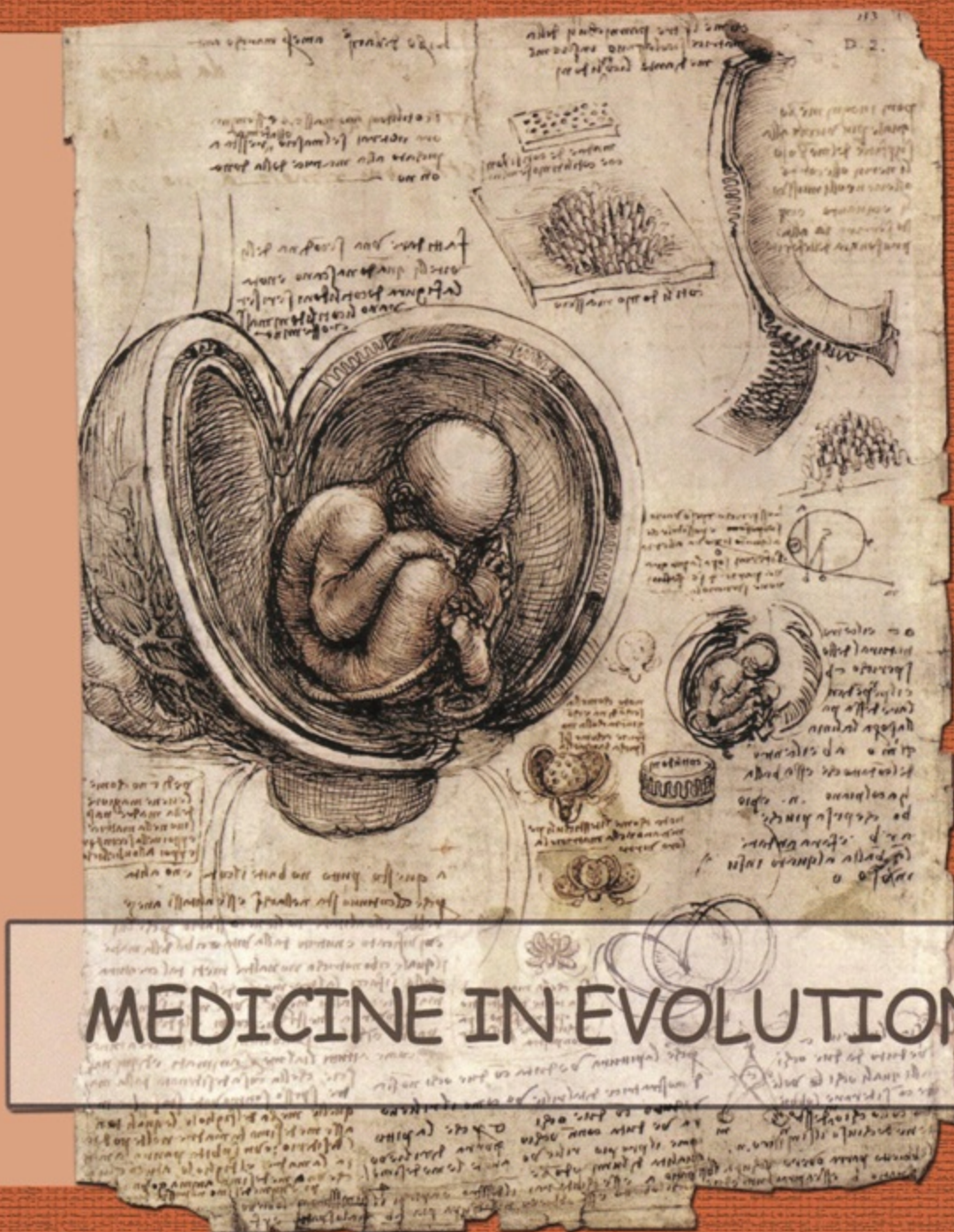


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Gerontostomatologia-calvar sau provocare

**10.00- 11.00 Conferință-Prof. Univ. Dr. Nizami Duran, (Dean, Medical Faculty, Antakya Hatay,Turkey)**  
Viral infection in Dentistry and Prevention Strategy

**11.00– 12.00 Conferință - Prof. Univ. Dr. Veronica Mercuț (Decan, Facultatea de Medicină Dentară, UMF Craiova)**  
Uzura dentară

**12.00-12.30 Conferință- Conf. Univ. Dr. Cristina Bica (Decan, Facultatea de Medicină Dentară, UMF Târgu Mureș)** Considerații oro-dentare la pacientul pediatric cu leucemie

**09.00 – 13.00 Sesiune de postere**

**13.00 – 13.30 Festivitatea de închidere a Congresului ZSB ediția a XXII-a**

#### INVITAȚII SPECIALE:

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**Prof. Univ. Dr. Henrique Luis (Lisabona/Portugalia)**

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**Timișoara,**

**4 - 6 Mai 2017**





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## • PROGRAM PRELIMINAR

### JOI, 4 mai 2017

#### 08.00 - 19.00 Înregistrarea participanților

**08.00 - 09.00 Ceremonia de deschidere** a celei de-a XXII a ediții a Congresului cu participare internațională a Zilelor Stomatologice Bănățene – în sala Europa a Centrului Regional de Afaceri Timișoara

**09.00 - 10.00 Conferință: Prof. Univ. Dr. Andrej Kielbassa, (Danube Private University, Lower Austria, Faculty of Dentistry)**  
Trends in modern dentistry

**10.00 - 11.00 Conferință: Prof. Univ. Dr. Henrique Luis (University of Lisbon- Faculty of Dentistry)**  
The necessity of dental hygienist profession in 21st Century

**11.00 - 12.00 Conferință: Prof. Univ. Dr. Ramona Amina Popovici (Facultatea de Medicină Dentară, UMF "Victor Babeș" Timișoara)**  
Terapii alternative în practica medicală dentară

**12.00 - 13.00 Conferință - Prof. Univ. Dr. Norina Consuela Forna ( Decan, Facultatea de Medicină Dentară, UMF "Gr. T. Popa" Iași)**  
Reabilitarea orală între clasic și modern

**13.00 - 13.30 Conferință: Conf. Univ. Dr. Luminița Nica (Facultatea de Medicină Dentară, UMF "Victor Babeș" Timișoara)**  
Tratamentul endodontic, retratament sau extracție? Cum să iau decizia corectă?

**13.30 - 14.00 Conferință: Conf. Univ. Dr. Alexandru Ogodescu (Facultatea de Medicină Dentară, UMF "Victor Babeș" Timișoara)**  
Stripping-ul în tratamentul ortodontic al adultului: Cum? Când? și Cu ce?

#### 14.00 - 15.30 Pauză de prânz

**15.30 – 16.00 Masă rotundă – Actualități legislative**  
**Moderator Dr. Delia Barbu, medic primar stomatologie**

#### 16.00 – 18.30 Comunicări Orale

**20.00 Cocktail oferit de organizatori- Restaurant Boavista Timișoara**

### VINERI, 5 mai 2017

**09.00 - 10.00 Conferință: Conf. Univ. Dr. Marius Pricop (Facultatea de Medicină Dentară, UMF "Victor Babeș" Timișoara)**  
Riscul fuzării cervico-toracice în abcesele perimandibulare

**10.00 - 11.00 Conferință: Prof. Univ. Dr. Diana Dudea (Facultatea de Medicină Dentară, UMF "Iuliu Hațieganu" Cluj Napoca)**  
Metode minim invazive de tratament a dinților discromici

**11.00 - 12.00 Conferință: Dr. (H) Esfandiar Modjahedpour MSc.L.O- Krefeld, Germania**  
Lingual orthodontics – a clinical overview

**12.00 – 13.00 Conferință: Prof. Univ. Dr. Lucia Barlean (Facultatea de Medicină Dentară, UMF "Gr. T. Popa" Iași)**  
**Strategii actuale în abordarea preventivă a afecțiunilor orale**

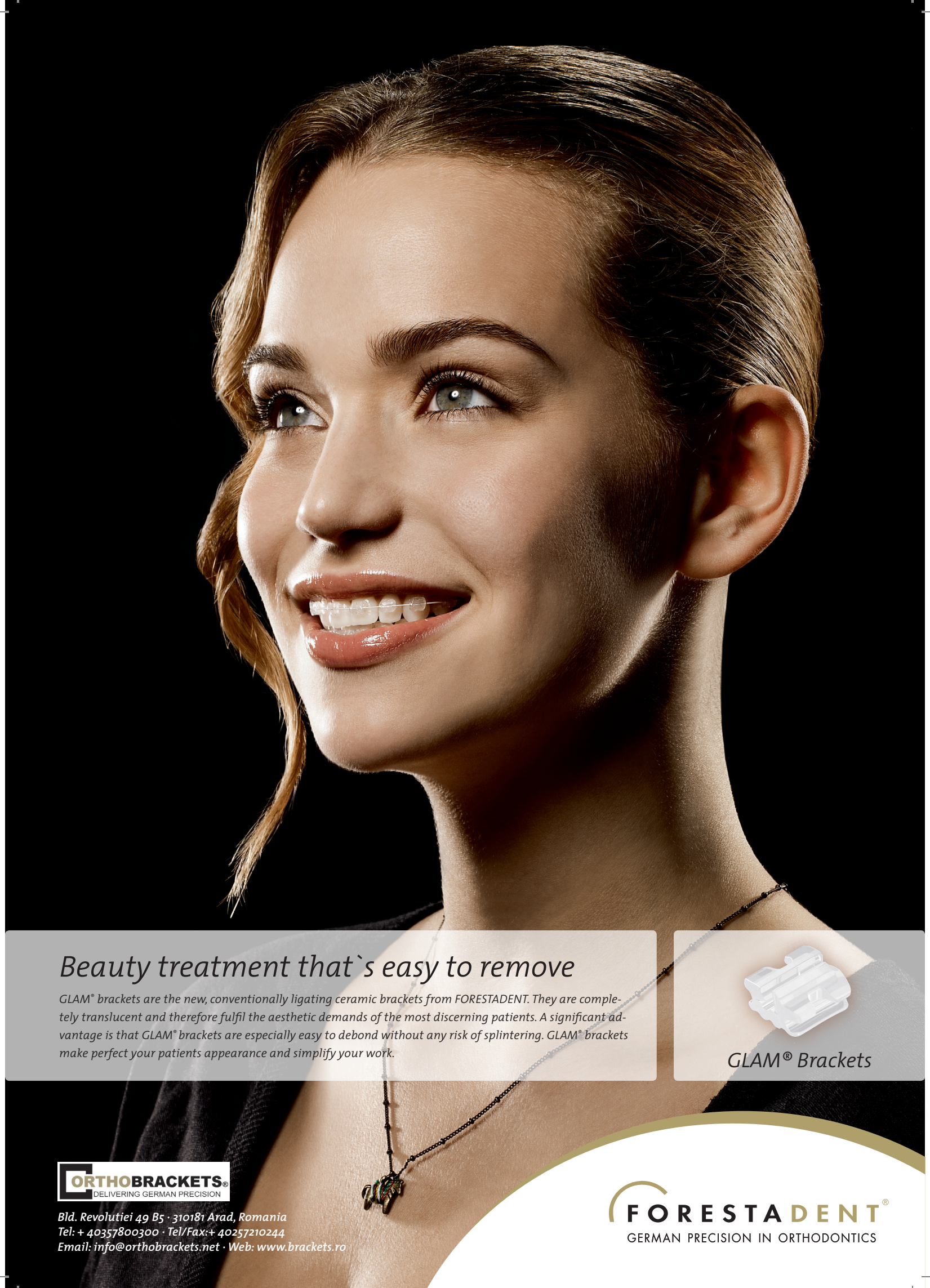
**13.00 – 13.30 Conferință: Șef lucr. Dr. Mariana Miron (Facultatea de Medicină Dentară, UMF "Victor Babeș" Timișoara)**  
Reacția de hipersensibilitate de tip imediat în cabinetul de medicină dentară

**13.30-14.00- Prezentare EMMI Ultrasonic**

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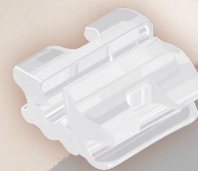
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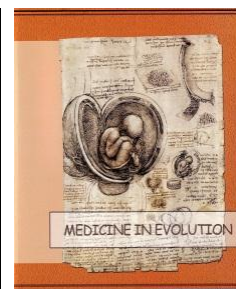
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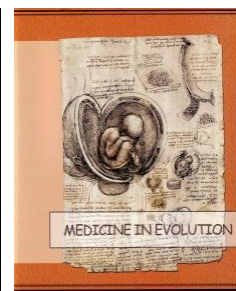


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# The psychological impact of acne vulgaris



**Georgescu S.R.<sup>1,2</sup>, Mitran M.I.<sup>2</sup>, Mitran C.I.<sup>2</sup>, Sarbu M.I.<sup>1</sup>, Matei C.<sup>1</sup>,  
Benea V.<sup>2</sup>, Tampa M.<sup>1,2</sup>**

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## **Abstract**

Acne is an inflammatory disorder of the pilosebaceous unit, very frequent in the general population, especially in adolescents. The lesions are located typically on the face, having a great psychological and social impact. Studies have shown the impairment of quality of life among acne patients; they experience feelings of low esteem, embarrassment or uselessness. Moreover certain psychiatric conditions like depression and anxiety are more common in these patients than in the general population. In this paper we summarized the results of several studies, which focused on the psychological impact of acne vulgaris.

**Keywords:** acne, quality of life, psychological status.

## INTRODUCTION

In recent decades, an increasing number of researchers discuss about psychodermatology, the combination of two medical specialties, psychiatry and dermatology. The link between skin and mind was first described by William James Erasmus Wilson in his book. He described the concept called "skin neurosis" which included delusions of parasitosis, alopecia areata, pruritus, and hypopigmented lesions. Today the role of psychological stress in the development of skin conditions is well known (1). There is a strong link between psychological disorders and dermatological diseases. The prevalence of psychological disorders among the patients with skin diseases is about 25% in the outpatients and can reach up to 45% in those hospitalized (2). With respect to acne it is not clear whether stress plays a role in the onset of the disease, but the presence of a high level of stress among acne patients as a consequence of disease occurrence is attested by numerous studies.

Therefore, several specific scales, including the Assessment of the Psychological and Social Effects of Acne (APSEA), the Acne Disability Index (ADI), the Cardiff Acne Disability Index (CADI) and the Dermatology-Specific Quality of Life (DSQL) questionnaire were conceived to assess the impact of acne on the quality of life. These specific scales have a high sensitivity but the results cannot be used to make comparisons between different diseases (3).

Acne occurs most commonly in adolescents. We should take into account that adolescence is a difficult period characterized by numerous events which can cause psychological stress. Adolescents experience changes of their body and for them the cosmetic appearance is very important. Under these conditions acne affects the quality of their lives, leading to feelings of low self-esteem, low self-worth, low body satisfaction, shame and stigma (4). Many studies on acne patients have analyzed the implications of the disease on the quality of their lives and their psychological status.

## ACNE - A VERY FREQUENT DISEASE

Acne vulgaris is considered the most frequent skin condition, affecting more than 85% of adolescents. The onset is commonly at puberty and usually resolves when the person reaches the age of 20-25 years, but in some cases the lesions persist for many years (5). Diagnosis is primarily based on medical history and clinical examination. The lesions have a polymorphous aspect and include non-inflammatory (open and closed comedones), inflammatory (papules, pustules, nodules and cysts) and post-inflammatory lesions (hyperpigmented macules, atrophic and hypertrophic scars) (Figure 1) (6). Comedones are the first lesions which appear in the course of acne and later on due to the development of an inflammatory process, papules and pustules will be seen. Usually nodules and cysts are encountered in severe forms of acne, unresponsive to classical treatment. The lesions are located mainly on areas with a high density in sebaceous glands, on the face, neck and superior thorax (7).



Figure 1. Multiple papules and pustules located on the face of an adolescent

The main factors implicated in the pathogenesis of acne are increased sebum production, hiperkeratinisation, proliferation of *Propionibacterium acnes*, and local inflammation (8). In patients with acne it was revealed the hyperproliferation of keratinocytes, with an accumulation of corneocytes and lipids in the hair follicle, process which underlies the appearance of comedones. An increased production of sebum and alteration of its composition were also observed. Androgens play an important role in the stimulation of sebum secretion. Linoleic acid level is decreased in patients with acne and that can be involved in the process of kyperkeratinisation (9).

Studies have shown that *P. acnes* plays an important role in the development of the inflammatory process. The microorganism is found in the hair follicle and it procures nutrients from sebum, growing in anaerobic conditions. *P. acnes* stimulates the release of cytokines with chemotactic and proinflammatory effect resulting in the local accumulation of lymphocytes and macrophages. Antibiotic-resistant strains of *P. acnes* were isolated from patients unresponsive to treatment and that may support its role in the pathogenesis of acne (8, 10).

We should take into consideration that stress can trigger acne. In the study of Poli et al, stress was supposed to be involved in 50% of cases. However, there are few studies that have clearly demonstrated the role of stress in the pathogenesis of acne. Recent studies have revealed that there are receptors on sebocytes for corticotropin-releasing hormone, melanocortins, beta-endorphin, vasoactive intestinal polypeptide, neuropeptide Y and calcitonin gene-related peptide. These receptors are involved in the production of proinflammatory cytokines and in the metabolism of androgens (11, 12). The release of adrenal androgens during a stressful event may influence the activity of sebocytes with effects on the course of acne (13).

### EFFECTS OF ACNE ON SOCIAL LIFE

A study on 429 students revealed that 31.5% of them believed that acne interfered with their daily activities. But 88.3% of them stated that acne did not affect the relationship with their close friends or relatives. Most of them felt that they had a more serious form of acne than they actually did (13). Another study which included patients with different degrees of acne severity showed that approximately one half of patients believed that acne affects their daily activities. The investigators also evaluated what young individuals who never had acne lesions believe about acne. They said that they had a great fear of developing acne and think that it represents an important source of discomfort (14). Acne has an important impact on



social integration, therefore it was reported that unemployment is more common among young people aged between 18-30 years suffering from acne than among those without acne (15).

Do et al included in their study 56 students aged between 13 and 16 years. To assess the psychological status of the study participants they used multiple scales, the Self Image Questionnaire, the Rosenberg Self-Esteem Questionnaire, the Index of Peer Relations, and the Beck Depression Inventory. It was found that girls were more stressed than boys. Among girls the scores were higher with respect to self-perception, social relationships and self-esteem. The degree of stress was correlated with disease duration (16). In his study Halvorsen et al noticed a similar psychosocial impact among girls and boys with substantial acne (many lesions), with some differences. Boys reported more frequently problems with family and friends; instead girls reported more problems with thriving at school. In addition they revealed a linear relationship between the social impact and the severity of acne (17).

Patients with acne tend to be solitary; they avoid being in contact with people or participating in sports (e. g. swimming) because they are dissatisfied with their physical appearance. Thus in a recent study, 10% of patients with acne did not swim because they were embarrassed (18). In the study by Hazarika 68% of patients stated that acne interfered with their social life. They avoid meeting new people especially during flares because they experience feelings of shame (19). Nguyen et al in their study reviewed articles available in Pubmed using as keywords "acne" and "psychosocial". They found that in the case of 19.2% of acne patients their personal and social lives were affected and social phobia was present in 45% of them (18% of control subjects) (20).

Ritvo conducted a study in which participants were shown pictures of people with and without acne, with no mention about the presence of the disease. Those with acne most commonly were described as shy, nerdy, stressed or lonely. In contrast those without acne were perceived as happy, healthy or smart persons (21).

## **IMPACT OF ACNE ON QUALITY OF LIFE**

The impact of acne on the quality of life varies depending on education, culture and community. Thus, in studies on patients from India it has been noticed that they accept acne more readily than patients from other places such as France. Similar differences were observed in the population of urban versus rural areas (3). Another study including people with different ethnicities revealed that black subjects were less worried about having acne than Asian ones (22). In the study performed by Zauli et al, before the initiation of the treatment the severity of acne was similar among women and men in the group, but APSEA score was higher in women. These results demonstrate that an important role in the perception of the impact of acne on the quality of life is played by subjective factors (23). Although acne has an important psychological impact, 80.8% of respondents in a survey considered that acne was not a disease and that was normal during adolescence (24).

It seems that acne patients experience an impairment in the quality of life, which is comparable with that of patients with chronic conditions (25). According to a study on 111 acne patients (SF-36 quality-of-life questionnaire was used), the psychological impact was similar among patients with acne and those with asthma, epilepsy, diabetes or lumbago. Coronary heart disease was the only evaluated disorder which had a greater impact (26).

In medical literature, there are several studies that have examined the correlation between the severity of acne and the degree of quality of life impairment, but the results are contradictory. (25, 27, 28). The results may be discordant because various scores are used (23).

Kokand in his study assessed whether the severity of acne correlates with quality of life impairment. The study included 112 women who were evaluated using Cardiff Acne Disability Index (CADI) and global acne grading system (GAGs). No correlation between the impairment of quality of life and severity of acne, assessed by the two scales was revealed. In

addition, no correlation between acne-related quality of life, disease duration and patient's age was revealed (29). A recent study that used CADI, has also shown that there is no correlation between the severity of acne and the impact on the quality of life. However a positive correlation between the patient's age and the impact on the quality of life was revealed. Therefore in older patients the impact of acne was higher (2).

A study conducted in Greece that included adolescents, with an average age of 15.7 years assessed the impact of acne on their quality of life using the Children Dermatology Life Quality Index and obtained a mean value of 4.02. Depending on the severity of acne the score had the following values, for mild acne it was 2.94, for moderate acne 5.40 and for severe acne 12.05. A positive relationship between the severity of acne and deteriorating quality of life was observed. In terms of age adolescents aged over 14 years were the most affected. A percentage of 21.4% of adolescents stated that the presence of the disease interfered with their school and personal activities. A similar percentage of adolescents (19.2%) reported difficulties in making new friends (30).

A study conducted in Nigeria which assessed the impact of acne on the quality of life and included patients with mild acne concluded that the disease impact on the quality of life was low (31).

The study by Vilar which included 355 patients (89.3% had acne) with an average age of 16 years has shown that acne patients mostly afraid that their acne will never heal (58% of respondents). Scores which assess the impact on the quality of life (Quality of Life in Children's Dermatology Index, Quality of Life in Dermatology) were greater in patients with acne than in those without acne. The self-esteem was assessed using Rosenberg Self-Esteem Scale and no significant differences were revealed between adolescents with acne and those without acne. Moreover, no correlation was observed between self-esteem and severity of acne. But it was noted that there was a correlation between the severity of acne and the quality of life (32).

## **PERSONALITY CHANGES AND PSYCHIATRIC DISORDERS IN ACNE PATIENTS**

In recent years studies have increasingly focused on the association between acne and mental diseases. It seems that depression is more common in acne patients than in those with alopecia areata or atopic dermatitis. A study that evaluated depression (scale the Carroll Rating Scale for Depression - CRS-D) and suicidal ideation in patients with dermatological disorders associated with important cosmetic impact revealed the highest score CRS-D in patients with psoriasis vulgaris followed by patients with acne. Suicidal ideation also had the highest prevalence in patients suffering from these two disorders, 7.2, respectively 5.6% (33). According to the study conducted by Behnaz which included 103 acne patients with varying degrees of severity, depression (31.1%) and psychoticism (34.0%) were the most frequently psychological disorders diagnosed that required treatment (34). A study by Kubota conducted in Japan on 1443 participants, aged between 13 and 19 years, of which 859 suffering from acne, has revealed that depression is most common among those with acne (35). Similar results were reported by other investigators (36, 37).

However, there are studies which have not revealed statistically significant differences between patients with acne and controls regarding depression (38, 39). According to the study conducted by Parker, self-consciousness, embarrassment, and impaired self-esteem and self-image were most frequently noticed in patients with acne while depression and anxiety were less frequently seen (40). The study by Magin et al conducted on 244 students did not find a correlation between acne and psychological morbidities. The authors explain this by the existence of certain differences between acne patients in different communities (41).

In the study conducted by Dalgard on 3775 adolescents, the prevalence of acne was 13,5% and depressive symptoms, low self-attitude, feelings of uselessness, low self-worth, and low body satisfaction were frequently reported. In addition the study has indicated a

greater psychological impact among boys compared to girls (42). However, in most studies, it was observed that the psychological impact is greater in women than men, perhaps because women are more interested in their appearance than men. (29, 43, 44). Halvorsen also reported that suicidal ideation is more frequently seen in acne patients than in the general population. His study included 3775 participants aged between 18-19 years, of which 14% said they had severe acne. Suicidal ideation was seen in approximately 1 in 4 adolescents with severe acne, two times more common in boys and three times more common in girls with severe acne than in those with fewer lesions of acne or without acne at all (17). An increased prevalence of suicide ideation was also observed in the study conducted by Picardi (7.1% of patients) (45). However Rehn in his study concluded that the suicide risk is similar to that seen in patients with mild knee pain, but the study included a smaller number of acne patients (165 subjects) (39).

Obsessive compulsive symptoms were commonly reported in acne patients. The patients experience compulsion to excoriate and obsessive ideas about their oily skin. In the study by Bez that included 146 patients with acne vulgaris, obsessive compulsive symptoms were more common in patients with acne compared to the control group (38).

Recently Gul et al conducted the first study that investigated the types of personality and psychiatric conditions in adult patients with acne. Adult acne was defined as the presence of acne lesions after the age of 25 years, being either the result of the persistence of acne lesions after the age of 25 years (persistent type) or the occurrence of the first lesions after 25 years of age (late-onset type). The Symptom Checklist 90-Revised (SCL-90-R) and Eysenck Personality Questionnaire-Revised Short Form (EPQ RSF) scales were used. The results showed that psychiatric disorders are more common in adults with acne. Regarding the type of personality, an increased incidence of neuroticism, which seems to be a predictor of common psychiatric disorders was observed (46).

## ACNE MEDICATION AND PSYCHOLOGICAL STATUS

It was observed that acne patients have an increased risk of developing anxiety or depression. Therefore acne should be treated on time and patients should be satisfied with their treatment. There have been several studies that highlighted what kind of treatment is associated with significant improvement in the quality of life. For example, in a recent study roxithromycin was administered in acne patients for 2-4 weeks, and it was observed that Skindex 29 and DLQI scores decreased significantly (47). Kaymak et al analyzed the quality of life, depression and anxiety in patients affected by acne depending on the treatment administered. One group received isotretinoin and the other group topical treatment. They used the Dermatology life quality index (DLQI), the Hospital Anxiety and Depression (HAD) scale, and the Beck Depression Inventory (BDI) to evaluate the patients. After 4 months of treatment all test scores were better in those treated with isotertinoin. Thus, it has been highlighted that a successful treatment (isotretinoin demonstrates superior efficiency to topical therapy) may improve the quality of life and the depression caused by acne and isotretinoin does not lead to the worsening of the depression (48).

