepancy, malocclusion, orthodontic treatment, dental adhesive technique

INTRODUCTION

With regards to the size of dental arches, it is known that the diameter of the superior arch is greater than the diameter of the inferior arch by 8-12 mm [1]. In 1958, Bolton determined the ideal ratio of the mesiodistal width of the upper teeth to the lower teeth for an optimal occlusion [2]. This analysis should be performed only in the permanent dentition, where there is an Anterior Ratio (from 1.3 to 2.3) and an Overall Ratio (from 1.6 to 2.6).

The Bolton Discrepancy in the superior arch is caused by narrow lateral incisors, localized macrodontia, increased overbite and overjet, crowding of upper teeth, retrusion and protrusion of the superior incisors. Whereas in the inferior arch it is caused by decreased overbite and overjet, inferior teeth crowding, inferior incisor retrusion [2].

This disharmony can be managed in different ways: tooth stripping to reduce volume (reducing the mesiodistal width in the case of crowding or increased volume), increasing the volume through direct and indirect restorations, modifying dental angulation and torque [2-4].

As a result of a self-study, Bolton analyzed the need to reduce tooth dimensions through stripping, or adding volume with dental composite materials [3] and reported similar results as John et al. in their study [4].

The difference in teeth dimensions depends on different factors, such as race (the black race higher values for maxillary canines, premolars and molars than the white race, with no differences in the incisor group [5], sex [6]. Sperry et al [7] reported a size excess with the inferior teeth among patients with Angle class III malocclusion. The study was conducted on a group of men and women diagnosed with Angle class I, class II or class III malocclusion [7]. In a similar research Crosby and Alexander [8], excluded patients diagnosed with Angle Malocclusion class III, no statistically significant differences were found.

This study analyses the frequency of Bolton's Discrepancy (DB) among a group of patients with orthodontic treatment need. It is also aimed to determine any correlations between this discrepancy, its localization and patients' gender.

MATERIALS AND METHODS

The sample consisted of 40 subjects, patients at Natural Smile Dental Clinic, referred to the clinic for orthodontic treatment between 2015 and 2018.

Patients were selected for the study according to the following criteria:

- fully erupted permanent dentition and present on the arch
- no prior orthodontic treatment
- absence of attrition, abrasion, abfraction and erosion lesions
- absence of restorations (and dental caries lesions) on proximal points.
- absence of dental prosthetic restoration

Method

Measurement of the mesiodistal widths (between contact points) located at the equator of the dental crowns, have been performed using a precision digital caliper. The measurements were taken on the study models (Fig. 1, Fig.2, Fig.3) of the patients.

The anterior ratio was determined using the following formula:

Anterior ratio= sum of the mesiodistal width of 6 mandibular anterior teeth/ sum of the mesiodistal width of the 6 maxillary anterior teeth x100

Overall ratio was determined using the following formula:

Overall ratio= the sum of mesiodistal widths of the 12 mandibular teeth/ mesiodistal width of the 12 maxillary teeth x100







Figure 1. Study model

Figure 2. Study model

Figure 3. Study model

The same examiner performed the measurements twice. When differences greater than 0.2mm were found, a third measurement was done, and it was taken into account. In the case where differences were less than 0.2mm, the value of the first result prevailed.

The descriptive and comparative statistical analysis was performed using the student t test with at statistical significance of p<0.05.

RESULTS

Measurements performed on the study models, showed that 15 of the 40 participants in the study recommended for orthodontic treatment, respectively 37.5% have Bolton Discrepancy. Regarding the patients gender, 40 participants, 7 females (17.5%) and 8 males (20%) of the sample presented the discrepancy. When analyzing the sample of Bolton Discrepancy diagnosed patients by gender, the results show that 46.6% were female and 53.4% were male. From the total of female participant patients (20), 35% presented the discrepancy, and out of the total of male participant patients (20), 40% presented the discrepancy.

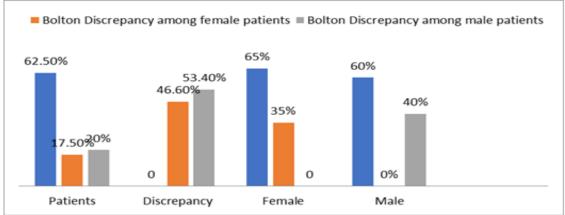


Figure 4. Systematizing ratio distribution according to amount and gender

Table I details the comparison of mean values in mm for the mesiodistal width of the individual teeth in the superior dental arch in female and male patients. As observed the values do not present statistically significant differences.

	.,			
Upper Arch	Male	Female	<i>p</i> -value	Difference Significance
IC	8,57±0,52	8,45±0,55	>0,05	IS
IL	6,93±0,53	6,73±0,58	>0,05	IS
С	7,73±0,38	7,63±0,42	>0,05	IS
PM1	6,85±0,40	6,78±0,48	>0,05	IS
PM2	6,39±0,42	6,34±0,43	>0,05	IS
M1	10,47±0,53	10,35±0,52	>0,05	IS

Table I. Average width, standard deviation and *p*-value of maxillary teeth

IC-central incisor, IL-lateral incisor, C-canine, PM1- first premolar, PM2-second premolar, M1- first molar, IS-Insignificant Figure 5 details the comparison of mean values in mm for the mesiodistal width of the individual teeth in the superior dental arch. Similar results were present on the inferior arch, with no significant differences (table II).

