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CONTENTS

ARTICLES



Major K.M., Bodog F.D., Pop O.L.

A comparative clinical study of the treatment of hypertrophic scars with intralesional steroid and silicone gel sheeting in different types of incision lines in caesarean sections	1
Neamtu A.C., Amaricai E.C., Ghircau Radu R., Olariu I., Lintini T.R., Olariu T., Iurciuc S.	
The role and importance of physical exercise in the prevention of cardiovascular disease	7
Todor L., Riviș M., Todor S.A., Ghircau Radu R., Fluieras R., Vasca E., Matichescu A.M.	
The Caldwell-Luc approach to maxillary cyst enucleation	16
Bontea M.G., Bimbo-Szuhai E., Macovei I.C., Maghiar A.M., Moga I.	
Factors influencing the postoperative evolution of patients underwent total hip arthroplasty	23
Cărămidă M., Dumitrache M.A., Dumitrașcu L.C., Ivan C.F., Oancea R., Sfeatcu R.	
Patients' attitude toward the use of secondary products for oral hygiene	30
Dumitrache M.A., Moanță E.A., Cărămidă M., Sinescu R., Himcinschi M.E., Funieru C., Sfeatcu R.	
Evaluation of the oral health values in a group of adults	37
Funieru C., Oancea R., Cărămidă M., Sfeatcu R.	
An analysis of how plaque-induced gingivitis can be measured in epidemiological studies	43
Modiga C., Pop D.M., Miron F.F.D., Cojocariu A.C., Marinescu A.G., Tănase A.D., Sinescu C., Romînu M., Negruțiu M.L., Craciunescu E.L.	
Processing Technologies of Polymers for Provisional Prosthesis	48
Todor R., Crăciunescu E.L., Miron F.F.D., Stoian C., Caplar B.D., Cojocariu A.C., Romînu M., Sinescu C., Negruțiu M.L., Pop D.M.	
The Influence of Metals Processing Technologies on Metal-Ceramic Interface	55

Sfeatcu R., Dumitrache M.A., Mihai C., Dumitrașcu L.C., Tănase M., Funieru C.	
Oral health related behaviour among dental students – a comparative study	62
Tănase A.D., Crăciunescu E.L., Miok K., Negruțiu M.L., Pop D.M.	
Informed consent in dental medicine	68
Riviş M., Bonta D.F., Todor S.A., Bonta L.C., Vasca E., Ghircau R., Fluieras R., Matichescu A.M.	
Treatment of maxillary sinus mucoceles by functional endoscopic sinus surgery	76
Matichescu A.M., Ling L., Podariu A.C., Neamtu A.C., Olariu I., Ghircau R., Dinu S., Popa M.	
Smoking - a risk factor for oral health in young people and adolescents	83
Cosoroaba R.M., Popovici R.A., Olariu I., Gaje P.N., Ceaușu A.R., Matichescu A.M., Ghircau Radu R., Todor L.	
The dark side of mast cells and their role in oral pathology	91
Vasca E., Riviş M., Popovici R.A., Fluieras R., Nica D., Chioran D., Todor S.A., Domocoş D.	
Treatment approaches for maxillary sinus cysts	100

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

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



§ În comparație cu starea inițială

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

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

Gegetului timp de 1 minut.
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A comparative clinical study of the treatment of hypertrophic scars with intralesional steroid and silicone gel sheeting in different types of incision lines in caesarean sections



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Abstract

Caesarean section is one of the most common interventions in obstetrics and gynecology today. Complications of scar healing and also the aesthetics of the scar is usually very important for patients. 96 patients were selected to participate in this study after giving birth by caesarean section. Each group included 24 patients, who underwent a Pfannenstiel section or a transverse laparotomy incision. The patients were treated with either intralesional steroid or silicone gel sheeting. The aim of this study was to compare and determine the roles of these two commonly used treatment options of hypertrophic scars and to compare the therapeutic options in different incisions in case of caesarean sections. Both methods were significantly efficient, however intralesional steroid therapy had a more rapid and long-lasting effect than silicone gel sheeting in both types of incisions of caesarean sections. These results confirmed the role of these two treatment modalities in the protocols. Our data suggest that silicone gel sheeting could be the first line therapy in both types of incisions of caesarean sections, while intralesional steroid is the second line treatment for primary linear hypertrophy of scars. Also, in recurrent linear hypertrophic scars, intralesional steroid therapy is recommended in first line in both types of incisions, because silicone gel sheeting was largely ineffective. Regarding the type of caesarean sections, in lower transverse laparotomy both types of treatment proved to be more effective, thus this could be an argument for the surgeon to choose this type of incision detrimental to the lower median laparotomy. Prospective randomized clinical trials should be needed to clarify their role further in the treatment protocols.

Keywords: hypertrophic scars, caesarean section, intralesional steroid, silicone gel sheeting, keloid scar

INTRODUCTION

More and more female patients live with hypertrophic scars due to the raising figure of operative interventions altogether over the years in obstetrics and gynecology.

The skin of the abdomen can be penetrated with a lower median incision or a lower transverse incision (Pfannenstiel). Caesarean section is now considered a routine intervention, but it also has its risks, one of them being pathological scar healing. It has been proven by some authors that keloid scars indicate an increased risk for developing skin or visceral tumours; ectopic endometrial tissue implants that may occur during the procedure usually lead to a second surgical intervention, one that could have been avoided; not at the end of all concerns are the aesthetics of the scar which is usually very important for patients. The most common types of pathological scars are hypertrophic scars, including linear (or surgical) hypertrophic scars. The most significant unanswered question in this area is the etiopathology of keloids. Despite the relatively rare occurrence of the disease (4 cases per 10,000 inhabitants in Hungary), the unclear origin, only symptomatic treatments, the high recurrence rates and the effect of serious complaints determine its severity [1, 2].

The cause of the formation of hypertrophic scars, the risk factors and the predisposing factors can be precisely determined – almost without exception – by knowing the detailed and accurate medical history data and the course of the disease. Their clinical significance is due to the continuous growth of the lack of generally accepted and professionally applied therapeutic protocols exacerbated by the number of cases [3].

According to the authors nearly 192 patients were treated with hypertrophic scars in the 7-year period from March 1, 2014 to April 31, 2021. Patients underwent caesarean section with different types of incision – lower median laparotomy and lower transverse laparotomy. Based on their experience in treating patients, it was possible to conclude that the increasing number of surgical sessions of various manual professions alone does not explain the increase in the incidence of linear hypertrophic scars. Other reasons include schematic incision conductions, deficiencies and errors in surgical techniques, ignoring risk and predisposing factors, inadequate treatment of wound healing disorders.

Choosing the way to open the abdomen in a caesarean section depends on the pathological changes, the reasons for performing the operation, on the anatomical features of the abdomen, and on any previous abdominal operations. The preferred method is the median laparotomy for operating a tumour or if there is a need to reach the upper regions of the abdomen, or if the patient initially had a longitudinal incision, or if the medical team decides to perform an urgent caesarean section. Transverse incisions are preferred when it ensures the proper window for the operation; also, from a cosmetic point of view, the total concealment of the abdominal scar can be obtained. Of course, the surgeon decides in favour of the transverse incision, when the risk pathological healing of the scar is increased: abdomen, long term treatment with immunosuppression, radiotherapy, vascular diseases, diabetes. If a previous incision was made, after a longitudinal incision the same incision is applied again, and after a transverse incision both types of incisions can be performed.

The large number of patients made it possible to select patients according to the specified criteria, in order to ensure the efficacy of the two most commonly used and accepted scar treatment methods in homogeneous patient groups. Based on more and more recent literature data, it can be concluded that the recommended therapeutic protocols are not definitive and are un even. According to the currently accepted recommendations, polysiloxane patch treatment should be chosen as the first line therapy of hypertrophic scars in both types of caesarean section [4, 5].

Aim and objectives

In the current study, after the detailed analysis of the clinical experiences, we tried to give answers primarily to the questions regarding the therapy and the application of the treatment of scars in the medical practice. We studied the results obtained after treating scars per primam: efficiency of the treatment with polysiloxane compared with intralesional steroid infusions, and also, we compared the groups of patients by the types of the incisions.

MATERIAL AND METHODS

With an overall experience of 192 patients with hypertrophic scars treated, to participate in this study, 96 patients were selected after giving birth by caesarean section; four randomized groups were formed depending on the type of the caesarean section. Each group included 24 patients, who underwent a Pfannenstiel section or a transverse laparotomy incision.

Our study consisted of four groups of 24 female patients, after caesarean section. Each of them was untreated and they were in an active phase of linear hypertrophic scar. The patients were treated 4-4 months with intralesional steroid or polysiloxane patch. The scars showed varied localisation, but all of them were located on a smooth anatomical surface. The scars on a congruent surface were excluded from the study, as the polysiloxane patch would not have been adequate, in failure to be correctly placed and fixed on the skin.

Exclusionary factors were the difficult doctor-patients cooperation, and the following associated diseases: diabetes, immune- and autoimmune diseases, local or systemic steroid and/ or non-steroid treatment.

At the beginning of the treatment all patients were given all necessary information and documentation.

The intralesional steroid treatment protocol: inj. Triamcinolone 1 ml/ cm 2 of a 10% solution of acetate (Krka, Slovenia) transmission, using a linear technique. The ampoule contained 4 mg of active ingredient in 1 ml solution. It was used 2% Lidocaine (Egis, Hungary) for dilution. The local anesthetic reduced the pain caused by the administration. The size of the injection needle varied from12 to 18 G, depending on the hardness of the scars. The treatment protocol with polysiloxane patch: appropriate size, that means the patches with polysiloxane could exceed 2-2 centimetres in all directions of the scar (Epiderm, Biodermis, USA). The patients wore the patches intermittently for 12 hours a day. Patients were trained how to use the patches, and how to replace the worn patches.

The control examinations were carried out every 2 weeks. In addition to digital photos and Vancouver scoring, the subjective complaints were also recorded, using the so- called Likert method. The essence of this method is that a patient, the attending physician and one not participating specialist in the treatment scores the three most important complaints (pain, itching, aesthetic acceptability) on a scale from 1 to 5 [6-8].

RESULTS

The youngest patient was 17 years old, the oldest was 46 years old. More than half of the patients came from the 30- 50 age group (1. Figure). The average age was 31 years. The location of the scars: lower median laparotomy (48), and transverse laparotomy (48).



Figure 1. Distribution of patients by age

The patients participating in this study, by the end of the 16th week of the treatment period, could give an adequate therapeutic response in all patient groups. Side effects and complications were not detected in any cases, and it was not required to interrupt the treatment. The majority of the patients (74) underwent a second caesarean section, where the previous scars were removed, which were further investigated with other methods (histopathological, immunohistochemical and electron microscopic).



Figure 2. Comparison results of the Vancouver scores

In twelve cases the subjective complaints completely disappeared and the scars went into remission. Based on the Vancouver score, it was possible to determine that the groups treated with intralesional steroid by weeks 6 to 8 of the treatment, developed significant regression accompanied by a rapid decrease of subjective complaints. For the polysiloxane patches, the expected therapeutic response in the treated group developed later and at a slower pace, after 8-12 weeks. The results of the treatments are significant in all groups [pILS> 0,05 and pPST> 0,05] (Figure 2). 85 percent of the patients` subjective complaints have also disappeared.



Figure 3. Hypertrophic scar treated with polysiloxane patches (hematoxilin- eozin, 200x)



Figure 4. Hypertrophic scar treated with intralesional steroids (hematoxilin- eozin, 200x)



Figure 5. Hypertrophic scar treated with polysiloxane patches (actin immunohistocehmistry, 400x)

DISCUSSIONS

In the treatment of abnormal scar formations, in addition to keloids, diverse hypertrophic scars are tasks to be avoided, if possible, for the surgeon. Despite significant and effective interdisciplinary cooperation, it cannot be argued that the problem area is of interest to surgical specialities: gynecology and obstetrics center, the general surgery center, plastic and reconstructive surgery center.

The principles of prevention are also not applied in many cases, as the number of patients with the most varied scar complaints, show an upward trend from year to year. Treatment should be determined on the basis of individual criteria and should be continued

according to the objective response to treatment, changing where necessary, or combining with other methods [9-11].

The experience-based treatment approach, ongoing controlled and randomized investigations of newer scar treatment procedures, and recent research (genetic, endocrinological and pharmacological) may result in the expansion of therapeutic protocols [10] and, perhaps in the not distant future, in the knowledge of the etiopathology of keloids and the solutions of its problem. Undergraduate and postgraduate courses are the greatest importance in the widespread dissemination and mastery of the principles of multi-level prevention.

CONCLUSIONS

Hypertrophic scars are seen in approximately 82% of women who have had a caesarean section recently. Evidence from current studies shows that polysiloxane patches should be the first-line therapy for both types of caesarean section in hypertrophic scars, while intralesional steroid is the second line of treatment for primary linear hypertrophic scars.

In recurrent linear hypertrophic scars, intralesional steroid therapy is recommended in first line in both types of incisions, because silicone gel sheeting was largely ineffective.

Regarding the type of caesarean sections, in lower transverse laparotomy both types of treatment proved to be more effective, thus this could be an argument for the surgeon to choose this type of incision detrimental to the lower median laparotomy.