The relationship between isotretinoin and depression is controversial, even to this day it is still not completely understood if there is an association between them. In 1982 isotretinoin has been approved by the FDA for the treatment of unresponsive acne to classical therapy. In the subsequent 20 years, 37 cases of suicide have been reported in patients treated with isotretinoin (49). However, a study on 7195 patients treated with isotretinoin has not revealed an increased risk of suicide or depression (50). Similar results were obtained in several other studies (51, 52). But, a group of Australian researchers recommended the monitoring of patients receiving isotretinoin at 4 weeks after the initiation of the treatment to detect the occurrence of depression. A standardized scale (K10) should be used to evaluate the patients and they should be asked about suicidal thoughts (53).



## CONCLUSIONS

Acne is a common condition with a major psychological impact. It occurs more frequently in adolescents, having a negative effect on their personality development and social integration. These patients should be monitored in order to prevent the occurrence of certain psychiatric conditions, such as anxiety or depression. Besides an adequate treatment which should be initiated in the early stages of the disease, a psychological support is important for these patients. The collaboration between the dermatologist and the psychologist or psychiatrist is therefore necessary.

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# Pulmonary function testing in lung cancer



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## Abstract

An increasing number of lung resections are being performed because of the rising prevalence of lung cancer that occurs mainly in patients with limited lung function. Before planned surgical treatment of lung cancer, patient's respiratory system function should be evaluated. According to the current guidelines, the assessment should start with the measurements of FEV<sub>1</sub>. Our study purpose was to demonstrate that lung resection can be performed even in patients with reduced FEV<sub>1</sub>. We performed a retrospective study in which we included 265 patients that required surgical lung intervention by thoracotomy. The main analyzed parameters were: age, sex, environment (urban/rural), pulmonary function (FVC, FEV<sub>1</sub>, FEV<sub>1</sub>/FVC), localization and type of surgical intervention. In conclusion our results support the findings of others authors and demonstrate that surgical lung resection can be performed even in patients with extremely low FEV<sub>1</sub>.

**Keywords:** Neoplasm, pulmonary function, FEV<sub>1</sub>, lobectomy, pneumonectomy.

## INTRODUCTION

Lung cancer is currently the most common cause of cancer mortality throughout the world. It kills more people than colorectal, breast and prostate cancers combined. Each year 1.38 million people die as a result of the disease, equating to more than 3000 deaths a day worldwide.[1]

Non-small cell lung cancer (NSCLC) accounts for 80% of all newly diagnosed lung cancers. Complete resection offers the best prospects and results in cure in a substantial number of patients with NSCLC. To determine whether lung resection is acceptable in patients with lung neoplasm and to what extent, patients need to be carefully screened.

Assessing the respiratory reserve is an important element in qualifying the patients for resection of lung parenchyma. Pulmonary function testing (PFT) has been used to evaluate the risk of postoperative complications since the 1950s. PFT including spirometry, lung volumes and arterial blood gases has been used to assess the postoperative risk of lung resection. Preoperative lung evaluation is important because it can find modified factors and decrease the risk. This allows surgery to be delayed in high-risk patients.

The best and most frequently used indicators for lung surgery from the PFT are FEV<sub>1</sub>, diffusion capacity of the lung for carbon monoxide and maximal oxygen uptake during exercise.[2]

The FEV<sub>1</sub> obtained by spirometry is the most commonly used test to assess the suitability of patients with lung cancer for surgery. Three large researches from the 1970s have shown that a mortality rate of <5% can be achieved if the preoperative FEV<sub>1</sub> is >1.5L lung function. Values of FEV<sub>1</sub> >80% predicted have been accepted as indicating that the patient should be considered suitable to undergo pneumonectomy without further evaluation.[3]

The purpose of our study was to demonstrate that surgical intervention can be performed even at a lower FEV<sub>1</sub>.

## MATERIAL AND METHODS

We performed a retrospective study in the period of 1. Jan 2012 until 31 Dec. 2015 in the Clinic of Thoracic Surgery of the Municipal Emergency Hospital Timisoara. The study included 265 patients that required surgical lung intervention by thoracotomy. We excluded patients that required only: fibrobronchoscopy with bronchial biopsy, thoracoscopy with pulmonary and pleural biopsy, lymph node biopsy, mediastinoscopy with biopsy, cytopathology examination of aspirate pleural fluid and guided transthoracic tomography puncture.

This study was approved by the ethical committee of the Municipal Clinical Emergency Hospital Timisoara. All the patients gave their written consent that their personal data can be used in scientific purpose. The main analyzed parameters were: age, sex, environment (urban/rural), pulmonary function (FVC, FEV<sub>1</sub>, FEV<sub>1</sub>/FVC), localization and type of surgical intervention.

For the statistical analysis and graphic representation of the data ANOVA software program was used. Statistical parameters were interpreted using normal values interval >95%. Presented data were expressed as standard deviation and standard error.

## RESULTS

The patients were divided into two groups depending on the gender: group A included 190 male patients (pts.) (71.7%) and group B 75 female patients (28.3%). Lung cancer

was significantly more frequent in male patients being 2.53 times higher. Diagnosis age between the 2 groups was represented by a minimum age of 22 years and a maximum of 79 years with a significant lung cancer incidence between the years 66-69 (110 patients) (41.5%). From this incidence 81 were male patients (30.6%) and 29 female (10.9%). Patients were predominantly from the urban area (175 patients) (66%) respectively 90 patients from rural (34%). Regarding the lung cancer localization the most frequent area was in the upper lobes 26.8%, right upper lobe (RUL) (n=71 pts.), left upper lobe 24.9% (LUL) (n=66 pts.), right lower lobe (RLL) (n=53 pts.), middle lobe (ML) (n=12 pts.), left lower lobe (LLL) (n=55 pts.), bilateral (n=8pts.). Data are presented in table 1.

Atypical pulmonary resection was performed in 54.3% (n=144) of patients, and 21.1% (n=56 pts) required lung tumor biopsy for palliative/diagnostic purpose. Radical surgeries were performed in 24.6% (n=65) patients. Radical lymph nodes excision is the most important survival outcome. Data are presented in table 2.

Table 1. Tumor location in the study group

Localization		Number of cases - percentage (%)	Male %	Female %
Right lung	Upper lobe	71 (26.8%)	59 (22.3%)	12 (4.5%)
	Middle lobe	12 (4.5%)	10 (3.8%)	2 (0.8%)
	Lower lobe	53 (20%)	35 (13.2%)	18 (6.8%)
Left lung	Upper lobe	66 (24.9%)	45 (17%)	21 (7.9%)
	Lower lobe	55 (20.8%)	35 (13.2%)	20 (7.5%)
Bilateral		8 (3%)	6 (2.3%)	2 (0.8%)

Table 2. Type of surgical intervention

Intervention type		Number of cases		Percentage %	
Radical	Right upper lobectomy	65	8	24.6	3
	Right lower lobectomy		15		5.7
	Middle lobe lobectomy		4		1.5
	Left upper lobectomy		15		5.7
	Left lower lobectomy		13		4.9
	Right pneumonectomy		1		0.4
	Left pneumonectomy		9		3.4
Palliative - diagnosis	Atypical resection	200	144	75.4	54.3
	Lung biopsy		56		21.1

Lobectomy with a reduced FEV<sub>1</sub> was performed in 6% (n=16) patients. Thus with a FEV<sub>1</sub> of 70% from predicted upper right lobectomy was conducted and a FEV<sub>1</sub> of 52% upper left lobectomy. Only in 1.9% (n=5) patients with a FEV<sub>1</sub> of 64% pneumonectomy could be performed. Surgical intervention with palliative/diagnostic purpose was performed in patients with a minimum FEV<sub>1</sub> of 34%. FEV<sub>1</sub> was reduced in 29.4% (n=78) patients in which we performed surgical intervention for palliative/diagnostic purpose and 7.9% (n=21) for oncological radicalism purpose.

Analyzing the annual cases distribution we observed a slight increase in number over a 4 year period. The most significant increase was in 2013 with 82 cases.



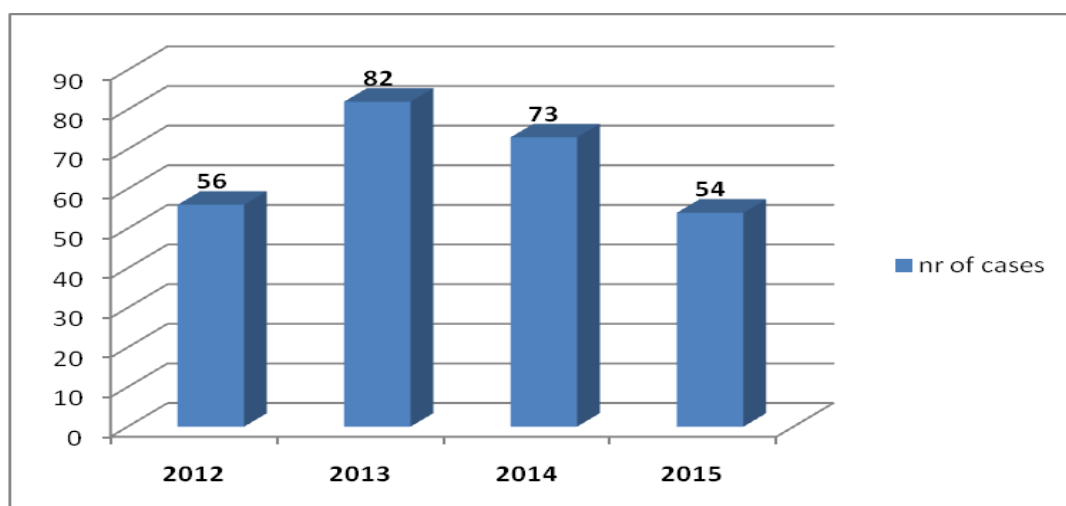


Figure 1. Annual distribution of the cases

## DISCUSSION

For many patients with lung diseases, including lung cancer, surgical resection is the obly potentially curative option that provides the best perspective for long term survival.[4] In presenting the option of curative-intent surgical therapy to a patient with lung cancer, it is important to recognize that risk assessment is a complex process.

Decision to operate patients with reduced FEV<sub>1</sub> is difficult due to the lack of respiratory reserve which is the main determinant of postoperative morbidity and mortality. Patients with airway obstruction have limited daily life activities before surgery, and additional loss of lung tissue performed by resection contributes even more to their inability.

According to the British Thoracic Society (BTS), patients with FEV<sub>1</sub> <40% have a high operative risk for lobectomy, and consideration of either sublobar resection or radiotherapy has been recommended for such patients.[5]

Spirometry should be conducted in accordance with the ERS/ATS standards.[6]

The previously published guidelines established independent boundary values of FEV<sub>1</sub> for lobectomy and pneumonectomy (1.5 l and 2 l respectively).[5]

Later guidelines added that FEV<sub>1</sub> should not be lower than 80% of the predicted value in both planned surgeries. The current values employ only a percentage threshold value, which is 80% of predicted value for FEV<sub>1</sub>. [7]

Even though in Romania we have difficult conditions to perform surgeries we have demonstrated that surgical lung intervention can be performed even in patient with a very low FEV<sub>1</sub> (40% from predicted). Traditionally, the estimated preoperative values of FEV<sub>1</sub> less than 30% from predicted were considered absolute contraindications for lung resection due to high incidence of cardio-respiratory complications and death is the post-operative period. Likewise, values between 30% and 40% frequently imposed more risks than the anticipated benefits of surgery; therefore, cardio-pulmonary exercise testing is mandatory in this group of patients.[8]

However, minimally invasive surgical techniques, such as video-assisted thoracic surgery, and the possibility of performing viable lung parenchyma sparing resections have allowed patients with preoperative FEV<sub>1</sub> <40% to undergo surgical procedures with relative low morbidity rates (15-25%) and postoperative mortality ranging from 1% to 15%, reported in the literature.[9]

In Romania there is no screening for lung cancer in the general population although it represents a major public health problem. If lung cancer is detected in early stages, surgery could be performed with the purpose of oncological radicalism but since this disease is

asymptomatic, those who benefit from surgical intervention with radical purpose (lobectomies, pneumonectomies) are only 24.6% of patients, the remaining receiving only palliative/diagnostic surgery (atypical pulmonary resection, tumor biopsies).[10]

## CONCLUSIONS

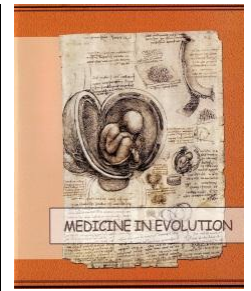
For many patients with lung cancer, surgical resection is the only potentially curative option that provides the best perspective for long-term survival. Selecting lung cancer patients for resection requires a complex process. Qualifying for the procedure requires not only meeting histopathological and radiological criteria, but also having a good lung ventilation capacity.

Our results support the findings of others authors and demonstrate that surgical lung resection can be performed even in patients with extremely low FEV<sub>1</sub>.

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# Morgagni hydatid acute necrosis: case report and histologic diagnosis



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## **Abstract**

The acute necrosis of appendix testis is a big chance for misdiagnosis and delays both for surgeons and pathologists as it may embrace the form of a testis torsion. We report the case of a 17 years old male patient with acute left scrotum swelling, pain and tenderness, with prior prolonged evolution that required surgical intervention and excision of a necrotic Morgagni hydatid. Histological evaluation revealed necrosis and a marked polymorphonuclear inflammatory infiltrate in the cystic cavity, thus, implying bacteriological evaluation. The extend of inflammation seems to be related with the intensity of pain and time to therapeutical intervention.

**Keywords:** appendix testis, Morgagni hydatid, necrosis, acute inflammation.



## INTRODUCTION

The appendix testis or sessile hydatid of Morgagni (AT-HM) is defined as a vestigial remnant of the Mullerian duct, located in the upper pole of the testis and attached to the tunica vaginalis, present about 90% of the time. The AT-HM is attached just beneath the head of the epididymis, with dimensions varying from 5 to 10 mm in length and less than half of these, as wide, and consists of connective tissue provided by the testis, with vascular capillaries and a canal lined by tall cuboidal, sometimes columnar, epithelium. It may be found a depression with a dentate border, thus, resembling the distal end of the salpinx with fimbriae (1). Hydatids, as appendice of testis or epididymis, were discovered by Morgagni in 1703, and published in 1761, being considered the remnants of the cranial end of the Mullerian duct, Wolffian duct or mesonephric tubules. The clinical relevance of AT-HM is well known among surgeons: acute testis or scrotum or, rarely, neoplasm of Mullerian type or adenomatous tumors that arise in Mullerian vestiges.

## CASE REPORT

We present the case of a 17 years old male patient with acute left scrotum pain. The duration of symptoms in general, and pain, in particular, were about 24 hours prior to consultation.

### I. Clinical examination data

The left scrotum proved to have a tenderness, relative swelling, reduced mobility and pain during palpation, especially in the upper pole.

### II. Laboratory results and additional paraclinical investigations

Laboratory test proved high neutrofilia, with high sedimentation rate and no other serum or paraclinical abnormalities. The patient was referred for surgical exploration and possible curative attitude, with epidural analgesia. During surgery, opaque to transparent fluid collection in vaginalis testis was observed and an enlarged AT-HM bluish with brown spots. Resection was performed and the tissue was referred to our Pathology department. Fluid samples were sent to the laboratory for cultures and Gram stains. The fragments were having dimensions within 1 cm in the largest diameter (0,3/0,2 cm) with round to ovoid shape, brownish colored, and a elastic appearance.

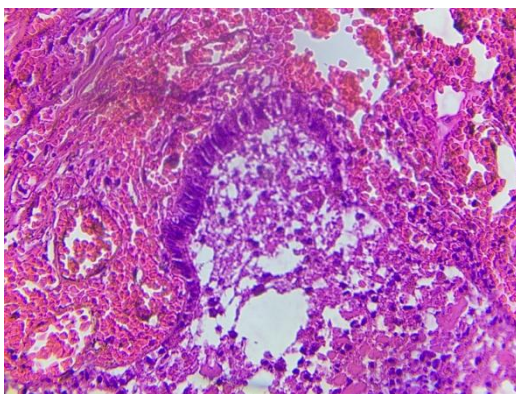


Figure 1. Histological aspect of cystic cavity epithelium with necrosis due to acute inflammatory infiltrate (H&E, 10x10)

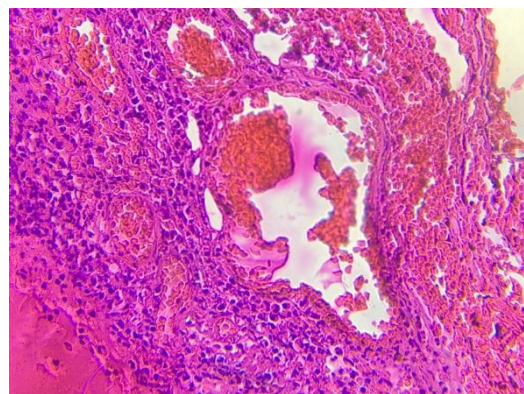


Figure 2. Capillary hyperemia with marked perivascular neutrophilic infiltrates, stromal dissection and tissue haemorrhagic infiltrates (H&E, 10x40)

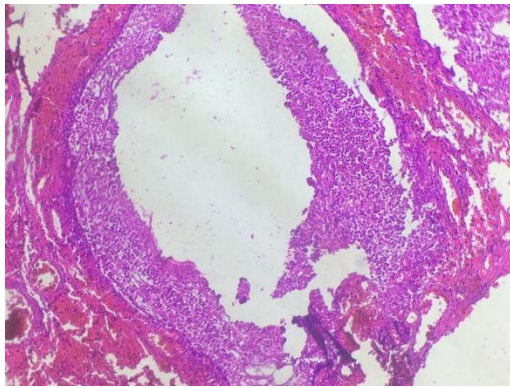


Figure 3. Cystic cavity filled with neutrophils and necrotic debris inside the necrotic hydatid (H&E, 4x10)

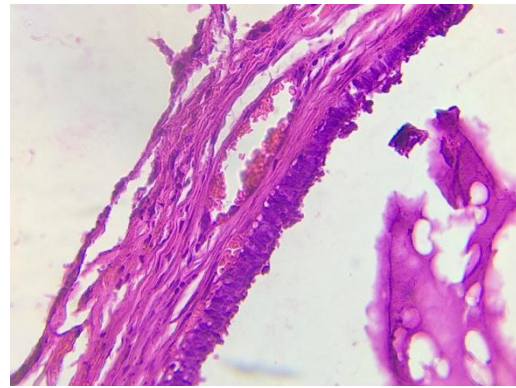


Figure 4. Reactive tall cuboidal epithelium with ischemic features: bland nuclei pseudo-multilayering, basal membrane cleavage, cytoplasmic vacuolisation (H&E, 10x10)

The AT-HM samples were fixed in 4% formalin for 24 hours, with subsequent processing in successive alcohol grade starting with 70 and 80 degrees ethanol for the first day, while during the second day three baths of 96,76 degrees ethanol were performed and the latter baths with izopropyl intermediaries and 99,96 ethanol clarification. Paraffin embedding and thin sections (2-3  $\mu$ m) were performed with standard haematoxylin and eosin stains. Histologic examination revealed fibroconnective tissue oedema with large areas of fibrinoid and haemorrhagic necrosis (figures 1 and 2). Inside the stroma, it is observable a cystic cavity lined with tall cuboidal epithelium dilated due to polymorphonuclear leucocytes (figure 3). Furthermore, the epithelium shows reactive and hypoxic changes with basal cytoplasmic vacuolization, together with a tendency for basal membrane cleavage (figure 4). Areas of fibrinoid necrosis and reticular areas, as a mark for necrotic oedema are present. The diagnosis was of a acute necrosis of a torted Morgagni hydatid with prolonged evolution, as the cultures and the Gram stains were sterile.

### III. Treatment and evolution:

As stated in the previous section, treatment is represented by excision and ligation of remnant pedicle, drainage while pharmaceutical approach required general analgesia in preoperative period, and anti-inflammatory medication, rest and fluid in immediate follow up. No late complications were recorded, with good outcome and full social insertion.

## DISCUSSIONS

The regression of the Mullerian duct is promoted by the Mullerian inhibiting substance, that takes place in 8th to 10th week of embryological age, the cranial part of the Muller duct being the first to regress, although, remaining connected to the primordium testis through a sort of a junctional structure from which the AT-HMs derive. The appendices of epididymis have a more controversial origin, studies on containing vasculature suggesting a cranial part of Wolff duct origin that would degenerate in a cystic formation, thus, emerging in appendix epididymis (2). The appendix testis is usually pedunculated and during peripubertal period it may swell due to increasing hormonal stimulation of oestrogens. The acute torsion may present with a gradual, longer period and less severe pain than that of testicular torsion. General symptoms may imply curbature with vomiting. Clinically, in early presentations, it may be distinguished from a testicular torsion, due to a discrete tenderness on top of the testicles, which stays in a non-tenderness fashion in the scrotum. Some authors, describe a visible blue dot juxtaposed to the infarcted appendix testis. In late cases, it is almost impossible to distinguish from a testicular torsion as the scrotum often becomes indurate with accompanying fluid collection. The Doppler ultrasound imagistics may offer a good assessment of testis vascular supply, while the only reasonable treatment remains analgesia

and surgical removal of torsted AT-HM. Contralateral surgical exploration of scrotum is not indicated if laterality is confirmed (3). A study of 79 cases, the median age was of 11 years old, with 54% of patients affected on the left side, with sterile urine, with no postoperative complications. In all these cases, 68% were confirmed clinically, while 14% were admitted as a suspicion (4). The main histologic characteristics are stromal oedema, haemorrhage, lymphatic or vascular dilation, congestion, thrombosis with acute inflammatory cell infiltrates. Sometimes, foci of calcification and chronic inflammatory infiltrate may be observable. The presence of intraepithelial or intravascular polymorphonuclear leucocytes (PNL) is correlated with stromal heavy infiltrate and may require further Gram stains or periodic-acid Schiff for fungi, in order to exclude any possible epididymo-orchitis or gangrenous AT-HM (5). From our experience, we may state that the extent of acute inflammation is solely correlated with the degree of evolution prior to any medical intervention or empirical anti-inflammatory treatment.

## CONCLUSIONS

The presence of acute scrotum in male patients may imply, at least, the presence of a torsion of appendix testis and advocate for a fast surgical assessment and intervention with careful histological and bacteriological analysis.

### *Acknowledgement*

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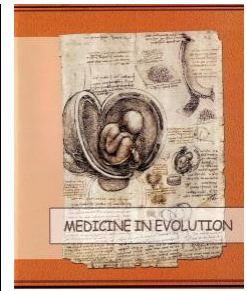
### *Conflict of interests*

The authors declare no conflict of interest of any kind. Ethical consent was obtained prior to publication both from patient and managing comitee of our Hospital.

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# Ageing of the orbit. An anthropometric study on dry human skulls



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## Abstract

**Introduction:** The orbit is one of the most complex anatomic structures in the human body. Understanding its anatomy and development is the keystone to treating the very large variety of diseases affecting this region. Until recently it was believed that age has an important influence on the orbit diameters only until the late teens. The purpose of our study was to determine the influence of age on adult human skulls and to demonstrate the enlargement of the orbit throughout life.

**Materials and methods:** We measured the orbital width, height, depth, length of the medial and lateral wall and calculated the orbital index in 166 adult skulls (332 orbital cavities) and divided them into 6 age groups. We calculated the means and Standard Deviations for each parameter for each age group and studied the influence of age on these parameters using ANOVA and the Tukey HSD test.

**Results:** The mean depth was  $43.21 \pm 2.42$  and the mean length of the lateral / medial wall was  $45.69 \pm 2.56 / 45.24 \pm 2.32$ . We found a significant but weak relation between age and orbital depth ( $r^2=0.039$ ,  $p<0.001$ ), a significant but moderate relation between age and the length of the medial wall ( $r^2=0.043$ ,  $p<0.001$ ) and a significant but weak relation between the age and the length of the lateral wall ( $R^2=0.01$ ,  $F(1,330)=4.60$ ,  $p<0.05$ ).

**Conclusions:** The study revealed significant variation of the sagittal diameters of the orbit with age. That should be taken into consideration when addressing pathology situated in this anatomic region.

**Keywords:** direct measurements, orbit, Vernier Caliper, depth, age.



## INTRODUCTION

The great variability of the human orbit led to the intense and multidisciplinary study of this anatomic region. In spite of the long and growing interest due to the large variety of pathology involving the orbit there is still a lot to find out about its complex anatomic variability. Many of the factors influencing the diameters of the orbit are known (gender, race, ethnicity) but there are probably many more to be found.

Until recently it was believed that the diameters of the orbit are only influenced by age until the late teens (1). The new hypothesis of the enlargement of the orbit throughout the entire life led to growing interest of many specialties (like maxillofacial surgery and face rejuvenation surgery) in the ageing of the orbit but it is also a very interesting subject in anthropology and forensic medicine (2).

The purpose of this study was to research the anthropometric variation of the orbit with age in the normal population using direct measurements of different orbital diameters.

## MATERIAL AND METHODS

In order to determine the variability of the orbit with age and gender we measured a total of 332 orbital cavities (166 dry adult human skulls), from the collection of Craniology of the "Fr I Rainer" Institute for Anthropology in Bucharest, Romania. To make the measurements more reliable, a single investigator, using a digital Vernier Caliper, measured all the distances using standard anatomical points. All measurements were recorded as Means ( $\pm$ SD) and the statistical analyses was done using the SPSS 20.0 version software.  $P < 0.05$  was considered significant. A linear regression was used to evaluate the impact of age on the orbit diameters.

We defined and measured the following diameters *orbital width* (distance between the midpoint of the medial and lateral margins) *orbital height* (maximum distance between the superior and inferior orbital margins) *orbital depth* (distance between the optic foramen and the midpoint of the orbital width) (Fig.1) and the *length of the lateral/medial wall* (distance between the optic foramen and the midpoint of the lateral/medial wall). We calculated the *orbital index* according to the formula:  $OI = \text{orbital height} / \text{orbital width} \times 100$ . We categorized the skulls according to gender and age. Six intervals of age were studied: 18-27; 28-37; 38-47; 48-57; 58-67 and over 68.



Figure 1. Measuring the orbital depth using the Vernier Caliper

## RESULTS

Of the total 166 dry human skulls 15.7% (Total 26 -18 Female and 8 Male) were in the **18-27** years interval of age, 24.1% (Total 40- 18 Female, 22 Male) were in the **28-37** years interval, 22.3% (Total 37-15 Female, 22 Male) were in the **38-47** years interval, 19.3% (Total 32-14Female, 18 Male) were in the **48-57** years interval, 9.0% (Total 15- 11 Female, 4 Male) were in the **58-67** years interval and 9.6% (Total 16- 10Female, 6 Male) were in the **over 68** years interval (Table I).

Table I. Dispersions of skulls according to gender and age

		Gender		Total	Percent
		Female	Male		
Age	between 18-27 yrs	18	8	26	15.7
	between 28-37 yrs	18	22	40	24.1
	between 38-47 yrs	15	22	37	22.3
	between 48-57 yrs	14	18	32	19.3
	between 58-67 yrs	11	4	15	9.0
	over 68 yrs	10	6	16	9.6
	Total	86	80	166	100.0

51.8% (86) of the 166 skulls were female and 48.2% (80) were male. The average age was 44.57( $\pm 16$ ), 44.86 ( $\pm 17.55$ ) (18yrs -85yrs) for the female group and 44.29 ( $\pm 14.3$ )(23yrs-82yrs) for the male group.