Table II. Average width, standard deviation and p-value of manufoliar teeth					
Lower arch	Male	Female	<i>p-v</i> alue	Difference Significance	
IC	5,15±0,58	5,16±0,42	>0,05	IS	
IL	5,79±0,43	5,76±0,51	>0,05	IS	
С	6,81±0,41	6,60±0,44	>0,05	IS	
PM1	6,86±0,40	6,96±0,44	>0,05	IS	
PM2	6,82±0,45	6,73±0,45	>0,05	IS	
M1	10,97±0,58	10,62±0,64	>0,05	IS	

Table II. Average width, standard deviation and *p*-value of mandibular teeth

IC-central incisor, IL-lateral incisor, C-canin, PM1- first premolar, PM2-second premolar, M1- first molar, IS-Insignificant

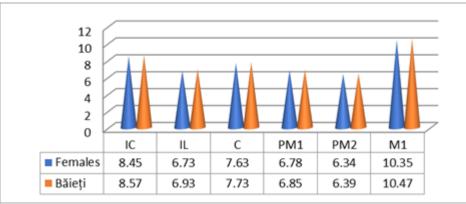


Figure 5. The average width of individual teeth in upper arch-females and males

The results regarding the two dental arches determined that the sum of mesiodistal tooth-widths in male participants (92,96 mm and 84,8 mm, respectively) is greater than the sum for female participants (91,69 mm and 83,65mm, respectively) on both dental arches. However, the results do not present significant statistical differences (p>0,05).

Table III details the mean, deviation and width ratio for mandibular-maxillary teeth. Although the anterior ratio and overall ratio have been slightly greater in female patients than in male patients, the difference is statistically insignificant.

Ratio	Males	Females	Value <i>p</i>	Difference
Anterior	76,44±4,14	76,80±2,91	>0,05	IS
Total	91,24±2,87	91,25±2,36	>0,05	IS

Table III. Anterior and Overall ratio in males and females

IS- insignificant

DISCUSSIONS

The results of the study indicate that 37.5% of the participants present Bolton discrepancy. This percentage is smaller than the 60% resulted in Crosby's study. The difference is explained by the different race type of the sample group on which the study was performed.

The first inferior molar reported the maximum variability, while the superior canine reported the minimum variability in the maxillary and mandibular teeth.

On the upper arch, the lateral incisor reported a maximum variability in female patients, while in the case of male patients it was the first molar and lateral incisors that presented a maximum variability. Maximum variability was observed on the central incisor and prime molar in male patients, while in the case of female patients the prime molar on the inferior dental arch recorded maximum variability. The mesiodistal widths on both arches presented similar distribution for both male and female patients, the measurements being greater in male patients, however the differences were statistically insignificant.

These results are in agreement with the study conducted on the population of South America, study performed by Santoro et al [9], but in disagreement with the conclusions in the study conducted by Lavelle et al. [6] and Moorees et al [10]. A similar study conducted on the population of North India concluded that teeth tend to be larger in male participants, however the study did not analyze their significance.[11] Similar to numerous authors, the studies performed by Ary et al [12] and Lavelle et al [6] show that there are difference in teeth size based on gender.

The anterior ratio and overall ratio have been compared on both genders. The results show that there is no significant difference. This can be referable to the similar distribution of mesiodistal tooth widths in male and female population. Similar results were recorded in a study conducted on the population of Southern China.[13]

CONCLUSIONS

After the analysis of 40 study models, the following have been identified:

- 15 patients, representing a total of 37.5% of the sample group, presented Bolton Discrepancy.
- Among those with Bolton Discrepancy, a slightly higher percentage belonged to the male sample group (53.4%).
- No significant differences were reported when comparing the arches or the anterior and overall ratio.

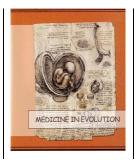
The presence of a mesiodistal discrepancy in the dental arches interferes with an optimal occlusion. The orthodontic positioning of teeth in correct intercuspation can result in interdental spacing, which in turn will need restorative treatments.

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Autofluorescence evaluation of oral keratotic lesions



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Abstract

Objective: The aim of this study is to assess the value of tissular fluorescence visualization for the diagnosis of oral white lesions.

Material and method: The study was conducted in the Department of Oral Medicine of the UMF Carol Davila and included 25 patients with the preliminary clinical diagnosis of oral keratotic lesions. The lesions were evaluated using tissue autofluorescence and the diagnosis was confirmed histologically.

Results: In this study for tissue autofluorescence, a sensitivity of 0.57 and a specificity of 0.72 were obtained.

Conclusion:According to the data analyzed in the present study, this adjuvant investigation does not bring superior benefits in the assessment of oral keratotic lesions, although this method is convenient, easy to use for patients who need long term follow-up, it requires caution because benign lesions can mimic suspicious disorders.

Keywords: oral keratotic lesions, autofluorescenc e evaluation.

INTRODUCTION

Oral mucosal white lesions can raise difficulties in diagnosis mainly because of the resemblances in the clinical appearance. In this category of oral disorders are included various lesions with different etiologic causes. Thus benign lesions such as traumatic keratosis, hyperplastic candidiasis, nicotinic stomatitis can show similarities with oral lichen planus or the challenging leukoplakia or even the leukoplakic onset of oral carcinoma[1]. The quick and correct diagnosis of those lesions improves the prognosis and evolution in cases of suspicious lesions or for lesions that have malignant potential.

The present diagnostic recommendations for oral keratotic lesions includes the following steps: a preliminary evaluation and a definitive diagnosis[2]. The preliminary phase includes the identification by conventional oral examination and palpation and the removal of possible local factors (tobacco, local trauma, Candida infection). A definitive diagnosis is obtained after the biopsy. The biopsy which implies invasive methods can be done from the beginning in case of idiopathic leukoplakia or in case of persisting lesions after the removal of local factors. After the histopathological examination, the final diagnosis is established by identifying the degree of dysplasia and including the lesion in suspicious or non-suspicious type [2].