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The role and importance of physical exercise in the prevention of cardiovascular disease



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Abstract

Cardiovascular disease (CVD) is the leading health problem of the modern world. They are the leading cause of death in both developed and transition countries. Physical activity (PA) has a beneficial impact on the cardiovascular system, both directly by improving endothelial function and indirectly by normalising atherosclerosis risk factors such as dyslipidaemia, hypertension, obesity and through positive effects on the clotting mechanism. The impact of physical activities on the cardiovascular system is manifested by immediate changes in hemodynamics, blood pressure and heart rate during physical training. After sustained physical training basal heart rate, blood pressure and heart rate response to physical activity stress decrease, indicating good conditioning through increased physical capacity. Prospective epidemiological studies have shown that a sedentary lifestyle has a two-fold increased risk of sudden death and cardiovascular mortality. Physical activity needs to be ongoing to have positive effects on the cardiovascular system; that means 4 to 5 times a week depending on the duration and intensity of exercise. Physical activity in patients with coronary heart disease should be individualised, quantified and monitored. In subjects with impaired heart muscle function, physical activity is limited with characteristic symptoms - dyspnoea and stenocardia. These patients are classified into mild, moderate and high risk groups and based on this the allowable intensity of their physical activity is assessed, as well as the degree of its control. Exercise should be range free and should not exceed this symptom limit. The aim of physical activity and training is to increase the symptom tolerance threshold.

Keywords: Cardiovascular diseases, physical exercises, life style

INTRODUCTION

In 1970 cardiac rehabilitation became synonymous with physical training indicated to selected groups of patients, namely young men with uncomplicated myocardial infarction, showing in these patients increased functional capacity, decreased resting heart rate, decreased systolic blood pressure, increased maximal oxygen volume (VO2max) but also increased ischemic threshold [1]. Subsequently, the notion of cardiac rehabilitation has acquired new meanings, with education, physical training, psychotherapy, counselling and practical guidance as its main components. The programs are varied in terms of content, main focus and major priorities, starting from those based on physical training, which have as a premise that improving physical performance has the effect of quickly solving all other problems, then moving on to those centred on psychotherapy, which have as a central point that improving depression and anxiety has the primary effect of regaining confidence in returning to normal life [2]. Therefore, today, cardiac rehabilitation is seen as an active, integrative, multi-faceted process, medical, family and social, in which the role of the complex team of doctors, nutritionists, psychologists, physiotherapists, kinesiotherapists is essential, these aspects being necessarily complemented by medical education measures, which will involve both the family and the community [3].

Literature data demonstrate that regular physical activity and increased exercise capacity improve survival in subjects without cardiac adaptation. In patients with coronary artery disease, increased exercise capacity is accompanied by increased life expectancy [2, 3]. Physical training is a central component of a multifactorial cardiac rehabilitation program [4]. Rehabilitation programs have demonstrated efficacy in coronary artery disease patients; however, there is less clinical evidence in valve surgery patients [5].

Most of the benefits of physical training are maintained as long as physical exertion is performed regularly, only to disappear almost completely after 2 weeks of physical inactivity [6]. The decrease in circulating catecholamines during daily exercise leads to an increase in the threshold for ventricular fibrillation and a decrease in the risk of sudden death. Decreased body weight is an important benefit of exercise, in addition, regular physical activity has an antidepressant effect [7].

The comprehensive recovery program includes physical training, psycho-social support, relaxation techniques and individual psycho-social counselling for each patient and their partner. Specific psychosocial areas are: depression, anxiety, personality and character elements, social isolation and everyday stress. Quality of life and depression can be improved by specific techniques, regardless of the extent of pre-existing disturbances [8].

Emotional support, the benefits of positive thinking and training appear to have a real effect in improving prognosis. Of all the entities presented, the most important on post-disease recovery as prognostic impact is depression, whose diagnosis and treatment immediately after onset leads to immediate positive outcomes [9].

The effect of cardiac recovery on vocational aspects is difficult to assess due to the increased variability of professional entities, regional, economic, political and social differences. For example, obtaining considerable social benefits, even if retirement occurred early in terms of age and length of service, makes the rate of re-employment low due to the satisfaction of individual needs without the need for additional work. However, studies have shown an increase in the return to work of patients included in rehabilitation programs. In a longitudinal study, participation in cardiac rehabilitation programs was an independent factor favoring return to work [10].

Although increased effort capacity is correlated not only with improved prognosis but also with return to work, it is still unclear whether this return to work is due to increased quality of life and effort capacity, or is the result of specific economic and social conditions and vocational counselling [11].

Cardiovascular recovery thus represents a multifactorial system of intervention that increases exercise capacity, improves emotional state and quality of life, increases return to work and decreases mortality. Cardiac rehabilitation has been shown to be cost-effective in improving patients' lifestyle and emphasizes the importance of applying optimal medical treatment in combination with rehabilitation techniques to achieve maximum benefit [12].

PHYSICAL ACTIVITY

Physical activity (PA) can be defined as any bodily movement of skeletal muscle contraction that results in a substantial increase in caloric requirement over resting energy consumption [3]. During PA, muscles rely on their active contraction in three major pathways, which are the phosphagen system (anaerobic alactacid), the lactic acid system (anaerobic lactacid) and the aerobic system. These three pathways aim to ensure the availability of ATP throughout the contraction and that they are activated in relation to the duration and intensity of the exercise [4]. More specifically, the phosphagen system and the lactic acid system can be referred to as the "anaerobic system". The mechanisms for the first response of muscle are (i) the collection of stored and already disposable ATP in the cell, (ii) the activation of the phosphagen system which consists of the cleavage of high-energy phosphagen and creatine phosphate (PCr) [5]. If these mechanisms are unable to provide adequate metabolic support to the contracting muscle, or another metabolic pathway takes over: non-aerobic carbohydrate breakdown, derived from hepatic and muscle glycogen stores, degraded to pyruvic acid and then lactic acid by glycolysis. [6]. The third, aerobic or oxidative metabolism, involves the burning of carbohydrates and fats, and only in a few cases proteins, in the presence of oxygen [7].

The pattern of activation of these three different pathways depends on the type of exercise chosen: in high-intensity, short-duration exercise, muscle contraction will rely on anaerobic pathways (the phosphagen system and the lactic acid system), whereas in low-intensity to moderate-intensity resistance exercise their contraction will rely only initially on anaerobic metabolism and then switch to aerobic metabolic pathways. Since the pattern of activation of these integrated processes is variable, as well as the main source of energy used, it is reasonable not to think that athletes might benefit from a different type of diet, depending on their main PA program.

Endurance training (ET) is a type of exercise usually performed at constant intensity, with the main aim of progressively increasing the "anaerobic threshold", i.e. the limit above which the body begins to use anaerobic metabolism to restore depleted ATP to the cost of lactate production accumulation [8]. Particularly for submaximal or maximal intensity exercise, the extremely rapid increase in muscle oxygen requirement cannot be immediately met by the aerobic system, thus creating a temporary "oxygen deficit" in which, as previously mentioned, the phosphagen system and lactic acid systems are the main suppliers of ATP synthesis [9]. Once the deficit is filled, a series of coordinated metabolic processes take place to maintain the supply of exogenous substrates. The liver has the primary role of sustaining blood glucose levels through both glycogenolysis and gluconeogenesis and can produce ketone bodies from increased serum fatty acid concentrations that come from adipose tissue lipolysis (activated by beta-adrenergic stimulation during exercise) [10]. In this scenario, where adipose tissue fat is considered a constant source of energy and ketone bodies are considered either an alternative or supplemental source of fuel to sustain endurance exercise [11].

Physical training, as a subcategory of PA, is defined as a structural intervention with the goal of increasing or maintaining RFC or health, achieving athletic performance, or both. Maximal oxygen consumption or RFC can be measured directly during the cardiopulmonary exercise test or estimated from the workload achieved on the treadmill or with the cycle ergometer, adjusted for duration. Although considerable epidemiological evidence suggests that moderate to vigorous habitual BP may help reduce chronic stress and protect against the development of atherosclerotic CVD, acute exercise-related cardiac events have been reported in the medical literature [34] as well as in the lay press [12], suggesting that vigorous PA (≥ 6 metabolic equivalents [METs]; 1 MET = 3.5 mL/kg/min) may trigger cardiac arrest or acute myocardial infarction (AMI) in individuals with known CVD [13]. Several trigger mechanisms have been suggested for plaque rupture and acute coronary thrombosis [14] and life-threatening ventricular arrhythmias (Figure 1) [15].



Figure 1. Physiological changes that accompany physical exercises, recovery and their possible sequelae. CHD, coronary artery disease; HR, heart rate; SBP, systolic blood pressure; MVO2, myocardial oxygen consumption [2]

Structural cardiovascular abnormalities, particularly hypertrophic cardiomyopathy (HCM), are major causes of sudden cardiac death (SCD) due to exercise in younger athletes [16]. In contrast, atherosclerotic CVD is the most common autopsy finding in middle-aged and older adults [17]. In a landmark study conducted by the Cleveland Clinic, investigators estimated that ~85% of US individuals aged ≥50 years have subclinical evidence of coronary artery disease [18]. Thus, the combination of vigorous PA and atherosclerotic or structural heart disease, rather than exercise per se, appears to present the trigger for cardiac events associated with strenuous exercise.

The relative risk (RR) for acute cardiac events during or immediately after mild to moderate intensity exercise is similar to that most expected by chance alone. In individuals with known CVD, high-volume, high-intensity or competitive training regimens may be associated with an increased incidence of acute cardiovascular events [19]. The absolute risks of exercise-related cardiovascular events in apparently healthy adults are 1 in 1,124,200 and 1 in 887,526 person-hours for nonfatal and fatal events, respectively [20]. Thus, intense bouts of PA, especially when not habitual, may increase the risk of cardiovascular complications; however, the absolute risk associated with each exercise session remains extremely low.

Although AMI and SCD can be triggered by vigorous PA, the risk decreases with increasing frequency (days/week) of vigorous PA. RR appears to be highest for inactive individuals with known CVD who perform unusual vigorous PA. For example, in the

Determinants of Myocardial Infarction Onset Study [21], the risk of AMI was 5.9-fold higher during 1-hour periods of vigorous BP up to high intensity compared with periods of lower levels of activity or rest. The RR of AMI was highest among those who exercised <1 time per week (RR, 107) compared with those who exercised \geq 5 times per week (RR, 2.4) [22]. Accordingly, 1-2 sessions of vigorous exercise alone per week reduced the risk of exercise-related AMI by nearly 80%.

COMMON ACTIVITIES ASSOCIATED WITH ACUTE CARDIAC EVENTS

Physical activities involving sudden bursts or high levels of anaerobic metabolism may transiently increase the risk of acute exercise-related cardiac events. These include alpine skiing [23], racquet sports [24], high-intensity interval training [25] and competitive sports activities (e.g. basketball) [26] compared to other more moderate activities. Neural and psychological stimuli secondary to competition can simultaneously increase sympathetic activity and catecholamine levels and lower the threat threshold for ventricular arrhythmias [27]. Other recreational and domestic activities associated with increased cardiac demands and a higher incidence of cardiovascular events include activities such as hunting [28] and snow removal [29], as well as marathon running [30] and triathlon participation [31].

Marathon running analyzed in the RACER (Race Associated Cardiac Event Registry) study evaluated the incidence and outcomes of cardiac arrest associated with marathon and half-marathon races in the US over a 10.5-year period. The study population included 10.9 million registered runners (mean age \pm SD, 42 \pm 13 years) [32]. Of the 59 cases of cardiac arrest, 42 (71%) were fatal. The incidence rate was 3.75 times higher during full marathons than half marathons and 5.6 times higher among men than women. Almost half of all SCDs occurred during the last mile. The overall risk of a cardiac event during marathons and half marathons was relatively low compared to other competitive endurance activities. Autopsy findings showed that HCM and atherosclerotic CVB were the most common underlying abnormalities.

Triathlon participation. The frequency of cardiac arrest and SCD has also been reported in >9 million triathlon participants from 1985 to 2016 [31]. There were 135 SCDs, or 1.74 per 100,000 participants, which exceeded the previously reported incidence rate for marathon running (1.01 per 100,000 participants) [30]. The incidence of cardiovascular events was also 3.5 times lower in women than in men. Most SCD occurred during the swimming segment (67%), while the remaining deaths occurred during the cycling, running and post-race recovery segments, respectively. Race experience was available for 68 participants, of whom 26 (38%) were competing in their first triathlon. Autopsies were performed on 61 victims, of whom 27 (44%) had either atherosclerotic coronary artery disease or cardiomyopathy.

Altogether, these data suggest that cardiac arrest and SCD during marathon running and triathlon participation occur occasionally and that physicians evaluating race participants should be aware of the increased risks of HCM and atherosclerotic coronary artery disease in this patient population [32], both of which can often be detected by appropriate medical screening. An increased risk among "novice" triathlon participants suggests inadequate preparation or poor training as potential contributors to some of the exercise-related deaths [31]. Finally, participants should also be advised to heed warning symptoms and avoid sprinting during the last minutes of the race, when cardiovascular events are most common [33]. Symptomatic athletes should be strongly advised to cease training and competition until a medical evaluation and clearance is obtained.

Among individuals participating in high-volume, high-intensity resistance training regimens, the use of cardioprotective medications is lower than among their less physically

active counterparts [34]. These data, along with reports documenting the impressive risk factor profiles and superb cardiac performance of marathon runners, as well as the anti-aging effects that regular endurance exercise provides [35], have led a growing number of health enthusiasts to adopt the idea that "more exercise is invariably better" [36].

Conventional long-term resistance training or isotonic exercise alters cardiac structure and function, and such adaptations are considered to be benign. These include: enlargement of all cardiac chambers; improved ventricular compliance and distensibility; and electrical remodelling, such as sinus bradycardia, sinus arrhythmia and first-degree atrioventricular block. However, emerging evidence suggests that, over time, high-volume, high-intensity training regimens may induce cardiac maladaptations, such as an increased incidence of atrial fibrillation (AF) and accelerated coronary artery calcification (ACC) [37]. Consequently, there is debate as to whether intense exercise may be harmful to the heart, particularly in some individuals.