Using ANOVA we calculated the differences between all the age groups and all the diameters measured and we found no statistically relevant difference between the right and left orbital cavities. Therefore we decided to calculate the variables using each of the orbits as an individual instead of the whole skull thus resulting a number of 332 orbital cavities to research. We divided them by the same age intervals (See Table II).

Table II. Dispersion of orbits according to age intervals

		Frequency	Percent
Age	18-27 yrs	52	15.7
	28-37 yrs	80	24.1
	38-47 yrs	74	22.3
	48-57 yrs	64	19.3
	58-67 yrs	30	9.0
	over 68 yrs	32	9.6
	Total	332	100.0

We calculated the means and Standard Deviations for each age group (Table III) and studied the differences on age groups of the depth, height, width and length of the medial and lateral walls using ANOVA. As opposed to the anterior diameters (height and width) we found a variability with age of the sagittal diameters that was statistically significant. The mean depth was 43.21 $\pm$ 2.42 and the mean length of the lateral / medial wall was 45.69 $\pm$ 2.56/ 45.24 $\pm$ 2.32. For the depth of the orbit we found differences between the 18-27years group and the 48-57years (p=0.004) and 58-67years (p=0.018) groups using the Turkey HSD test.

Table III. Dispersion of depth, length of the medial and lateral walls, height, width and orbital index according to age intervals

Age	Depth	Length of the medial wall	Length of the lateral wall	Height	Width	Orbital Index	Total
18-27 yrs	42.28 (2.08)	44.10 (1.99)	44.81 (2.35)	32.97 (2.72)	39.47 (2.30)	83.55 (4.98)	52
28-37 yrs	43.18 (2.48)	45.20 (2.36)	45.88 (2.63)	33.19 (2.67)	39.81 (1.76)	83.44 (6.38)	80
38-47 yrs	42.82 (2.89)	45.16 (2.90)	45.49 (3.01)	33.33 (2.38)	39.84 (2.01)	83.76 (5.88)	74
48-57 yrs	43.90 (2.13)	45.81 (1.52)	46.32 (2.27)	33.30 (1.93)	40.24 (1.40)	82.80 (4.92)	64
58-67 yrs	44.03 (1.75)	45.63 (2.04)	45.39 (2.17)	32.81 (2.26)	39.87 (2.00)	82.3 (3.83)	30
over 68 yrs	43.57 (2.15)	45.86 (2.26)	46.11 (2.12)	33.22 (2.45)	39.94 (1.98)	83.20 (5.25)	32
Total	43.21 (2.42)	45.24 (2.32)	45.69 (2.56)	33.18 (2.41)	39.86 (1.89)	83.28 (5.46)	332

For the length of the medial wall we found statistically relevant differences between the 18-27years age group and the 48-57 years ( $p=0.001$ ), 58-67 years ( $p=0.041$ ) and over 68 years ( $p=0.009$ ) age groups. For the length of the lateral wall we also found a statistically relevant difference between the 18-27 years age group and the 48-57years ( $p=0.019$ ) group.

We used Pearson's Test to find correlations between the variables measured and we found a number of significant and strong correlations (Table IV) but what interested us were the ones concerning the age. We considered it a weak correlation when  $r$  was between 0 and 0.3, moderate for  $r$  between 0.3-0.6, strong for  $r$  over 0.6 and significant when  $p<0.05$ .

Table IV. Correlations between variables

Variables	Correlation	p
<b>Age-Depth</b>	<b>Weak (<math>r=0.19</math>)</b>	<b><math>P&lt;0.001</math></b>
<b>Age-Length of the medial wall</b>	<b>Weak (<math>r=0.21</math>)</b>	<b><math>P&lt;0.001</math></b>
<b>Age-Length of the lateral wall</b>	<b>Weak (<math>r=0.11</math>)</b>	<b><math>P&lt;0.001</math></b>
Depth-Length of the medial wall	strong ( $r=0.72$ )	$P<0.001$
Depth-Length of the lateral wall	strong ( $r=0.75$ )	$P<0.001$
Depth-Height	weak ( $r=-0.27$ )	$P<0.001$
Depth-width	weak ( $r=0.13$ )	$P<0.05$
Depth-Orbital index (OI)	weak ( $r=-0.39$ )	$P<0.001$
Length of the medial-lateral wall	strong ( $r=0.73$ )	$P<0.001$
Length of the medial wall-height	weak ( $r=-0.13$ )	$P<0.05$
Length of the medial wall-width	weak ( $r=0.31$ )	$P<0.001$
Length of the medial wall-OI	weak ( $r=-0.38$ )	$P<0.001$
Length of the lateral wall-height	weak( $r=-0.12$ )	$P<0.05$
Length of the lateral wall-width	weak ( $r=0.28$ )	$P<0.001$
Length of the lateral wall-OI	weak ( $r=-0.34$ )	$P<0.001$

Variables	Correlation	p
Height-width	moderate ( $r=0.46$ )	$P<0.001$
Height-orbital index	Strong ( $r=0.77$ )	$P<0.001$
Width-Orbital index	weak ( $r=-0.20$ )	$P<0.001$

There was a significant and strong correlation between the depth and the length of the medial and lateral wall and between the height and the orbital index ( $r>0.7$ ),  $p<0.001$ . We found a moderate correlation between the height and the width of the orbit ( $r=0.46$ )  $p<0.001$  and a number of weak but also significant correlations ( $r<0.3$ ,  $p<0.05$ ) between the depth and the width of the orbit, the depth and the height, the depth and the orbital index (see table 4). The correlations we found and were most interested in were between age and depth, length of the medial and lateral wall. Those were weak but significant ( $r<0.3$ ,  $p<0.001$ ).

We used a linear regression to evaluate the impact of age (as an independent variable) on the depth, length of the medial and lateral wall (as dependent variables). We found a significant but weak relation between age and orbital depth ( $r^2=0.039$ ,  $F(1.330)=13.36$ ,  $p<0.001$ ). 3% of the variance orbital depth is explained by the age (Figure 2).

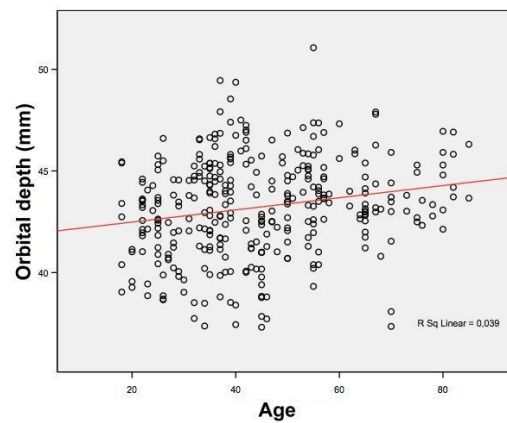


Figure 2. Relation between age and depth of the orbit

$$Y=4188,43+2.995 \cdot x \text{ (y is the depth, x is the age)}$$

There is a significant but moderate relation between age and the length of the medial wall

( $r^2=0.043$ ,  $F(1.330)=15.88$ ,  $p<0.001$ ). 4% of the variance length of the medial wall is explained by the age (Figure 3).

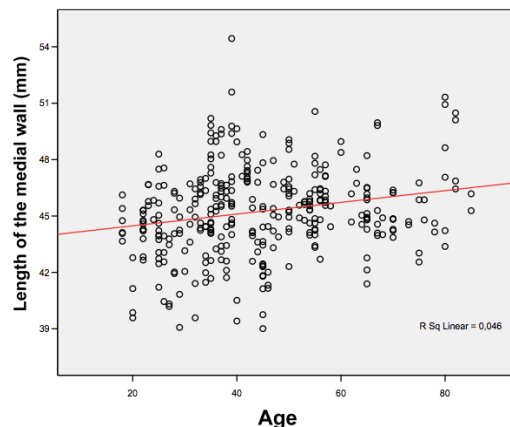


Figure 3. Relation between age and length of medial wall



$$Y=4385,30+3,11*x \text{ (y is the length of the lateral wall, x is the age)}$$

We found a significant but weak relation between the age and the length of the lateral wall ( $r^2=0.01$ ,  $F(1.330)=4.60$ ,  $p<0.05$ ). 1% of the variance length of the lateral wall is explained by the age (Figure 4).

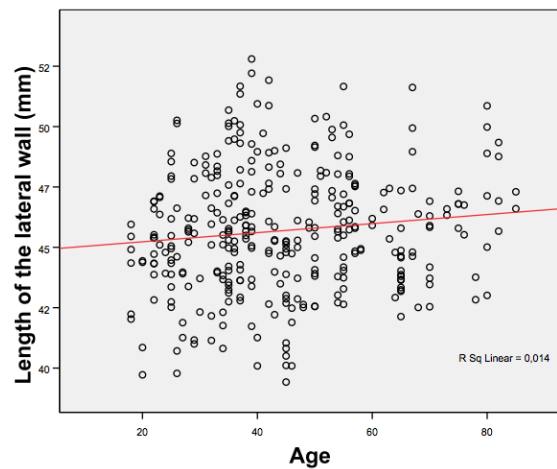


Figure 4. Relation between age and length of lateral wall

$$Y=4485,43+1,88*x \text{ (y is the length of the lateral wall, x is the age).}$$

## DISCUSSIONS

The orbit is one of the most variable structures in the human body. Understanding its anatomy and development is the keystone to treating the very large variety of diseases affecting this region. Its variability with gender, ethnicity, race and age makes it a very important tool in anthropology and forensic medicine (3).

In our current study we measured many important diameters of 332 human orbit (depth, height, width and length of the lateral and medial wall) and divided them according to 6 age groups (18-27; 28-37; 38-47; 48-57; 58-67; over 68). This is, to the best of our knowledge, the first such study on the population of Romania and we believe it provides an important baseline of anthropometric data. The Orbital Index was 83.28 which places the group in the mesoseme category (OI between 83-89) (4). The mean orbital height was  $33.18 \pm 2.41$  and the mean orbital width was  $39.86 \pm 1.89$ . Neither the orbital height and width nor the orbital index varied with age.

Our study also included the sagittal diameters of the orbit. The mean depth was  $43.21 \pm 2.42$  and the mean length of the lateral / medial wall was  $45.69 \pm 2.56$  /  $45.24 \pm 2.32$ . As opposed to the anterior diameters we found a variability with age of the sagittal diameters that was statistically significant. We studied the differences on age groups of the depth, length of the medial and lateral walls using ANOVA. For the depth of the orbit we found differences between the 18-27 years group and the 48-57 years ( $p=0.004$ ) and 58-67 years ( $p=0.018$ ) groups using the Tukey HSD test.

For the length of the medial wall we found statistically relevant differences between the 18-27 years age group and the 48-57 years ( $p=0.001$ ), 58-67 years ( $p=0.041$ ) and over 68 years ( $p=0.009$ ) age groups. For the length of the lateral wall we also found a statistically relevant difference between the 18-27 years age group and the 48-57 years ( $p=0.019$ ) group using the Tukey HSD test.

We used a linear regression to evaluate the influence of age (as an independent variable) on the depth, width, height, length of the medial and lateral wall (as dependent variables). Our study revealed significant changes in orbit sagittal diameters with age.

We found a significant but weak relation between age and orbital depth ( $r^2=0.039$ ,  $p<0.001$ ). This means that 3% of the variance orbital depth is explained by the age. The best-fit function describing the relationship was determined to be  $Y=4188,43+2.995*x$  (y is the depth, x is the age)

There is a significant but moderate relation between age and the length of the medial wall

( $r^2=0.043$ ,  $p<0.001$ ). This means that 4% of the variance length of the medial wall is explained by the age. The function describing it is:  $Y=4385,30+3,11*x$  (y is the length of the medial wall, x is the age).

We also found a significant but weak relation between the age and the length of the lateral wall ( $R^2=0.01$ ,  $p<0.05$ ). Meaning 1% of the variance length of the lateral wall is explained by the age according to the function:  $Y=4485,43+1,88*x$  (y is the length of the lateral wall, x is the age).

The results of this study are similar to more recent studies (5-7) that noted an increase of the orbital volume with age. Bentley et al. and Lang observed this volume increase until the early teens (8, 9). Chang et al studied 72 patients from 3 months to 18 years of age and found a significant relationship between age and depth ( $r^2=0.81$ ,  $p<0.001$ ) and concluded that 81% of the variance of orbital depth is accounted for by the model. He found that depth increases rapidly in the first 6 years of life and turns toward a horizontal asymptote in the early teens (1). Our study, like others (10) revealed the continuation of the enlargement of the orbit throughout life.

Weaver et al (11) studied the variation of normal bony orbit and soft tissue anatomy on 39 subjects. The results also suggest the enlargement of the bony orbit with age. Unlike our study, performed on human skulls, this study used CT images of live subjects and investigated the influence of subject's height on the orbital anthropometry. These findings suggest that there is indeed a correlation and that normalizing by height might reveal other effects on orbit anthropometry. Without normalization the orbital diameters were greater in males than in females. This is similar to our results from a previous study on human skulls (12). However, after normalization they concluded that, relative to the height, the female's orbital aperture is larger than the male's.

In our current study we were interested in the influence of age on the orbital diameters and did not take into account the gender or other factors (like height, ethnicity) that can influence orbit anthropometry. Perhaps that is the reason why we only found a weak (but significant) correlation between age and the studied parameters.

Interest in the age-dependent increase of orbit dimensions grew in maxillofacial surgery and facial rejuvenation surgery. Bittermann et al. suggested it could have an impact on long term stability and orbital symmetry of alloplastic orbital reconstructions especially during long term follow-up (13).

Mendelson and Wong (2) studied the age related changes of the facial skeleton and observed an increase in area and width of the orbital aperture with age. They observed that resorption is uneven and site and time specific, the inferolateral rim receding earlier (middle age) and the superomedial orbital rim receding later (old age). The inferomedial margin shows a tendency to recede with age especially in males (14, 15). The central part underwent little or no resorption what so ever (16, 17). Pessa (16) found no difference in the superior and inferior mid orbital rims and Mendelson et al (18) measured directly the mid axis of the orbital floor and roof and found no significant changes with ageing. Our study also found no influence of ageing on the anterior diameters of the orbit (width and height) probably due to the anatomical landmarks used for the measurements (midpoint of the lateral, medial, superior and inferior margins).

The difference between our study and others is that we took into consideration the sagittal diameters of the orbit (depth, length of the medial and lateral walls) and found important correlation between these measurements and ageing.

## CONCLUSIONS

The orbit is an extremely complex anatomic region and the factors that influence its variability have been studied for almost a century and probably will be for many years to come. Understanding the anatomy, development and evolution is essential in many disciplines like ophthalmology, ENT, maxillofacial surgery and plastic surgery.

Our study revealed important variation of the sagittal diameters of the orbit with age.

It also found important correlations between many of the parameters measured and it can provide an important baseline of anthropometric data for clinical purposes.

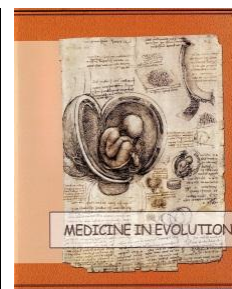
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# Severe depressive episode of a patient with multiple sclerosis. Case study



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## **Abstract**

The following study revolves around aspects regarding multiple sclerosis and the effects that it has on the mind, in particular on depression. These aspects are illustrated through a case study done on a 31 years old patient with the diagnosis of severe depression without psychotic elements, with emotional lability and elements of anxiety. The dynamics of this disease are explained correlating anamnesis data with the clinical interview. In the end the the aims and psychotherapeutic steps are exposed briefly.

**Keywords:** multiple sclerosis, depressive disorder, emotional liability, anxiety.

## INTRODUCTION

The origin of depressive disorders is multi-factorial, combining genetic predisposition, certain neurological disorders, exposure to certain drugs or abuse of narcotic drugs, as well as environmental factors and psychosocial factors, including major losses and emotional trauma that took place mostly in the early part of one's life, correlated with the inability to handle these events.

Depressive disorder and, the major one in particular, is associated with a high mortality. Up to 15% of individuals suffering from major depressive disorder die by suicide. The statistics suggest that there is a fourfold increase in the rate of mortality in individuals with an age of over 55 years.

Multiple sclerosis (MS) is a chronic disease of the central nervous system (CNS), characterized by episodes of focal demyelination and inflammation with multiple localizations disseminated over time and through a process of axonal degeneration at a person with a genetic susceptibility to the disease [1].

Depression is less common in the early stages of MS. The more the disease progresses the more the depression is occurring more severe. Studies show that the severity of the depression manifested in patients with MS relapse- remission, compared to those with progressive MS may also be due to the inflammations that are present in the pathology of depression - more depressive thoughts than those without hope are appearing [2, 3, 4].

A longitudinal study done on a 3-year period showed that symptoms associated with changes in mood (sadness and irritability) are more fluctuating than the vegetative ones (sleep and appetite) than the evaluative ones (the feeling of guilt and the feeling of being worthless) [5].

## AMNESTIC DATA

Subject: S.D.

Age: 31 years

Diagnostic: major recurrent depressive disorder without inter-episodic recovery, (DSM IV, 2000) without psychotic elements, with emotional liability and elements of anxiety. Multiple sclerosis [6].

At the time of the interview, S.D. is at the first internment, due to a severe depressive episode without psychotic symptoms, triggered as a result of the many emotional shocks and severe somatic pathology of which the patient has been suffering from the age of 22 years, multiple sclerosis, whose evolution and treatment may have depressive states as a side effect.

S.D. was diagnosed with depression six months ago, although the first symptoms appeared 2 years ago, and followed so far psychiatric treatment in ambulatory.

## PERSONAL/SOCIAL HISTORY

She was raised by her paternal grandparents until the age of 3 years, after which she was raised and cared for by her parents, while maintaining the same emotional bond with her grandparents. The father is diagnosed with depression, with repeated hospital admissions and currently follows specialized psychiatric treatment. She has a brother and a sister, both older than her, the mother's children from a previous marriage relationship, half-brothers with whom the patient has no emotional connection.

She is currently working as a nurse. She is not married but she is in a relationship for about 10 years. She lives with her partner and she is pleased with this relationship, where she finds support and empathy. In this relationship she feels loved, appreciated, understood protected and respected.

At the time of submission, the overall level of functioning of the patient is at a level that she perceived as weak-unpleasing. She has a tendency of social isolation, low self-esteem, suicidal thoughts occur frequently, incurability and guilt. Her work capacity is impaired due to focus difficulties, of the state of sensitivity.

## **SYMPTOMATOLOGY**

At the time of the interview, the symptoms were: concentrating difficulties, emotional instability, disturbances of appetite with weight loss, increased fatigue, increased emotiveness, anxiety, depressive mood, mixed insomnia, superficial sleep, decrease in work efficiency, attention difficulties, states of sadness, crying easily agitated states, ruminations on existential topics, does not see anything good in the future, considering that it would be better to die.

## **HISTORY OF PRESENT DISORDER**

The first event reported by the patient as being traumatic, was at the age of three when she was separated from her paternal grandparents with whom she had a close emotional relationship. She continued to keep a close connection with her grandparents, until their deaths, event that occurred when she was 12.

The relationship with her father was always cold, being marked by conflict, ambivalence, authoritarian style, low empathy toward her needs. She is aware that her father loves her, but doesn't express affection and he has never put it first. Her relationship with her mother is marked by trust and mutual love.

During college, she was diagnosed with MS, a degenerative disease whose treatment may have as a side effect depressive moods.

She failed to complete university studies because she hasn't promoted the license, an event that marked her negatively. After five years since that event, she had to start a new life in another city, to find a job, a new house and a new social group.

Her employment in her current job has generated a major change. She felt impaired in front of various situations and felt helpless, unable to make decisions, claiming lack of concentration, anxiety.

## **PSYCHOLOGICAL PROFILE**

Her psychological development was marked by certain events experienced with intensity, emotional loss and emotional trauma, through the inability to handle these events: the death of her paternal grandparents, the moment of the diagnosis of multiple sclerosis, professional failure.

S.D. has developed an ambivalent attitude towards her father and the tendency towards opposition, but with the acceptance of his behavior and how his way of interacting, with the installed tolerance only into adulthood, with the awareness of her father's diagnosis. Regarding her mother she manifests a balanced affection, based on affectivity, trust and obedience.

Towards herself, she manifests increased exigency, which sometimes becomes the source of some frustration, focused on the general expressing of herself, on general physical attributes and her own psychological states which are ambivalent.

She presents increased emotional instability, with depression and tendency toward anxiety, low self-appreciation, difficulty in controlling emotions, which creates difficulties in adjusting to certain life events. She manifests tendencies toward social withdrawal and she no longer wants to go out with her friends, she avoids interacting with people who don't know her problem.

Her negative emotional states are due to interpersonal conflicts, her concern for the evolution of her illness and the effectiveness of treatment followed by her, stress overload, increased requirements towards herself, as well as her father's condition.

She recounts chronic fatigue, the smallest tasks demanding a substantial effort, and her efficiency in carrying out the tasks is diminished.

She accuses feelings of guilt and devaluation through negative assessment of non-realistic concerns related to personal value on account of some failures from the past. The feeling of professional responsibility is very increased. She is self-blaming for the existence of the disease, for failing to deal with occupational or interpersonal responsibilities. There are additional symptoms such as sleep disorders, decreasing energy, feelings of guilt or devaluation, difficulty in concentration, thinking, decision making.

She describes normal functioning but this is made with an increased effort. Suicidal thoughts often appear.

### **PSYCHOTHERAPEUTIC OBJECTIVES**

Fixing objectives together with the patient and their ecological testing by the subject, authentic engagement in rebalancing the personality represents the psychotherapeutic conditions of success.

The objectives were fixed in agreement with the patient.

- Calming the patient
- Self-discovery
- Changing the reference system – from the external, criticizing one to the internal adapted one – regarding the judgment of her acts.
- Dismantling the guilty complex
- Restructuring the beliefs(convictions) of life by changing old beliefs that sabotaged her personality
- Hypnotherapist strategy - of strengthening the ego, relaxing, amending attributional style, creating positive expectations and accessing her latent resources

The aim of the therapy is not only to resolve the episode that the patient is facing, but also to avoid relapses, which is in the therapeutic process the patient learns to acquire the skills for handling depression.

### **CONCLUSIONS**

The patient presents a somatic disease whose treatment induces like side effects the depression, whose clinical picture was neglected by the patient and her entourage for two years.

The patient has a genetic predisposition (father) and there are a number of family related, social and professional predisposing factors.

Due to all these factors the patient's personality changes, establishing an adaptive type behavior depressive, anxious and hesitant.

The perception of one's own persona is distorted due to the impairment of cognitive functions (memory, attention), which malfunction results in decreased efficiency in terms of professional pursuit (self-expression, self-realization).

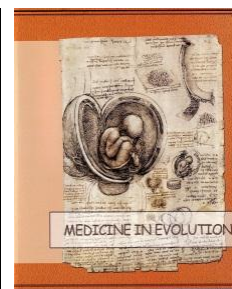
Psychopathological reactions of post-traumatic stress of psychological type, have generated a circumstantial psycho-social vulnerability, with the affection of auto-appreciation and self-realization in the context of a personality structuring of a depressive and anxious pattern. As a result of psycho-diagnosis and clinical assessment psychiatric treatment, and psychological therapy were recommended for relieving the highlighted problems.



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# A case of porokeratosis in an older patient



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## Abstract

Porokeratosis represents a rare chronic disorder of keratinisation. Porokeratosis comprises a heterogenous group of skin diseases with various cutaneous manifestations and different etiologies. Its histopathologic hallmark is the cornoid lamella, which corresponds to the hyperkeratotic border of the clinical lesions. Several types of porokeratosis have been described, disseminated superficial actinic porokeratosis (DSAP) being the most common among them. DSAP is an autosomal dominant disorder with onset in the third or fourth decade of life. Its pathogenesis is not fully understood, but certain triggering factors proved to be involved in the onset of the disease. The most important factors reported are sunlight exposure and immunosuppression. We present a case of late onset porokeratosis in an elderly woman, without evident risk factors.

**Keywords:** porokeratosis, DSAP, elderly.

## INTRODUCTION

Porokeratosis includes a group of hereditary or acquired disorders characterized by a defect in the process of keratinisation. At least six types of porokeratosis have been described, classic porokeratosis Mibelli, disseminated superficial porokeratosis (DSP), disseminated superficial actinic porokeratosis (DSAP), porokeratosis palmaris et plantaris disseminata, linear porokeratosis, and punctate porokeratosis (1). Porokeratosis was first described by Mibelli and Respighi, in 1893. Initially, disseminated superficial porokeratosis (DSP) was defined as a clinical entity of porokeratosis of Mibelli, and later on the role of sun exposure in the onset of the disease was evidenced and the term DSAP was introduced. DSAP was first described as a separate entity by Chemosky in 1966 (2).

DSAP, the most common form of porokeratosis, is an autosomal dominant disorder, whose pathogenesis is not fully elucidated, but histopathological studies revealed that a clone of mutant keratinocytes proliferate into the epidermis and dermis (3, 4).

## CASE PRESENTATION

A 71-year-old patient presented to our clinic for multiple mild pruritic, brown lesions, located on her shins. The lesions had appeared 3 month earlier. There were no significant aspects in her medical past. On physical examination, she was in good condition and was afebrile. The vital parameters were within normal range. The local examination revealed multiple well demarcated brown papules, 2-3 mm in size, symmetrically distributed on her shins; there were no lesions on her soles. It is noteworthy that the eruption was confined to her shins, and the number of lesions did not exceed 100. The lesions exhibited a hyperkeratotic border with central atrophy (*Figure 1*). The physical examination was otherwise normal and laboratory tests revealed no significant findings.



Figure 1. Clinical aspect. Multiple well demarcated brown papules with a hyperkeratotic border and central atrophy

Given the clinical appearance of the lesions we suspected the diagnosis of porokeratosis. The patient denied chronic sun exposure or the presence of similar cases in her family. A biopsy was performed from the right shin. The histopathological examination displayed ortho and parakeratosis with a columnar pattern, epidermal atrophy and basal cell pigmentation. A moderate perivascular lymphocytic infiltrate was observed in the superficial dermis (*Figure 2*). Histopathological examination confirmed the diagnosis of porokeratosis, DSAP type. Treatment with topical corticosteroids was initiated, with a favourable outcome.