For the early detection of oral keratotic lesions, complementary diagnostic methods were studied and are used in present. These adjuvant techniques improve identification of the lesions (based on tissue reflection, autofluorescence, and vital staining), lesion assessment (cytology and vital staining) and risk assessment (salivary biomarkers)[3]. Moreover, all of these methods are used for screening for oral squamous cell carcinoma and oral epithelial dysplasia[4]. But these methods do not replace the conventional oral examination or the histological evaluation which remains the golden standard for oral keratotic lesions.

One adjuvant system is VELscope Vx which is a device that is based on tissue fluorescence visualization. This has a significant advantage that it allows the clinician to detect changes in cellular, structural or metabolic activity in oral mucosal tissues. This system uses a handpiece that emits light at 400-460nm wavelength, under which normal mucosa is fluorescent green and abnormal tissue is dark as it absorbs the light [5].

This adjuvant examination method is based on modification of the normal autofluorescence which is caused by tissue changes such as disruption of collagen matrix and elastin and metabolic alterations such as decressing of flavin-adenin dinucleotide quantity and increasing of the reduced form of dinucleotide nicotinamide adenine[5].

Aim and objectives

The aim of this study is to assess the value of tissular fluorescence visualization for the diagnosis of oral white lesions. This was done by comparing the dysplasia degree from the histopathological examination of the lesions with the VELscope images taken previously.

MATERIALS AND METHODS

For the present study, we reviewed the medical charts of patients diagnosed with white lesions of the oral mucosa. The patients were referred for diagnosis to the Oral Medicine/Oral Pathology Discipline, Faculty of Dental Medicine between March 2017 to March 2018. A number of 45 medical sheets were retrieved. Of these, 20 cases with incomplete clinical data, without VELscope evaluation or without histopathological exam were excluded. The remaining 25 cases were selected and analyzed. The inclusion criteria in the present study were the following: clinical diagnosis of the oral keratotic lesion, the histopathological exam, stored image of the lesion in conventional light and through the tissue autofluorescence device(VELscope Vx system), the patient's informed written consent for study participation.

The patients were examined by an Oral Medicine specialist by a detailed and rigorous conventional oral examination (visualization in the incandescent light of the dental chair and palpation) and evaluation with the VELscope system. During VELscope examination the room light was dimmed in order to assist visualization and to increase the contrast. The device was positioned 10 centimetres from the lesion. Pictures of the lesions in conventional light and using VELscope device were taken. The biopsy of the lesions was done and the histopathological evaluation conducted to the final diagnosis.

From the medical charts, the following data were retrieved: demographic data-age, gender, smoking details, symptoms, location, and the dimension of the lesion, histopathological result.

RESULTS

Of the total number of patients included in this study, 52% (n = 13) were women and 48% (n = 12) men. Regarding age, most of the patients were 40 to 60 years old (10 cases), over 60 years (8 cases) and 7 cases younger than 40years. According to smoking, the group was divided into smokers (13 patients- 52%), non-smokers (six patients- 24%) and former smokers (six patients- 24%). The most frequent oral mucosa site affected was the tongue (six cases) and multiple locations - more than two affected areas - (six cases), followed by gingiva (five cases), hard palate (four cases), buccal mucosa (three cases) and soft palate (one case). The lesions identified were classified by size as having less than 2 cm^2 (11 cases), between 2 and 4 cm² (11 cases) and more than 4 cm² (three cases).

The clinical preliminary diagnosis were leukoplakia: in 21 patients (84%); oral lichen planus: in three patients (12%) and oral papilloma: in one patient (4%).

For all these lesions the autofluorescence evaluation and the histopathological results are presented in Table 1.

	Non-dysplastic lesions	Dysplastic lesions	Carcinoma
Autofluorescence retained	13 cases	3 cases	
Lost autofluorescence	5 cases	2 cases	2 cases
Total number of cases	18 cases	5 cases	2 cases

Table 1. Concordance between autofluorescence and histopathological diagnosis

Although the group analyzed in this study is not a large one, we observed in lesions without dysplasia, where we would have expected all patients to have retained autofluorescence (Figure 1), there were five cases out of 18, in which autofluorescence was lost (Figure 2). Regarding the dysplastic lesions, for which we would have assumed that they will show lost autofluorescence, a great number of cases (three patients) had the autofluorescence preserved compared to only two patients with lost autofluorescence. In oral carcinoma cases, the result was as expected with lost autofluorescence.

For the present results, analyzing the sensitivity and specificity for VELscope system, we obtained the following values for sensitivity: 0.57 and for specificity: 0.72(Table 2). This means that autofluorescence correctly identified (positive test) 57% of the dysplastic lesions and 72% of the nondysplastic lesions (negative test).

Table 2. Contingency table 2x2 with the f	our possibilities regar	ding the result of a d	iagnostic test
	Procont discaso	Abcont discosso	Total

	Present disease	Absent disease	Total
Positive diagnostic test	4	5	9
Negative diagnostic test	3	13	16
Total	7	18	25



Figure 1A. Clinical aspect of gingival leukoplakia



Figure 1B. Autofluorescence image with no loss of autofluorescence

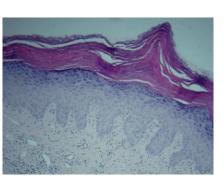


Figure 1C. Histology of the lesion showing no dysplasia(HE20x)



Figure 2A. Atypical hard palate location of erosive oral lichen planus with keratosis and ulcers

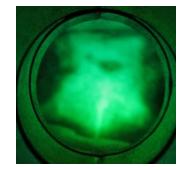


Figure 2B. Visual autofluorescence lost

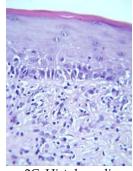


Figure 2C. Histology diagnosis oral lichen planus without dysplasia (HEx400)