PREVENTION OF CARDIAC EVENTS

There is now considerable evidence that acute cardiovascular events can be triggered by various physical, chemical and psychological stressors, including intense physical exertion [38]. The underlying mechanisms may involve biomechanical, prothrombotic and arrhythmogenic stimuli, largely mediated by associated increased sympathetic nervous system output.

Fortunately, regular exercise, stress management, smoking cessation, and favorable modification of other coronary risk factors may attenuate the response to and protect against trigger-induced coronary events [39]. The beneficial role of regular moderate to vigorous exercise may be due to multiple mechanisms, including cardiovascular, neurological, and biochemical adaptations, as well as psychological effects (Figure 2). Concurrent favorable autonomic adaptations include increases in heart rate variability, a strong prognostic indicator that is inversely related to mortality [35]. In addition, exercise preconditioning provides immediate cardioprotective benefits against AMI, conferring transient antiarrhythmic and antiischemic effects against ischemic injury [27, 34]. The impact of even brief PA seizures reaching a minimum threshold of \geq 50% of functional capacity appears to provide the impetus for improved clinical outcomes following acute cardiac events [33].

Anti- Atherosclerotic	Psychologic	↓ Anti- <u>Thrombotic</u>	Anti- Ischemic	Anti- Arrhythmic
Improved lipids	\downarrow Depression	↓ Platelet adhesiveness	↓ Myocardial O ₂ demand	↑ Vagal tone
Lower blood pressures	↓ Stress	↑ Fibrinolysis	↑ Coronary flow	↓ Adrenergic activity
Reduced adiposity	↑ Social support	\downarrow Fibrinogen	↓ Endothelial dysfunction	↑ Heart rate variability
↑ Insulin sensitivity		↓ Blood viscosity	↑ Endothelial progenitor cells and Cultured/circulating angiogenic cells	
\downarrow Inflammation			↑ Nitric Oxide	

Potential Cardioprotective Effects of Regular Physical Activity

Figure 2. Mechanisms by which moderate to vigorous physical activity may reduce the risk of initial and recurrent cardiovascular events. ↑, increased; ↓, low; O2, oxygen [2]

PROPHYLACTIC USE OF CARDIOPROTECTIVE DRUGS BEFORE INTENSE EXERCISE

Although some have suggested that recreational athletes with known or suspected CVD may benefit from taking aspirin or beta-blockers shortly before competitive exercise, there are no definitive data to indicate that these agents (despite their proven efficacy for secondary prevention) decrease acute exercise-related cardiopathy [32]. Accordingly, related reports [34, 36] and the INTERHEART study [33] suggest that there is insufficient evidence to recommend prophylactic use of these drugs prior to intense PA or participation in competitive sports.

Although there are various potential strategies to reduce the risk of triggering acute cardiac events, we believe that a healthy lifestyle that includes structured exercise should be included in stress reduction interventions [40], due to associated autonomic adaptations and parasympathetic predominance [41]. This strategy is readily available, beneficial for both physical and mental health, and offers gains of up to eight years in life expectancy in the most physically active population cohorts [42].

CONCLUSIONS

The effects of chronic stress and various stressors (e.g. physical, chemical, psychological) in the development of cardiovascular disease and the triggering of acute cardiac events are well documented. Regular moderate to vigorous PA, structured exercise and higher levels of RFC appear to be therapeutic in addressing risk factors that are precursors to CVD. On the other hand, studies suggest that unusual physical exertion of vigorous to high intensity may trigger acute cardiovascular events, especially in habitually sedentary individuals with known CVD. It is also reported that in some individuals, high-volume, high-intensity exercise regimens can lead, over time, to maladaptations, including increased coronary calcification and the development of AF, as depicted by an inverted J-shaped curve. Although exercise is widely recognized for its beneficial effects, from data reported in the literature it is suggested that "you might get too much of a good thing".

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The Caldwell-Luc approach to maxillary cyst enucleation



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Abstract

In the era of endoscopic surgery of the maxillary sinuses, an external approach to them may be ideal in certain situations. The Caldwell-Luc procedure uses an external approach for the surgical treatment of severely diseased maxillary sinus. It is reserved for selected patients with extensive maxillary disease, especially those with massive polyposis or fungal disease, chronic maxillary sinusitis, or massive cysts of various etiologies. Failure to completely clean the maxillary mucosa can lead to early postoperative recurrence of the disease. The anterior and inferior regions of the maxillary antrum are particularly difficult to access endoscopically.

Keywords: Caldwell-Luc procedure, maxillary cysts, endoscopic surgery

INTRODUCTION

The sinuses are the air spaces within the pneumatic bones situated at the frontobasal region of skull. There are four in number: frontal, maxillary (the largest), sphenoidal and ethmoidal. Clinical-pathological aspects of maxillary sinusitis was described by Nathanial Highmore (1651), therefore maxillary sinus is also known as Highmore's antrum [1].

The Caldwell Luc operation is an approach to the maxillary sinus through the anterior wall by making a window just below the canine fossa, simultaneously making an intranasal counterdrainage through the inferior meatus (Figure 1) [2]. It was introduced by George Caldwell (1893) and Henry Luc (1897).



Figure 1. Caldwell Luc surgery. a) Area available for antrostomy. b) Caldwell-Luc surgical procedure showing the location of the window in the anterior maxillary sinus. c) Diagram showing the surgical technique in which a long sublabial incision facilitates gentle tissue retraction and the anterior antrostomy is created through a cutting burr. [3] (Modified image)

George W Caldwell, a surgeon in New York, combined the canine fossa approach with intranasal drainage to gain access to the maxillary sinuses in order to improve therapeutic outcomes. He published his work in the New York Medical Journal in 1893. In parallel, the French surgeon Henry Luc performed a similar surgical intervention for chronic sinusitis in 1897. The difference between the two techniques was the location of the antrostomy. Caldwell performed inferior meatal antrostomy and Luc performed middle meatal antrostomy [1].

This procedure was the treatment of choice for chronic and recurrent maxillary sinusitis until the introduction of Functional Endoscopic Sinus Surgery (FESS) to improve physiological drainage at the natural ostia [2,4-6]. The lower meatal antrostomy allows passive drainage of reaccumulated secretions and facilitates postoperative toileting [7].

The Caldwell-Luc operation is mainly used for neoplasms, intrasinus trauma, removal of foreign bodies, repairing oroantral fistulae and to ensure access to the orbital floor and pterygomaxillary fossa [2,8,9].

MATERIALS AND METHODS

Caldwell-Luc surgery is usually performed under general anesthesia, but can also be performed under local anesthesia. It is recommended to use topical anesthesia and inject adrenaline into the soft tissues at the level of the canine fossa.

The incision is made from the lateral incisor to the second molar. The mucoperiosteal flap is then raised to expose the anterior wall of the sinus which is opened at the level of the canine fossa where the bone is relatively thin. The opening can be enlarged with Hayek or Kerrison forceps to produce a hole large enough to provide access, for example to allow the removal of sinus lining or the insertion of an endoscope and instruments.

Clinical case

A 45-year-old patient is referred to the Timişoara Oral and Maxillo-Facial Surgery Clinic, with a recurrent history of painful swelling on the right cheek for approximately 6 months. The clinical examination reveals two pseudotumoral formations at the level of the maxillary vestibule next to the root remnants 1.6 and 1.4. On palpation, the soft, elastic consistency of the formations is noted (Figure 2).



Figure 2. The intraoral image of the cystic formation

The orthopantomographic radiological examination (OPG) and cone beam computer tomography (CBCT) revealed the presence of a cystic formation of 2/2 cm at the apex of the first molar (1.6) and an osteitis near the apex of the first premolar (1.4). The root of the second premolar (1.5) is not involved in the cystic lesion, it being located tangent to the cystic membrane (Figure 3).



Figure 3. A) OPG image from CBCT; B) CBCT image, coronary section; C) CBCT image, axial section; D) CBCT image, sagittal section

The patient is offered endodontic treatment of the second premolar (1.5). Following the refusal of endodontic treatment, it is decided to extract the tooth. The classic Caldwell-Luc method is used surgically to expose the cystic formation (Figure 4).



Figure 4. A) Incision; B) Detachment of the mucoperiosteal flap

After exposing the cystic formation, its contents are aspirated (Figure 5).



Figure 5. Aspiration of cystic fluid

Cystectomy is performed followed by the extraction of teeth 1.4, 1.5 and 1.6 (Figure 6).



C D Figure 6. A) Cystectomy and intraoperative extraction of causative teeth; B) Cystic membrane; C) Bone geode; D) Suture

Clinical case

A 51-year-old patient is referred to the Timişoara Oral and Maxillofacial Surgery Clinic, as a result of a right genial swelling and the symptoms of maxillary sinusitis.

Following the clinical examination (Figure 7) and the radiological examination (Figure 8), the diagnosis of odontogenic cyst of the right maxillary first molar (1.6) with intrasinus evolution is made.



Figure 7. Intraoral image of the cystic formation



Figure 8. A) OPG image from CBCT; B) CBCT image, coronary section

Surgery is performed using the classic Caldwell-Luc method to expose the cystic formation followed by the extraction of the maxillary right first molar (1.6) (Figure 9).



Figure 9. A) Extraction of the first molar, cystectomy and communication of the dental alveolus with the cystic lesion; B) Bone geode following cystectomy; C) Cystic membrane; D) Suture

RESULTS

The histopathological examination in the first case: fragment of the cystic wall (serial sections) lined by non-keratinized squamous stratified epithelium with focus of reactive epitheliosis, on a fibrous connective support, hyalinized with perivascular, subepithelial lymphoplasmacytic infiltrates and suppurative micro foci. Absence of active odontogenic epithelial remnants. On the periphery of the cystic wall partial insertion of cortical lamellar bone tissue.

The cyst had a sinus evolution, it pushed the floor of the maxillary sinus superiorly, there was no communication between the sinus and the cystic lesion, and no signs of sinusitis.

The histopathological examination in the second case revealed a polypoid thickened sinus mucosa, lined by exulcerated respiratory pseudo-stratified epithelium on a loose connective support with inflammatory edema, lymphoplasmacytic infiltrates and dystrophic microcalcifications, and on the surface of the mucosa there is mucus and fibro-leukocyte detritus.

Clinically, postoperatively, the patients presented no complications, with a good healing of the bone tissue and there were no oral-antral communications.

DISCUSSIONS

There are studies that highlight the problems associated with this radical surgery and find that the regenerated antral mucosa would not have normal motility and ciliary function [1].

Caldwell-Luc surgery (CLS) is a well-established procedure. Until the era of antibiotics and endoscopic sinus surgery, this operation was a fundamental surgical technique for treating inflammatory sinus disease. Despite the success of the endoscopic technique there are well-documented indications for Caldwell-Luc surgery, which ensures good access to the sinus, perisinus and pterygomaxillary fossa [2,5,10].

Huang and Chen [8] in their study with CLS without inferior meatal antrostomy concluded that creating sinonasal window after clearing dental origin tumors/cysts from maxillary cavity do not change surgical outcome.

Becker *et al.* [11] compared maxillary sinus specimens removed during Caldwell-Luc procedures and traditional maxillary sinus antrostomies. They found that in a few cases, post CLS, samples from the antrum had necrotic bone debris compared to the control group where they found relatively healthy mucosa. They concluded that this surgery should be used as a last resort when other modalities fail.

Han *et al.* [12] performed a study on patients with a history of failed Caldwell-Luc surgery. They found that endoscopic revision of the maxillary sinus yields comparable results to repeat Caldwell-Luc procedure in these patients.

Inferior meatal antrostomy (IMA) theoretically allows passive drainage and postoperative suction toileting. IMA has been criticized for prolonged operative time, damage to the nasolacrimal duct, epistaxis from the sphenopalatine artery, and deviation from normal sinus physiology [13]. Al-Belasy showed in a study that IMA closes within 3 months of surgery in 82% of 367 cases [7]. And other studies suggest that IMA is not necessary in the Caldwell-Luc surgery for odontogenic sinus disease [8].

CONCLUSIONS

The Caldwell-Luc procedure has been the method of choice in maxillary sinus surgery, its use declining with advances in endoscopic technology and the discovery of new antibiotics.

The Caldwell-Luc operation is safe and effective provided the sinus wall is handled gently and carefully and should remain in the repertoire of surgeons managing maxillary sinus conditions.

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Factors influencing the postoperative evolution of patients underwent total hip arthroplasty



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Abstract

This study aimed to explore the preoperative risk factors related to blood transfusion after hip arthroplasty and the benefits of anterior approach over the traditional lateral approach and to determine the influence of selected factors on the intensity of postoperative pain after hip total hip arthroplasty.

Methods: Patients underwent preanesthetic assessment, checking preoperative hemoglobin (Hgb) levels and reassessing on the first and second postoperative days. We also controlled postoperative pain according to our pain control protocol to track opioid need at 6, 12, 24, 48, 96 hours after hip arthroplasty.

Results: Risk factors affecting postoperative blood transfusion were highly correlated with preoperative Hgb level. In anterior approach the needed quantities of opioids is lower.

Keywords: Blood transfusion, postoperative pain, total hip arthroplasty

INTRODUCTION

Total hip arthroplasty (THA) is the primary most common orthopedic surgery to alleviate hip pain duet to degenerative diseases by replacing pathogenic hip joint to artificial joint, resulting in improved quality of life [1,2]. The success of THA for the treatment of symptomatic osteoarthritis of the hip is well recognized and the operation has been described as the operation of the 20th century [3].

The anterior approach is a minimally invasive technique that involves accessing the hip joint from the front of the hip, rather than the side or back. This approach has several advantages over the traditional lateral approach. First of all, it has been shown to result in less postoperative pain, which is due to the fact that the muscles and soft tissues around the hip joint are not disrupted during surgery. Additionally, the anterior approach is associated with a faster recovery time, as patients are able to start weight-bearing on the affected hip much sooner after the surgery. The lateral approach is the more traditional method of performing total hip arthroplasty. This approach involves accessing the hip join from the side of the hip and requires the surgeon to detach the muscles and soft tissue around the joint. This can result in more postoperative pain and a longer recovery time.