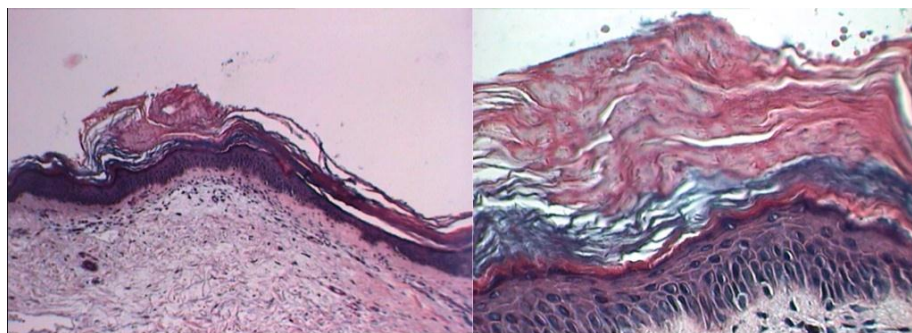


Figure 2. Histological aspect – hematoxylin and eosin stain. Ortho and parakeratosis with a columnar pattern, epidermal atrophy, basal cell pigmentation and a moderate perivascular lymphocytic infiltrate in the superficial dermis

## DISCUSSIONS

Porokeratosis is a chronic skin disease, characterized by an abnormal process of keratinization. DSAP is an autosomal dominantly inherited disorder and the most common form of porokeratosis (3). The disease typically appears in the third or fourth decade of life, its incidence being double among women than among men (5).

There are certain factors that are thought to be involved in the development of DSAP. Since the lesions are typically distributed on sun exposed areas, rarely being seen on sun protected areas (axilla, perineum) (4) and the exacerbations occur in the summer, it was supposed that UV play a role in the pathogenesis of DSAP (6). Additionally there are reported cases of DSAP, which occurred in patients undergoing treatment with UV (7). Our patient denied chronic sun exposure, but her lesions started in the summer.

Zhang et al suggested the role of mevalonate kinase (MVK) gene mutations in the pathogenesis of DSAP. It seems that MVK protects keratinocytes against the UVA induced apoptosis. They detected MVK mutations in 33% of patients with familial DSAP and in 16% of patients with sporadic DSAP. These mutations were not detected in patients without DSAP (8). Mutations in SSH1 or ARPC3 associated with DSAP were also reported in medical literature (9).

An association between immunosuppression and DSAP was suggested by many researchers. It is well known that UV have an immunosuppressive effect, they act on Langerhans cells and impair their role in immune surveillance promoting the development of the disease. Additionally, cases of porokeratosis which appeared or exacerbated after renal transplantation have been reported (10). In the same vein, chemotherapeutic agents with immunosuppressive effect which lead to impaired function of Langerhans cells seem to be involved (4). In our case, the patient did not use any immunosuppressive therapy and did not suffer from any chronic disorder with impact on the immune system. But we should keep in mind that old age can be associated with a certain degree of immunosuppression.

The onset of DSAP is usually in the middle-aged adults, but several cases in the elderly have been also described. In the elderly, the late onset of the disease may be explained by the fact that the disease remains latent until the amount of sun exposure reaches a certain level which induces the occurrence of lesions. Immunosenescence also could be a factor which promotes the late expression of the disease (11).

Clinically, porokeratosis is characterized by brown lesions with an atrophic and slightly depressed center and a hyperkeratotic border, giving them an annular aspect (4, 12). The lesions are small sized, with a diameter of 5-10 mm and are located symmetrically on the sun exposed areas. The cutaneous eruption may consist of few lesions or can reach several hundred (4). The study by Shumack et al, which analysed 29 Australian subjects with DSAP, has revealed an average of 268 lesions per patient. Usually the lesions are asymptomatic, but in some instances the patient may complain of pruritus or pain (13). The lesions appear

predominantly on the extension surfaces of the arms and legs, the face being involved in only 15% of cases despite the link between DSAP and sunlight (14). However in the study by Gu et al. 82, 4% of patients with DSAP had lesions on the face, which may suggest that there are differences with respect to the clinical presentation between the Caucasian and Asian subjects (9). In our case, the lesions were confined to the limbs with a symmetric distribution.

Patrizi et al analysed the cases of porokeratosis in their clinic over a period of 8 years. They found 12 (22%) cases in old patients, the mean age being 68.6 years. They observed that most of them had a very mild form of DSAP, the eruption being confined to the lower limbs and suggested that porokeratosis in the elderly could be considered a new subtype of DSAP (15). Those characteristics we also observed in our case.

Clinically, the lesions are identical to those observed in DSP, but in the case of DSAP the lesions are located on the non-exposed areas as well. The main differential diagnoses are granuloma annulare, actinic keratosis, tinea corporis and viral warts (16).

Histologically, the hyperkeratotic border corresponds to a thick layer of ortokeratosis, which includes a narrow column made of parakeratotic corneocytes resulting the cornoid lamella. Therefore cornoid lamella is the result of a focal proliferation of abnormal keratinocytes. This corneocytes arrangement is characteristic and is known as "the stack of plates". At this level the granular layer is absent (2, 6). Cornoid lamella could also be seen in actinic keratoses but in this case it is associated with cellular atypia (16). Cases of DSAP coexisting with other forms of porokeratosis have been described (17).

It was revealed that the epidermal cells which are under the cornoid lamella exhibit abnormal DNA ploidy. In addition, it was observed that the keratinocytes collected from patients with porokeratosis present chromosomal instability after X ray irradiation. Recent studies have shown the overexpression of p53 gene in keratinocytes located under or adjacent to cornoid lamella (18, 19). Shen in his study revealed the early apoptosis of keratinocytes and the impairment of their terminal differentiation, which can be involved in the pathogenesis of the disease (18).

Protection from sunlight plays an important role in the management of DSAP. There are available many treatments with a variable efficacy (20). Depending on the extent of the disease local or systemic therapies may be administered. Keratolytic agents such as salicylic acid can have beneficial effects on the lesions. Another topical agent used is 5 fluorouracil 5%, which acts on the synthesis of DNA and RNA, inducing the destruction of abnormal cells (20, 21). It was noticed that the association between 5 fluorouracil and salicylic acid may prove more efficient; salicylic acid enhances the degree of 5 fluorouracil penetration. Imiquimod, diclofenac gel, dermatocorticoids and vitamin D derivatives have been also reported to be useful in the treatment of DSAP (2).

With respect to systemic medication, retinoids are effective, especially due to their effect on the atypical cells and thus they contribute to the decrease in risk of carcinogenesis (20). Recently it has been emphasized the effectiveness of photodynamic therapy, the results being encouraging (22). Destructive modalities such as cryotherapy, electrodesiccation, laser therapy have been applied, with a variable efficacy. These methods are indicated in patients with few lesions (2).

The patients with DSAP have a good prognosis. The follow-up of these patients is very important in order to diagnose a neoplasm in an early stage (21). Porokeratosis presents a risk of malignant transformation and can evolve into SCC or BCC. The incidence of malignant transformation varies between 7.5 and 11% (14, 23). The early onset, the large size of the lesions and genetic factors contribute to the malignant process (11).



## CONCLUSIONS

This case is particular given both the late onset of the disease in an older patient with no chronic sun exposure and the localization confined to the lower legs. In this context DSAP should be taken into account not only in young patients but in older patients as well.

### *Acknowledgement*

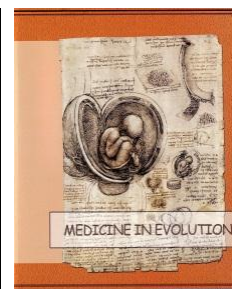
This work was possible partially with the financial support of Young Researchers Grant from the Carol Davila University of Medicine and Pharmacy, no. 33884/11.11.2014 and 33897/11.11.2014.

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# Laparoscopic sleeve gastrectomy in super-obese patient: Case report



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## **Abstract**

The purpose of this case report is to present a 31-year-old patient diagnosed with super-obesity (BMI = 97.47 kg/m<sup>2</sup>), type II Hypertension, type II Diabetes Mellitus and sleep apnea on which we performed a laparoscopic sleeve gastrectomy as a surgical treatment of obesity. There were no incidents or accidents during the operation, the postoperative outcome was favorable. The patient was monitored on a 5-year period for weight loss and comorbidities remission. He lost 205 kg, the blood pressure and the a-jeun glycaemia are in normal ranges, also the sleep apnea has subsided with no drugs administered. We selected this case from our 10-year experience in bariatric surgery in order to emphasize the benefits of laparoscopic sleeve gastrectomy even in super-obese patients. However, the compliance of the patient is essential in achieving satisfying postoperative results.

**Keywords:** morbid obesity, super-obesity, sleeve gastrectomy, laparoscopy.

## INTRODUCTION

According to an epidemiologic study performed on the Romanian population in 2015, 21.3% of the adult population suffers from obesity [1]. Obesity is a chronic disease which is characterized by an excess weight gain. It is quantified by the Body Mass Index (BMI). Its classification has the following stages: class I obesity (30-35 kg/m<sup>2</sup>), class II obesity (35-40 kg/m<sup>2</sup>) and morbid obesity (40-50 kg/m<sup>2</sup>). The patients with a BMI that exceeds 50 kg/m<sup>2</sup> are defined as super-obese.

The treatment of this disease requires a complex multidisciplinary approach, in which the metabolic surgery has a prominent place [2]. Nowadays, laparoscopic sleeve gastrectomy is the second most used bariatric technique, after the Roux-en-Y gastric by-pass. The sleeve gastrectomy was imagined as a first surgical step in a much more complex surgical intervention: the duodenal switch [3]. Over the last decade, academic studies have shown the efficiency of the sleeve gastrectomy as a standalone procedure in the treatment of the morbidly obese patients [4]. However, super-obese patients needed a second surgical intervention, consecutive to the sleeve gastrectomy in order to obtain a normal weight [5][16].

We selected this patient, from our 10-year experience in bariatric surgery, in order to emphasize the efficiency of sleeve gastrectomy even in super-obese patients.

## CASE REPORT

31-year-old patient, from the urban environment, with no family history of obesity was clinically diagnosed with super-obesity. At the time of the examination, the patient had a weight of 330 kg at 1.84 m in height (BMI = 97.47 kg/m<sup>2</sup>). We admitted the patient in our clinic for further investigations and surgical treatment.

Anamnestic data reveled fatigue, the impossibility of prolonged orthostatic position and lumbar pain while standing. The diet of the patient consists of home-cooked meals in large quantities, no fast food, but he admits the excessive intake of sweets, especially soft drinks.

Previous medical history includes high blood pressure, diabetes mellitus type II and sleep apnea. The patient has no prescription for any medication, also he denies using alcohol, drugs or tobacco.

The clinical exam shows excess fatty tissue, soft abdomen with no pain on taxis, intraperitoneal organs in normal ranges. Blood pressure is 155/85 mmHg and the heart rate is 95 bpm.

Preoperative investigations were comprised of lab tests which revealed an a-jeun glycaemia of 116 mg/dl. Chest X-Ray showed the presence of central pulmonary stasis and cardiomegaly. Pulmonary tests confirmed the light restrictive pulmonary dysfunction. None of the interdisciplinary medical consults denied the surgical intervention.

The preoperative preparations include stopping liquid and solid foods intake 12 hours before the operation and the installment of elastic contention stockings in the morning of the surgery.

General anesthesia with oro-tracheal intubation was used. The position of the patient on the operating table was standard French position. Due to the volume of the abdominal fatty tissue, difficulties were encountered when installing the pneumoperitoneum. Thus, we used two fastening systems for the anterior abdominal wall and two CO<sub>2</sub> insufflators to reach an intraabdominal pressure of 15 mmHg. The laparoscopic approach was through 5 trocars and an XXL surgical kit specific to bariatric surgical operations. The intraperitoneal cavity revealed on inspection a very large stomach, the liver and the rest of the intraperitoneal viscera in normal macroscopic ranges. The great curvature of the stomach was stripped out with the 10 mm LigaSure (Covidian™) vascular clamp 5 cm from the pylorus up until the

Hiss angle. We calibrated the stomach with a 36 Fr oro-gastric probe. The sleeve gastrectomy was performed with 8 EndoGia (Covidian™) 60mm blue linear staplers. Hemostasis control along the resection line was performed with titanium clips. The great curvature of the stomach was extracted through the right-hand trocar orifice. The integrity of the resection line was tested by injecting 50 ml of methylene blue through the oro-gastric probe, with no intraperitoneal leaks recorded. We placed a naso-gastric probe and a drainage tube along the remaining stomach. There were no incidents or accidents recorded during the surgical operation.

Postoperative protocol included IV hydro-electrolytes, pain medication, antibiotics, PPI and anticoagulants (low weight molecule heparin) for the prevention of thrombo-embolic accidents. The drainage tube is removed on the 3<sup>rd</sup> day along with the naso-gastric probe. Liquid food is resumed on the 3<sup>rd</sup> day and semisolid food on the 4<sup>th</sup> day. The patient is discharged on the 10<sup>th</sup> day with no postoperative complications recorded during the hospital admittance.

The discharge recommendations include a strict diet, previously presented and explained to the patient, PPI medication for 1 month as well as the necessity for alimentary supplements in the form of vitamins to prevent malabsorption phenomena.

The patient was monitored on a 5-year period, with regular medical examinations on 1 month, 3 months, 6 months, 1 year and 5 years. We recorded the weight loss through BMI and by calculating the excess weight [table I]. The evolution of comorbidities was monitored as well (hypertension, diabetes mellitus and sleep apnea) [table II].

Table I. Measurements of weight loss, BMI and excess body weight

	PREOPERATIVE	1 MONTH	3 MONTHS	6 MONTHS	1 YEAR	5 YEARS
WEIGHT (KG)	330	283	259	229	167	125
BMI (KG/M <sup>2</sup> )	97.47	83.58	76.50	67.63	49.32	36.92
EXCESS WEIGHT (KG)	245	198	174	144	82	40

Table II. The evolution of comorbidities

	PREOPERATIVE	1 MONTH	3 MONTHS	6 MONTHS	1 YEAR	5 YEARS
HYPERTENSION (MMHG)	155/85	150/85	145/85	130/80	110/70	110/60
A JEUN GLYCAEMIA (MG/DL)	116	110	110	100	100	95
SLEEP APNEA	yes	yes	yes	yes	no	no

After the operation, the patient stopped the intake of solid sweets and soft drinks, otherwise the diet remained unchanged. In the past 5-years the patient suffered 3 more surgical interventions in order to remove the excess skin from the abdomen, thorax and arms. Following these operations, he was able to perform physical effort.

## DISCUSSIONS

The purpose of this case study is to present a super-obese patient (BMI = 97.47 kg/m<sup>2</sup>) who suffered a laparoscopic sleeve gastrectomy. Due to patient compliance, weight loss was progressive and sustained, a second bariatric surgery was thus no longer needed.

Sleeve gastrectomy was initially utilized as the restrictive component of the duodenal switch [6]. In time, this procedure proved its efficiency by itself and was successfully performed on obese patients with a BMI of 35-43 kg/m<sup>2</sup> [4][15]. For super-obese patients or with important comorbidities, two successive surgeries were imagined, first of which is the sleeve gastrectomy because of its lower surgical risks. Subsequently the Roux-en-Y gastric bypass [7][8] or the duodenal switch [5] were performed.



However, academic studies performed on large number of patients proved the efficiency of laparoscopic sleeve gastrectomy as sole bariatric procedure even in the case of super-obese patients. Due to excessive weight loss following this procedure, Roux-en-Y gastric by-pass or duodenal switch were no longer needed [9][10].

Regardless of the surgical technique that was used, it must be performed in bariatric surgery centers of excellence that have surgeons and other medical specialists trained in the management of the obese patient [14]. Obesity is a pathology that requires a complex multidisciplinary team comprised of specialists in surgery, nutrition, cardiology, pneumology, endocrinology as well as anesthesia and intensive care [11-13].

The case presented falls in the context of recent international studies which promote laparoscopic sleeve gastrectomy as sole bariatric surgical treatment for the super-obese patient. After 5-years, our patient has reached 125 kg and a BMI of 36.92 kg/m<sup>2</sup>, with an excess weight loss of 83.67%. Subsequent the massive weight loss (205 kg) the patient comorbidities have subsided. Thereby, in present time, the patient has normal blood pressure, no sleep apnea and the a-jeun glycaemia in normal ranges. Furthermore, lumbar pain in orthostatic position is absent which allows him to perform physical exercises. Overall the quality of life has improved substantially, the patient is socially reintegrated and able to pursue a career.

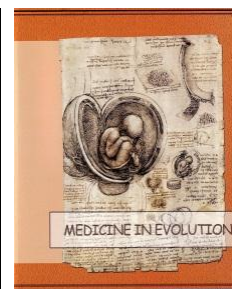
In conclusion, laparoscopic sleeve gastrectomy proved itself to be an efficient surgical procedure even in the case of super-obese patients. However, the patient compliancy is essential to obtain satisfactory postoperative results.

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# The influence of the personality type upon the arterial hypertension



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## Abstract

The present study emphasizes the methods to prevent arterial hypertension and the negative influence of stress and personality type regarding health.

Even if the existence of personalities that are strictly specific to some psychosomatic illness is almost unanimously challenged - in recent years, it has been schematized for coronary artery disease a genuine behavioral syndrome consisting of a number of psycho-behavioral factors of risk for this disease. This type, named "Type A behavior pattern (TABP)" is present in subjects with different personality types (psychasthenic, hysterical, paranoid, etc), unified by the presence of certain related behavioral features (regarding the accomplishment of a task, usually a professional one) and relating to others.

The type A of personality and stress are currently considered risk factors for cardiovascular diseases (HTA) or otherwise (gastric and duodenal ulcer).

**Keywords:** hypertension, personality Types A or B, stress, cardiovascular diseases.

## INTRODUCTION

The first modern approach on psychological problems regarding cardiovascular diseases was made by Thomas Lewis who identified the phenomenon of "soldier's heart" [1]. This refers to the fact that a large number of soldiers on the front lines got sick with heart disease, which represents the expression of the body's reaction to the cruel reality of war.

Since ancient times, the heart was considered the center of emotion and passion. People prone to heart ailments tend to give, to act generously, but from a solar, dominant perspective: guiding, advising with the intention of doing good to others. This attitude, however, can easily slip towards force or even coercion, these people believing that they know better and, as a result, they are entitled to lead others too. Cardiac symptoms are therefore related to the human tendency to construct something outside, to influence his peers, to modify the environment [2,3,4].

The vulnerability of the heart is expressed by the statement that the heart can be "broken", the idea that reveals our intuitive ability to appreciate how much our emotional states influence this energy center [5,6].

Cardiovascular risk factors enable the determination of the total cardiovascular risk as the risk of fatal cardiovascular events in a predefined period of time. The number and magnitude of each risk factor are important as they are both proportional to the cardiovascular risk.

### *Objectives*

The objective of this thesis was to study the influence of stress and personality type A or B on the cardiovascular diseases, more specifically regarding arterial hypertension. Considering that these factors increase the risk of cardiovascular complications and at the same time lead to a decreased quality of life for the patients.

Regarding this matter, a study has been conducted in the Department of Cardiology of the emergency Military Hospital "Victor Popescu" Timisoara, on patients hospitalized with hypertensive pathology.

## METHODS AND TECHNIQUES

For the data collection related to personality type A or B and stress, the questionnaire that measure the personality type A respectively B was used, as well as the Lindemman Scale that presents a list of stress agents from the life of the subjects. These factors can lead to the appearance of stress in the person's life, with both physical and mental negative consequences. The resulting data was statistically processed by the program SPSS.

## THE STUDY GROUP

The study group was composed of 136 hypertensive patients, both female and male who were older than 40 years and who were hospitalized in the Department of Cardiology of the emergency Military Hospital "Victor Popescu" from Timișoara.

## RESULTS

Applying the questionnaire to measure the type of personality, it was revealed the number of patients with the personality type A respectively B and the incidence figures of type A respectively B were analyzed in relation to gender and the environment of origin.

In the group of 75 persons with type A personality, 50 men representing 66,66%, and the remaining 25 persons, the equivalent of 33.34% are women. Of the 61 people with type B

personality, 21 persons representing 34,42% are men and the remaining 40 percent, the equivalent of 65.58% are women.

Of the group of 75 people with type A personality, 48 individuals representing the 64% live in urban areas, and the remaining 27 patients, equivalent to 36% live in rural areas. Of the 61 people with type B personality, 24 persons representing 39.34% live in urban areas, and the remaining 37 patients, the equivalent percentage of 60.65% live in rural areas.

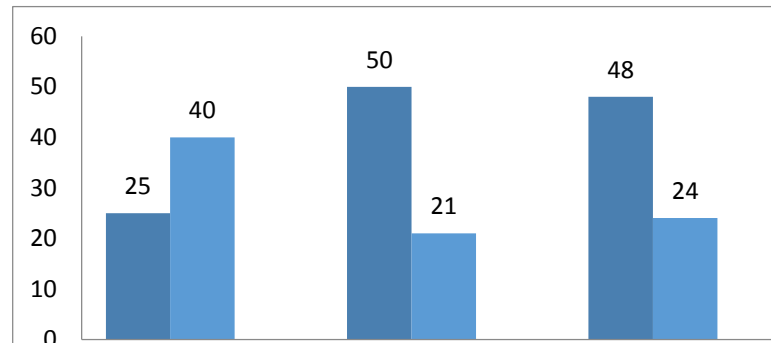


Chart 1. Graphical representation of the type of personality variables on sex and area of origin

Subjects with behavior type A have coronary cardiopathy two times more often than the ones with behavior type B. type A behavior, in relation to type B, appears to be correlated with a more rapid upward trend and a more marked secretion of catecholamine or the serum amount of fatty acids and cholesterol at the appearance of a professional SP.

A series of data suggest that subjects with the behavior type A (which propels them toward the upper echelons of the professional hierarchy) pay a greater tribute to stress than their professional subordinates, justifying his appearance in medical literature, the concept of 'Managers Diseases', in which coronary cardiopathy and HTA are occupying a prominent place. They believe that these bosses are able to adapt ("desensitization") to professional stress through suitable coping mechanisms. More recent research also reveal the negative coronary impact of professional overloading, in a time pressure (working ceaselessly) under the conditions of a reduced decision-making control towards the low-qualified workers ("blue collars").

Regarding the scale for the measurement of the stress factors, the Lindemann scale, results indicate a significant growth of stress caused by medium life crisis.

From the total group of 136 people questioned, 30 people representing a percentage of 22.05% are without significant problems, 33 persons, the equivalent percentage of 24.26% have a small life crisis, 49 people, representing a percentage of 36.02% have a medium life crisis, and the remaining 24 people the percent equivalent of 17.64% present a major life crisis.

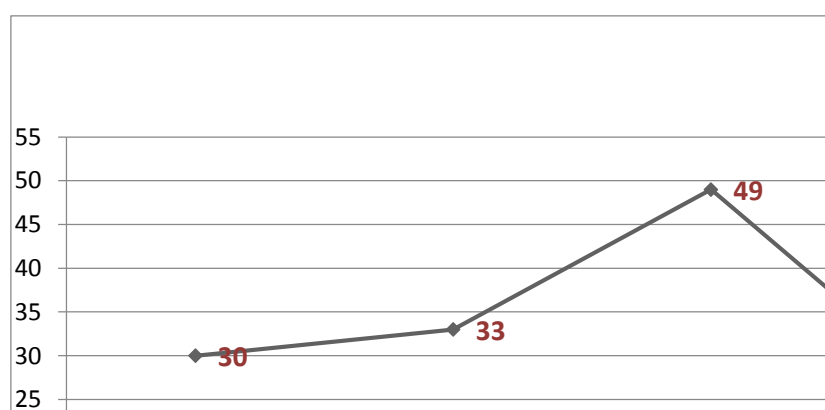


Chart 2. Distribution of patients depending on the level of stress



Of the total of 71 men interviewed, 24 people, representing a percentage of 33.80% are without significant problems, 14 persons, the equivalent percentage of 19.71% have a mild life crisis, 21 people representing a percentage of 29.57% have a medium life crisis, and the remaining 12 people, the equivalent percentage of 16.90% present a major life crisis. Of the total of 65 women surveyed, 15 persons, representing a percentage of 23.07% are without significant problems, 16 persons, the equivalent percentage of 24.61% have a mild life crisis, 21 persons, representing a percentage of 32.30% have a medium life crisis, and the remaining 13 people representing a percentage of 20.00% present a major life crisis.

Of the total of 51 persons surveyed who live in urban areas, 10 persons, representing a percentage of 19.60% are without significant problems, 8 persons, the equivalent percentage of 15.68% had a mild life crisis, 11 people representing a percentage of 21.56% had a medium life crisis, and the remaining 22 people representing a percentage of 43.13% present a major life crisis. Of the total group of 85 persons surveyed who live in rural areas, 21 persons, representing a percentage of 24.70% are without significant problems, 19 persons, the equivalent percentage of 22.35% have a mild life crisis, 27 people representing a percentage of 31.76% had a medium life crisis, and the remaining 18 people representing a percentage of 21.17% present a major life crisis.

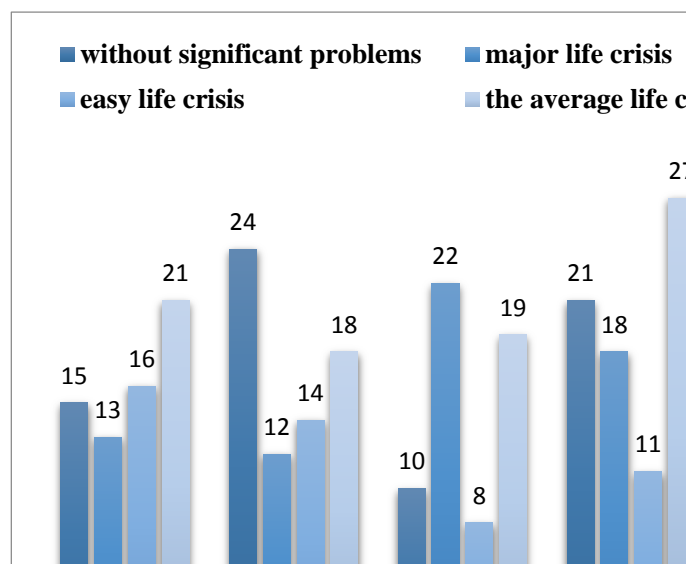


Chart 3. Distribution of patients depending on the level of stress on environment variables sex and origin

## CONCLUSIONS

Subjects with personality type A are ambitious people, who have a relationship with aggressive tendencies, have a continuous need for success, have competition spirit with domination tendencies and power manifestation. They feel the need to exert control, having aggressive ways of solving conflicts. These people are always running out of time, deeply involved their work, bitter, tense, serious, extraverted, authoritarians, irascible and sometimes even neurotics. The voice of these people is serious, strong, rhythmical, accompanied by fast gestures and amplitude. These people do not know and do not accept methods of relaxation, having the habit of performing multiple things simultaneously. Taking into account the characteristics of this personality type we can say that this A type is continually exposed to stress.

People with personality type B need dependency, emotional control, resistance to frustration, low competitiveness. They focus on quality and less on quantity. At the same time they are uncaring, careless, calm, lacking in ambition, leisurely regarding their time.

The data collected revealed more patients with type A personality. Most patients with type A personality are men because they are more exposed to stress due to the much larger responsibilities that they have in their family, at work, in society, etc. Comparing between the averages of the provenance environments of the patients, a higher rate of type-A personality was revealed among those living in urban areas, this being due mainly to the much more stressful life environment, congestion, pollution, loud noise, etc.