Figure 3A. Tongue tumor with nonhomogenous leukoplakic areas

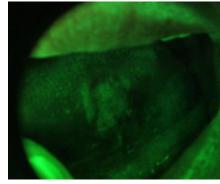


Figure 3B. VELscope image of the tumor showing loss of autofluorescence

DISCUSSIONS

We assessed the autofluorescence visualization's benefits for oral keratotic lesions when compared with the histopathological outcome. The autofluorescence evaluation of oral lesions is a non-invasive technique that does not require consumables, is well-accepted by the patients. It can be repeated frequently adjuvant to the conventional oral cavity examination, allows objective interpretation, with rapid results and does require minimal training[6]. Our study results suggest a good sensitivity (0.57) and specificity(0.72) but a study limitation is the small sample size of patients. Moreover, this investigation is limited by a high number of false-positive results, as the inflammatory or vascular lesion, focal melanosis, amalgam pigmentation show a loss of fluorescence visualization [6].

A meta-analysis of seven studies published in 2017 analyzed the accuracy of this complementary optical diagnostic method with reference to a total number of 616 oral lesions. The results show that 90% (sensitivity 0.90) of the lesions and 72% (0.72 specificity) of the unchanged tissue are correctly identified by tissue autofluorescence [3].

In three of the studies cited in the aforementioned article [7,8,9], tissue autofluorescence recorded a sensitivity between 0.22 - 1 and specificity between 0.084 - 0, 8. The presentation of the obtained results, compared to other similar studies, is shown in Table 3. The specificity of the test, of 0.72, is identical to that reported by Lingen in 2017. The sensitivity value of 0.57 is close to the data reported by Awan and Farah.

Although some authors appreciate that VELscope has a moderate to high sensitivity and low specificity and cannot distinct between benign and malignant lesions, these devices improve the clinical data obtained by conventional examination. There are larger studies undertaken in present for this subject mainly in order to detect their applicability in primary dental care[10].

	Author / year	Number of	Results:
		lesions	Sensitivity (Se), Specificity (Sp)
	Present study	25	Se = 0.57, Sp = 0.72
	Awan K.H. et al. 2011 [7]	125	Se = 0.84, Sp = 0.15
	Farah C.S. et al. 2012 [8]	112	Se = 0.30, Sp = 0.63
	Hanken H et al. 2013 [9]	120	Se = 0.22, Sp = 0.08
	Lingen M.W. et al. 2017 [3]	616	Se = 0.90, Sp = 0.72

Table 3. Comparison of the results of tissue autofluorescence obtained in the present study with those of the specialized literature

CONCLUSIONS

According to the data analyzed in the present study, this adjuvant investigation does not bring superior benefits in the assessment of oral keratotic lesions, although this method is convenient, easy to use for patients who need long term follow-up, it requires caution because benign lesions can mimic suspicious disorders.

Conflict of interests statement

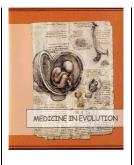
All the authors declare that they have no financial or other conflict of interests regarding the present study and the device involved in this article.

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Teachers' perception of oral hygiene of children aged 8 to 12 years old. Case study in the rural area of the Timis county.



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Abstract

Our social approach is to evaluate in rural areas important dental hygiene activities and their effects. This analysis is carried out through stakeholders present in rural areas and more specifically teachers who work with children between the ages of 8 and 12 years old. the research method used was a quantitative method, the tool used to be a questionnaire that consisted of 14 questions. In order to carry out this study, 20 teachers were interviewed, in grades 1-4 in rural schools in Timis County.

Keywords: Teacher, oral hygiene, children. Timis County.

INTRODUCTION

Romania's post-decembrist experience was a prominent and profound-minded experience, which was not limited at political and economic level by changing a totalitarian system with a capitalist one and a centralized economy to a capitalist economy regulated by market rules. On a social level, the mutations were at least as profound. The 30 years have brought profound changes and the level of population and their lives (1). The replacement of the egalitarian system with a meritocratic system, which has known Romanian features, has led to the development of increasingly obvious social cleavage between poor and rich between educated and least educated people, between young and old and perhaps most obviously between villages and towns. With the illusion of some villages located in the immediate outskirts of the major cities that became bedrooms for these cities, life in rural areas experienced a constant degradation. In this context the quality of life of people living in rural areas is increasingly low, and the likelihood of reducing gaps with those living in urban areas is becoming increasingly low. Obviously, the medical component of the standard of life is not any different. The number of doctors is increasingly lower in rural areas, with information obviously less available, so much more limited access to what quality medical services mean for people in rural areas.

Aim and objectives

Starting from these realities, our social approach is to evaluate in rural areas important dental hygiene activities and their effects. Even though such research was carried out through child-wide analysis (2), no research was done at the level of stakeholders. This analysis is carried out through stakeholders present in rural areas and more specifically teachers who work with children between the ages of 8 and 12 years old.

MATERIALS AND METHODS

For data collection, the research method used was a quantitative method, the tool used to be a questionnaire that consisted of 14 questions. In order to carry out this study, 20 teachers were interviewed, in grades 1-4 in rural schools in Timis County. In order to provide a more competitive picture of the perception of dental hygiene in the authentic countryside, the localities where the research was carried out were at a distance of at least 20 km from Timisoara, as follows: Berini (2), Ictar-Budint (1), Iosifalau (1), Periam (5), Sacosu Turcesc (3), Sustra (2), Topolovatu Mare (3), Uliuc (3). Respondents were 100% female, with an average age of 41.5 years and an average work experience of 20 years. In terms of the level of training of respondents, 15 people completed university studies, 4 people high school and one person another school.

RESULTS

A first dimension targeted by our analysis was the analysis of teachers' perception of the importance that children attach to dental hygiene. As can be seen in Figure 1, the vast majority of the teachers surveyed believe that children pay little attention to dental hygiene. This result may be a first indicator that supports the need to pay more attention to children in grades 1 to 4 in authentic rural areas.