Inappropriate management of postoperative pain delays recovery of the patient. Pain prevents the patient from undertaking rehabilitation, induces physical and mental suffering, sleeping disorders, lowers the quality of life and increases treatment costs [4,5].

Aim and objectives

This study aimed to explore the preoperative risk factors related to blood transfusion after hip arthroplasty and the benefits of anterior approach over the traditional lateral approach and to determine the influence of selected factors on the intensity of postoperative pain after hip total hip arthroplasty.

MATERIAL AND METHODS

Data collection

Our clinical study, a prospective observational cohort study, has been conducted in the Orthopedics Department of Oradea Pelican Clinical Hospital between January 2022-December 2022 and we selected a number of 121 patients, who underwent THA after a diagnosis of osteonecrosis of the femoral head or osteoarthritis of the hip joint (degenerative, secondary). The research has been analyzed and approved by the hospitals Ethics Committee and in case of identifying an eligible patient, we proceeded to present and sign an informed consent protocol.

Exclusion criteria: age under 18, inflammatory hip arthritis, periprosthetic joint infection, history of revision surgery, patients with special devices due to severe instability, anatomical deformity, refusing participation in this study.

We split the group in two bathes. Patient went under preanesthetic evaluation, controlling preoperatory Hgb level and reevaluation on 1st and 2nd postoperative day. We also monitored postoperative pain according to our control protocol to track opioid need at 6, 12, 24, 48, 96 hours after hip arthroplasty.

Statistical analysis

The medical statistics program MedCalc® version 12.5.0.0 (MedCalc® Software, Mariakerke, Belgium) was used to store the information entered on the study sheet in a database and to perform statistical analysis. The results of the statistical tests are presented by the probability of the "null" hypothesis (p), its value below 0.05 proves a statistically

significant difference between the studied batches. Certain results will also be displayed in graphic form using the same statistical program.

Each continuous variable will be checked for the distribution of values compared to the normal population using the Kolmogorov-Smirnov test. Depending on the result of this test, the continuous variables with normal distribution will be represented by the mean and standard deviation (in brackets), and those with asymmetric distribution by the median and the 10th and 90th percentiles (in brackets). Depending on the nature of the variable, parametric (for variables with normal distribution) or non-parametric (for variables with asymmetric distribution) tests will be used. Among the parametric tests used, we mention the Student test (t-test) for independent groups, and Mann-Whitney test for the non-parametric tests.

Categorical variables will be described by their absolute values and percentages, in brackets. They will be studied using the following tests: the chi-square test with Yates' correction for continuity in the case of 2x2 frequency tables and the simple chi-square test – for the other types of frequency tables (3x2, 3x3, etc.).

In order to study the involvement of some variables as risk factors for transfusion / early mobilization, the relative risk of mortality was determined by calculating the OR (odds ratio) with a 95% confidence interval. In order to demonstrate which of these factors have independent prognostic value for mortality, a multiple regression model was constructed with gradual, conditional introduction of the variables (if p<0.05). The result of this test will give us the relative independent risk for each individual variable.

RESULTS

Following selection criteria, there have been included in the study a number of 121 patients, of which 6 did not sign the informed consent. Out of remaining 115 patients, a number of 66 underwent hip arthroplasty through an anterior approach, and a number of 49 through lateral approach.

Comparing the quantity of transfusion needed and the quantity of analgesic treatment in the postoperative period we show that the two groups did not differ significantly demographically and clinically at baseline. Patients divided according to the surgical technique are described with the following criteria (Table 1).

	Anterior approach (n=66)	Lateral approach (n=49)	Statistical significance (p)
Gender (M/F)	32/34	19/30	0,3972
Age – media (SD)	62,9 (12,5)	65,3 (10,7)	0,3080
Environment of origin (U/R)	49/17	32/17	0,4055
BMI (kg/m²) – media (SD)	28,5 (3,9)	29,9 (5,7)	0,1333
Comorbidities (percentage %) • HTN • CHD • MI • CVA • DM • RhD	$\begin{array}{c} 43 \ (65,2) \\ 1 \ (1,5) \\ 0 \ (0) \\ 0 \ (0) \\ 13 \ (19,7) \\ 1 \ (1,5) \end{array}$	30 (61,2) 2 (4,1) 1 (2,0) 2 (4,1) 10 (20,4) 1 (2,0)	0,4513
Preoperatory hemoglobin level (g/dl) – media (DS)	13,8 (1,4)	13,5 (1,5)	0,2458

Table 1. Baseline demographic and clinical criteria for the two study arms

M = male, F = female, SD = standard deviation, U = urban, R = rural, BMI = body mass index, HTN = hypertension, CHD =coronary heart disease, MI = previous myocardial infarction, CVA = cerebrovascular accident, DM= diabetes melitus, RhD = rheumatic disease
Among the clinical criteria, only the body mass index BMI showed differences between the two groups, being lower among patients with anterior approach, but this difference did not reach the threshold of statistical significance either. So, we can state that the two groups were comparable in preoperative condition.

To describe the comparative bleeding risk for the two surgical techniques we have presented in the following table both evolution of the hemoglobin level and blood transfusion requirement in the first two postoperative days, along with the total number of RBCs administered. (Table 2).

	Anterior approach (n=66)	Lateral approach (n=49)	Statistic significance (p)	
Preoperatory hemoglobin level (g/dl) – media (SD)	13,8 (1,4)	13,5 (1,5)	0,2458	
Postoperatory hemoglobin level day 1 (g/dl) - media (SD)	11,3 (1,3)	11,4 (1,5)	0,6933	
Postoperatory hemoglobin level day 2 (g/dl) – media (SD)	10,3 (1,2)	10,5 (1,4)	0,2311	
Intraoperatory transfusion needed - nr. of patients (%)	1 (1,5)	2 (4,1)	0,7931	
Postoperatory transfusion needed, day 1 - nr. of patients (%)	4 (6,1)	3 (6,1)	0,7035	
Postoperatory transfusion needed, day 2 - nr. of patients (%)	3 (4,5)	5 (10,2)	0,4186	
Total number of RBCs units perfused – media (IQR)	1 (1-1,5)	1 (1-1,75)	0,5390	
SD= standard deviation, IQR = interquartile range, RBCs = washed red blood cells				

Table 2. Comparison of study groups in terms of blood loss

The values remain comparable on the 2nd postoperative day, both in terms of the hemoglobin level (Figure 1) and the blood transfusion requirement.

Analyzing data that could constitute a risk factor for postoperative transfusion, we built a logistic regression model targeting postoperative blood transfusion. Thus, we included age, gender, preoperative hemoglobin levels, comorbidities and type of surgical approach in the model. The results show us that in this research only the low level of preoperative hemoglobin was an independent risk factor for postoperative transfusion: relative risk = 0.3866 (95% CI: 0.23-0.64), p < 0.0001. So, neither age, nor comorbidities, nor surgical technique contributed to the risk of blood transfusion for these patients.



Figure 1. Postoperative hemoglobin level (Hbg) evolution (1d/ 1st = day 1, 2d/ 2nd = day 2) for the two study groups (mean values and standard deviation with scoring of all values)

The efficacy of postoperative analgesia was checked by noting the pain scores in the study sheets, at regular intervals. The results of these values, summarized in the following table (Table 3), show us that pain relief was effective in both groups of patients, the medians not exceeding a score of 3 in the first 4 postoperative days. To achieve this goal, comparable doses of opioids were needed for the two groups of patients (Table 3).

	Anterior approach (n=66)	Lateral approach (n=49)	Statistic significance (p)	
Postoperator VAS at 6 hours – media (IQR)	0 (0-0)	0 (0-0)	0,6594	
Postoperator VAS at 12 hours- media (IQR)	0 (0-2)	1 (0-3)	0,1355	
Postoperator VAS at 24 hours – media (IQR)	3 (2-5)	3 (2-5)	0,4834	
Postoperator VAS at 48 hours – media (IQR)	2,5 (2-4)	3 (1-5)	0,8844	
Postoperator VAS at 72 hours – median (IQR)	1 (0-3)	1 (0-3)	0,6563	
Postoperator VAS at 96 hours - media (IQR)	0 (0-0)	0 (0-2)	0,3465	
Tramadol (total quantity perfused) in postoperatory period (mg) - media (IQR)	200 (150-200)	150 (150-300)	0,5303	
Morfin (total dose perfused) in postoperatory period (mg) - media (DS)	10 (7,5-15)	10 (7,5-15)	0,7663	
IQR = interquartile range, SD = standard deviation, VAS = pain visual analog scale				

Table 3. Comparison of study groups in terms of postoperative analgesia needed

DISCUSSIONS

The conducted study concerned the determination of the influence of selected factors on the intensity of postoperative pain after hip arthroplasty and blood transfusion needed. The analysis included the dependence of the pain intensity on the type of approach performed. The time that elapses after the surgery affects the intensity of postoperative pain. The highest intensity of pain occurs on day 0 and decreases in the following days. There are reports confirming this relationship in the literature. In the research conducted by Sobieralska-Michalak K. *et al.*, the respondents experienced the greatest pain on day 0 and the lowest on day 3 postoperatively [6].

Our study indicated that the sex of the patients did not significantly affect the level of the perceived intensity of postoperative pain. Mei W. et al. reported that female sex belongs to the group of independent risk factors for the development of postoperative pain shortly after a surgical procedure [7]. Kołodziej W. and Karpel E., proved that more pain intensity occurs in women than in men [8] Regardless of the type and extent of surgery, women reported slightly higher pain scores in the research of Gerbershagen HJ *et al.* [9]. Haghighi M.J. *et al.*, in their studies, showed that in patients undergoing general surgery, the mean pain intensity was significantly higher in men than in women [10]. There is no consensus in the literature regarding pain perceiving. This is the reason why we have not split the study group based on gender, but we wanted to see the intensity of pain corelated with the type of the surgical approach and the need of analgesics used, including opioids.

Orthopedic procedures turned out to be among the most painful procedures [11]. The postoperative analgesic medication is standard for all types of surgical procedures. The difference is in the needed quantity of opioids and that is the main goal of our study to see the required quantity of morphine and tramadol in the two type of approach.

Fu Cheng Bian *et al.* proves that risk factors affecting postoperative blood transfusion were highly correlated with preoperative Hgb, type of anesthesia, TXA, and age [12]. Our study proves the same regarding correlation of needed blood transfusion and preoperative Hgb level and we did not found any correlation in between age and blood transfusion.

CONCLUSIONS

Patients report the strongest pain on the day of the procedure, with a decreasing tendency in the following days. In anterior approach the needed quantities of opioids are lower and is justified by the lower trauma level of anatomical structures. The mean factor that influences the quantities of needed blood transfusion is preoperative hemoglobine level.

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Patients' attitude toward the use of secondary products for oral hygiene



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Abstract

The proper oral hygiene routine includes, besides toothbrushing, secondary oral hygiene products like interdental cleaning products and mouthrinses. The aim of the present study was the assessment of patients' attitude toward secondary oral hygiene products. Material and method: the cross-sectional study was conducted in 2022 on a sample of 223 Romanian adults and the assessment was performed using an on-line self-assessment questionnaire. The results showed the frequency of users at least 1 time/day as follows: 33.63% dental floss, 15.69% interdental brushes, 19.73% oral irrigator, 44.39% mouthrinses. Regarding the motivation for the use of interdental cleaning products, prevention of oral conditions was mentioned as follows: 27.80% for dental floss, 9.87% for interdental brushes users and 16.59% for oral irrigator. For justifying the use of mouthrinses for preventive reasons, 17.04% mentioned prevention of caries and 56.05% of gingival inflammation. Among the reasons for not using these products in daily routine, neglect and the lack of comprehension of their role as well as the lack of perceived need were most frequently met statements. Conclusion: In the present study, adults declared a low rate of use of secondary oral hygiene products and the barriers mentioned were mostly related to insufficient knowledge and interest regarding the impact they have on prevention of dental caries and periodontal inflammation.

Keywords: oral hygiene, dental prevention, oral health, interdental cleaning, mouthwashes

INTRODUCTION

Both dental caries and periodontal disease are caused by the dental plaque accumulation and persistence [1]. Dental plaque is a biofilm with a very complex organized and specialized structure composed by bacteria embedded in an intercellular matrix [2,3].

Even though there are many risk factors that influence the development of dental caries [4] and periodontal disease [5], in order to prevent their debut and relapse, it is mandatory to control the dental plaque [4,5]. The main procedure to remove the dental plaque is the toothbrushing [6,7] with a proper toothbrush, tooth paste adapted to each patient's needs as well as a correct brushing technique. However, toothbrushing only is not enough to remove the plaque [8] because of the inability of a toothbrush to reach interdental spaces where a high quantity of plaque remains after toothbrushing, thus, maintaining the risk for the development of caries and inflammation in these vulnerable proximal areas.

Dental floss is a well-known and the most commonly used secondary product for cleaning interdental spaces [2,9]. Its features are variable and developed to respond to different patients' needs and preferences. Unfortunately, there are some clinical situations that impede the dental floss use, such as the presence of dental bridges or fixed orthodontic appliances. Interdental brushes are another type of secondary products used for interdental spaces [2,9]. These are appropriate and efficient especially for periodontal patients whose large interdental spaces caused by the recession of interdental papilla [10], or orthodontic patients who need to clean under the orthodontic archwire [9]. These interdental brushes are of different diameters to suit the dimension of interdental spaces. Other technical characteristics are made to ease their use by different patients [2]. Another product recommended for mechanical control of dental plaque in interdental spaces is the oral irrigator [2,10], which is a device that cleans using water with controllable pressure. It is suitable for the vast majority of patients.