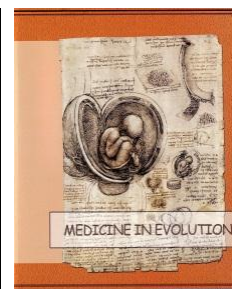
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As a result of the application and interpretation of statistical data from the questionnaire that assesses the stress factors, a major life crisis has been highlighted at most patients [7,8]. The Stress agents most frequently encountered were: illness, the husband's or wife's death, financial difficulties, retirement, loneliness.

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# Sevoflurane inhalation anesthesia vs propofol total intravenous anesthesia on oxidative stress in laparoscopic kidney surgery



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## Abstract

**Introduction:** Oxidative stress is involved in several pathological mechanisms due to increased production of free oxygen radicals with effects in different organs. Overproduction of free oxygen radicals and decrease of organism defense mechanisms is incriminated in multiorgan failure. There are a few studies about the correlation between oxidative stress, antioxidant activity and anesthetic drugs in laparoscopic surgery.

**Aim:** To assess the perioperative effects of sevoflurane or propofol on oxidative stress markers, malondialdehyde (MDA), and antioxidative markers such as superoxide dismutase (SOD) in renal laparoscopic surgery.

**Material and methods:** The study included 23 patients with localized kidney cancer (T1-T2) treated by laparoscopic radical nephrectomy. Patients were divided into two groups: sevoflurane group (n=11) and propofol group (n=12). Induction and maintenance of general anesthesia was performed with sevoflurane and propofol respectively within the two groups. Blood samples were collected before anesthesia induction, at the end of surgery and at 24 h after surgery and the levels of malondialdehyde (MDA) and superoxide dismutase (SOD) were measured.

**Results:** There were no statistically significant differences between the two groups regarding age, height, weight, body mass index (BMI), sex, living area as well as surgery time, heart rate, mean arterial pressure, end-tidal carbon dioxide, peripheral oxygen saturation, duration of anesthesia, and intraoperative complications. There was a significant increase of malondialdehyde levels in sevoflurane group compared to the propofol group, at the end of surgery and 24 hours postoperatively ( $p < 0.05$ ). There were no statistically significant differences between the two groups, regarding malondialdehyde levels before anesthesia induction. There was no statistical difference between the two groups, regarding superoxide dismutase levels before anesthesia induction. The results obtained at the end of surgery in the two groups differed significantly ( $p < 0.05$ ), but there was no difference between the two groups about superoxide dismutase levels at 24 hours after surgery.

**Conclusion:** Significant oxidative stress and antioxidant activity is proved by the increase of malondialdehyde and decrease of superoxide dismutase levels during laparoscopic radical nephrectomy. Perioperative oxidative stress is significantly decreased by propofol used in general anesthesia due to its antioxidant properties.

**Keywords:** Oxidative stress, antioxidant activity, malondialdehyde, superoxide dismutase.

## INTRODUCTION

Oxidative stress is involved in several pathological mechanisms due to increased production of free oxygen radicals with effects in different organs. Overproduction of free oxygen radicals and decrease of organism defense mechanisms is incriminated in multiorgan failure[1]. Overproduction of free oxygen radicals, which include malondialdehyde (MDA) cause oxidative stress. Diminished antioxidative defense, which includes superoxide dismutase (SOD), or glutathione peroxidase (GSX), also contributes to oxidative stress [2,3,4].

Several recent studies have shown that oxidative stress is less aggressive in the laparoscopic versus open surgery. Furthermore, laparoscopic surgery has multiple advantages regarding patient overall operative stress, patient postoperative recovery and reduces perioperative morbidity and mortality. Currently there are several studies regarding the correlation between oxidative stress, antioxidant activity and anesthetic drugs in laparoscopic surgery.

In our study we therefore assessed the effects of sevoflurane or propofol on oxidative stress marker malondialdehyde (MDA) and antioxidative marker superoxide dismutase (SOD) in renal laparoscopic surgery. Sevoflurane is a volatile anesthetic drug used in many surgical procedures because of its beneficial properties. It can be used both in the induction and maintenance of general anesthesia during surgery. Propofol is an intravenous anesthetic with antioxidant properties that is commonly used for the induction and maintenance of anesthesia during surgery.

## MATERIALS AND METHODS

We enrolled in the study 23 patients which were treated for localized kidney cancer (T1-T2) by transperitoneal laparoscopic radical nephrectomy between 2014 and 2016, and were randomized in two groups: the sevoflurane group (n=11 patients) and propofol group (n=12 patients).

All patients enrolled in the study were adult patients (age above 18 years), with ASA (American Society of Anesthesiology) evaluation I-III and undergoing elective renal laparoscopic surgery.

Exclusion criteria included: a history of propofol allergy, multiple or severe comorbidities (severe cardiac disease, severe chronic obstructive pulmonary disease, severe hepatic disease or severe renal disease), pregnancy.

The study protocol was conducted in accordance with the Helsinki declaration (2008) and approved by the Ethics Committee of the Emergency Clinical Hospital Craiova. Written informed consent was obtained from each patient.

All patients had general anesthesia. Patients from both groups were routinely monitored by electrocardiogram - DII derivation on ECG, pulse oximetry, capnography, pletismography blood pressure, urine output. All patients were premedicated 1 h before the surgery with midazolam 0.1 mg/kg.

In the sevoflurane group, patients initially received inhalator sevoflurane for anesthesia induction started at 8% and gradually decreased until sevoflurane MAC (minimum alveolar concentration) reached 2-2.5%. Subsequently remifentanyl 1 µg/Kg over 30-60 seconds and rocuronium bromide 0.5-0.6 mg/kg was administered intravenously. Patients were intubated with 7.5-8 mm cuffed endotracheal tube and ventilated with pressure ventilation mode: tidal volume 6-8 ml/kg, respiratory rate 12-16 breath/minute, fraction of inspired oxygen 1 with the aim to achieve a maximum of 45 mmHg end-tidal carbon dioxide concentration. Anesthesia was maintained with sevoflurane 1-1.5 (MAC), remifentanyl 0.05-2 µg/Kg/min and rocuronium bromide 0.1-0.2 mg/kg as needed. Fluid replacement was performed with 6-8 ml/kg/h of Ringer lactate solution. Extubation was performed according

to Aldrett score. Patients received postoperative analgesia with morphine intravenous 0.1 mg/kg alternative with paracetamol 1g intravenous periodically at 6 hours.

In the propofol group, anesthesia was induced with propofol 2 mg/kg followed by remifentanyl 0.1-2 µg/Kg/min and rocuronium bromide 0.6-0.9 mg/kg. Patients were intubated and ventilated by same protocol described above. Anesthesia was maintained with propofol 0.1-0.2 mg/kg/min, remifentanyl 0.05-2 µg/Kg/min and rocuronium bromide 0.1-0.2 mg/kg as needed. Fluid replacement, extubation and postoperative analgesia were performed similarly to the sevoflurane group.

Blood samples were obtained from peripheral veins preoperatively before anesthesia induction, at the end of surgery and at 24 hours postoperatively in order to measure the levels of malondialdehyde (MDA). Blood samples were separated by centrifugation at 1200 rpm within 45 min of sampling and stored at -20°C until they were analyzed. Malondialdehyde was assessed with high performance liquid chromatography (HPLC) with fluorescence detection. Values were measured as µmol/l of MDA. Blood samples for superoxide dismutase (SOD) measurement were immediately stored at 2-8°C until they were analyzed. SOB was assessed by the photometric technique (enzymatic method). Values were measured as U/g Hb.

Mean and standard deviation values were determined for all parameters in the two groups. We used Student's t-test to analyze the differences between variables in the two groups. P-values of 0.05 or less were considered statistically significant. Data was analyzed by MedCalc and SPSS statistical software.

## RESULTS

Demographic data for age, height, weight, body mass index (BMI), sex, living area, are shown in Table I. There were no statistically significant differences between the two groups.

Table I. Demographic data of patients (data expressed as mean±SD or percentage)

Parameter	Sevoflurane Group(n=11)	Propofol Group(n=12)
Age(years)	65,35±6,45	67,22±5,24
Height (cm)	174,35±7,76	174,55±7,33
Weight (kg)	81,64±10,39	80,55±11,09
BMI	26,76±2,67	26,18±3,80
Sex (masc./fem.)	27%/73%	33%/67%
Rural/Urban	45%/55%	41%/59%

There were no significant differences among two groups regarding surgery time, heart rate, mean arterial pressure, end-tidal carbon dioxide, peripheral oxygen saturation, duration of anesthesia, and intraoperative complications (p = ns).(Table II)

Table II. Parameters monitoring perioperative (data expressed as mean±SD)

Parameter	Sevoflurane Group(n=11)	Propofol Group(n=12)
Heart rate(beats/min)	95,07±11,85	91,88±9,65
MAP (mmHg)	96,00±12,50	93,33±6,93
EtCO2 (mmHg)	40,21±3,24	39,78±1,99
SpO2 (%)	99,50±0,76	99,56±0,73
Operation time (min)	161,07±12,12	158,89±9,93
Anesthesia time (min)	188,57±11,51	182,22±8,70
Intraoperative complications	2/11	3/12

For patients that received volatile anesthetic (sevoflurane) malondialdehyde levels, were significantly increased at the end of surgery (6,66±1,35 µmol/l) compared with levels before anesthesia induction (3,20±0,82 µmol/l). Subsequently, malondialdehyde levels decreased gradually but not significant postoperatively at 24 hours to 5,40±1,64 µmol/. In the



propofol group, malondialdehyde levels before anesthesia induction were  $3,22 \pm 0,64 \mu\text{mol/l}$  and increased to  $5,15 \pm 0,57 \mu\text{mol/l}$  at the end of surgery and then decreased significantly to  $3,67 \pm 0,65 \mu\text{mol/l}$  at after 24 hours after surgery. (Table III)

Table III. Malondialdehyde levels (MDA) in the two groups (data are expressed as mean $\pm$ SD) (\*  $p < 0.05$ )

Marker	Sevoflurane Group(n=11)	Propofol Group (n=12)
MDA preop( $\mu\text{mol/l}$ )	$3,20 \pm 0,82$	$3,22 \pm 0,64$
MDA end of surgery( $\mu\text{mol/l}$ )	$6,66 \pm 1,35^*$	$5,15 \pm 0,57^*$
MDA postop 24h( $\mu\text{mol/l}$ )	$5,40 \pm 1,64^*$	$3,67 \pm 0,65^*$

There were no statistically significant differences between the two groups, regarding malondialdehyde levels before anesthesia induction. There was a significant increase of malondialdehyde levels in sevoflurane group compared to the propofol group, at the end of surgery and 24 hours postoperatively ( $p < 0.05$ ). (Fig. 1)

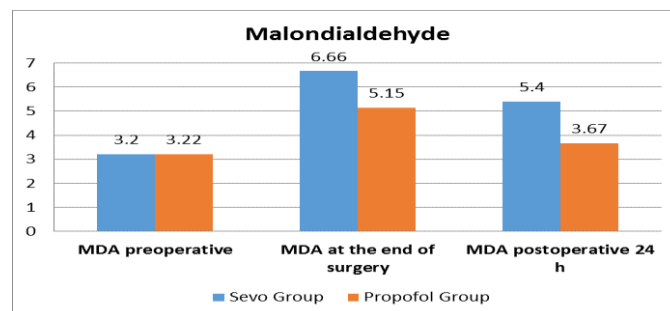


Figure 1. Malondialdehyde levels in the two groups

Superoxide dismutase levels in the Sevoflurane group before anesthesia induction were  $2221,71 \pm 96,97 \text{ U/g Hb}$ . The SOD levels decreased at the end of surgery to  $1889,57 \pm 165,23 \text{ U/g Hb}$  and increased to  $2049,43 \pm 124,13 \text{ U/g Hb}$ . SOD levels measured before anesthesia induction and at the end of surgery differed significantly ( $p < 0.05$ ). Superoxide dismutase levels in the Propofol group before anesthesia induction were  $2181,89 \pm 97,49 \text{ U/g Hb}$ , decreased slightly at the end of surgery to  $2064,33 \pm 60,31 \text{ U/g Hb}$  and increased postoperatively after 24 hours to  $2121,44 \pm 72,86 \text{ U/g Hb}$  (table IV).

Table IV. Superoxide dismutase levels (SOD) in the two groups (Data expressed as mean $\pm$ SD) (\*  $p < 0.05$ )

Marker	Sevoflurane Group (n=11)	Propofol Group (n=12)
SOD preop (U/g Hb)	$2221,71 \pm 96,97$	$2181,89 \pm 97,49$
SOD end of surgery (U/g Hb)	$1889,57 \pm 165,23^*$	$2064,33 \pm 60,31^*$
SOD postop 24h (U/g Hb)	$2049,43 \pm 124,13$	$2121,44 \pm 72,86$

There was no statistical difference between the two groups, regarding superoxide dismutase levels before anesthesia induction. The results obtained at the end of surgery in the two groups differed significantly ( $p < 0.05$ ), but there was no difference between the two groups about superoxide dismutase levels at 24 hours after surgery.

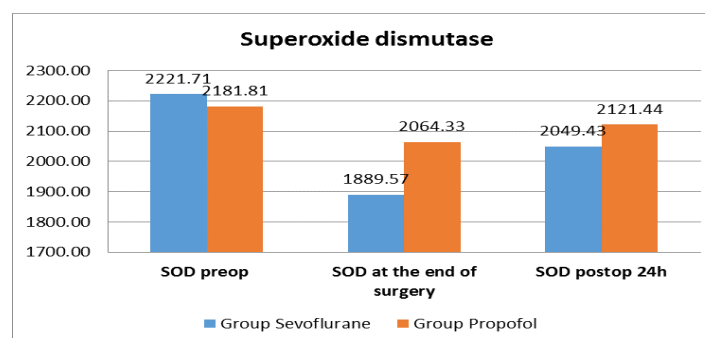


Figure 2. Superoxide dismutase levels in the two group

## DISCUSSIONS

Laparoscopic nephrectomy is a new technique used for last decades all over the world for kidney cancer treatment. The method is preferred compared to the open surgical technique because of its multiple advantages. The major advantage of laparoscopic surgery is less stress than in the open operative techniques [5].

Operative stress is characterized by oxidative stress [6]. Laparoscopic surgical techniques, being less traumatic and less aggressive, is characterized by less severe oxidative stress than the open surgical techniques used in renal surgery [7,8].

Oxidative stress is the presence of free oxygen radicals in excess of the buffering capacity of antioxidants. Oxidative stress is an expression of oxidant and antioxidant biomarkers imbalance [9]. Thus, the most correct approach for the determination of oxidative stress is to evaluate and compare the oxidative damage parameter and the antioxidant parameters [10].

In the present paper, we studied malondialdehyde as an oxidative stress marker and superoxide dismutase as an antioxidant marker. We determined a significant increase in MDA level in early postoperative periods (immediately after surgery) compared to preoperative (before anesthesia induction) and postoperative period (24h), in the sevoflurane group compared to propofol group. Malondialdehyde increased levels at the end of surgery demonstrates the development of oxidative stress in patients undergoing the laparoscopic radical nephrectomy despite the minimal invasiveness of this operative technique. Similar results were obtained of Glantzounis et al in their paper [11].

Regarding SOD levels, we obtained a significant decrease at the end of surgery and at 24 hours after surgery compared to levels before anesthesia induction, in the sevoflurane group compared to propofol group. That demonstrates the propofol antioxidant effect on oxidative stress during the laparoscopic total nephrectomy for localized renal tumors. Our results can be compared with other studies such as, Kozlik J et al who studied oxidative markers and antioxidant activity in gynecological laparoscopy [12].

Our study is different from other similar studies because the anesthesia induction in patients undergoing laparoscopic surgery from the sevoflurane group was performed only by sevoflurane inhalation. Our data may therefore be more accurate than in other studies about impact of anesthetic drugs on oxidative stress in laparoscopic surgical patients. Cai Li et al obtained similar results when he studied the effects of sevoflurane and propofol on intestinal ischemic reperfusion injury in patients undergoing elective open surgery and proved that patients receiving propofol for elective open surgery had significantly lower levels of biomarkers reflecting oxidative stress than the patients receiving sevoflurane for the same procedure. He also used only inhalator anesthesia induction for the patients in the sevoflurane group [13]. Further studies are required to further demonstrate the role of oxidative markers and antioxidants in the late postoperative period.

## CONCLUSIONS

Significant oxidative stress and antioxidant activity is proved by the increase of malondialdehyde and decrease of superoxide dismutase levels during laparoscopic radical nephrectomy. Perioperative oxidative stress is significantly decreased by propofol used in general anesthesia due to its antioxidant properties.

### *Conflict of Interests*

Authors have no conflict of interests to declare

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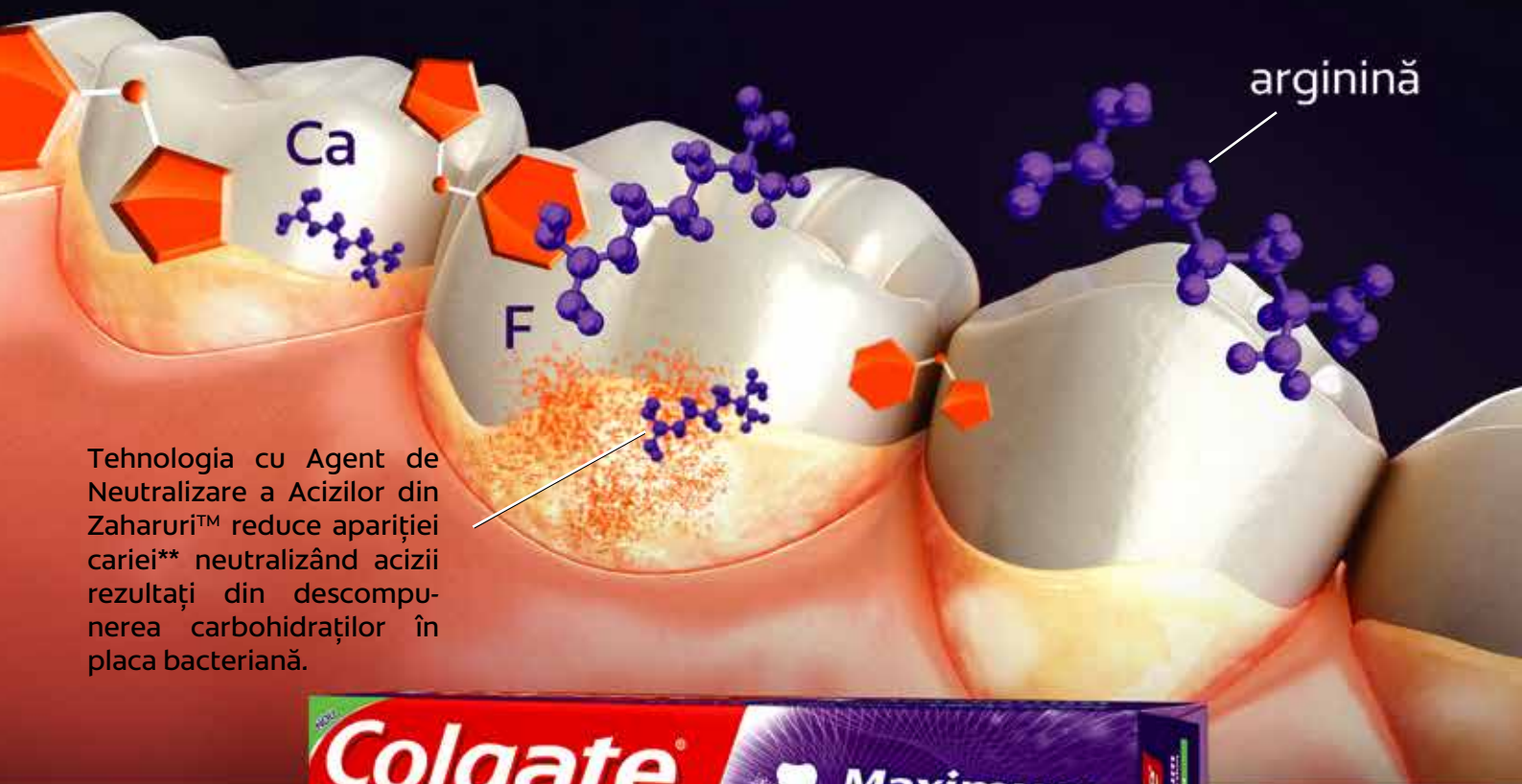
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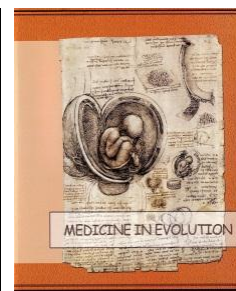
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# Prevalence of malocclusion and the assignatin of the need of orthodontic treatment at pupils from Bucharest



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## **Abstract**

Dental-maxillary anomalies represents the expresion of biologic variation from normal, and the need of orthodontic treatment consider both psihosocial aspects and the effects that dental anomalies can have upon oral health. Thus, the aim of this study was to establish the prevalence of dental-maxillary anomalies and the need of orthodontic treatment for a group of children from some elementary schools in Bucharest. The study group consisted of 220 children aged between 6-12 years, that were clinically examined. For each child there were analized the variables considered for DHC component of IOTN. In the study we observed that 95.5% of the subjects have important anomalies that requires orthodontic treatment. In orthodontic pathology we noticed a high prevalence of Angle class II/1 malocclusions.

**Keywords:** index of orthodontic treatment need (IOTN), dental health component (DHC), dental-maxillary anomalies.



## INTRODUCTION

As a wide view, dental-maxillary abnormalities represent the expression of biological variation from normal, and the necessity of the orthodontic treatment needs to take in consideration, in equal measure, psychological aspects and the effects of dental-maxillary anomalies that could have upon the oral health state. [1]

During childhood and adolescence, dental-maxillary abnormalities or any variation from normal of growing and development processes can affect the facial muscles and bones, with psycho-social implications mainly expressed through depreciation of facial and dental aesthetics. [2] It makes sense to consider that the main objectives of orthodontic treatment are related to aesthetics improvement and raising self confidence.[3] In the case of adolescents/teens, a pleasant dental appearance represents an important factor of psycho-social well-being.[4]

Over the time there were investigated different groups of people with the aim to provide epidemiological data concerning the dental-maxillary abnormalities predominance. Most of these studies use classification of the malocclusions imposed by the American School. Regarding the indices of establishing the need of orthodontic treatment, these take in consideration the aesthetic affection degree, the potential side affects upon the oral health and type of malocclusion.[5]

In 1989 Petter Brook and William Shaw conceived the Index of Orthodontic Treatment Need (IOTN). This index, initially named the Index of Priority of Orthodontic Treatment, was aimed to classify malocclusions considering the degree of orthodontic treatment need and to determine the patient's priority for orthodontic treatment when the financial resources were limited.[6]

IOTN has 2 components Dental Health Component (DMC) and Aesthetic Component (AC), respectively, and represents the most frequently used instrument in quantification of treatment need, a safe instrument, valid and easy to use in children and adults.

Although the data offered by literature showed that IOTN was widely used in Great Britain [7], Sweden [8], Germany [9], France [10] and Italy [11,12], yet there is little available research to evaluate both the predominance of dental-maxillary and the need for orthodontic treatment in primary and secondary school.

Therefore, the aim of this study was to establish the prevalence of dental-maxillary abnormalities and the need for orthodontic treatment for a group of pupils from Bucharest aged 6 to 12 years.

## MATERIAL AND METHODS

This study was done between 2012-2014 on selected subjects from 5 schools in Bucharest. The study group consisted of 220 children aged between 6 to 12 years (medium age of 10 +/- 18 years).

The research was approved by the Ethics Commission of UMF "CAROL DAVILA", the Management of the schools included in the study, pupils' parents and by the Hospital Administration and Medical Services from Bucharest.

The criteria of inclusion used to select the pupils were represented by:

- mixed dentition aged (6-12) years;
- the presence of first permanent molars;
- no prior orthodontic treatment;
- no local/general conditions or traumas that may influence the growth and development of facial structures.

In school surgeries, each student was clinically and orally examined. Sterile consultation kits, protection gear (masks, disposable gloves) and disposable paper cups have

ben used. For a methodical and efficient collection of the data needed for research, the clinical examination results were registered in the OMS type file. Filling in this form was done only considering clinical aspects (inter-oral clinical examination) without the use of complementary exams (X-ray examination). On each form general data of the pupils and date of the examination were recorded.

Criteria used to classify the American School

Class I (neutral occlusion) - characterizes itself through neutral reports of six year old molar level, meaning the buccal groove of the mandibular first molar contacts the mesio-buccal cusp of the maxillary molar mesio-buccal. As a result, there were enclosed in the class I all individuals that presented the above mentioned molar relation and one or more of the following characteristics: dental rotations, diastema, crossbyte, openbyte (as modifications situated mesially towards the six year old molar).

Class II (distal occlusion) - the buccal groove of the permanent mandibular first molar occludes distally to the maxillary mark. In this class there are two clinical forms, known as subdivisions.

Subdivision 1(class II/1) characterized through distalized reports associated with protruded superior front teeth.

Subdivision 2 (class II/2) characterized through distalized reports and retrusion of frontal superiors.

Class III (messialized occlusion) characterizes itself through mesial reports at the level of 6 years old superior and inferior molars, the inferior mark being set mesially in report with the superior one. [13]

*Need of orthodontic treatment*

To establish the need of orthodontic treatment in this study only the DHC (dental health component) of IOTN was considered.

For each patient, there were analyzed certain variables considered for the DHC component of IOTN meaning: - absent teeth

- overjet
- crossbyte
- interdental contact points displacement

Considering the above mentioned elements, each patient was included in one of the 5 severity degrees (1<sup>st</sup>. Degree-lack of need for treatment, 2<sup>nd</sup> degree-reduced need, 3<sup>rd</sup> degree-moderate need, 4<sup>th</sup> degree-high need, 5<sup>th</sup> degree-extremely high need) (3).

## **DATABASE AND USED STATISTICS PATTERNS**

To register and work out the studied variables a data base using the program SPSS17.0 was created.

In the study there was made a descriptive and analytic statistics analysis of the studied variables, the data being handled in such a way as to determine the percentage frequencies, standard deviation and environment averages.

The level of statistic significance was set to 0.05 (CI=95%) and as low the values were, the more soared the level of statistics significance was.

## **RESULTS**

In table I there is the predominance of dental-maxillary abnormalities according to the American School classifications. So, in the whole studied group we noticed that the most frequent abnormality was the class II/1, this affecting more than a third of the analyzed subjects (35,5%). Class I and II Angle abnormalities concerned 27,3%, 25,5% of the checked pupils, respectively, with a lower frequency in class III Angle cases. This sort of abnormality was observed at 26 of the subjects, representing 11,8% of the total of the pupils.

At the level of the study group, the DHC component analysis IOTN showed that the majority of individuals, more precisely 95,5% showed important abnormalities which required orthodontic intervention, while a very low percentage (4,5%) of the tested subjects had minor malocclusion that do not require orthodontic intervention.