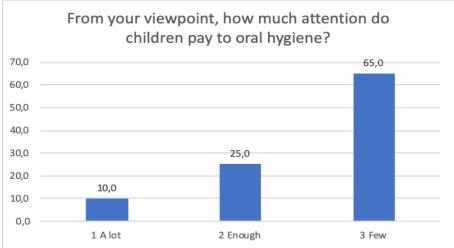


Figure 1. How much attention do children pay to oral hygiene

As the literature states, a low interest in activities that support dental hygiene is associated with a number of problems in oral health. From here starts another dimension of interest in our research, namely the extent to which the problems in the health of the mouth (toothache, thrush, etc.) end up impacting the smooth conduct of the educational act. In this respect, the teachers interviewed were interviewed about the frequency with which the problems of dentition affected teaching activity. As can be seen in Figure 2, the distribution of answers is almost perfectly normal for the ranges analyzed from every week to never. Thus, for the vast majority of teachers surveyed, the problems of dentition affect the teaching activity every 2 – 3 months. Only one teacher replied that they encountered such problems every week, while two responded that the teaching activity was never affected by the children's dentition problems. However, in summing up the answers of those who have problems at least every few months or more often, we notice that 65% of the respondents (13 out of 20), find themselves in such a situation, which denotes that even school activities are impacted by dental problems that children have.

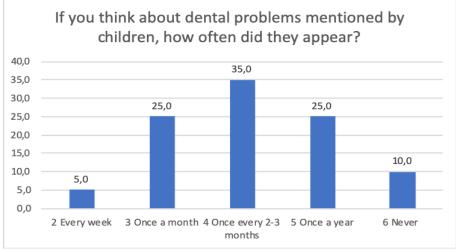


Figure 2. Dental problems mentioned by children

Even if the frequency with which the dental problems affect the instructiveeducational process is quite high, the extent to which the act of education ends up being affected is considered by the majority of respondents to be limited or very limited (see Figure 3). However, 25% of respondents (5 out of 20 people) believe that the educational act is largely affected by dental problems experienced by students. This percentage is appreciated as a very large one, if we consider that the question referred only to the extent to which dental problems impact the act of education, without taking into account the other types of medical problems.

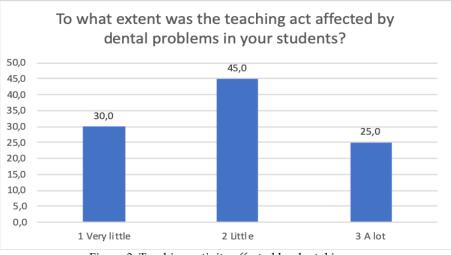


Figure 3. Teaching activity affected by dental issues

In order to solve dental health problems, the almost unanimous (19 out of 20) appearance of respondents is that education is very important for solving this problem. On a scale of 1 to 5, the respondents consider that the main authority that should perform dental education actions is the Public Health Agency. Private initiative is the one in which our respondents put great hope, with toothpaste firms being in the opinion of our respondents the second agent as important that should develop dental education programs.

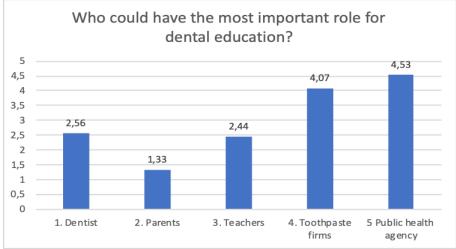


Figure 4. Persons involved in dental education

CONCLUSIONS

Our analysis highlights, this time with clear and conclusive data the health situation and rural environment with dental hygiene focus. Our approach to interviewing a category of stakeholder, in particular of teachers working in rural areas aims to highlight how this problem is assessed by an audience that has the capacity to realistically and knowingly assess this situation, without a subjective or limited involvement of their own experiences and knowledge.

A first result worth mentioning is that the vast majority of interviewed people believe that children pay little attention to dental hygiene. This indicator is a first indicator of the need to inform and train children from rural areas for the development of healthy behaviors. The effects of low attention to oral hygiene has a number of repercussions, some of them even for educational and educational activity. Only 2 out of 20 people responded that their teaching activity was never affected by children's tooth problems. This percentage becomes a worrying one if we think first of all that 18 out of 20 were affected at least once a year and, secondly, that this percentage only takes into account the incidence of dental problems. It should be noted that these effects were during the school period and only for dental problems without regard to other health problems that could have affected the educational educational act or more than that the quality of children's lives. All these results indicate the need to carry out systematic and stretching steps on the rural population. In order to carry out these activities, the main agencies for implementing educational and information steps identified by our respondents are the Public Health Agency and the companies producing toothpaste.

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Clinical comparative study between the classical and the digital wax-up and indirect mock-up



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Abstract

Obtaining functional and aesthetically pleasing dental restorations is the main goal of prosthetic treatments. A patient's smile should be in harmony with her/his facial features, reflect her/his personality and give her/him self-confidence. Nowadays, the vision that the doctor has in mind when designing a treatment plan can be materialised by means of a wax-up and subsequently by an indirect mock-up. Wax-ups can be made using the conventional method, i.e., by the addition of wax on a cast, or digitally, by creating 2D or 3D options of future dental restorations.

Keywords: dental aesthetics, conventional wax-up, Digital Smile Design, DSD, TRIOS, 3Shape, indirect mock-up.

INTRODUCTION

With rapid technological evolution and easy access to information, patients' demands have risen more and more, reaching as close to perfection as possible, hoping for an end-result that will presumably reflect their personality and their lifestyle [1].