In addition to mechanical control of dental plaque through toothbrushing and the above-mentioned interdental cleaning secondary products, in certain cases, in order to favor the condition for primary and secondary prevention of dental caries and periodontal inflammation, there is recommended the use of mouthrinses in order to either chemically control the dental plaque [11] or increase the fluoride intake [12,13]. To maximize their effect of the active ingredients and to minimize their secondary effect it is mandatory for patients to respect the product indications.

In practice, the use of secondary oral hygiene products is scarce among patients [9]. There are many reasons for the lack of use, because of either the patients' lack of knowledge or lack of motivation [14]. However, among patients that are aware of these secondary products, the difficulties they have when using them are an important reason for keeping them from using them regularly [2,9,14]. Moreover, when it comes to the mouthwashes, the patients tend to choose them for comfort reasons more than for functional, medical or dental reasons [9].

Aim and objectives

The aim of the present study was to assess the patients' attitude towards the use of secondary oral hygiene products in terms of opinions, motivation and difficulties in use.

MATERIAL AND METHODS

A survey was conducted between February-June 2022, under the coordination of the Oral Health and Community Dentistry Departament from the Faculty of Dental Medicine,

"Carol Davila" Medicine and Pharmacy University (Bucharest, Romania). The study group was formed by 223 Romanian adults that were neither dental students nor dentists. Participants were assessed using an on-line questionnaire with 22 items, both open and closeended questions regarding the use of dental floss, interdental brushes, oral irrigator and mouthrinses. The questionnaires were anonymous, no sensitive personal data were collected and the subjects were informed regarding the aim of the study and their rights as participants in a study in accordance with the Declaration of Helsinki.

RESULTS

Participants had a mean age of 29.64 ± 2.82 years and 86.10% (192 subjects) were females. It was observed that within the studied group, regarding the frequency of use of secondary oral hygiene products, mouthrinses are used by more participants (87.00%) compared to the interdental cleaning products and that oral irrigator is the least frequently used product (43.50%). Moreover, dental floss is the preferred product for cleaning the interdental spaces but its use for at least 1 time/day is declared by only 33.63% of participants (Table I).

	Type of secondary oral hygiene products $\%$ (N)			
	Dental floss Interdental brushes		Oral irrigator	Mouthrinses
Frequency				
> 1 time/day	13.00% (29)	7.17% (16)	7.17% (16)	14.35% (32)
1 time/day	20.63% (46)	8.52% (19)	12.56% (28)	30.04% (67)
< 1 time/day	44.39% (99)	29.60% (66)	23.76% (53)	42.60% (95)
Never	21.97% (49)	20.63% (46)	56.50% (126)	13.00% (29)

Table I. Frequency of use of secondary oral hygiene products

When it comes to motivation for using these products, participants to the study declared the use of interdental cleaning products mainly to remove the food debris that are disturbing (47.53% for dental floss, 20.18% for interdental brushes, 20.63% for oral irrigator) but in low percentage they perceive it as a contribution to prevention of dental caries and gingival inflammation (Table II).

On the other hand, mouthrinses are perceived as beneficial in prevention mostly related to periodontal inflammation (56.05%) in comparison to dental caries (17.04%) (Table III). Another finding regarding the use of mouthwash is that 53.36% of the subjects declare the use of it to benefit from fresh breath in similar frequency as for inflammation prevention (Table III).

	Type of interdental cleaning products % (N)		
	Dental floss	Interdental brushes	Oral irrigator
Reason			
Prevention of dental caries/periodontal inflammation	27.80% (62)	9.87% (22)	16.59% (37)
Removal of disturbing food debris between teeth	47.53% (106)	20.18% (45)	20.63% (46)

	Type of interdental cleaning products % (N)			
	Dental floss	Interdental brushes	Oral irrigator	
Reason				
Recommendation from the dentist	22.87% (51)	16.14% (36)	17.94% (40)	
Easier use compared to other interdental cleaning products	13.00% (29)	6.73% (15)	11.21% (25)	
Intolerance/impossibility in use of other interdental cleaning products	3.59% (8)	7.62% (17)	5.38% (12)	

Table III. Patients' reasons for using mouthwashes

	Mouthrinses% (N)
Reason	
Prevention/control of dental caries	17.04% (38)
Prevention/control of periodontal inflammation	56.05% (125)
Control of hypersensitivity	10.76% (24)
Fresh breath	53.36% (119)

On the other hand, in regards to the underuse of the secondary oral hygiene products, the most frequently met answers about the reasons for not using them every day, were negligence (25,11% dental floss, 14.35% interdental brushes, 17.49% oral irrigator, 28.25% mouthrinses) (Table IV).

In case of mouthrinses (41.70%) and interdental brushes (55.15%), most of the participants stated they are not aware of the role these products play in maintaining oral health.

	Type of secondary oral hygiene products % (N)			
	Dental floss	Interdental brushes	Oral irrigator	Mouthwash
Reason				
Don't understand its importance	1.35% (3)	55.16% (123)	8.97% (20)	41.70% (93)
Don't need it	7.17% (16)	8.97% (20)	12.11% (27)	34.53% (77)
Don't know how to use it	3.14% (7)	16.14% (36)	7.62% (17)	0% (0)
Hard to use it	9.87% (22)	15.69% (35)	5.38% (12)	0% (0)
Causes gingival bleeding	14.35% (32)	3.59% (8)	6.28% (14)	-
High costs	0% (0)	7.17% (16)	2.24% (5)	2.24% (5)
Lack of time needed for use	8.52% (19)	13.00% (29)	6.28% (14)	6.73% (15)
Neglect	25.11% (56)	14.35% (32)	17.49% (39)	28.25% (63)

Table IV. Patients' reasons for not using every day the secondary oral hygiene products

DISCUSSIONS

In the present study, adults declared a low rate of use of secondary oral hygiene products and the barriers mentioned were mostly related to insufficient knowledge and interest regarding the impact they have on prevention of dental caries and periodontal inflammation. Current recommendations for the prevention of dental caries include the use of dental floss for both adults and children [4,6], even from the first interdental contact formed between temporary teeth [6]. Moreover, in cases of high carious risk, fluoride containing mouthrinses are recommended as supplements [12,13]. On the other hand, the use of both mechanical control of dental plaque using products that adapt to different interdental space devices, and chemical control through antiseptic mouthwashes [10,11].

A study [15] on a sample with adults with a similar age as our group (26 year-old vs. a mean age of 28 years among participants in present study), observed that 51% consider dental floss use important, while our subjects even though in a very low percentage declare they didn't consider the dental floss use important. Only one third report a daily use and one quarter used it less than daily because they neglected. Moreover, a previous research [14] regarding behavioral change for daily use of dental floss showed that the motivation to use it increases after patients are properly informed about the risks that incomplete plaque removal has on oral health as well as the benefits the use of interdental cleaning methods have on prevention of oral conditions. In our study, we found that a very low proportion of subjects are aware of the role that dental floss has on prevention of dental caries and gingival inflammation.

When it comes to the interdental brushes as alternatives to dental floss, in our study it observed that it was the interdental cleaning products with the highest percentage of participants who answered they didn't understand its role as well they had difficulties in using it or didn't know how to use it at all. Previous meta-analyses [2,10] stated that, compared to dental floss, interdental brushes have a higher impact in reducing inflammation, when used properly, and it is recommended as the first-choice interdental cleaning product for patients with periodontitis [10]. Thus, within the studies group there is a necessity to increase the awareness regarding the importance of interdental brushes used on prevention and control of the inflammation. Related to difficulties in using them, opposite to our participants' perception, previous research showed that interdental brushes are preferred by the patients due to the ease in use compared to dental floss [2].

Oral irrigators were found in our survey to be the interdental cleaning product with the least percentage of users and with the highest percentage of subjects that stated they did not need this product. A Cochrane systematic review [2] published in 2019 showed that there is some evidence showing a superiority in oral irrigator compared to dental floss when it comes to reducing the gingival index but not the dental plaque index. However, this product's ability to remove the biofilm from not only supragingival but also subgingival surfaces [2,10], as well as hard-to-reach areas, are benefits for certain patients.

Mouthwash was the secondary oral hygiene product used by the highest proportion of participants in the study, compared to the other products assessed. Moreover, no participants reported difficulties in using this product. However, the users might underrate its impact on oral health since half of them answered that the main reason for rinsing with this solution is for a fresh breath. Although there is a strong evidence in the literature that twice daily use of fluoride containing mouthrinse proved to reduce the risk of dental caries in vulnerable patients [12,13,15], in our study a low proportion of subjects showed awareness about the role the fluoride mouthwashes play in the prevention of dental caries. On the other hand, antiseptic containing mouthrinses are strongly recommended for patients with gingival

inflammation going under active and maintenance periodontal treatment [11], only half of the participants mentioned prevention of gingival inflammation as a reason for using mouthrinse.

The present study have the limitation of reporting results based on patients' selfassessment and statements. Clinical assessment to correlate the survey data with oral health status and plaque index are considered for a future phase of this research. In addition, this cross-sectional survey represents a starting point for a detailed research regarding the practical difficulties patients have in using secondary oral hygiene products.

Nevertheless, this study offers an overview on patients' perspective and level of knowledge that contributes to the basis of oral health promotion programs aiming to increase the awareness and knowledge level in regards to proper oral home care routine in preventing oral conditions.

CONCLUSIONS

The current survey showed a suboptimal use of secondary oral hygiene products, with mouthwashes preferred over interdental cleaning products. Participants showed a low level of awareness regarding the importance of using these products for the prevention of dental caries and gingival inflammation. Participants' motivation regarding the use of interdental cleaning products was most frequently related to the removal of disturbing food debris, underestimating the role it plays in oral conditions. Dental floss was the product of choice for interdental cleaning. Among the limits in using these secondary oral hygiene products, negligence and low level of understanding their role were most frequently mentioned.

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Evaluation of the oral health values in a group of adults



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Abstract

This study aims to put into perspective the attitudes and oral health values of a defined population group from Romania, in connection with their dental habits. By using a set of closed questions, the individuals participating to the study were able to give a glimpse into the general psychology behind most of their decisions regarding oral health. The paper comes to provide valuable information regarding the difference between the oral health values of the studies subjects from different groups of environment, educational levels, sex, age, and work field. The results showed that the most favourable populational group to have a high oral health values and sanogenic behaviour is correlated with the feminine sex, high educational level, urban environment, medical work field, and not so much with age, as the results state a clear non-difference age dependant.

Keywords: oral health values, behaviours, attitudes, adults

INTRODUCTION

Health is a topic of interest nowadays because with the evolution of technology and the emergence of the Internet and social networks, access to information is much easier, thus, the general population has become more and more interested in the various means of maintaining and improving the general state of health. This also applies to oral health, which is closely related to general health [1].

It is generally considered that oral health is a veridic indicator of general health and a key indicator of general wealth. It is also known the fact that for a good oral health the individual must have: a properly tooth brushing technique that should be carried out at least 2 times a day, the use of auxiliary means of oral hygiene, periodic checks at the dentist, a balanced diet low in carbohydrates, administration of fluoride, etc. [2].

The oral health habits of the general population are greatly influenced by the multitude of information with which they have daily contact through the mass media, social networks or other means of information or communication thus, for a healthy habits and behavior, they must filter a large amount of information [3,4].

Oral health exists along a continuum influenced by the values and habits of people and communities, aspects studied in this paper [5]. Oral health might be also used as a mean to evaluate the individuals on self-care practices [6]. The degree to which people invest in oral hygiene contributes to maintaining health. Educational level, treatment options in interaction with patients' values can encourage the adoption of profilactic behaviors [5,6].

To the extent that the values regarding oral health determine the behavior of patients, the enrichment of knowledge regarding the aspects valued by the individual becomes a priority that influences the quality of dental treatments. Thus, a profile of the population from different social backgrounds regarding personal values towards health can be outlined, an important aspect considering that they influence lifestyle.

Aim and objectives

In order to establish the awareness among the general population, as well as the oral health values of the individuals, which will represent the main aim of this paper, certain objectives are established: evaluation of importance towards maintaining and improving oral health, and of oral health values regarding the necessity of dental visits. Collection of general data was done: the level of education, living environment as well as the field of activity. In addition, the study aims to correlate the results obtained according to the level of education, environment, gender and type of activity (medical/non-medical field).

MATERIAL AND METHODS

The cross-sectional study was carried out between October and November 2021, on a group of 241 participants in Oral Health and Community Dentistry Department of the Faculty of Dental Medicine, "Carol Davila" University of Medicine and Pharmacy from Bucharest. A self-administered questionnaire consisting of closed questions – Oral Health Values Scale (Edwards, 2021), completed electronically via Google Forms, was used as a research tool, validated in Romanian language [5,6]. This was distributed via a link and was completed online by the people who participated in the study. The questionnaire contained questions related to the oral health values of participants related to oral hygiene, but also about the importance given by the participants to the means of maintaining oral health. The data obtained from the questionnaire were processed with Google Sheets, Microsoft Office Excel and Microsoft Word.

RESULTS

POPULATION.

Adults between the ages of 18 and 68 participated in this study, the average age being 29.7 +/- 10.69. Among the subjects who participated in the study, 73.86% (N=178) are between 18-30 years old; 12.45% (N=30) are aged between 31-45 years; and 13.69% (N=33) of the participants are between 46-68 years. The distribution of all participants by age is shown in the graph below using the Shapiro–Wilk test for interrogating the normality of the null-hypothesis.



Figure 1. Abnormal distribution of the participants by age

SEX.

The gender distribution was not equal, with 75.52% of females participating (N=182), and 24.48\% of males (N=59).

ENVIROMENT.