Considering the severity degree, the need of treatment was variable. Therefore, 32.7 % of the patients was in great need (14.5%) and in need (18.2%). 36.4% of the patients claimed a moderate need of orthodontic treatment and 26.4% of the subjects claimed a reduced treatment need. (Table II)

Table I. Predominance of dental-maxillary abnormalities (American School classification)

AnDM	Frequency	Percentage
Cls. I	60	27.3
Cls. II/1	78	35.5
Cls. II/2	56	25.5
Cls. III	26	11.8
Total	220	100

Table II. Case distribution considering the treatment need evaluated with DHC component of IOTN

IOTN (DHC)	No.	%
No treatment needed(Gr.1)	10	4.5
Reduced need(Gr.2)	58	26.4
Moderate need (Gr. 3)	80	36.4
Great need (Gr. 4)	40	18.2
Extreme need (Gr. 5)	32	14.5
Total	220	100

At the evaluation of the need for treatment considered the type of dental-maxillary abnormality (Angle classification), the obtained results showed that all the subjects with class III abnormalities were in extreme need of orthodontic treatment. Also, an extreme need was presented by 10,7% of the subjects with Angle II/1 abnormalities. The subjects with class II/2 abnormalities (71,4%) were also in great need. The moderate need of treatment was observed at all the subjects each class II/1 Angle abnormalities and only at 3,6% from the subjects with class II/2 Angle abnormality. A reduced need of treatment was detected at the majority (83.3%) of subjects with class I Angle abnormality and at 14.3% of the subjects with class II/2 abnormality (table III).

Table III. DHC component distribution considering Angle abnormality

IOTN (DHC)	Cls. I	Cls. II/1	Cls. II/2	Cls. III
No treatment needed(Gr.1)	16.7%	0.0%	0.0%	0.0%
Reduced need(Gr.2)	83.3%	0.0%	14.3%	0.0%
Moderate need (Gr. 3)	0.0%	100.0%	3.6%	0.0%
Great need (Gr. 4)	0.0%	0.0%	71.4%	0.0%
Extreme need (Gr. 5)	0.0%	0.0%	10.7%	100.0%
Total	100.0%	100.0%	100.0%	100.0%

As follow up to the comparative analysis of the obtained data, from statistic point of view, concerning the need of orthodontic treatment, I noticed that there was a high significant difference from statistic point of view concerning the need of orthodontic treatment at the three analyzed classes of dental-maxillary abnormalities ( $p < 0.05$ ) (table IV).

Table IV. Comparison between the studied dental-maxillary abnormalities concerning the need of orthodontic treatment

	Value	df	P
Square chi	534.9	16	0.00
Probability rate	485.8	16	0.00
Linear association test	174.5	1	0.00
No. of Valid Cases	220		

(Statistically significant  $p < 0.05$ )

## DISCUSSIONS

Although both the local and foreign literature offer studies that had as purpose the establishment of predominance of dental-maxillary or different types of malocclusion, still due to the use of certain indices and different methods of variable population considering age or race, the comparison of the obtained results was difficult and needed to be done with a lot of care.

Considering the fact that the used methodology in this research was similar to the one used in other studies, and considering that the local literature offered a reduced range of information, the obtained results in the current study will be predominantly discussed through the means of the conclusions drawn from the studies held in other European countries.

In our study, class I Angle abnormalities involved a pretty high percentage of individuals, respectively 27.3%. Though, considering the fact that in this class were included all dental-maxillary abnormalities situated mesially from the 6-year-old molar, the class I report did not necessarily imply an ideal occlusion.

Regarding class I abnormalities Dorobat V. as follow up to the study done in 1987, found a superior predominance to the one from the current study, of 44,7%. Also, in one of the researches done in Albania in 2013, on pupils aged between 7 and 15, was reported a predominance of 40,4% of class I abnormalities. Superior values, as 34,9% was also found by Bilgic F. and his team, after a study done on Turkish population in 2015. [14,15]

As conclusion to this research I found a predominance of 35,5% of abnormalities of class II/1, higher to the one reported in UK (12,5%) or for the teenagers in Bogota (14,9%). Still Josefsson and his team after a study done on the population in Sweden, it was found a raised frequency of class II abnormalities (over 40%) tying this result to the genes and population influence. Also, a raised incidence (40%) of class II abnormalities was found in teenagers from Ankara. [16,10,8,15]

In the current research, class III abnormalities were the least observed at only 11,8% of the examined subjects. Despite all these, Goose and the team (2,91%), Haynes(2,5%), Foster and the team(3,5%), Proffit and the team(5,7%) reported inferior values of predominance of class III abnormalities. [17,16,18,19]

Also, Routen A.M. and his team, after a study done on children aged between 7 and 15 coming from South-East of Romania reported a percentage distribution of 64% for class I abnormalities, 21% for class II/1, 13% for class II/2 and 2% for class III Angle. Therefore, these authors found as predominant class I Angle abnormality, result, which contradicts the one, obtained in the current research, but as in our study, class III abnormality presented the most reduced balance among the studied population. [20]

Regarding the need of orthodontic treatment, the obtained results as follow-up of this study showed that 32,7% of the sampled population present a normative need of degree 4 and 5. Also reduced and moderate need of treatment (degree 2+3) was observed at 62,8% of the subjects.

From the point of view of orthodontic need, evaluated through the use of DHC component of IOTN, our results were in accordance with those of other studies from the specialty literature. So, Singh S. and his team, after a research done in 2016, on teenagers aged between 13 and 18, found that 37,5% of the subjects presented a need of treatment of degree 4 and 5. [21]

Bilgic and his team found inferior values to those obtained by us. These authors, after the study, concluded that 28,7% from the studied group presented a need for treatment of degree 4 and 5. [2] Also Souames and his team in France and Perillo and his team in Italy found that 21,3% respectively 27,3%, respectively, from the studied population presented a need of orthodontic treatment of degrees 4 and 5. [10,12]

In UK, Brook and Shaw (1989) evaluated the need of orthodontic treatment on a sample of 333 pupils. The results of this study showed that 32,7% of the examined population presented an extreme need of treatment and 35,1% of the individuals have a reduced need or no need at all. [6]

On the contrary, Burden and Holmes (1994) concluded that only 21-24% of the British pupils were part of the high-need category (when the DHC component of IOTN was evaluated). [22] Similarly, the research done by Mandall (1999) on pupils aged between 14 and 15 from Manchester showed that 48% of these had no need of orthodontic treatment, and 34%, 18%, respectively, of the studied population presented a great or extreme need of treatment.

The value variations of IOTN, which emerge from the prior mentioned research, can be explained by the size of the studied sample and by the research methods used.

## CONCLUSIONS

1. Among the pupils from Bucharest prevailed class II/1 Angle abnormality, which was in accordance with the data conclusions from the specialty literature as well as the results of the research done on different European populations.
2. One third of the investigated population presented a striking need of orthodontic treatment, following the evaluation done through the use DHC component of IOTN.

### *Conflict of interests*

The authors declared that they had no conflict of interests.

### *Author contribution*

All authors had equal contributions to this paper.

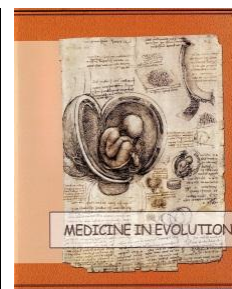
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# Salivary immune system and oxidative stress biomarkers in patients with multiple tooth decays in the aesthetic zone



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## Abstract

Tooth decay (TD) represents an important problem in human pathology. Although TD has an unclear etiopathology, the immune system response to injuries and the oxidative stress (OS) are two incriminated factors. We aim to evaluate from the saliva of patients with multiple tooth decays the salivary IgA as an immune system reaction and ceruloplasmine and lipide peroxides as OS biomarkers. In the patients salivary IgA levels were significantly ( $p<0,05$ ) augmented. Ceruloplasmin was found to be significantly ( $p<0,05$ ) reduced and the lipid peroxides significantly ( $p<0,05$ ) raised in the tested group. These result plead for the implication of the immune response and antimicrobial systems in the etiopathology of tooth decays. Moreover, oxidative stress seems to have a contribution in this pathology. The study of the effect of using antioxidant therapies in reducing the incidence of tooth decay are challenging future research directions.

**Keywords:** tooth decay, saliva, immune system, oxidative stress.

## INTRODUCTION

TD represents a major problem in human pathology. Numerous risk factors were implicated but still, its etiopathology remains unclear.

OS is involved in numerous oral disorders including tooth decay. Meanwhile, the immune system does not remain passive and it triggers defense or attack systems more or less effective [1].

Saliva represents the first biological liquid that makes contact with the external materials introduced in the oral cavity and it is in permanent contact with the teeth and oral mucosa. Saliva contains several antimicrobial proteins (lysozyme, peroxidases, lactoferrin, immunoglobulins, opsonins) capable of influencing the tooth decay development [2]. IgA along with the lysozyme, the salivary peroxidase and the complement are capable of destroying gram positive bacteria implicated in TD etiology. Salivary IgA can bond to the lysozyme, aggregate oral bacteria and inhibit bacteria adherence to oral tissues. IgA with lactoferrin, another salivary antibacterial agent, can generate via lactoperoxidase the hypochlorite bacteriostatic ion that can in turn amplify lysozyme activity [3].

### *Aim and objectives*

We aim to evaluate the contribution of the local antimicrobial defence in the etiology of tooth decay by assaying the salivary IgA as an indicator of the immune salivary system activity. At the same time we plan to estimate the effect of the oxidative stress by measuring the salivary ceruloplasmin and lipid peroxides.

## MATERIALS AND METHODS

16 patients with multiple oral untreated TD formed the tested group. Subjects were carefully examined and those with associated pathologies like vascular and inflammatory disorders, diabetes or other diseases that modify the immunologic reaction or the oxidants-antioxidants balance of the organism were excluded from the study.

The control group was formed by 10 apparently healthy subjects.

Saliva was collected from all subjects after a previous preparation. The subjects were restrained from eating and smoking for 30 minutes and the oral cavity was washed with distilled water. Unstimulated saliva was obtained by expectoration and the samples were kept at -10° until used. Salivary IgA, ceruloplasmin and lipid peroxide were measured in both groups (Table 1).

Table 1. Biochemical parameters and the methods used in testing saliva in both groups

Parameter	Method
IgA (UI)	Radial immunodiffusion Mancini [4]
Ceruloplasmin (mg%)	Colorimetric enzymatic assay Ravin [5]
Lipidic peroxides (MDA) (mmol/l/ml)	Colorimetric with thiobarbituric acid [6]

## RESULTS

Salivary immunoglobulins were found statistically ( $p < 0,05$ ) augmented in the tested group (Figure 1).

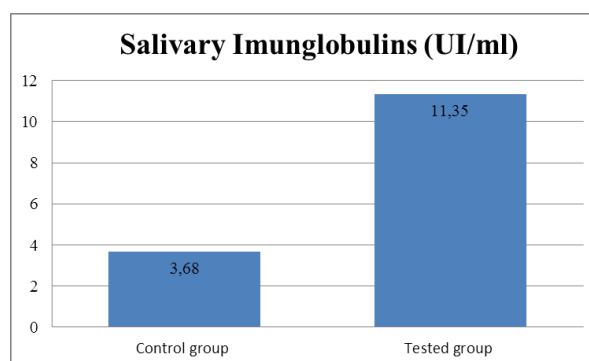


Figure 1. Immunoglobulins levels in the unstimulated saliva - tested and control group

Salivary ceruloplasmin levels decreased statistically ( $p < 0,05$ ) in the tested group compared with the control group (Figure 2).

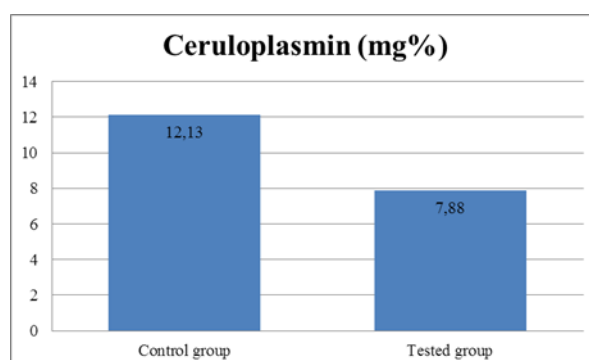


Figure 2. Ceruloplasmin levels in the unstimulated saliva - tested and control group

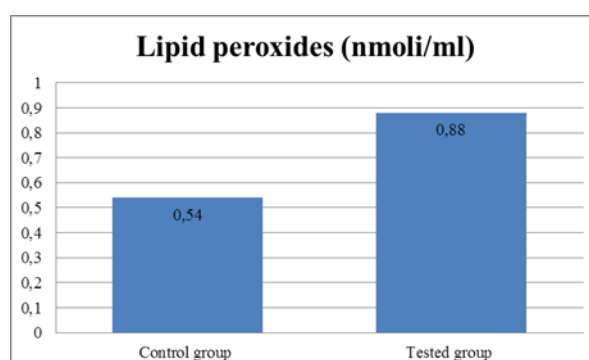


Figure 3. Lipid peroxides levels in the unstimulated saliva - tested and control group

## STATISTICAL ANALYSIS

Kolmogorov-Smirnov test was used to establish data normality. Data were analyzed using the nonparametric Kruskal-Wallis test for overall groups comparison and Anova test respectively. When needed Bonferroni post-hoc analysis and Dunnett C analysis was applied. To analyze all data SPSS 13.0(Chicago, IL,USA) statistical package was used and Excel.

## DISCUSSIONS

It is accepted that the Atc from IgA class act in a "first line" of oral mucosa defence because of their capacity of bonding the Atg [7]. Because of its antimicrobial and antiviral activity IgA can reduce the concentration of the *S. mutans* and interfere with bacteria adherence to tooth enamel [8].

Local and general implication of the immune response was observed in head and neck squamous cell carcinomas where seric IgG, IgM and IgA as well as salivary IgA were significantly increased [9]. In our study we obtained significant decrease in the salivary Ig A levels in patients with multiple tooth decays. Our results are in concordance with other studies in which IgA exerted a protective role against antibacterian and dietary Atg translation through oral mucosa. [10].

The oxidative stress resulted from the accumulation of free radicals or the decrease of the antioxidant capacity is responsible for several oral disorders. Increased lipid peroxidation was found in the periodontal pockets, implicating oxidative stress in the periodontal pathology [11, 12]. Metal dental biomaterials were incriminated in inducing oxidative stress. Amalgam fillings is considered a source of peroxide reactions [13]. Salivary increased lipid peroxidation levels were found in our study in tested group. Our results are in concordance with a previous study where an association was established between tooth decay and oral hygiene and salivary lipid peroxidation [14].

In counteracting the oxidative stress saliva possesses enzymatic and nonenzymatic systems like ceruloplasmin and lactoferrin. These systems, by blocking heavy metals like iron and copper, prevent the metals participatin in reactions that catalize free radicals formation [15]. In our study the salivary ceruloplasmin levels were significantly reduced when compared with the control group either as a result of antioxidant defence activity or because of ceruloplasmin blocking the heavy metals in the oral cavity.

## CONCLUSIONS

The significant IgA increase pleads for the implication of the immune response and antimicrobial systems in the etiopathology of tooth decays.

The increased lipid peroxidation and decreased ceruloplasmin levels indicates the participation of oxidative stress in this pathology. Future studies regarding the use of antioxidants therapies in reducing the incidence of tooth decay are emerging.

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# Analysis of biofilm formation on orthodontic mini-screws



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## Abstract

**Introduction:** The aim of this study is to present various means of detecting bacteria in patients' saliva that undergo an orthodontic treatment and the impact of their presence on temporary anchorage devices – mini screws.

**Materials and methods:** This study was divided in two phases – the in-vivo phase which consisted in gathering data from twelve patients of the Department of Orthodontics of the Faculty of Dentistry at the University of Medicine and Pharmacy “Carol Davila” Bucharest, and the in-vitro phase which was conducted in the microbiology laboratory and was dedicated to examining, counting and recording bacterial accumulation on orthodontic brackets and titanium mini screw implants. The three main organisms chosen to be studied were Mutans Streptococcus, Lactobacillus Casei and Porphyromonas gingivalis and their study was made using selective culture environments.

**Results:** Significant differences were found regarding the appliance type, time period and bacteria. Standard metal brackets proved to have a higher adherence than titanium mini screw implants.

**Conclusions:** There were significant differences found with regard to amount of bacteria that accumulated on the appliances with respect to time period. More bacteria were found to accumulate on the appliances between weeks one and two and a decrease in bacterial accumulation was found between weeks two and three.

**Keywords:** orthodontic anchorage procedures, mini screws, microbiological colonization.



## INTRODUCTION

Dentists and skilled personnel can elaborate caries screening programs for patients undergoing orthodontic treatment. Caries not necessarily develop if the effects of protective factors exist, but all cases should be monitored because of the presence of three main bacteria in plaque and saliva: *Mutans Streptococci*, *Lactobacillus casei* and *Porphyromonas gingivalis*. These three adhere to the temporary anchorage devices – mini screws and can seriously damage the tooth structure and the surrounding tissues.

*Mutans Streptococci* have the ability to produce lactic acid from sugar and can tolerate acid values of the oral pH. A high sugar intake and frequent low values of pH generate increases in the number of *Mutans Streptococci*.

In the field of microbiological culture methods, *Mutans Streptococci* are identified through standard testing procedures involving mitis-salivarius agar containing bacitracin<sup>1</sup>. A number of substances ensure high selectivity of the procedure, such as sucrose and bacitracin, a polypeptide antibiotic, such as various salts, with the latter being responsible for the blue color of the agar. *Mutans Streptococci* show a high resistance to this combination while other microorganisms are inhibited. If plaque and saliva samples are used undiluted or softened dentin samples taken from smears and back of the tongue, enterococci and yeasts can also be cultivated. However, these colonies could be clearly distinguished from those of *Mutans Streptococci* by their appearance. Enterococci appear flat dark blue-brown colonies, while yeast form large colonies of white light blue mat.

*Lactobacilli* can lead to alterations of the tooth structure by adhesion, lactic acid production and forming colonies in retentive cavities. In the early fifties, the agar Rogosa made its way into microbiological laboratories for detecting lactobacilli<sup>2</sup>. Tomato juice agar used proved to be very sensitive to a large number of intervening germs, which substantially complicated the identification of lactobacilli. In contrast to the agar, Rogosa agar allows the selective detection of lactobacilli and remained the standard laboratory procedure until nowadays. Yeasts can occur, but only rarely and in a very small number. Their appearance is also clearly distinguished from that of lactobacilli. The corresponding colonies are relatively high and cream-coloured. In case of doubt, they may be identified by adding drops of H<sub>2</sub>O<sub>2</sub>.

*Porphyromonas gingivalis* is a gram-negative anaerobe, an opportunistic pathogen that can coexist with the host. It has the ability to colony the sub gingival space by adhering to adsorbed salivary molecules, epithelial cells, matrix proteins and to structures from other bacteria already present on the tooth surface or epithelial surfaces. This bacterium can cause periodontal diseases that lead to chronic destruction of periodontal tissues, with a final result in tooth exfoliation.

## MATERIAL AND METHODS

The this study involved 12 subjects that were patients at the UNIVERSITY OF MEDICINE AND PHARMACY "Carol Davila" – Bucharest department of Dentistry, Department of Orthodontics. Plaque samples were taken from the gingival base of a maxillary incisor bracket, a mandibular incisor bracket, and the head of a titanium mini screw implant at three different time periods (one month, two month, and three months). The standard metal brackets served as the control. The samples were taken and cultured at each time period for three specific bacteria including *S. mutans*, *Lactobacillus casei*, and *P. gingivalis*. Each month for three consecutive months, plaque samples were taken from the same locations in each patient and cultured shortly after. All bacterial counts were recorded and appropriate tests to confirm various bacterial species were performed.

The *in-vitro* phase of this study consisted of 12 standard metal brackets and 12 titanium miniscrew implants set up in a unique experimental design. The brackets and mini

screws were placed inside of sterile suction tubing (4 bracket and 4 miniscrews) per section of tubing. These appliances were exposed to equal amounts of three bacterial species including *Streptococcus mutans*, *Lactobacillus casei*, and *Porphyromonas gingivalis*. The appliances were rocked back and forth for 24 hours a day and each section of mini screws and brackets were removed from the anaerobic chamber at a specified time period. These time periods were one week, two week, and three week and the appliances were then cultured for the specific bacterial types.

All preliminary records were obtained including a designated treatment plan before the study began. All standardized assent, consent, and/or parental consent forms were obtained by the protocol and all patient records of each of the patients involved in the study were shelved in the chart room of the Faculty of Dentistry at UNIVERSITY OF MEDICINE AND PHARMACY"Carol Davila"- Bucharest. All patients received a case presentation, whereby the investigator conducting that specific patient's treatment explained the diagnosis and treatment plan to the patient and/or the patient's parents. The patient was then taken into the Orthodontic Clinic at the UNIVERSITY OF MEDICINE AND PHARMACY"Carol Davila"- Bucharest. All necessary appliances including brackets and mini screws were placed according to the specified treatment plan for each patient. Patients were given proper oral hygiene instruction the day the appliances were placed. The patients were also reminded at the initial appointment not to perform any oral hygiene measures twelve hours prior to their next appointment, which included: no brushing of any teeth or appliances at all, no flossing, and no rinsing with any type of mouthwash. Once the patient arrived for their appointment, three plaque samples were taken from the patient prior to any other treatment being initiated. The same areas were sampled on each patient once a month at every appointment for three months total. The same areas were sampled at each visit. A total of 9 samples were taken from each patient throughout the course of the data collection process.

A #23 explorer (Hu-Friedy Inc, Chicago, IL) was used for the data collection of plaque samples from specified areas. A #23 explorer (Hu-Friedy Inc, Chicago, IL) was used for each area where a sample was taken. A total of three explorers were used at each collection time period. The three specific areas that the samples were taken from where: the gingival base of the bracket of a maxillary right central incisor, the gingival base of the bracket of a mandibular right central incisor, and the head of the temporary anchorage devices (mini screw). The method for obtaining the sample consisted of scraping the explorer across the base of the bracket and along the head of the temporary anchorage device. The explorer for each specified area was scraped across the appliance a total of three (3) times to gain an adequate amount of plaque on the explorer tip. Another #23 (Hu-Friedy Inc, Chicago, IL) explorer was then obtained and the next area to be sampled was made available and the samples taken in the same manner.

After the three scrapes across the each of the specified areas of the appliances, the tip of the #23 (Hu-Friedy Inc, Chicago, IL) explorer was then placed into a vial containing buffered anaerobic transfer media that contained varying amounts of carbon dioxide, protein, and glucose so that the organisms remained viable. The tip was swirled around five times in the media to ensure that all contents were removed from the tip of the explorer. The lid was replaced on each vial and they were transported to the microbiology laboratory. The vials were placed into an anaerobic chamber that was kept at room temperature (23° C) and stored until they were cultured. Each area that was sampled including, the mandibular central incisor bracket, the maxillary central incisor bracket, and the orthodontic miniscrew, had a vial specific to the indicated area for a total of three vials for each patient at each visit. Every visit following for the next three months, the exact same protocol was followed and three vials were collected for each patient at the specified time.

The urine streak technique was used to culture the bacteria. Specific agar plates (Anaerobe systems, Atlanta, Ga) that were pre-reduced were used to spread the contents of

the vials across them. The vials were then vortexed with the Digital Vortex Mixer (Fisher Scientific Co, Pittsburgh, PA) for approximately 15 seconds. The vials were opened and a one microliter plastic inoculation loop (Copan Diagnostics, Corona Ca) was placed into the vial and a sample taken. The loop was then spread straight down then middle of a specific agar plate and then spread gently across the entire width of the plate (urine streak technique). No dilutions were necessary. The plates were streaked in this manner to keep track of colony counts. The specific agar plates used in culturing included: Mitis Salivarius Agar with Tellurite (MSTAT) plate was used to specifically culture *streptococcus mutans*. Trypticase Soy blood agar plate (TSBA) was used to identify *Lactobacillus casei* and TSBA and HK agar plate was used to identify *Porphyromonas gingivalis*. A total of three plates per vial were used for the data collection. Once spread out, all of the plates were placed into a 5% CO<sub>2</sub> incubator at 37°C for a period of seven days to allow for bacterial growth. The plates were placed upside down in order to prevent condensation falling onto the culture surface.

## RESULTS AND DISCUSSION

Significant differences were found with regard to appliance type, time period, and bacteria. The standard metal brackets were found to have a greater bacterial adherence than the titanium miniscrew implants. The bacterial types were found in a specific order as well. The bacteria found in greatest amount on all appliances was *S. mutans*, followed by *Lactobacillus casei*, and finally, *P. gingivalis*. Bacterial amounts increased from weeks one to two, but then the amounts decreased from weeks two to three. This data was consistent with what was found from the results of the *in-vivo* portion of the study. It shows that the model designed for the *in-vitro* experiment does indeed work and has significant clinical correlation, and can be used for future studies.

Findings of 10<sup>5</sup> CFU or more of Lactobacilli and Streptococci Mutans per ml of saliva indicate a high risk for caries. (Fig. 1)

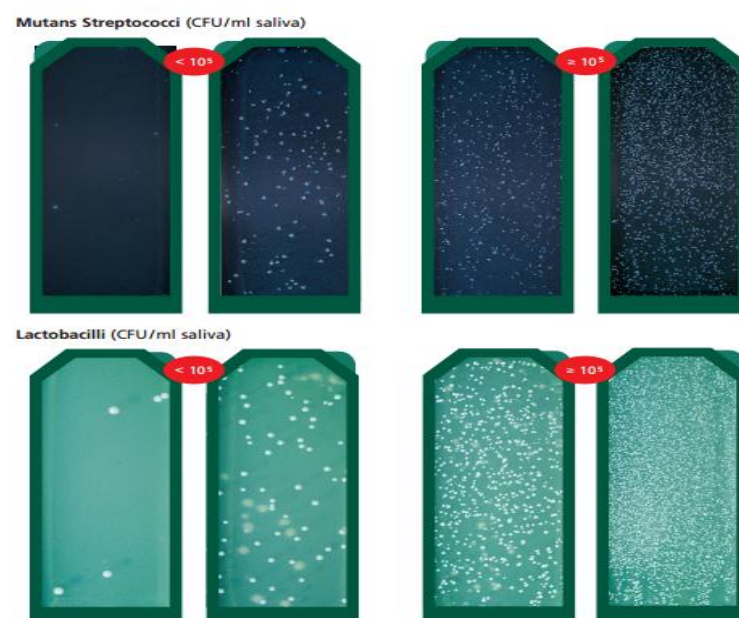


Figure 1. Cultures of Mutans Streptococci and Lactobacilli

Yeasts can also occur, but only rarely and in a very small number (Fig. 2). Their appearance is also clearly distinguished from that of *lactobacilli*. The corresponding colonies are relatively high and cream-coloured. In case of doubt, they may be identified by adding drops of H<sub>2</sub>O<sub>2</sub>.