The perception of beauty is a unique characteristic of every human being, describing an infinity of possibilities with various emotional nuances. In order to obtain predictable and stable results, both functionally and aesthetically, very good communication between the dentist, the dental technician and the patient is essential [2].

In modern prosthetic rehabilitations, the first stage of treatment begins with a thorough initial anamnesis in order to establish the patient's wishes and expectations, followed by a clinical analysis in order to establish her/his objective needs. Besides taking impressions for the study models, even beginning from this stage the practitioner can benefit from the help of digital technologies. These include digital photography, the use of digital software for the prefiguration of future dental shapes [3] and of the dental composition in a two-dimensional or a three-dimensional format, by means of a digital wax-up [4, 5, 6, 7].

Aim and objectives

The main objective of this study was to compare the preview of the future project in terms of dental shapes, size and arrangement, using two different methods (conventional and digital wax-up) and their assessment in terms of difficulty, working time, costs and aesthetic results. At the same time, the aesthetic performances of both methods were evaluated by the means of a questionnaire distributed to 100 subjects active in the dental field.

MATERIALS AND METHODS

A 25-year-old male patient came to our office with the desire to improve the aesthetics of his smile. Following the very thorough clinical examination, it was concluded that the patient had moderate caries risk, that he had undergone a series of dental and endodontic treatments and that he was not accusing any symptoms in temporal-mandibular joint and masticatory muscles.

For a better understanding the patient's perception of his physiognomic appearance and aesthetic desires, he was asked to complete an aesthetic questionnaire in order to establish the future treatment plan. The patient's complaints referred to the unpleasant appearance of his smile due to, in his opinion, the uneven gingival levels, the nonharmonious ratio between the length and the width of his teeth, their position on the arch and the spaces between the upper frontal teeth. The patient's desire was to have perfectly aligned teeth, with a more natural appearance and a lighter colour. At the same time, it was essential to preview the final aesthetic result from the beginning of the treatment.

The extra oral examination from a frontal view showed a correct symmetry and facial proportions (Fig. 1). From a lateral inspection, the patient had a straight profile (Fig. 2).

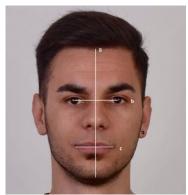




Figure 1. Frontal extra oral examination; a. The midsagittal line, b. The bipupillary line, c. The intercommissural line

Figure 2. Extra oral lateral examination a. Frankfurt plane, b. Dreyfuss plane, c. Simon plane, d. E-line

A standard set of photographs was taken, which included portrait and profile photos, the mandibular rest position, the dental arches in maximum intercuspation (MI) front view, as well as from the left and the right side, and an occlusal view of each dental arch (Fig. 3).



Figure 3. The standard set of photographs

Following the clinical examination, the patient was diagnosed with Angle Class II/2, with an increased overbite and no overjet (Fig. 4). The shape of the maxillary central incisors was square, and they were situated orally.



Figure 4. Dental analysis

After completing the detailed clinical analysis and the complementary examinations, the functional and aesthetic objectives of the treatment plan were established:

1. Alignment of the maxillary frontal teeth;

- 2. Closing of the diastema;
- 3. Compensation of the palatal position of the maxillary incisors by adding vestibular volume;
- 4. Volume addition in the upper premolar area, in order to compensate for the negative buccal corridors;
- 5. Correction of the gingival smile by performing crown lengthening and implicitly correcting dental proportions (length/width ratio).

To preview the patient's future smile, two types of wax-ups, conventional and digital, were obtained. For the conventional wax-up, the impression of the dental arches was taken using a polyvinyl siloxane silicone (Express VPS, 3M Espe, USA) and a face bow recording was also carried out. The models were mounted in the semi-adjustable articulator (Artex® cr, Amann Girrbach, Austria) (Fig. 5) in the MI position, and the condylar slopes and Bennett angles were programmed by computerised axiography.



Figure 5. Casts mounted in the semi-adjustable articulator

In the dental laboratory, on the study models, the technician performed the wax-up according to the indications provided by the dentist. The wax-up was created with white wax by correctly repositioning the incisal edges of the central maxillary incisors (8), continuing with the buccal surface design and continuing with the entire dental arch up to the upper 2nd premolars (Fig. 6).



Figure 6. Classical maxillary wax-up

The dentist verified that the indications given to the dental technician were included in the wax-up design. Testing the project intra orally was performed using the indirect mockup. An impression of the wax-up was taken with a putty addition silicone (Fegura Sil Putty, Feguramed GmbH, Germany), which was checked to fit perfectly into the oral cavity.

For the indirect mock-up, an A1 colour composite (LuxaCrown, DMG, USA) was used (Figs. 7, 8, 9).



Figure 7. Extraoral frontal view of the mock-up





Figure 8. Extraoral lateral view of the mock-up

Figure 9. Intraoral frontal view of the mock-up

Subsequently, the mock-up was verified by the practitioner in the oral cavity. The distribution and intensity of the contact points in MI position, the anterior guidance and the lateral guidances were verified. The phonetic tests were also carried through.

As for the modern technique of previewing prosthetic restorations, a 2D digital simulation technique - Digital Smile Design (DSD), and 3D simulation - digital wax-up, were performed.

Keynote presentation software (Apple Inc., USA) was used to perform the digital simulation (DSD) and the wide-smile portrait photography and the intra oral photography of the maxillary arch with contrastor were selected for best results. Because the patient's facial symmetry was maintained, the reference line in the horizontal plane was the bipupillary line, while in the vertical plane the face midline was used [9]. Although the program generated a variety of dental shapes, the one that was presented to the patient was the one depicting square-shaped incisors and canines with rounded cusp tips (Figs. 10, 11).