Looking at the residential environment of the people who participated in the study, it was found that 83.8% (N=202) come from the urban environment, while a smaller percentage of 16.2% (N=39) come from the rural environment.

EDUCATIONAL STATUS.

The distribution according to the educational status of the participants was also assessed, and the results revealed that the majority consists by people with university education in a proportion of 61.6% (N=143), followed by people with postgraduate education 20.7% (N=48), undergraduate education in proportion of 17.2% (N=40) and people with elementary education in a very small percentage.

FIELD OF WORK.

Regarding the field of activity, we found out that a percentage of 58.9% (N=142) of the participants come from the medical field, while a percentage of 41.1% (N=99) of the participants come from the non-medical area.

IMPORTANCE OF DENTAL FLOSS.

Regarding the habits of the people participating in the study regarding the use of dental floss, a percentage of 19.5% (N=47) totally agree with the fact that it is not healthy to floss for a few days, if the overcrowded schedule does not allow this practice. A percentage of 18.3% (N=44) of the participants agree with this and a percentage of 29% (N=70) partially agree with not using dental floss when time does not allow them to do so. Also, 17% (N=41) of the participants disagree and 16.2% (N=39) totally disagree with not using dental floss in case of a busy schedule. By gender, we observe the fact that with regard to the male gender, an equal percentage of 20.34% (N=12) totally disagree, disagree and 16.95% (N=10) totally

agree with the fact that flossing is not a priority in an overcrowded schedule. For women, a percentage of 14.84% (N=27) totally disagree, 15.93% (N=29) disagree, 31.87% (N=58) partially agree, 17.03% (N=31) agree and 20.33% (N=37) totally agree with the lack of prioritization of the use of dental floss in the case of an overcrowded schedule. From the point of view related to field of activity, among the people from the medical field 27.46% (N=39) totally disagree with the lack of prioritization of the use of dental floss in case of time shortage, 28.87% (N=41) disagree, 27.46% (N=39) partially agree, 9.1% (N=13) agree and 7.04% (N=10) totally agree with this aspect. In the case of people from the non-medical field, an equal percentage of 31.31% (N=31) partially agree and agree with the lack of prioritization of the use of dental floss in the saspect. In addition, among the people from the non-medical field, not a single person disagreed or totally disagreed with the lack of prioritization of the use of dental field, not a single person disagreed or totally disagreed with the lack of prioritization of the use of dental field, not a single person disagreed or totally disagreed with the lack of prioritization of the use of dental floss in the case of a busy program.

IMPORTANCE OF DENTAL TREATMENTS.

The values of the participants regarding the dental treatments necessary to maintain an adequate dental-periodontal status is a good one, a percentage of 92.9% (N=224) of the participants totally agree to invest in dental treatments in order not to end up with dentures. A percentage of 4.6% (N=11) of the people participating in the study agree with the treatment of the diseases that appeared at the level of the teeth and gums, in order not to require a denture, a percentage of 0.4% (N=1), equally, partially agree and disagree with this. Also, 1.7% (N=4) of the participants in the study are in total disagreement with the preventive treatment of diseases occurring in the teeth and gums, as they do not have a problem with wearing a dental prosthesis.

In the case of dividing the lot by gender, a percentage of 100% (N=56) of male persons and a percentage of 90.66 (N=165) of female persons totally disagree with the idea of dentures prosthesis and prefers the application of dental treatments to prevent this.

Depending on the field of activity, 100% (N=142) of people in the medical field opt for the preventive application of dental treatments in order not to end up wearing dentures, while only a percentage of 82.83% (N=82) of people from the non-medical field are of the same opinion. Also, among people from the non-medical field, a percentage of 11.11% (N=11) disagree with the lack of application of prophylactic dental treatments and wearing a dental prosthesis, an equal percentage of 1.01% (N= 1) I partially agree and agree with this and 4.04% (N=4) totally agree with the idea of becoming denture wearers.

In the case of the division of the lot according to the area of origin, a percentage of 100% (N=202) of the people from the urban environment totally disagree with this and 56.41% (N=22) of the people from the rural area have the same opinion. The rest of the people from rural areas present the following answers: 28.21% (N=11) totally disagree, an equal percentage of 2.56% (N=1) partially agree and agree, and 10.26% (N=4) totally agree with the lack of application of preventive dental treatments and wearing a dental prosthesis.

PATTERN OF DENTAL VISITS.

Regarding the dental attendance 50.2% (N=121) of participants in this study totally disagree with visits to the dentist only in case of emergency. A percentage of 18.7% (N=45) disagree that visits to the dentist should only be done in critical moments, 12% (N=29) partially agree with this, 8.3% (N=20) agree with the fact that specialist consultation should only be approached in case of the presence of oral diseases and 10.8% totally agree with this.

In the case of dividing the group according to the field of activity, a percentage of 85.21% (N=121) of people from the medical field totally disagree with presenting to the dentist only in case of acute diseases of the teeth and gums, and the rest of 14.79% (N=21) disagree with this. Among people from the non-medical field, 26.26% (N=26) totally agree

with going to the dentist only in case of a problem, 20.2% (N=20) agree, 29.29% (N =29) partially agree and 24.24% (N=24) disagree.

Depending on the area of origin, a percentage of 59.9% (N=121) of people from the urban environment totally disagree with the dental consultation only in the case of an acute condition, 22.28% (N=45) disagree with this, 14.36% (N=29) partially agree and a small percentage of 3.47% (N=7) of people from the urban environment agree. In the case of people from rural areas, a percentage of 66.67% (N=26) totally agree with the need for a dental consultant only in case of acute conditions and the remaining 33.33% (N=13) agree with this thing.

DISCUSSIONS

The study was carried out on a sample of 241 people with different levels of education, both from the medical and non-medical fields. The people in the studied group came from both urban and rural areas.

The aim of the study was achieved, so a concrete evaluation of values towards the oral health of the people involved was achieved.

Regarding the values of the people in the studied group towards the importance they give to oral health, we can state that, in a large percentage, the answer is a favourable one. The results showed that females give more importance to oral health than males, which can be explained by the fact that women are generally more concerned with physical appearance and as a result, they pay more attention to maintaining an adequate dental and gingival status while obtaining at the same time an aesthetic and harmonious smile [6-8]. Also, the results show that women have a higher level of knowledge about the connection between oral health and general health [7,8].

Also, the results of the study show that the concern for oral health increases with the level of education, similar with other researches [5,6]. Thus, people with university or post-graduate education give greater importance to oral health than people with secondary or primary education. The analysis of the level of education in relation to the level of knowledge about oral health shows that, as the education level of the subjects increased, so did their level of knowledge about oral health.

People with university and post-graduate studies show a greater concern towards oral hygiene compared to people with secondary and primary education. The same applies to females compared to males. The results showed that people from the medical field are more concerned about oral hygiene than people from the non-medical field, aspect that can be explained by the fact that people from the medical field possess a level of knowledge more about the importance and role of tooth brushing in maintaining an adequate oral status [5,6]. This also applies to the use of dental floss as an auxiliary mean of achieving dental hygiene. People in the medical field have a better attitude towards using the dental floss [5,6].

Related to the pattern of dental visits and attitude related to the costs of the treatments necessary to maintain an adequate oral health status, these differ depending on certain variables. In the case of dividing the group according to the field of activity, the results show that people from the medical field have a positive habit and attitude towards regular dental check-ups compared to people from the non-medical field [5,6]. Thus, people from the medical field prefer the application of prophylactic treatments in order to avoid complications or even the loss of teeth and the need to replace the remaining space.

CONCLUSIONS

Oral health, as an integrated part of general health, is a subject of great importance nowadays because a poor oral health implies a low quality of life. Thus, a large percentage of the people who participated in the study gave a favourable answer regarding the attitudes and values towards the importance given to oral health. Following the results obtained, it was observed that oral health values and attitudes differ depending on certain variables: gender, level of education, environment and field of activity.

Thus, female persons attach more importance to oral health than male persons. Also, the higher the level of education, the greater the interest in oral health. In the case of the environment, people from the urban environment give greater importance to oral health than people from the rural environment, something that can be explained by the low information and limited access to medical and dental services.

Regarding the field of activity, people from the medical field are better informed and have a more favourable habits and values towards people from the non-medical field.

The results show the importance of oral health education in communities, but also in the dental clinics. Given the current conditions, in Romania there are population groups at risk that have limited access to education and health services.

Thus, it is necessary and recommended to carry out dental prevention programs with the aim of increasing the degree of awareness of the importance of oral health and to motivate and sustain the population to adopt healthy habits and positive oral health values.

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An analysis of how plaque-induced gingivitis can be measured in epidemiological studies



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Abstract

Aim and objectives: The study shows an analysis of how gingivitis can be measured in epidemiological studies, especially when prevalence is the main target; Material and methods: 1595 pupils from Bucharest schools were clinical investigated in order to find the oral health status. The schoolchildren were randomly selected and grouped into clusters. The gingivitis was measured using Silness and Löe gingival index (GI) and bleeding on probing – BOP, respectively; Results: %BOP > 0 was 37% and had a higher percent for the maxillary arch; Conclusions: BOP has more obvious clinical criteria but GI can lead to a prevalence of gingivitis closer to reality.

Keywords: children, gingivitis, epidemiology

INTRODUCTION

Plaque-induced gingivitis represents a chronic gingival inflammation produced by the common dental plaque [1]. The presence of oral microbiota in the gingival sulcus is responsible for the pathologic changes in gingivitis. The amount of dental plaque and her interaction with the host lead to different stages of gingivitis: stage I – *the initial lesion*, where only vascular changes are present and no clinical signs; stage II – *the early lesion*, where a clinical erythema can be present; stage III – *the established lesion*, a real and visible inflamed gingiva and stage IV – *the advanced lesion*, when inflammation is extended to the alveolar bone and is more like a periodontal breakdown than a gingivitis [2].

The plaque-induced gingivitis is completely reversible if the oral hygiene rules are applied. If not, long term gingivitis can lead to periodontal disease and the treatment becomes more complex.

Aim and objectives

When the patient comes for a dental appointment, it can be very easy for the dentist to identify the plaque-induced gingivitis in a simple clinical exam. However, when the examiner is an investigator in a clinical (epidemiological) study, things get more complicated because of the high number of peoples who need to be investigated, short time for every clinical exam and the way gingivitis is measured according to the clinical protocol. There are many ways and clinical scores for measuring gingivitis in epidemiological studies and this raises some questions when comparing results from different studies that use different methods for measuring plaque-induced gingivitis. The aim of this study is to make an analysis of how gingivitis was measured in an epidemiological study in Bucharest, Romania.

MATERIAL AND METHODS

This analysis is based on data from the PAROGYM study. The study involved 1595 pupils aged 11 to 14 years from 56 different Bucharest schools. Other results related to caries, gingivitis and teeth eruption were already published [3-6].

The sample was drawn from the total of 58,000 Bucharest schoolchildren population from 5th to 8th grade (data from 2008) and built on clusters using the EpiInfo software (Centers for Disease Control and Prevention, Atlanta, GA, USA). The sample characteristics were: 50% assumed prevalence of gingivitis, 95% confidence interval and a 2.4 estimation error. We used classes as clusters in a single-stage cluster sampling method. The children were stratified by city regions, grades, and the presence (or not) of a dental unit in schools.

The data were analysed using the SPSS processor, software version 24 (IBM, Armonk, NY, USA).

The clinical protocol and the informed consent form were approved by the Ethics Committee of "Carol Davila" University of Medicine and Pharmacy. Every schoolchild enrolled in the study had an informed consent signed by one of the parents.

Plaque-induced gingivitis was measured using both, Silness and Löe gingival index (GI), including score 1 (erythema) for all teeth and gingival surfaces (except third molars) and bleeding on probing (BOP). The gingival scores are the following [7]:

- 0: healthy gingiva
- 1: mild inflammation (discrete changes in colour, slight edema; no bleeding on probing)
- 2: moderate inflammation (the colour turs to red, edema, and glazing; bleeding on probing)

- 3: severe inflammation (marked redness and edema, ulceration; tendency to spontaneous bleeding)

The BOP technique was used only for 326 pupils and then was abandoned due to the lack of time. BOP was performed by insertion a Goldman–Fox/Williams D/E periodontal probe at the base of gingival sulcus (Fig. 1 and 2). Gingival enlargements or periodontal pockets were also measured (Fig. 3).



Figure 1 and 2. BOP technique



Figure 3. Periodontal pocket measurement

A several minutes pause was taken between both evaluation, GI and BOP.

RESULTS

The BOP results are shown in the table no.1.

Table 1. BOP results

BOP			
	No. cases	Percent	
BOP = 0	205	62.9%	
BOP > 0	121	37.1%	
Total	326	100%	

The maxillary and mandibular values of the BOP are graphically exposed in figures 4 and 5.



Figure 5. Percentages of mandibular BOP

DISCUSSIONS

The manner for measuring plaque-induced gingivitis is very important when we try to compare different results from different studies. In this study we chose to use Silness and Löe gingival index (GI) for all teeth but third molars. The chances for someone to have all gingival surfaces of all teeth without any inflammation are low. Moreover, the GI score no. 1 does not involve any gingival bleeding, so any change in gingival colour may lead to a gingival "inflammation". Therefore, the examiners must be very well prepared and calibrated before the study begins.

Measuring plaque-induced gingivitis only with BOP or with others bleeding scores may be a way to make clinical assessment more facile because they are much more visible clinical criteria. Therefore, the examiner can identify easier plaque-induced gingivitis and can save more time in clinical exams. That is the main reason why researches prefer bleeding scores in their clinical protocols. However, in this case we are tempted to believe that prevalence of plaque-induced gingivitis is somehow underestimated since clinical sigs such as discrete changes in gingival colour or slight edema (GI score no. 1) are excluded.