Figure 2. Cultures of *Candida albicans* found in saliva

The present study found no significant differences among bacterial type, location, or time and there was no significant differences on the interaction of these variables. The overall amount of *S. mutans* was higher on the orthodontic brackets than the miniscrew appliance. The increase in *S. mutans* adherence after placement of orthodontic brackets is in agreement with the study conducted by Corbett et. al.; these findings indicate that orthodontic patients had a higher cariogenic *S. mutans* concentration once they are banded <sup>3</sup>. There were no significant differences found between accumulation on the standard metal brackets in the areas of the maxillary central incisor bracket base, the mandibular central incisor bracket base, and the head of the miniscrew implant. There was no consistent pattern found for this either. It was highly variable as to which of these sites had more bacterial accumulation for the *in-vivo* portion of the study. Not one appliance in particular yielded a higher amount of any type of bacteria. This could be due in part to the small sample size of patients used in the study. Also, all the areas that were chosen to be cultured were in an area that was easy to maintain consistent oral hygiene. All areas sampled were in the anterior portion of the mouth which, in general, is easier for the patients to keep clean. There was a trend of greatest adherence of *S. mutans*, followed by *Lactobacillus casei*, and finally, *P. gingivalis*.

## CONCLUSIONS

There were significant differences found with regard to amount of bacteria that accumulated on the appliances with respect to time period. More bacteria were found to accumulate on the appliances between weeks one and two and a decrease in bacterial accumulation was found between weeks two and three. This information correlates with the findings found in the *in-vivo* portion of the study.

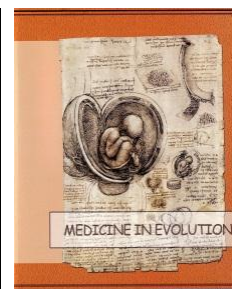
Beside the three main bacteria, other microorganisms can be present in the saliva and influence the oral micro flora causing serious variations in local pH and contributing to caries development.

Patients undergoing orthodontic treatment must be placed under strict oral hygiene measures. Practitioners must explain to their patients the importance of these measures and inform them over the possible drawbacks of the orthodontic treatment and the effects of not respecting indications.

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# Complex treatment of dental avulsion: report of two cases



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## **Abstract**

Dental luxation, especially avulsion, is considered a severe form of traumatism because of the high frequency of complications.

Complex treatment of two clinical cases with dental avulsions is presented.

The analysis of the two presented cases shows that the compexity of the treatment increases with injury severity and with the types and number of complications.

Respecting the operative protocol in avulsions of permanent teeth is essential for a favourable prognosis.

**Keywords:** dental trauma, avulsion, complex treatment.

## INTRODUCTION

Dental trauma has a high prevalence (approximately 45%) in paedodontic practice [1].

Tooth avulsion is the complete displacement of tooth out of the socket affecting mainly the frontal teeth and can have a considerable impact on everyday life and self-esteem [11].

Luxations, especially avulsions, are considered a severe form of traumatism because of the high frequency of medium and long term complications (loss of the tooth's vitality and risk of losing the tooth).

Dental avulsion has a frequency between 1 – 16% in permanent teeth [10]. An age category with high frequency of traumatisms is of children between 7 and 9 years of age who suffer play accidents or accidents related to fights or sports [23].

*Successful dental treatment* of total luxations depends on the maturity of the tooth's root, the correct handling of the tooth, the time elapsed until replantation and the storage medium of the tooth (dry or wet) as well as the correct repositioning and stabilisation.

Providing an immediate emergency treatment can be decisive for keeping or losing the tooth [20].

The use of an appropriate medicine prescription and respecting the operative protocol in avulsions of permanent teeth, both mature and immature, is essential for a short term favourable prognosis as well as, especially, for the prognosis for longer time periods. The use of an appropriate medicine prescription and respecting the operative protocol in avulsions of permanent teeth, both mature and immature, is essential for a short term favourable prognosis as well as, especially, for the prognosis for longer time periods.

## MATERIAL AND METHODS

Below we present two case reports which are distinguished by different clinical and therapeutic (dental and pharmacological treatment) aspects that influenced the success or the failure.

### *Case I: boy, 9 years old*

*Disease history:* at 9 years the boy had a play accident with traumatic avulsion of the right upper lateral incisor (1.2) and extrusive luxation at the right upper central incisor (1.1). Immediately after the trauma the child has replanted the tooth 1.2 into its socket and has repositioned the tooth 1.1. The boy has not informed parents about the accident being afraid of being punished.

The boy presented at the Paediatric Dentistry Department only two months after the injury (Fig. 1) because of a high mobility of the tooth 1.2.



Figure 1. Radiographic aspect of 1.1 and 1.2, 2 months after injury

*Diagnosis:* 1.2 avulsion with immediate self-replantation complicated with root resorption; 1.1 extrusive luxation and uncomplicated enamel-dentin fracture.



The radiography revealed that both teeth presented wide open apices and that a process of root resorption has begun.

*Treatment:*

Complications appeared very early, after 6 months, because of the late presentation and lack of immediate stabilisation consisting in root resorption in both teeth (Fig. 2.).

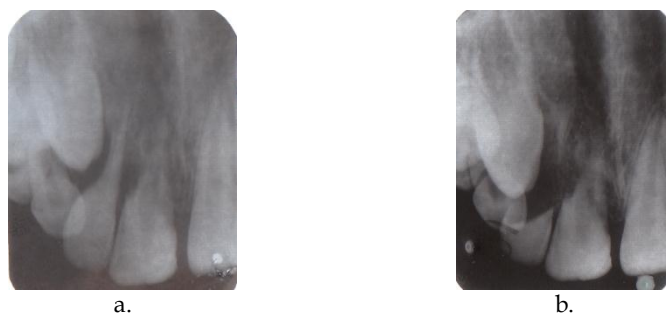


Figure 2. Root resorption in 1.1 and 1.2 after 6 months (a) and 1 year 10 months (b)

Despite the endodontic treatment with calcium hydroxide during about one year and 10 months after presentation at tooth 1.2 the root resorption was complete. This process has been aggravated by the mesial inclination of the erupting canine (1.3). The upper lateral right incisor was extracted almost 1½ years after the injury with the spontaneous partial gap closure (eruption of 1.3). During this time the child took analgesics if needed to relieve pain (Nurofen 200 mg).

At the same time, we tried to suppress root resorption of 1.1 by endodontic treatment initially with Ledermix paste followed by a calcium hydroxide paste, replaced periodically, so the tooth arch was preserved about 10 years after trauma, helping to conserve bone / space in view of the subsequent insertion of an implant.

The extraction of 1.1 was performed followed by the insertion of a titanium implant and a ceramic crown (Fig. 3). The prosthetic solution improved both functional and aesthetic aspects thus enhancing the patient's quality of life as a young adult.



Figure 3. Radiographic aspect after implant insertion

The following general medicines have been prescribed postoperatively: analgesics if needed Nurofen (acetaminophen) 200 mg, anti-inflammatory drugs Celebrex (celecoxib) capsule 100 mg - 2 capsule / day during 3 days and antibiotics Ospamox (amoxicillin) tablets 1000 mg - 1tb / 12 h during 5 days to prevent inflammation and microbial complications. Also, to minimize postoperative swelling, the patient was instructed to apply an ice pack for about thirty minutes in the first five hours following surgery. To avoid pain and bleeding the patient was instructed to chew on the opposite side of the implant and cut all food into small pieces

The following local medicines have been prescribed pre- and postoperatively: chlorhexidine 0.02% antiseptic gel (Elugel) alternating with mouth rinses with a chlorhexidine 0.10% mouthwash (Eludril). These medicines reduce plaque build-up and help to prevent

gingivitis, they are bactericidal, fungicidal, analgesic and promote healing. Another recommendation was to maintain an adequate oral hygiene.

**Case II: girl, 13 years old**

*Disease history:* at 13 years the girl had an accidental fall with traumatic avulsion of the upper left central incisor (2.1). Immediately after the trauma the child washed the tooth with tap water and kept it in the mouth until the presentation at the Paedodontics Clinic, approximately 1 hour later.

*Diagnosis:* 2.1 avulsion, properly stored until initiation of the treatment.

The radiography revealed that 2.1 had closed apex and no other associated injuries.

*Treatment:*

In this case, the recommended clinical protocols were respected.

The tooth and the socket were cleaned with saline solution with potassium benzyl penicillin 400 000 IU (Fig. 4). The tooth was replanted and immobilized with a semi-flexible splint (Fig. 5) for 10 days. Correct repositioning was evaluated radiographically.



Figure 4. Avulsed 2.1 in saline solution (a), tooth's socket at presentation (b)



Figure 5. Stabilisation of 2.1 with a semi-flexible splint

Systemic antibiotics have been prescribed - Augmentin (Amoxicillin and Clavulanic Acid) tablets 625 mg. 1tb / 12 h during 5 days. Analgesics were prescribed postoperatively if needed - Nurofen 200 mg, to avoid discomfort. Also, to minimize postoperative swelling the patient was instructed to apply an ice pack for about twenty minutes during the first six hours following surgery. To avoid pain and bleeding the patient was instructed to chew on the lateral teeth and cut all food into small pieces. Another recommendation was to maintain an adequate oral hygiene.

Endodontic treatment was performed one week after tooth replantation (Fig. 6).



Figure 6.2.1. Radiographic aspect after endodontic treatment

Clinical and radiographic control were scheduled at 4 weeks, 3 months, 6 months, 1 year and yearly thereafter but after about two years the girl abandoned monitoring.

## DISCUSSIONS

The long term success after replantation of an avulsed tooth is impossible to be guaranteed but there are many factors (a short extra alveolar dry time, an appropriate storage medium for tooth transportation, absence of other severe injuries, absence of other dental diseases like caries or advanced periodontal disease, healthy patients, stage of root formation, adequate socket management, adequate handling of the tooth, proper replantation and stabilization, type and duration of splinting, timely controls, immediate suitable endodontic treatment after infection installation) that may increase the probability of a good prognosis [6, 9, 15, 17].

Unfortunately, in dental traumatology very few studies present a survival analysis. However, the general opinion is that avulsed and replanted permanent incisors have a survival time rate of less than five years [4, 14].

Based on the literature the prognosis of traumatized teeth in general and of avulsed teeth in particular depends on prompt and appropriate treatment [7]. The prognosis of teeth with this traumatic injury depends on appropriate management at the place of accident [25].

The two presented cases showed some similarities but also many differences (Table I).

Extra-alveolar dry time (< 30 minutes) and extra-alveolar total time (< 90 minutes) are important factors for the long-term success [2, 3, 5, 6, 7, 16]. The prognosis is best for teeth replanted within 5 minutes after dental avulsion [8, 12, 19]. Immediate tooth replantation leads to a better periodontal ligament repair and reduces significantly the occurrence of root resorption [2, 15].

Our first case had an extra-alveolar dry time longer then the recommended time and developed early root resorption while in the second case the extra-alveolar dry time was in accordance with the recommended time and the tooth had a favourable evolution after 2 years.

Table I. Comparative presentation of the two cases

<b>Case 1, boy, 9 years</b>	<b>Case 2, girl, 13 years</b>
1.2 avulsion, 1.1 extrusive luxation	2.1 avulsion
Immature permanent teeth	Mature permanent tooth
Late presentation to dentist – 3 months	Immediate presentation < 60 min
Extra alveolar dry time > 30 min.	Extra alveolar dry time < 30 min
Tooth was not transported to the dentist	Wet storage until replanting (saliva)
No socket management	Proper socket management
Self-replantation > 1 hour	Immediate replantation by the paedodontic
Without splinting in disagreement with the operative protocol	Proper splinting in compliance with the operative protocol
No timely control of root canal infection	Timely control of root canal infection
Late endodontic treatment after installing infection	One week after tooth replantation before installing infection
Follow-up during 14 years	Follow-up only for 2 year (abandonment)
Early root resorption with loss of both teeth	Favourable evolution after 2 year
Expensive	Cheaper
Interdisciplinary treatment: paedodontic, orthodontic, implantology, prosthetics.	Paedodontic treatment
Large number of prescription drugs	Limited number of prescription drugs
Unfavourable prognosis	Favourable prognosis

The storage medium used to transport the tooth is another factor that may influence the prognosis [16]. An appropriate storage medium (milk, physiological saline or saliva) [3, 6, 15, 21] was used in our second case (saliva) but not in the first. Other prescribed physiological

storage mediums are: Hank's solution (highly purified collagen solution, Eagle's medium, Dentosafe®, Germany), EMT Tooth saver (USA), Viaspan® (USA) [3, 21]. Medias such as tap water, chlorhexidine, chloramine, alcohol or other sterilizing solutions are not recommended [26].

At the site of injury, the tooth was not cleaned at all in the first case while in the second one it was cleaned with saliva. In the dental office both tooth and socket have been cleaned with physiological saline and potassium benzyl penicillin.

After tooth replantation, it is recommended to maintain the repositioned tooth in correct position using short-term and non-rigid splints [3, 24]. The splinting must provide patient comfort and improved function [24].

In our first case the tooth was self-replanted and not stabilized which was in contradiction with treatment protocol while in the second case the replantation was followed by an immobilization with a semi-flexible splint for 10 days thus respecting the treatment protocol.

The risk for pulp necrosis, root resorption and ankylosis is higher in permanent mature teeth [21] and when the dry storage period is prolonged [3, 9, 17, 19]. These results are not in accordance with the evolution of our cases because the prognosis may be modified by other factors too.

Systemic antibiotic coverage is recommended in patients with avulsed replanted teeth accompanied by other associated injuries or complications or in patients whose medical status may warrant antibiotic coverage [18, 24]. We used in both cases systemic antibiotics prescriptions in accordance with the "Guideline on Use of Antibiotic Therapy for Pediatric Dental Patients" [22]. Thus, in the first case there was used a therapeutic systemic antibiotic coverage and in the second case a prophylactic prescription to prevent the infection. [18].

The endodontic use of a Ledermix paste containing corticosteroid and tetracycline [5] produced in the first case, at the central right incisor, the slowing of the root resorption and allowed keeping the tooth on the arch for 10 years which is in accordance with literature data [3].

The use of a topical antibiotic soak is not currently recommended by the BSPD Avulsion Guidelines but literature demonstrates a favourable benefit for use of an antibiotic soak which is in accordance with the evolution of our second case. There is, however, no readily available soaking solution in the UK and insufficient evidence to recommend one particular drug, dose or duration [6]. The use of a saline solution with potassium benzyl penicillin to clean the tooth and the socket led to a favourable outcome in the second case after two years of monitoring.

Pain management comprised systemic analgesics prescription as needed i.e. Nurofen, a non-opioid analgesic based on Paracetamol (also known as Acetaminophen) and ibuprofen that reduced inflammation. [13].

The analysis of the two presented cases shows that prescription drug submission increases with injury severity and with the types and number of complications.

## CONCLUSIONS

The use of an appropriate medicine prescription and respecting the operative protocol in avulsions of permanent teeth, both mature and immature, is essential for a short term favourable prognosis as well as, especially, for the prognosis for longer time periods.

Such severe trauma requires early immediate access to an emergency treatment at the place of accident made by parents, teachers, healthcare professionals or children themselves to improve the prognosis for the replanted tooth/teeth.

## Acknowledgement

All authors contributed equally in the elaboration of the study.

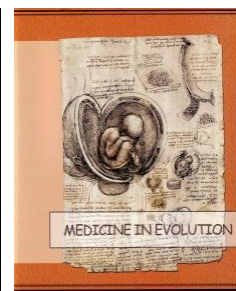
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# Prosthetic rehabilitation of the aesthetic area in a patient affected by bruxism



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## Abstract

**Introduction:** Bruxism is a repetitive jaw-muscle activity characterised by clenching or grinding of the teeth and/or by bracing or thrusting of the mandible. Bruxism has two distinct circadian manifestations: it can occur during sleep (indicated as sleep bruxism) or during wakefulness (indicated as awake bruxism).(1)

**Case report:** A 53 year old male patient sought dental consultation regarding the generalized teeth sensibility and masticatory deficiency. He requested prosthetic rehabilitation of the aesthetic area. The occlusal equilibration and gingival maturation were the biggest challenges of this case, because the patient is a bruxoman.

**Conclusions:** When prosthetic intervention is indicated in a patient with bruxism, efforts should be made to reduce the effects of likely heavy occlusal loading on all the components that contribute to prosthetic structural integrity.

**Keywords:** aesthetic area, bruxism, aesthetic score.

## INTRODUCTION

Bruxism' originates from the Greek word *brychein*, meaning to 'gnash the teeth'. An early and common definition of bruxism was thus "gnashing and grinding of the teeth for non-functional purposes" (6). Later definitions have been more specific, for example, "involuntary, non-functional, rhythmic or spasmodic gnashing, grinding, and clenching of teeth, usually during sleep" (6). The same medical dictionary (7) adds that causes of bruxism may be related to repressed aggression, emotional tension, anger, fear, and frustration. Sequelae of bruxism that have been proposed include tooth wear, signs and symptoms of temporomandibular disorders (TMD), headaches, toothache, mobile teeth, and various problems with dental restorations as well as with fixed and removable prostheses (3,4).

Bruxism, which can be considered an umbrella term for clenching and grinding of the teeth, is the commonest of the many parafunctional activities of the masticatory system. Opinions on the cause of bruxism are numerous and widely varying. Current reviews indicate that the etiology is not fully known but that it is probably multifactorial (2). Although intermittent clenching and grinding are extremely common, they usually pose no serious consequences for the oral structures. On the other hand, manifest bruxism can result in problems that are as frustrating for the patient as for the treating dentist.

## CASE PRESENTATION

This article depicts the case of a 53 year old male patient engaged in parafunctional activity accounting for a wide range of pathological phenomena concerning the oral cavity and the maxillofacial sector. Clinical examination revealed teeth sensibility, masticatory deficiency, multiple fissures in the dental enamel (Figure 1), a decrease in the vertical dimension of occlusion and an overall prejudice to the aesthetic area (Figure 2), features abiding by the behavioural pattern of nocturnal or sleep bruxism. Worth noting is the old-aged guise typically associated with a reduced occlusal vertical dimension (OVD). The therapeutic stage commenced with endodontic treatment. We proceeded with teeth preparation (Figure 3), impression (Figure 4) and the adjustment of provisional crowns conceived using the CAD/CAM technique. The provisional crowns were maintained for a period of 3 months, allowing for occlusal equilibration and gingival maturation. Once these goals were met, the final prosthetic restorations consisting of lithium disilicate Emax capes loaded with Emax ceramic were cemented, thus concluding the treatment (Figure 5,6).



Figure 1.



Figure 2.



Figure 3.

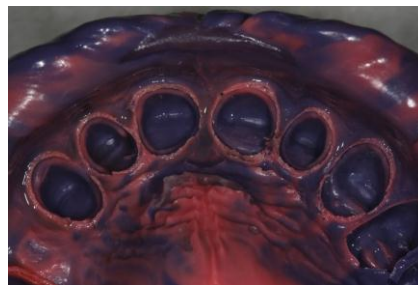


Figure 4.



Figure 5.



Figure 6.

## DISCUSSIONS

Bruxism is a common parafunctional habit, occurring both during sleep and wakefulness. Usually it causes few serious effects, but can do so in some patients. The etiology is multifactorial. There is no known treatment to stop bruxism, including prosthetic treatment. The role of bruxism in the process of tooth wear is unclear, but it is not considered a major cause. The relationship between bruxism and prosthetic treatment is one that relates mainly to the effect of the former on the latter.

## CONCLUSIONS

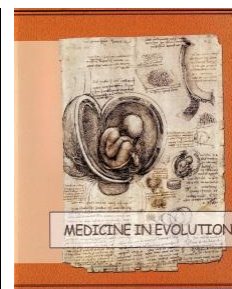
The etiology of bruxism is not well known, but it is agreed that it is multifactorial. There is no specific treatment available at this time to stop bruxism, so that the focus has been to reduce the adverse effects of the habit.

Bruxism may be included among the risk factors, and is associated with increased mechanical and/or technical complications in prosthodontic rehabilitation, although it seems not to affect the prosthetics survival. When prosthetic intervention is indicated in a patient with bruxism, efforts should be made to reduce the effects of likely heavy occlusal loading on all the components that contribute to prosthetic structural integrity. Failure to do so may indicate earlier failure than is the norm.

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# Serum protein carbonyl groups and hydrogen donors as oxidative stress biomarkers in 4NQO induced oral carcinogenesis



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## Abstract

Oxidative stress (OS) is a generic term reflecting the degradation resulted from an instability between generation and neutralization of free radicals. OS has significant implication in various diseases including oral cancer. We measured some OS biomarkers during 4NQO induced oral carcinogenesis in rats. Two groups of rats received 4NQO in polyethylene glycol and the vehicle alone respectively for 12 weeks. After 16 weeks animals were anaesthetized and blood was collected from the retroorbital sinus. Carbonyl groups (PC) (Reznick method) as markers of oxidative stress and hydrogen donors (HD) (Janaszewska method), indicators of antioxidant capacity were assayed. In 4NQO group PC values increased, but not significantly ( $p=0.773$ ) maybe because of the body antioxidant system reaction. The HD levels increase significantly ( $p=0.001$ ) probably in the effort of the organism to counteract the OS. These results point to PC and HD as possible biomarkers of oral carcinogenesis.

**Keywords:** oral cancer, oxidative stress, carbonyl proteins, hydrogen donors.

## INTRODUCTION

Oxidative stress (OS) is a generic term that have been used frequently in the 1970s, but its conceptual origins can be traced back to the 1950s to researchers pondering the toxic effects of ionizing radiation, free radicals, and the similar toxic effects of molecular oxygen [1]. OS reflects a certain level of degradation in a cell, tissue or organ resulted from a instability between generation and neutralization of the free radicals normally and continually formed in the organism [2]. OS has a significant role in the developement of various diseases including, atherosclerosis, malaria, rheumatoid arthritis, neurodegenerative diseases and cancer [3].

For oral cancer studies, animal experiments with 4 nitro-quinoline-1-oxide (4NQO) as the carcinogen are the most used models [4]. 4NQO generates reactive oxygen species (ROS) that produce DNA alteration directly or through their metabolites. Moreover it has been reported that tobacco, one of the most important factor implicated in oral carcinogenesis, contains carcinogens acting in the same manner as 4NQO [4].

### *Aim and objectives*

The aim of this study was to evaluate the status of serum oxidative stress by dosing the level of carbonyl groups and the degree of the antioxidant defense by measuring the serum hydrogen donor capacity during 4NQO induced oral carcinogenesis in Wistar albino rats.

## MATERIAL AND METHODS

### *Animals*

20 male Wistar albino rats (8 weeks old and weighting a mean $\pm$ deviation 220 $\pm$ 20 g) were purchased from „Iuliu Hatieganu”University of Medicine and Pharmacy Bioabase and then transferred to the Department of Physiology Biobase. The animals were hosed 2 per cage and maintained in a controlled environment at a temperature of 21 $\pm$ 2°, 70 $\pm$ 4% humidity and under 12h dark/ 12h light cycle. They were fed a standard pellet laboratory diet and received water ad libitum. They were acclimatized 1 week before the experiment started.

The animal protocol in this study was approved by The Ethical Committee on Animal Welfare of „Iuliu Hatieganu”University of Medicine and Pharmacy in accordance with the Romanian Ministry of Health.

### *Chemicals*

4-nitro-quinolin-1-oxid (Sigma-Aldrich®) was dissolved 0,5% wt/vol in polyethylene glycol (Sigma-Aldrich®)

### *Experimental procedure*

The rats were randomly divided into 2 groups. To initiate oral carcinogenesis the tested group was treated with 25 $\mu$ l solution of 4NQO topically applied on the oral mucosa three times a week for 12 weeks. The control group received the vehicle alone (polyethylene glycol). The rats were restrained from drinking water two hours after these procedures. After 16 weeks animals were anaesthetized and blood was collected from the retroorbital sinus.

### *Assay of oxidative stress and antioxidant capacity parameters*

Blood samples (5ml) were centrifuged for 5 minutes at 3500 rpm. After plasma was obtained it was immediately frozen and kept at a temperature of -80° C until it was processed.

Carbonyl groups (PC) were assayed and expressed in nmol/mg protein [5] and hydrogen donors (HD) were measured and expressed in inhibition% [6] (table 1)

Table 1. Biochemical assays

Serum	
Oxidative stress	PC (Reznick method)
Antioxidant capacity	DH (Janaszewska method)

### Statistical analysis

Kolmogorov-Smirnov test was used to establish data normality. Data were analyzed using the nonparametric Kruskal-Wallis test for overall groups comparison and Anova test respectively. When needed Bonferroni post-hoc analysis and Dunnett C analysis was applied. To analyze all data SPSS 13.0(Chicago, IL,USA) statistical package was used and Excel.

## RESULTS

Median PC levels were increased in the tested group 3.646(1.09-6.06) versus control group 2.736(0.60-5.26). The comparison between groups have returned a value of 0.773 (not significant).

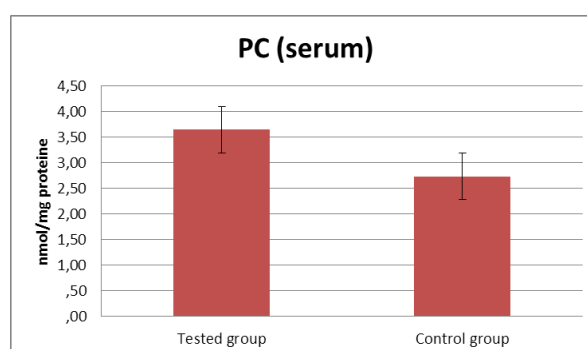


Figure 1. Serum PC levels in tested group and controls

HD median level was elevated in the tested group 43.145(31.02-57.14) as compared to control group 25,118(16.36-33.01). The difference between groups was significant ( $p < 0.001$ ).

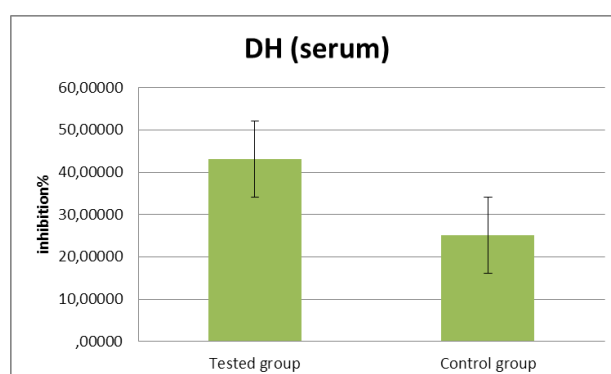


Figure 2. Serum HD levels in tested group and controls

The clinical aspect of the oral mucosa of rats had no specific alterations. The rats in the group treated with 4NQO had hyperemia on the marginal gingiva (figure 3).



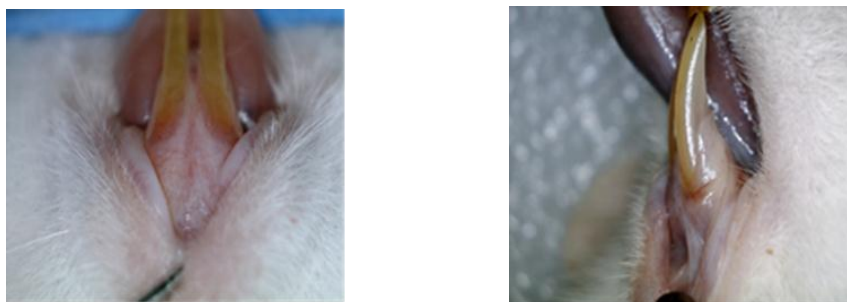


Figure 3. Clinical aspects during 4NQO induced carcinogenesis. Hyperemic marginal gingiva (left) vs unmodified aspect (right)

## DISCUSSIONS

Oxidative alteration of DNA, lipids and proteins are important molecular events that occur during initiation, promotion and progression of carcinogenesis [7, 8]. Studying them could add data to the elucidation of the exact mechanisms of carcinogenesis which are still unclear.