Figure 10. Final dental shapes selected for the case



Figure 11. Aesthetic aspect of final DSD

An innovative 3D-preview method of future prosthetic restorations is using the digital wax-up. This involves obtaining a digital impression using the intra oral scanner. With the TRIOS intra oral scanner (3Shape, Denmark), the optical impression of the two dental arches was obtained, including the dental contacts in the MI position (fig. 12).



Figure 12. Digital impression of the occlusion (frontal and lateral views)

All this information was sent to the dental technician's laboratory who created a digital wax-up using special software (Argen, USA). Respecting the indications for the realisation of the 2D digital wax-up, the technicians chose the most suitable dental shapes from the dental library contained in the software (according to the 2D project). This wax-up was positioned in occlusal-gingival direction at the same level with the patient's natural incisal edges and exceeding the natural cervical contour by 2-3 mm on the maxillary frontal teeth. In a bucco-oral direction, a compensation for the retruded maxillary central incisors and for negative buccal lateral corridors was performed by accentuating the thickness of the buccal surfaces (Fig. 13).

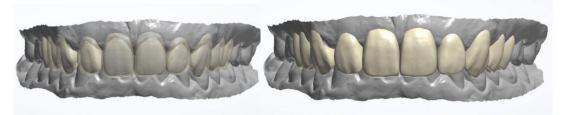


Figure 13. The digital wax-up viewed from the front

The 3D digital wax-up was superimposed over the patient's dental arch using a portrait photography (Fig. 14).



Figure 14. Final digital aspect provided by the digital wax-up

In order to check the 3D wax-up into the patient's mouth, a 3D printed model (Form 3 3D Printer, Formlabs, USA) was done. On the model a silicone guide (Fegura Sil Putty, Feguramed GmbH, Germany) (Fig. 15) was created for obtaining an indirect mock-up through the same procedure as for the conventional one (Fig. 16).



Figure 15. 3D-printed model and silicone key



Figure 16. Extraoral portrait and profile of the digital mock-up

With the patient's consent, separate photographies containing the conventional mockup, the digital mock-up and the initial situation of the patient were assessed by a group of evaluators. This group was composed of 100 6th-year Dental Medicine students of the "Iuliu Hatieganu" University of Medicine and Pharmacy, Cluj-Napoca, who had already attended the lectures of Dental Aesthetics. They answered 5 questions in order to aesthetically compare the 2 mock-ups (the classic and the digital ones).

The questions included in the questionnaire were:

- 1. Which variant do you consider to be the best in terms of dental shapes?
- 2. Which variant do you consider the most aesthetic?
- 3. Which variant looks more natural to you?
- 4. Which variant do you think fits the face better?
- 5. Which variant would you choose?

All responses received were anonymous. The information obtained from the questionnaires was entered in an Excel spreadsheet and analysed through a pie chart. The questions referred to the intraoral and extraoral characteristics of dental proportions, shapes, inclinations, but also to the facial aesthetic aspect of the patient.

RESULTS

The two projects were carried out by two different technicians, each one being experienced with one of the two techniques. From the point of view of technical difficulty, they declared that the work seemed to be of reduced difficulty. Regarding the working time of the digital project (including the importing of the.stl file, the introduction in the virtual articulator and the creation of the digital wax-up), 1 hour and 10 minutes were estimated. Regarding the working time of the conventional project (casting of the models and mounting in the semi adjustable articulator and applying the wax-up wax), 3 hours and 45 minutes were estimated. The costs were higher in the case of the digital system by purchasing the necessary equipment and amortisation, but also by printing of the model. The aesthetic analysis was carried out through questionnaires distributed to 100 students.

Regarding the dental shape, out of the total 100 participants in the study, 7% chose the variant in which the mock-up was obtained from the digital wax-up (2D and 3D), and the rest of 93% opted for the variant in which the mock-up was made starting from the conventional wax-up, modelled by the dental technician (Fig. 17).

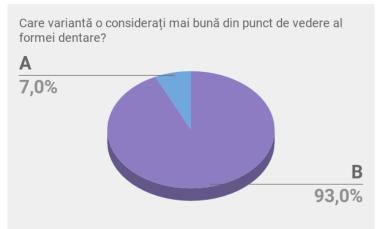


Figure 17. Dental shape evaluation

Similarly to the previous question, 93% of the participants in the study considered that the dental shape, and implicitly the shape of the dental arch, obtained from the conventional wax-up, had a more pleasant aesthetic aspect when compared to the digital variants (Fig. 18).

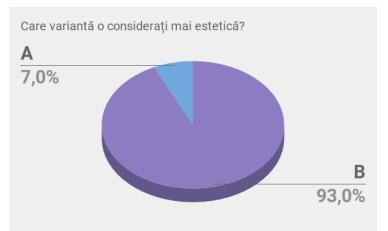


Figure 18. Evaluation of the aesthetics of the mock-ups

The next aspect of this study referred to the natural appearance of the mock-ups. The participants were asked to choose the mock-up that they considered to best mimic the natural appearance of teeth. The majority of 90% opted for the mock-up achieved by the conventional method to the detriment of the digital variant, which was only chosen by 10% of the subjects (Fig. 19).

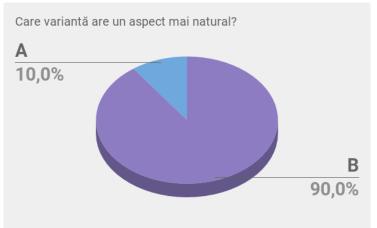


Figure 19. Evaluation of the natural appearance of the mock-ups

The next aspect that was analysed referred to the integration and harmonization of the new dental shapes with the patient's physiognomy. 85% of participants considered that the dental shape transposed from the conventional wax-up fitted best with the facial aesthetics, 14% of participants chose the digital version and only 1% of participants considered that both variants corresponded to the facial appearance (Fig. 20).