In our study the differences are obvious: 91% (GI > 0) or 45% (GI = 2 or 3) vs 37% (BOP > 0) [4].

There are researches who prefer to use GI [8,9], or BOP [10], or both [11].

Chavez et al concluded that BOP is more related with inflammatory changes from the base of gingival sulcus being a real predictor for periodontal breakdown and GI is more used for marginal inflammatory changes [12].

CONCLUSIONS

Epidemiological studies of gingivitis require a deep analysis for choosing the proper method for measuring. BOP has more obvious clinical criteria but GI shows a prevalence closer to reality.

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Processing Technologies of Polymers for Provisional Prosthesis



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Abstract

Aim and objectives

Dental practice is tending to remove the metallic component of fix partial prosthesis due to unfavourable mechanical behaviour. The polymers are used for prosthesis with metal free infrastructures and optimal function.

Material and methods

Polymers used for provisional prosthesis can be used with different technologies and have different mechanism of initiating the polymerization. Thermoplastic and chemoplastic polymers need different technologies and technological alternatives are: subtractive CAD-CAM, milling, printing technology and polymers injection.

Results

The chosen materials and manufacturing technologies may influence the success of the final prosthetic treatment. The standard and quality of provisional restoration is decisive for a successful prosthetic treatment.

Conclusions

Materials used are highly biocompatible and resistant to dental plaque adhesion. Present polymers induce low periodontal inflammation due to the lack of residual monomers.

Keywords: matrix, composite, optical microscope

INTRODUCTION

Fixed temporary dental restorations made through traditional or CAD-CAM procedures are crucial in dental treatment due to the diagnosis esthablishment, traeatment planning improvement and protective benefits. Cemented provisional restorations help maintain hygiene, guide marginal gingiva healing and prevent the successive abutment movement (1).

The introduction in current practice of alternative technologies for processing polymers by injection, the CAD/CAM systems, subtractive and additive techniques, made possible to obtain long-term temporary restorations. Polymers can be processed due to the implementation of subtractive technologies and the use of high-performance scanning systems. The processing of polymers as well as milled or printed polymers involves the mastery of a new technology and major investments in software and hardware (2, 3).

The long-term success of a fix prosthodontic restoration is influenced by several factors. A temporary restoration achieved by conventional or alternative technologies allows the aesthetic results to be predictable. The use of materials with increased biocompatibility and favourable mechanical strength, respectively the absence of residual monomers and polymerization shrinkage became possible by using the injection of thermoplastic polymers, milled or printed (4,5).

The implementation of CAD-CAM technologies in the dental office and laboratory, increases the efficiency of the treatment stages. The temporary restorations made with digital design will allow the correct identification of therapeutic solutions, but at the same time allow a constructive cooperation between the doctor, patient and dental laboratory (6,7,8).

Aim and objectives

The aim of this study is to discuss the advantages and importance of fixed temporary prosthodontic restorations in dental practice. Also, it points out the development of alternative technologies including subtractive and additive techniques. Aditionally the introduction emphasizes how the implementation of CAD-CAM technologies increases the efficiency of the treatment stages.

MATERIAL AND METHODS

Processing polymers by printing and milling improves clinical activity. The usage of CAD-CAM enhances the efficiency of the therapeutic process with design and computeraided manufacturing components (9).

In this study were prepared and evaluated with non-invasive techniques, four groups of temporary fix partial prostheses. Group 1 made with thermoplastic polymers reinforced with fiberglass, group 2 provisional restauration made with injected polymer, group 3 provisional restauration made with milled technology and group 4 printed provisional restorations. For each group was made six samples.

The four groups were compared to the control group, in which the restorations were made with self-curing acrylic resin by classical technique. The control group was made using an impression key of the wax-up. The Temdent Classic Schutz Dental polymer was prepared by mixing the powder with the liquid in the proportion recommended by the manufacturer. When the polymer reached the plastic phase it was introduced into the impression key and applied on the cast. After polymerization of the material, the temporary restoration was finished and polished. Manufacturing the samples of group 1, temporary restorations reinforced with glass fibres, followed the protocol: on the wax pattern of non-metalic framework was obtained the transparent pattern from EG CORE followed by the adaptation of EG Fiber on dental cast. The polymerisation was made in Hereus curing oven for 60 sec. The aesthetic component was made from Estenia C&B composite resin which is a high-filled hybrid ceramic (Fig.1). The last stage is represented by thermal treatment in the Biodent SystomatD oven (De Trey).



Figure 1. Group 1, reinforced fiber temporary restoration

The second group of samples were made using two injected thermolpastic polymers BioHPP - Bredent and Pekkton® Ivory (Cendres + Métaux). After making the non-metallic framework by injecting thermoplastic polymers with the help of PEKKtherm and PEKKpress injection systems, the physiognomic veneering was made with Nexco light-curing DRC (Ivoclar Vivadent) (Fig.2a, 2b).

Semi-crystalline polymers have been used in medicine for over fifteen years. In recent years, they also entered the field of prosthetic restorations. Bio HPP and Pekkton is a high performance thermoplastic polymer. It has been used for 20 years in medicine for making different types of prostheses (10, 11).



Figure 2. Group 2, 2a. Pressed Pecton framework, the appearance after removing the investment material, 2b. Aplying the veneer layer

For the third group of temporary restorations were used milled polymers. The term "subtractive system" includes techniques that allow to obtain restorations by successive reduction from a polymeric disk. These systems consist of three components: the scanner-3D Neway Open Technologies, the software Exocad for processing the data, and a milling system.

The milling process was performed with an Imes-Icore 350i five-axis milling machine that works in a dry environment. The chosen material was PMMA (polymethylmethacrylate) from Aidite (Fig.3).



Figure 3. Group 3. The milling process

The fourth group followed the protocol for making the printed restorations. The first step was to send the design file to the Asiga Max printing unit. The material used is a Detax Freeprint temp UV polymer resin, shade A2. The liquid polymer is positioned in the tank, where a suitable homogenization is performed before starting the printing process.

The materials used in 3D printing technology are liquid resins, which are light cured using UV wavelengths of 385nm. The system has the ability to process translucent materials (Fig.4). The Asiga System generates the polymerization parameters of each material, so the materials are polymerized accurately and the results are repeatable. The internal radiometer actively monitors the intensity of the LED during each polymerization ensuring a correct exposure to light for each layer. The successive deposition of layers, allows the making of the 219 layers for the prosthetic restoration at a temperature of 23.40C and an estimated working time of 58 minutes. To complete the polymerization and stabilize chemically the restoration was introduced into the UV chamber for 10 min. (6).



Figure 4. Group 4. Image during printing of the restoration

RESULTS

To evaluate the differences between the temporary restorations in the control group made by indirect Scutan technique from self-curing resin and the group of fix prostheses made by alternative milling technologies it was used a minimally invasive system, the radiography. X-rays of the restorations were made, both from the buccal side and from the occlusal side (Fig.5).

Analysing the X-ray, results showed both in the buccal and occlusal side the existence of air inclusions in the thickness of the self-curing resin. These defects can determine a decrease in the mechanical resistance of the fix provisional prostheses.



Figure 5. Rx-occlusal view. a. The restoration made by Scutan technique, control group b. The restoration made by milling, control group 3

The fixed partial prostheses reinforced with fiberglass were investigated using the Optical Coherence Tomography, a noninvasive imagistic technology, working at 1300 nm, in Time Domain Mode. The cross-section ensures a proper assessment of the material. The images showed the presence of inclusions especially at the level of the polymer-fiberglass interface in both B scan and C scan mode (Fig.6).



Figure 6. OCT Time Domain Mode C SCAN. Sample 1, Group 1- Reinforced polymer



Figure 7. Group 2.OCT Time Domain Mode B Scan, Injected polymer- The gaps between the polymeric layers can be a favourable factor for chipping

The evaluation of the temporary restorations created by milling technique was made with a microscope with the following features: Video capture resolution: 160x120, 320x340, 640x480, 1280x1024, 1600x1200, Still Image Capture Resolution: 160x120, 320x340, 640x480, 1280x1024, 1600x1200, Light Source In built White LED x 8 PCS, Snapshot Software and

Hardware. With the help of the digital microscope, the images from the cervical adaptation were captured. The inaccuracies of the cervical adaptation were measured, and found values between 0.207-0.070 mm for the milled ones (Fig.7) and 0.022 mm and 0.106 mm for the printed restorations (Fig.8).



Figure 8. Microscopic evaluation of the cervical adaptation of the group 3 milled restoration. Spacing between the crowns margin and the limit of the marginal preparation



Figure 9. Microscopic evaluation of the cervical adaptation of the group 4, printed restoration. Spacing between the crowns margin and the limit of the marginal preparation

DISCUSSIONS

Compared to other materials used for temporary fix partial prostheses, the advantage of milled PMMA is that it has exceptional optical properties, good mechanical resistance and strength. Milled PMMA is considered a technological alternative to the classic technique of making fix partial temporary prostheses in dental offices or dental laboratories (9).

Making polymeric fixed partial prostheses on non-metallic frameworks obtained by injecting thermoplastic polymers is a viable technological alternative in complex therapies, where long-term temporary restorations must be kept functional in the oral cavity for a longer period of time (11).

The implementation of computer-assisted additive and subtractive technologies in current practice is justified by the advantages of CAD/CAM systems (12, 13). The marginal adaptation inaccuracies can be caused by errors in drawing boundaries in the digital design stage, or because of the manual finishing of the restoration after the detachment from the polymer disk, or from the printing blank.

Substractive systems are widely used in dental labs and offices while additive methods are less prevalent. Casting and printing are more common than temporary restoration printing. The materials used for temporary restorations should be assessed for cytotoxicity (14,15,16,17).

The use of temporary milled restorations, obtained as a result of mock-up and wax-up are tools that will allow us to evaluate the smile line, the position of pontics in the buccal-oral direction, the profile line and an evaluation of the space for physiognomic component of the final fix partial prostheses with natural abutments or implant support (18).

CONCLUSIONS

The temporary restorations are made for morphological and functional rehabilitation on a limited period of time. The chosen materials and manufacturing technologies may influence the success of the final prosthetic treatment. The standard and quality of temporary restoration is decisive for a successful prosthodontic treatment.

Milled, printed, injected or light-cured, the temporary restorations are reproducing the exact shape, colour and size of the treatment's final result. The materials used must be highly biocompatible and resistant to dental plaque adhesion, and the cytological testing are required before the introduction of new materials into the oral cavity. The absence of residual monomer in milled and injected polymers induces low periodontal inflammation, which represents an important advantage of these alternative materials and technologies.

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The Influence of Metals Processing Technologies on Metal-Ceramic Interface



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Abstract

Aim and objectives

The aim of this study is evaluation of metal-ceramic prostheses interface. The metallic frameworks were made with two technologies.

Material and methods

For samples manufacturing, was used the NeWay Open Technology Scanner. On the virtual cast, was designed the metallic framework with EXOCAD program for SLS. The patterns for the melting-pouring technology were milled in wax using the Zenotec Select Hybrid. The veneering of Co-Cr metallic frameworks was made with IPS d-SIGN (Ivoclar Vivadent) ceramic. The samples were cut and investigated with the optical microscope.

Results

Optical Microscopy revealed inclusions and dehiscence on metal-ceramic interface of pour-melted frameworks. The interface of ceramic and sintered framework had dehiscence and the veneering ceramic showed spherical inclusions.

Conclusions

The errors of detaching the veneered ceramic are reduced in case of SLS due to the adherence of ceramic which is higher for SLS metallic infrastructures.

Keywords: metal framework, SLS, metal-ceramic interface

INTRODUCTION

The patients demandes on the aesthetic results of the prosthodontic restorations have increased significantly due to the concept of "metal-free dentistry" (1). Melting-casting still remains the most used technological option for obtaining metallic frameworks, although multiple errors occur and require a lot of working time (2). The options of making computer-assisted dental prostheses (CAD/CAM) using subtractive or additive technologies have become very popular due to high accuracy (3, 4).

The subtractive method of milling the metallic disc is considered a waste of material. Pre prior studies, 90% of raw material is lost in manufacturing (4, 5).

In order to eliminate the disadvantages represented by the material loss and pollution in case of dry milling (3), the use of addition methods like rapid prototyping technology is now an option that allows the making of metal frameworks for fixed prosthetic restorations. Selective Laser Sintering (SLS) was introduced in dentistry to make the frameworks of fixed and partial prostheses (3, 4). Selective laser melting has as a principle the addition of successive layers of metal powder followed by melting and rapid solidification. Through this process is obtained a fine and homogeneous microstructure, while in the stages of conventional casting there is always the risk of overheating and segregation (5, 6).

SLS is an additive technique that allows the generation of a complex threedimensional structure to be consolidated by successive selection of metal powder. The prostheses are built through layers, using the thermal energy provided by a computerfocused laser beam (7).

Aim and objectives

The aim of this study is evaluation with the Optical Microscope the metal ceramic interface of metal-ceramic prostheses. The metallic frameworks were made with Selective Laser Sintering (SLS) technology and compared with the ones made through melting-pouring classic technique.

MATERIAL AND METHODS

For this study were made 12 samples, of full physiognomic metal-ceramic crowns. Two groups were created, six samples for each group of prosthetic restorations. For the first group the metal frameworks were obtained by the classic melting technology with alternative protocol regarding the wax models and for the second group, SLS technology was used. Selective Laser Sintering is replacing the conventional casting of the metal alloys. In both situations, Co-Cr metal alloy is use for the design of metallic infrastructure.

The scanning of the working cast was done using the NeWay Open Technology Scanner. The scan was followed by the "Order from" file in which the dental abutments were selected, the type of restoration (fixed partial prosthetic restorations), the type of material (wax pattern respectively Co-Cr). This was followed by scanning the entire cast at a low resolution, to obtain an overview image and the scanning of each abutment.