The mechanisms of OS protein alteration are numerous (more than 35). Protein alteration by ROS results in the enzymatic activity diminuation, modification of cellular energy production, alteration of cell membrane potential, alteration of the level and type of cell proteins and ultimately cell dysfunction. Protein carbonilation is implicated in most of these processes. Protein carbonylation by ROS could happen via protein direct oxidation or, secondary, as a result of the reaction between the carbonylic products and carbohydrates, lipids, final products of lipid or glucidic peroxidation [9]. In our study 4NQO administration resulted in higher levels ( $p=0.773$ ) of serum protein carbonyl groups indicating an augmentation of the general OS status in animals in which oral carcinogenesis was induced.

Few studies indicate significant serum PC augmentation in patients diagnosed with oral lichen planus [10]. Protein carbonylation is initiated by hydroxyl free radical [11]. The fact that 4NQO first generates the anion superoxide and the hydrogen peroxide free radicals [12] could explain why PC levels are not significantly modified in our study.

It is well known that the organism possesses defense systems in order to maintain the equilibrium between the prooxidants and antioxidants [13]. Serum hydrogen donor capacity (HD) is an expression of the total antioxidant capacity of the serum because it is evidencing the amount of reducing substance that has neutralized ROS. Our results indicate elevated values ( $p<0.001$ ) of HD in the serum of the tested group probably as a result of mobilization of the organism in counteracting OS through antioxidant mechanisms [10].

The significantly increased of HD serum levels during 4NQO induced oral carcinogenesis may also explain the not significantly PC serum levels in these animals compared with those found in the control group.

## CONCLUSIONS

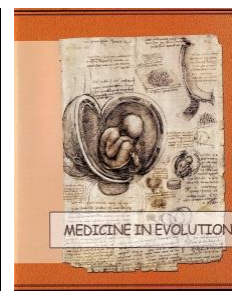
We concluded that serum PC and HD levels could be used as indicators of oxidative stress implication in oral carcinogenesis.

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# Vertical tooth preparation for zirconia fixed partial denture to restore a disharmonic smile



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## **Abstract**

This clinical report describes a minimally invasive preparation technique, utilised to prepare the teeth of a young adult with anterior maxillary disharmonies, in order to receive all ceramic zirconia restorations.

**Keywords:** zirconia; vertical tooth preparation; metal-free; BOPT; disharmonic style.

## INTRODUCTION

Metal-free fixed partial dentures are becoming widespread due to their enhanced aesthetic and biocompatibility. An extensive preparation for an all-ceramic crown demands 63-73% tooth hard tissue removal and a major risk of pulpal and periodontal reactions.<sup>1,2</sup> The finish line of the abutment preparation can be located supragingival, equigingival or subgingival, and the last one is more susceptible to produce gingival inflammation.<sup>3-5</sup> Restoration of teeth and periodontal health are interconnected, because the key for the longevity of a dental restoration is to maintain a good gingival health.<sup>6</sup>

The BOPT technique (biologically oriented preparation technique) consists in vertical preparation of the teeth that includes a limited invasion of the gingival sulcus.<sup>7</sup> By removing the emergence profile of the anatomic crown, which coincides with the cemento-enamel junction, it can be created a new prosthetic junction, with the desired location of the gingival margin.<sup>7</sup> This is very useful because it allows to obtain an adequate emergence profile, that is mandatory for an aesthetic crown.<sup>8,9</sup> Another advantage of this technique is that the retention is improved and simplifies the impression procedure compared to preparation with finish lines. The disadvantage of this technique is that it is often difficult to localize the prosthetic margin in the correct location because there is no dental finish line.<sup>8</sup>

## CASE REPORT

A 26-year-old male, dissatisfied with his smile, presented at the Prosthodontic Clinic of the Faculty of Medicine and Dentistry of Timisoara, Romania, trying to improve his appearance. The patient's major concern was the disproportion and the misalignment of his teeth. The patient had no contributory medical history and took no medications.

A thorough examination was performed after obtaining the inform consent and appropriate digital photos and radiographs were taken. The patient presented a deficient cantilevered fixed partial denture (FPD) from the maxillary right canine to the lateral incisor. The other maxillary teeth presented extended carious lesions and malposition (Fig. 1, Fig. 2).



Figure 1. The smile of the patient at the presentation



Figure 2. The disharmony of the frontal teeth alignment

After taking a first impression and pouring the study cast, the wax-up and the mock-up were realized in accordance to the right teeth proportion.

The sequences of the treatment plan consists in removing the old FPD, periodontal treatment, carious lesions and endodontic treatment for the second left bicuspid.

The right and left cuspids, both the central incisors and the second left bicuspid were prepared for FPD, using a 17 diamond burs set (Sweden & Martina) designed by Dr. Ignatio Loi (Fig. 3). On the maxillary left lateral incisor a chamfer preparation for an aesthetic veneer was done.



Figure 3. Teeth preparation with BOPT technique

Teeth preparation was followed by fabricating a first temporary acrylic restoration, using a silicone index of the wax-up and a resin based provisional restoration material (Protemp Garant, 3MESPE).

The provisional crowns were tested and relined with acrylic resin, in order to obtain a new emergence profile, for the proper healing of the gingival tissue (Fig. 4).

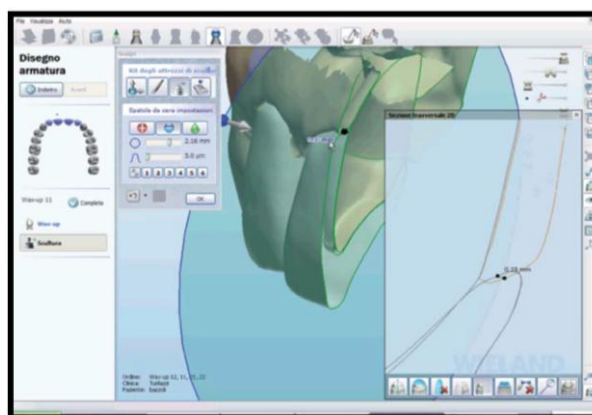


Figure 4. Digital design of the final provisional restorations

After 4 weeks, the periodontal status of the patient was assessed and an one stage double mix impression with polyvinyl siloxane (Elite HD, Putty/soft) was taken, then poured. The cast was scanned in the dental laboratory and the digital model was obtained. The dental technician overlapped the digital anatomical contours of the wax-up with the digital model of the abutment (Fig. 5). The position of the cervical margins was important in order to obtain a correct emergence profile. The digital design was transferred to a milling machine (Zirkonzahn M5 Germany) in order to fabricate the long- term temporary crowns (Telio CAD, Ivoclar, Vivadent). The main goal of the provisional restorations was to modify the gingival contour and also to offer important information about the aesthetic aspect of the final restoration (Fig. 6).



Figure 5. The final provisional restoration six weeks after the insertion



Figure 6. The smile of the patient with the zirconia final fixed partial dentures

The provisional restorations were used for six weeks, time for gingival healing. The final restorations were fabricated (Fig. 7):

- a ceramic veneer on the maxillary left lateral incisor
- two FPD with an Zirconia Prettau infrastructure veneered with feldspathic ceramic

Creation Z1-CT on maxillary right canine-lateral incisor-left central incisor; and maxillary left canine- second premolar.

## DISCUSSIONS

Maintaining the periodontal tissues healthy is mandatory for the long term success of the prosthetic restorations. The BOPT technique is based on the vertical preparation which allows to obtain good aesthetic results and improved tissue stability. This technique was originally used on teeth with periodontal disease, but later it was proven that it is proper also on healthy periodontal teeth<sup>9</sup>. In this protocol, the cemento-enamel junction is reorganized by means of the prosthesis, which permits good management of new tooth contours<sup>7-9</sup>. After preparing the teeth, the process begins with fibroblast stimulation and their migration to the damaged area<sup>3</sup>. Vertical preparation without a finish line on the teeth is an alternative procedure for FPDs, but there is a risk of uncontrolled invasion of the sulcus if the dentist or laboratory technician has little experience<sup>9</sup>.

Studies<sup>10,11</sup> have shown that a correct finish line of the prepared tooth is vital in placing the FPD because it reduces the space between the restoration and the tooth. If there is a small space between the prepared tooth and the fixed restoration, the amount of cement used for fixing the FPD will also be less. It is known that today's cements used for fixing the FPD are toxic, because they have an acid pH, especially if they are placed in contact with the gingival sulcus that is very sensitive<sup>1</sup>.

The health of the periodontal tissues depends of a proper designed restoration. If the margins of the restoration are placed incorrectly the biologic width is violated by the incorrect adapted restorations<sup>4,12</sup>.

## CONCLUSIONS

This clinical report describes the clinical steps involved in aesthetic and functional rehabilitation of the maxillary teeth of a young patient with disharmonic smile. The vertical preparation technique and the temporary crowns used in this case are important steps for a good final result.

### *Conflicts of interest*

None.

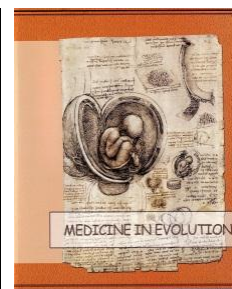
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# Cone beam computed tomography (CBCT) diagnosis of lingual bone canals in the mandibular interforaminal area



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## Abstract

**Aim:** Diagnosis and description of lingual foramina and bone canals in the mandibular interforaminal region using CBCT investigations and analysis software on a group of Romanian patients.

**Methods:** A pool of 70 patients, 35 women and 35 men, who underwent previous CBCT investigation of the anterior mandibular area, were analyzed in order to identify foramina and bone canals on the lingual side of the mandibular interforaminal region. Linear and angular measurements were made to establish the trajectory, orientation, distance from midline and mandibular base, and diameter of foramina.

**Results:** Lingual foramina and associated bony canals were observed in all subjects, 5 being the maximum number of canals found in one patient. The average diameter of the identified bone canals was 1.21 mm. The average distance from the midline to the center of the foramina was 3.28 mm. A total of 26 patients (13.33%) showed foramina on the vestibular cortical bone. Statistically relevant differences were noted between genders in some cases.

**Conclusion:** Investigation of the interforaminal mandibular region using CBCT recordings and software enables to observe a larger number of bony canals than other radiographic techniques and at lower dose of radiation. Clinicians who perform surgical procedures in the anterior area of the lower jaw should use CBCT investigation and its analysis software in order to precisely observe the anatomy of the area and diminish the risk of complications associated with surgery.

**Keywords:** CBCT, mandible, lingual foramen, lingual bone canal, interforaminal region.

## INTRODUCTION

Neurovascular disturbance associated with implant placement in interforaminal region of the mandible [1] led to studies based on three main directions: radiographic studies using Computed Tomography (CT) investigations [2,3], radiographic studies using Cone Beam Computed Tomography(CBCT)[4] and anatomical studies that used data from dissections on corpses [5]. The first two kinds of studies found varying numbers of canals passing through the cortical lingual bone but their identification was made based on anatomical studies. Thus, canals identified through radiographic methods were described as: the incisive canal, superior genial foramen and bifurcated mental foramen [6] whereas anatomically, they were defined as: deep lingual artery, facial artery, hypoglossal nerve, the lingual artery, lingual nerve, submental artery and sublingual artery [5], all of which were present in the interforaminal area of the lower jaw.

Lingual bone canals present in the mandible, in the interforaminal area, identified through radiographic investigations and anatomic dissection have names and definitions that literature has still not reached a consensus on. For example, the bone canal located in the middle of the interforaminal region(Fig.1 A), near the genial apophysis, is called in different studies lingual foramen of the mandible, central pit, median lingual foramen, midline foramen, mandibular lingual foramen, bone canal in the mandibular interforaminal region or superior genial spinal foramen and its bony canal [7, 8].

The inspection of mandibular hard tissue structures is presently achieved using CBCT technology [9-14], which can provide a precise localization with the help of advanced CBCT analysis software, and at much lower radiation exposure than the one involved in CT imaging.

Studies related to the mandibular interforaminal region are important in fields such as the insertion of dental implants [12, 14], facial lifts [15], chin bone grafting [16] or genioplasty [17]. Identification of these anatomical structures is vital in order to avoid post-surgery bleeding.

## MATERIAL AND METHOD

### *Patients*

For this retrospective study, 70 patients (35 women and 35 men) were selected from a private dental clinic in Timisoara, their equal number in the study providing necessary balance in statistical tests. The patients were aged between 20 and 73 years. No patient had undergone radiological examination for this study. Inclusion were the following: Romanian nationality, existence of a CBCT investigation of the anterior mandible between the two mental foramina, CBCT voxel size of 0.2 mm, the use of the same type of CBCT scanner, Promax 3D (Planmeca, Finland). Exclusion criteria were as follows: injury or trauma of the lower jaw bone, artifacts and existing surgery in the studied area. All patients signed an form of informed consent about the use of their data in this present study.

### *CBCT imaging*

Analysis of the 70 mandibular CBCT investigations was done using the Romexis software version 4.1 (Planmeca, Finland). Identification of the existing bone canals was done using two planes of the multiplanar reconstruction (sagittal and axial) along with cross-sections drawn perpendicular to the panoramic curve of the lower jaw. All volumes were examined at a 0,2 mm slice thickness, equal to the thickness of the voxel during acquisition. Passing from one section to another was made with a step of 0.2 mm, by successively pressing tabs in the software interface. Linear and angular measurements were made with specific

tools from the Romexis software. The intra-osseous trajectory of the observed bone canals was described using the following the terms: parallel, mesial, distal, inferior, superior, anterior, posterior.

### *Statistical analysis*

The data were processed using IBM SPSS 18, 2010 (IBM, USA). The value threshold of statistical significance was set at  $p < 0.05$ . Probability  $p$  value was declared at each test applied to 3 decimal places. We used for ordinal data tabulating the percentage batch submission to one decimal place. Math test values were declared for meaningful comparisons, according to statistical output program. If tests not significant ( $p > 0.05$ ) was only reported probability value  $p$ . For comparisons between the sexes data type scale we applied  $t$  test and categorical data we applied the Mann-Whitney test.

## RESULTS

The total number of bony canals identified in all patients was 195 and the average number of canals was 2.78 canals per patient. The hierarchy in terms of the number of canals in descending order is as follows: three canals found in 24 patients, two canals found in 20 patients, four canals found in 15 patients, one foramen found in 8 patients, and, finally, 5 canals found in 3 patients (Table I).

Table I. Number of foramens sex crosstabulation

		Sex		Total
		M	F	
1	Number(n)	3	5	8
	Percentage (%)	8.6	14.3	11.4
2	Number(n)	10	9	19
	Percentage (%)	28.6	25.7	27.1
3	Number(n)	12	12	24
	Percentage (%)	34.3	34.3	34.3
4	Number(n)	9	7	16
	Percentage (%)	25.7	20.0	22.9
5	Number(n)	1	2	3
	Percentage (%)	2.9	5.7	4.3
Total	Number(n)	35	35	70
	Percentage (%)	100	100	100

Table II. Group Statistics, for number of foramens

Sex	Number	Mean	Std. Deviation	Std. Error Mean
M	35	2.86	1.004	0.17
F	35	2.77	1.114	0.18

The comparative statistics relating to the number of foramina show that there are no differences between the sexes,  $p=0,719$  (Table II). The mandibular lingual foramen and its bone canal was observed in all patients. Out of the total number of patients, 26 (13.33%) had bone canals in the interforaminal mandibular region that penetrated the vestibular cortical bone (Fig. 1 C). The lowest height measured from the middle of the foramen an identifiable canal to the base of the mandible was 0.76 mm, whereas the highest measured 18.4 mm. The statistical study shows that the average height from the foramina to the base of the jaw in the men group is 14.57 mm, while the average height in the women group is 13.43 mm. There is an average difference of 1.13 mm, confidence interval 0,506-1,765 which certifies the fact that average height for the men group is significantly higher compared to the women group,  $t(64.1) = 3.6$ ,  $p = 0.001$ .

The diameter of the foramina observed in our study ranged from 0.46 mm to 1.94 mm, with an average size of 1.21 mm and a standard deviation of 0.24 mm. The average distance to the mid-sagittal plane of the outermost canals was 3.28 mm.

Regarding the trajectory and orientation of the bony canals, in the sagittal plane, 7 canals (3.58%) were bifurcated. Six canals (3.07%) showed a change in trajectory two times along their path, either from anterior to posterior or from inferior to superior. The difference in angulation of the three directions of the canal pathway had an average of 12.19 degrees. Canals with two segments of different angulation were observed in 20% of the bone canals (a number of 39 canals), the average angulation difference being 30,25 degrees. A total of 150 canals (76.92%) had only one direction, from posterior towards the anterior of the mandible, out of which ascending canals (trajectory towards the alveolar crest) had a mean angulation of 25,28 degrees and descending canals (trajectory towards the mandibular base) had a mean angulation value of 33.89 degrees. A total of 5 canals (2.56%) were observed to have a pathway parallel to the horizontal plane (Fig. 1 B).

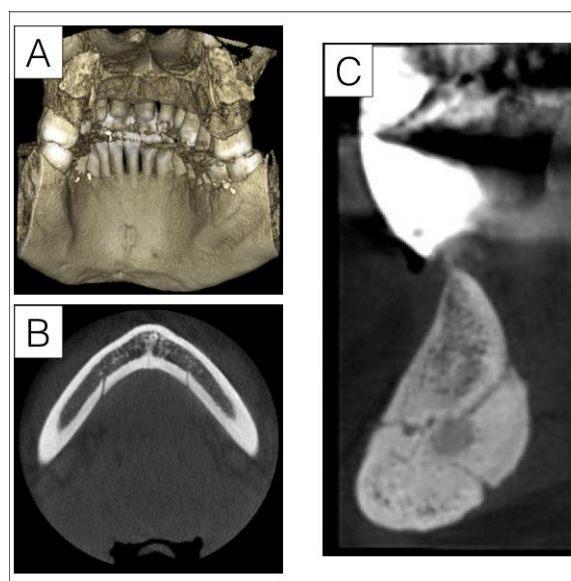


Figure 1. Multiple foramina in different sections and views, (A) view from the lingual in volume rendering of a mandibles with multiple foramina, (B) three foramina in axial section at the same level, and (C) three foramina in sagittal section, one of them with exit to vestibular

Analysis of the trajectory and orientation of the canals in the axial plane revealed that only one canal (0.51%) showed three segments of different angulations on its trajectory, the direction of the canal being distal with an angulation average of 19.65 degrees. A total of 20 canals (10.25%) showed two differently angulated segments, with directions varying from mesial, distal and parallel to the sagittal plane (Fig 1 B). A single penetration angle through the whole pathway was observed in the case of 174 canals (89.23%), the direction of the canals

being: mesial for 83 canals (42.56%), distal for 59 canals (30.25%). The mean angulation of these canals was 18.95 degrees for canals oriented towards the distal and 18.18 degrees for canals oriented towards mesial. A total of 34 channels (17.43%) had a trajectory parallel to the sagittal plane, only 5 of 34 (17%) being fully visible in a horizontal (axial) section.

Not all bone canals were visible in a sagittal plane analysis. A number of 21 channels (10.76%) were only observed in a cross-sectional plane sections due to their perpendicular pathway with the drawn panoramic curve of the mandible (Fig. 2).

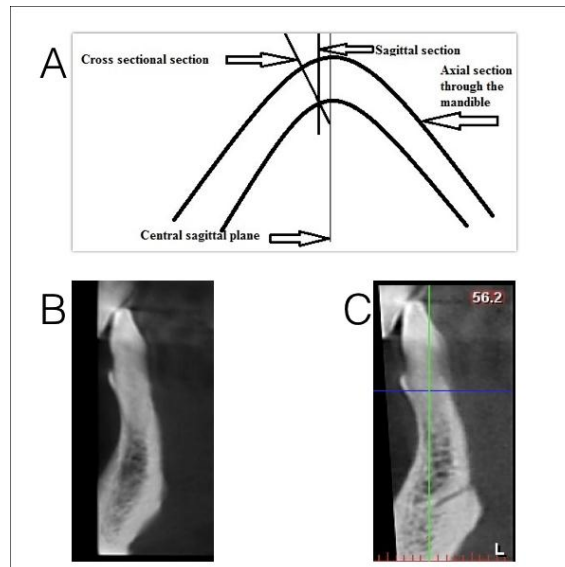


Figure 2. Sections with different orientation in the mandible, (A) schematic orientation of the sections, seen in the axial plane, (B) sagittal section (C) cross sectional section, perpendicular to the jaw curve

## DISCUSSIONS

CBCT analysis software provides clinicians, such as maxillofacial surgeons, dental implantologists, or plastic surgeons, with the tools needed for a very precise preoperative radiological evaluation of the interforaminal lingual mandibular anatomy. Careful inspection of anatomical features and precise planning simplify the clinical procedures performed in the area.

Arteries and veins that pass through these canals that can be found using CBCT radiographic investigations: deep lingual artery, facial artery, the lingual artery, submental artery and sublingual artery can be the cause of intra-operative and post-operative bleeding; therefore, detailed study of their location and morphology is of great importance and clinical maneuvers around them require caution.

Identification of all bony canals found in the studied area, along with measurements of their sizes and angulation of their trajectories can be done very precisely using software associated with CBCT investigations, which besides multiplanar reconstruction has tools that allow to study sections perpendicular to the curvature of the jaw. These, so called cross-sectional images are currently used in the field of dental implants to precisely measure the size of the available alveolar bone [19]. The images obtained by drawing the panoramic curve in the 3D volumes, do not offer much supplementary information because of the overlapping structures in the direction of the X-ray beam[1], but sections perpendicular to this curve offer the chance to discover orthoradial orientations and cross-sectional orientations, through which new trajectories of bone canals can be identified as done in this present study.

Compared with other studies, diameters of the identified bony canals in the interforaminal region are similar: the present study found the average diameter of the lingual foramens to be between 0.46 to 1.94 mm, while a study by Babiuc et. al [9] found diameters



ranging from 0.52 to 1.74 mm. Scaravilli et al [2] noted a prevalence of 2.3 bony canals in the interforaminal region per patient, whereas the prevalence in the present study is of 2.78 canals per patient.

Results regarding the existence of bony canals are similar with those of Gahleitner et. al [3] where 95.2% of bone canals were found in the median.

The results presented in this study describe the importance of finding the bony canal of the lingual mandibular foramen and other bony canals in the interforaminal area most importantly due to the existence of those canals with a diameter greater than 1 mm [4].

The novelty of the present study consists of 4 elements: (i) the use of panoramic sections and the cross-sectional slices associated with them in the studied area[18], (ii) the evaluation of the entire volume with a 0.2 mm thickness step, (iii) the gender balance of the study group (iv) the inclusion of labial foramina, the trajectory and the orientation of the lingual bone canals into the set of investigated anatomical features.

## CONCLUSIONS

CBCT examinations of the interforaminal mandibular region can reveal bone canals whose presence can lead to complications in clinical procedures. Compared to classical CT software based on multiplanar reconstruction, advanced features of CBCT analysis software enable a faster and more precise identification of bone canals of the mandible. Dentists and maxillo-facial surgeons who need bone grafting from the mandibular anterior area or perform genioplasty, and even plastic surgeons should use CBCT software that, along with multiplanar reconstruction, provides cross-sectional visualization of the mandibular arch, thereby helping to avoid potential complications.

### *Conflicts of interest*

The authors declare that they have no conflict of interests.

### *Acknowledgements*

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# Dental Hygienist

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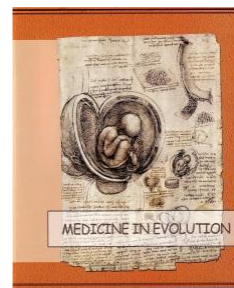
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Themes may be selected from all medical fields. Manuscripts which offer a special gain for daily activity will have priority. The title must be clearly, precisely stated. It may be completed by a subtitle. It is advisable to include in the key words of the title the main message, the special element which may be observed from the case evolution. The content of a case report must be divided into three parts:

Introduction – It must include a maximum of 15 typed rows (half page). Here, the main medical problem is summarized in order to place the case in a specific domain.

Case report – It contains essential specific information on the case. In order to make a logical, chronological and didactical case report the following 5 chapters are needed:

- I. Anamnesis;
- II. Clinical examination data;
- III. Laboratory data;
- IV. Additional paraclinical investigations;
- V. Treatment and evolution.

Discussions – The reason for the case report must be stated. The report must be patient-centered. Occasional deviations from typical (characteristic) evolutions, nosologically important facts must be presented in such a manner to expose the clinical picture as completely as possible. The case report must not appear as an appendix of a general review. Dimensions of a case report: maximum 6-8 typed pages, 30 rows of 60 characters/page.

## 6.3. MEASUREMENT UNITS, SYMBOLS, ABBREVIATIONS

All measurements must be expressed in International System (IS) units. Abbreviations must be fully explained when first used.

## 6.4. TABLES

Tables are noted with Roman figures and they will have a brief and concise title, concordant with their content.

## 6.5. ILLUSTRATIONS

Number all illustrations in Arabic figures in a single succession. Apply a label on the back side of every illustration, containing its number and an arrow indicating the upper side. Coloured illustrations may be accepted but it is the choice of the editors, according to particular technical abilities of each journal issue, or it may involve a fee in special cases.

## **6.6. EXPLANATIONS FOR DRAWINGS AND GRAPHS**

Explanation for drawings and graphs must be clear and in readable dimensions, considering the necessary publishing shrinkage.

## **6.7. PHOTOGRAPHS**

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

## **6.8. ILLUSTRATION LEGENDS**

Include explanations for each used symbol, etc. Identify the printing method for microphotographs.

## **7. COPIES FOR PUBLISHING**

In order to accelerate publishing, the main author will send a set of printed sheets presenting the final version of the paper, as it will appear in the journal. It is really helpful that texts to be also sent on electronic support, diacritic characters mandatory.

## **8. REJECTION OF PAPERS**

If a paper does not meet publishing conditions, whatever these may be, the editors will notify the first author on this fact, without the obligation of returning the material. Original photographs or the whole material will be returned only if the author comes to the editor and takes them.

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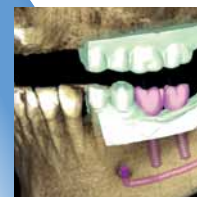
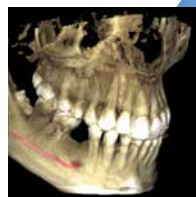
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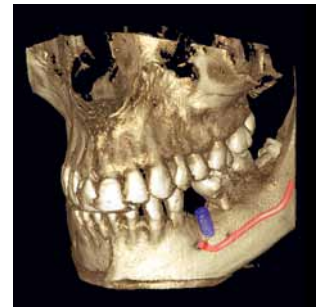
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