Figure 20. Integration of restorations in the facial aspect

When participants in the study were asked to opt for the mock-up variant that they considered optimal for the patient, 92% of them preferred the facial aesthetics offered by the conventional mock-up and only 8 % of participants opted for the mock-up made after the digital version (2D and 3D) (Fig. 21).

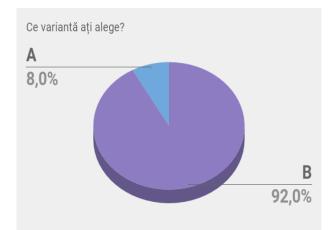


Figure 21. Graph with the choice of the preferred mock-up

DISCUSSIONS

The main purpose of this study was to compare two methods of wax-up, conventional and digital, and to evaluate the difference between them in terms of aesthetics, the costs involved and the time needed to their realisation. In order to obtain predictable results of the treatment plan, a prefiguration of the final result must be made right from the beginning.

The wax-up is an extremely important conceptual tool that offers the physician's vision of the treatment plan, facilitating communication between the medical team and the patient [11, 12].

Although we are living in a digital age, where technological progress is absolutely spectacular, in a relatively short period of time new and improved technologies appear to be replacing their conventional counterparts, human touch remains a necessity so far, being irreplaceable.

At the present time, in addition to the conventional way of achieving future dental arch shapes, it is also possible to create 2D and 3D previews of future dental restorations. Regarding the technological process of obtaining the two types of arch configurations, it is a well-known fact that the digital version performs faster, being achieved in a relatively short period of time, especially if the software design is done by an experimented technician. Digital technology is very advanced: the software programmes contain libraries of personalised teeth, offering a variety of shapes, dimensions, inclinations and alignments of virtual teeth. However, when they are transposed into the oral cavity, these digitally obtained shapes do not always manage to mimic the naturalness of real teeth, they do not always fit into the facial aesthetics and they may fail to harmonise the smile that patients desire. The precision and talent of the dental technician to create dental shapes that are in accordance with the patient's physiognomy and personality have not been completely replaced by any technological process so far. The creation of dental shapes by adding successive layers of wax on the cast is a time-consuming method, which implies solid knowledge of occlusion and dental morphology, craftsmanship, precision and artistic sense from the part of the dental technician.

However, after the try-out in the oral cavity, there are cases where the dentist may ask for changes in the wax-ups. The ones made in digital format are easy to correct directly in the software, in a short time, but for the conventional ones the technician needs to devote more time and attention, to remodel the dental surfaces and to create new fully functional contacts. However, for an experienced technician, this task should not be very time consuming.

To achieve the 3D digital wax-up, the teeth and arch designs are created with the help of special software and they are materialised by printing a 3D model using a special resin and a 3D printer [13,14]. At the same time, if changes to the initial shape of the wax-up are required, after the corrections are made in the software, a new 3D model is quite rapidly printed with the new configuration of the arch.

Digital workflows require a significant investment from the part of the dental laboratory in order to have all the technology required to perform all necessary operations.

Coachman et al. concluded in their article that the realisation of the treatment plan in a digital format facilitates interdisciplinary communication between doctors of different specialties involved in treating a clinical case, since they can have access to the patient's documentation even if they are not present at the time of initial consultation. When performing a digital wax-up from the 2D and 3D configuration of the dental arches, one obtains useful information that is available to all specialists in the case team, including the prosthodontist, the orthodontist and the surgeon, in order to establish correct staging of the treatment plan, even if the doctors collaborate remotely. At the same time, by performing the mock-up in the oral cavity, the patient is involved in the final decision to establish the final dental shapes and the aesthetic configuration of the arches [15].

Tarantili et al. conducted a study in which they concluded that the average exposure time of a smile is 500 ms. In order to obtain the conventional wax-up, the dental technician uses the standard photography set. However, capturing the complete dynamics of a smile in single snapshots is very difficult, therefore, a video recording of the patient's speech and smile would be necessary. In their opinion, the ideal method of achieving the shape of the dental arch is to create a 2D digital wax-up, which will fit in the facial dynamics and aesthetics [16].

Stanley et al. concluded in their article that performing a digital diagnostic mock-up helps both the medical team to properly plan the therapeutic steps, but it also allows the patient to visualise the future aspect of her/his smile, making her/him aware of the future design of the dental restorations and being able to express her/his opinion regarding the aesthetic aspect [17].

However, in order to create a highly accurate design of 3D digital wax-ups, in addition to the standard set of photographs, the patient's facial scan is also needed to accurately create the image of a perfect smile [18,19].

CONCLUSIONS

In order to achieve predictable aesthetic results, communication between the dentist, the dental technician and the patient is essential. The use of questionnaires, photography sets, diagnostic models, wax-ups and mock-ups is mandatory in cases of complex oral rehabilitation. Although the 2D and 3D representations of the shapes of the future dental arches is an important element that allows visualisation of the expected results, the craftsmanship and the delicacy with which the technician creates the dental shapes cannot be completely replaced by a digital system. However, the ease of making changes and the possibility to evaluate them in real time (on the patient's photograph), represent a huge benefit that will firmly place the digital preview technology in the current practice.

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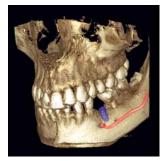
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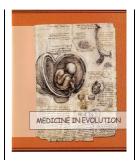
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Abstract [Book Antiqua, 12, bold, justify alignment]

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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[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:

<u>Introduction</u> – 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.

<u>Case report</u> – 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.

<u>Discussions</u> – 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.

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Offer glossy, good quality photographs. Any annotation, inscription, etc. must contrast with the ground. Microphotographs must include a scale marker.

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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.

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