The steps of making the design with the EXOCAD software were as following: first was marked the insertion axis of the future restoration and was drawn the limit of the preparation. The design of the frameworks had the purpose to define the internal surface, this stage is being called "interface". Depending on the material used for the infrastructure, was selected the appropriate thickness of the space for the cement film. This cement film comprises 3 areas: "cement gap" - it is applied at a distance of 1 mm from the marginal limit to "extra cement gap" - which is found on the entire surface of the dental abutment. The

transition from "cement gap" to " extra cement gap" is given by "smooth distance". The values of these cement areas are: "cement gap" - 0.080 mm; "extra cement gap" - 0.100 mm.

By similarity, the program also draws the outer surface of the framework. The thickness is given depending on the type of processed material, sintered or milled (Co-Cr alloy, wax). The design of the metal framework and the design of the wax pattern of the future metal framework is accessed by the "frame design". The virtual wax knife can be used to adjust the occlusal surface, according to requirements, so that both the thickness of the metal frameworks and the thickness of the wax pattern frameworks are 0.50 mm. In the stage called "finalize", the last touches are made and the data file obtained is saved, so the FPR design is stored and can be transmitted to the CAM module (Fig. 1).



Figure 1. The creation of the metallic framework design in "Frame design"

The strategy and stages of manufacturing the sintered frameworks were preceded by several geometric decisions regarding the position of the frameworks on the disk during the sintering process. Firstly, the framework is positioned upside down to ensure well-finished plans, and secondly, the frame is left tilted to reduce the effect of scale and the volume of any supporting structures. The stl data file was transmitted to the Phenix PXS 3D laser sintering device, and a specially Cr-Co alloy (Starbond CoS 16 Powder from Scheftner Dental Alloys) was used for sintering.

The sintering process takes about 6 hours. The disc on which the prosthetic frameworks are located is placed in a preheating oven, which is rises to a temperature of 240°C, 10°C per minute. At this temperature is kept for 35 minutes. Next, the temperature is rising to 820°C, with 20°C per minute and is maintained at this temperature for 45 minutes. After the 45 minutes, the oven temperature is gradually decreasing to 600°C and during this time the disc is inside the oven. At this point, it can be removed from the oven and allowed to cool gradually. Due to the high precision of the SLS machine, to verify the adaptation of the prostheses was easy, thus it was demonstrated that no major processing was required.

The polishing of the surfaces was made using tungsten carbide burrs, which are suitable for Co-Cr alloys. The network of metallic rods was removed with a disc, then with rotary tools, respectively hard burrs. The metallic component was processed and adapted, followed by the blasting and final cleaning of the metal surface with the steamer.

The strategy and manufacturing stages of the milled wax pattern, used the Zenotec select hybrid system, which combines a CNC (computer numerical control) milling system that offers a state-of-the-art technology (simultaneous 5-axis milling) with the advantage of very compact external dimensions. It is chosen the wax block for the milling, the bar code is scanned and then the wax-pattern is positioned on the wax block. The computer automatically generates the clamping rods. The milling of 3-elements wax pattern takes 12 minutes.

The patterns are easily removed from the wax block with a scalpel. Further, are chosen and applied the casting rods with a diameter of 2 mm and 3 mm, respectively, and the wax pattern were prepared for investing and casting. After the investing, the assembly was preheated at 8000C for 60 minutes followed by a rise of temperature to 9500C. At this temperature, takes place the melting at pouring of the Co-Cr alloy. The technological process ends with the removal of investment material and finishing.

The next step was to apply IPS d-SIGN ceramic (produced by Ivoclar Vivadent) on the frameworks in several stages. The thermal treatment of the ceramic was made at the sintering temperature recommended by the manufacturer with the programmed P300 oven from Ivoclar Vivadent.

The fix partial prostheses were analysed using optical microscopy. The metal-ceramic interface was evaluated by an invasive technique. With the help of a diamond disk mounted on the rotary instrument using cooling with air and water. The samples were sectioned in the areas of interest: the structures on the retainer element and the rigid connectors. Buccal -oral sections were made for all the samples (Fig.2).



Figure 2. Sectioning on the retainer element with cast metallic framework

The sectioned samples were cleaned with the steamer and polished with Klingspor abrasive paper with different granulation size in descending order: 220 microns, 360 microns, 800 microns and 1200 microns.

RESULTS

After preparing the samples, they were analyzed under an optical microscope. To analyze the metal-ceramic interface, it was used the TM-M200 digital microscope from JINGOU, which has the following technical characteristics: -Video capture resolution: 160x120, 320x340, 640x480, 1280x1024, 1600x1200, Still Image Capture Resolution: 160x120, 320x340, 640x480, 1280x1024, 1600x1200, -Light Source In built White LED x 8 PCS, Snapshot Software and Hardware.

The microscopic evaluation of the samples revealed the presence of defects, inclusions and dehiscence at the interface between the metal and the ceramic material. It was detected a defect in the metal-ceramic interface on the buccal-oral section of the mesial retainer element.

The characteristics of the interface defects are: dehiscence between the cast alloy and the sintered ceramics of 0.083 mm - 0.127mm (Fig.3a). It was detected at the level of the metallic component of the prosthesis with the cast framework in the buccal-oral section, a casting defect in the mass of the material (Fig.3b). The evaluation in the area of the connector for the prosthetic restoration with metal cast framework revealed the existence of gaps at the interface and the existence of inclusions in the sintered ceramics (Fig.4).



Figure 3. a. The aspect of the metal-ceramic interface with the defects. b. The aspect of the defect in the cast metal framework.0.010mm-0.030mm



Figure 4. Image with the connector section – the cast framework visible



Figure 5. a. The aspect of the metal-ceramic interface for the prosthetic restoration with the sintered framework, buccal-oral section. b. Inclusions in the ceramic mass. Section aspect of the connector - sintered framework

When evaluating the aspect of the metal-ceramic interface for the restorations with sintered framework, in the buccal-oral section an area without dehiscence was highlighted, but in the ceramics was observed the existence of spherical inclusions (Fig.5). At the evaluation in the area of the connectors, inclusions in the ceramic mass were found.

DISCUSSIONS

The processing performance of metal frameworks obtained by the SLS technique depends on several parameters which include laser beam size focus, laser power, sintering speed, average particle size of the base powder, layer thickness, layer overlap and atmospheric processing conditions (8, 9).

The researchers found that the internal adaptation, the marginal adaptation, the precision of laser sintered metal restoration are better than those obtained by traditional casting techniques. In the study comparing the marginal adaptations, the smallest marginal discrepancies were obtained at the level of the laser sintered metal frameworks $51,78\mu m$, while in the case of the conventional method of obtaining the metal framework, the marginal discrepancies of the framework was $80,39 \mu m$ (9, 10).

The strength of the metal-ceramic bond of the SLM samples and that of the conventional metal cast after 3, 5 and 7 burnings did not accentuate major differences according to the test results. On the other way, after more extensive analyzes, the metal framework obtained by melting-casting, after 3, 5 and 7 burns, showed a significantly lower adhesion to the ceramic mass compared to that of the metal made by SLM (8).

The different manufacturing techniques influence the morphology and the surface thickness of the Co-Cr dental alloys. Thus, the adhesion strength of the groups exceeds the minimum acceptable value, recommended by ISO 9693, of 25 MPa (11,12,13). Thereby, the frameworks from Co-Cr alloy prepared with SLM techniques could be a promising option for metal-ceramic restoration (13).

The high costs and environmental pollution due to metal dust are the consequences of computer-assisted milling, as a subtractive manufacturing method. In comparison, the SLM technique is an additive manufacturing method. It consists of a high power laser that is used to melt the Co-Cr powder layer. This melting leads to the formation of metal substrates that provide structures with up to 100% density without porosity and material waste (13, 14).

The advantages of SLS technology, in terms of reducing human errors while maintaining a constant quality of restorations recommends this process.

CONCLUSIONS

By making the metal components using the SLS technology, having a smaller number of working steps, the sources of errors encountered in melting-casting are eliminated. The metal frameworks made by SLS technology has fewer structural defects compared to that obtained by traditional technology.

The metal-ceramic interface in the case of SLS structures showed a lower number of defects. The incidence of ceramic detachment, due to failure, can be reduced by using SLS technology in the manufacture of the metal component.

The metallic components obtained by SLS, compared to those made by meltingcasting, contain less porosities and inclusions.

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Oral health related behaviour among dental students – a comparative study



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Abstract

The aim of the present study was to compare the oral health behavior of first year students with that of sixth year students from Faculty of Dentistry, University of Medicine and Pharmacy "Carol Davila", in Bucharest. A descriptive cross-sectional study was carried out on 293 undergraduates, divided into 2 groups: 156 students from the first year and 137 from the sixth year. The method used was the sociological survey based on an anonymous self-administered questionnaire. The results showed an unhealthy behaviour among first-year students and a correct one regarding oral hygiene, but also incorrect in other respects (dental attendance, diet with low consumption of fruits and vegetables, but frequent consumption of cariogenic foods, and smoking status). The oral health behaviors reflect the importance of the speciality knowledge accumulated during the years of study. The knowledge and habits of dental students are an important part of professional education.

Keywords: oral health, habits, knowledge, education

INTRODUCTION

The level of knowledge and concern of individuals towards oral and general health are important and influence their healthy or unhealthy behaviour. Even more, the issue is of interest regarding students studying at Faculty of Dentistry. In order to ensure its continuity, society was conditioned to transmit the necessary knowledge, attitudes and behaviors to new generations [1,2]. The education process, specific to civilization, is initially informal, in the family; later formally in organizations (kindergartens, schools, high schools, faculties, colleges, doctorates) based on standardized programs and methods and with the help of dedicated personnel (educators, teachers, professors, university teaching staff) [1,3]. Concentrating high-potential human resources, education itself being a factor of change.

Health promotion represents the mediation strategy between people and their living environment that summarizes personal choice and society's responsibility towards health [4,5]. The medical personnel behaviour towards their own health reflects the understanding of the importance of preventive approaches and of improving and preserving the health of patients. Dental students are models of behaviour for patients, family, and friends and why not, even for the whole society, in terms of obtaining and maintaining an adequate oral health status [1,6].

Aim and objectives

The aim of the present study was to evaluate the behaviors towards oral health among the students of the Faculty of Dentistry from the University of Medicine and Pharmacy "Carol Davila" in Bucharest. The objective was to reveal the comparative description of the oral health habits of the undergraduates from the first and last year of study.

MATERIAL AND METHOD

A descriptive cross-sectional study was carried out on 293 students, divided into 2 groups: 156 students from the first year and 137 from the sixth year. The method used was the sociological survey based on an anonymous, self-administered questionnaire. The questionnaire has common closed questions regarding the oral health behaviour, thus allowing the comparative assessment of this aspect in the two studied groups.

RESULTS

The comparative evaluation allowed to highlight the degree to which the medical and dental knowledge accumulated during the faculty influenced the behavior towards oral health of the undergraduates.

Preventive treatment before faculty. According to the data presented in Figure 1, the percent of first-year students who benefited from preventive treatment before their university studies was significantly higher (p<0.01) than that observed among sixth-year dental students. Probably the behavior of individuals has changed over time and they visit more frequently the dentist for regular check-up, and also, the dental system is more oriented towards prevention, not just for curative treatment.

Frequency of tooth brushing. The rate of association with brushing teeth once a day was significantly higher in first-year students, who are not influenced by speciality information. Dentists probably do not give enough importance to the frequency of brushing in the sanogenic message they convey to patients (Figure 2).



Figure 1. Preventive treament before faculty (%)

Figure 2. Toothbrushing once a day (%)

As expected, the association with brushing teeth 2 times a day (correct frequency) was significantly higher in final year students (Figure 3). The percentage of students from the 6th year who use mouthwash as an auxiliary means for oral hygiene was higher compared to that observed in the group of students from the 1st year, but not statistically significant (p>0.05) (Figure 4).



Figure 3. Toothbrushing twice a day (%)



The rate of association with *the use of dental floss* was significantly higher (p<0.001) among final year students, whose behavior is influenced by the medical and dental information received during the years of study (Figure 5).



Figure 5. The use of dental floss (%)



Figure 6. Consumption of cariogenic foods (%)

Regarding the content of the *diet*, the association with the consumption of cariogenic foods and carbonated beverages, is statistically significantly higher in first-year students than in sixth-year students (p<0.05), which indicates a healthy behavior of students in the last year, influenced, probably, by the knowledge obtained during the years of study (see Figure 6 and Figure 7).



Figure 7. Consumption of carbonated drinks (%)



Tobacco consumption. The frequency of smoking is higher among 6th year students, the observed difference not being statistically significant (p=0.2) (Figure 8).

Regarding the students' *behavior after meals*, the correct answer (using sugar-free chewing gum - Figure 9 and rinsing with water - Figure 10) was chosen by a higher proportion of students from the 6^{th} year (p<0.001).



Figure 9. Using sugar-free chewing gum (%)



Figure 10. Rinsing with water after meals (%)



Figure 11. Toothbrushing after meals (%)

Figure 12. Lack of preventive behavior after meals (%)

The rate of association with tooth brushing after meals was not statistically significantly associated with the year of study (p=0.4). Anyway, in everyday life, it is unlikely to carry out this action, although it would be desirable as a mechanism for dental caries prevention (Figure 11).

The association with the lack of any preventive action after meals was statistically significantly higher among first-year students (p<0.001), a fact probably explained by the lack of knowledge in this regard (Figure 12).

DISCUSSIONS

Oral health knowledge is a prerequisite for healthy behaviors, although cross-sectional studies seem to show a weak correlation between medical knowledge and healthy habits [7]. Moreover, in literature, no association between the level of knowledge and the proper oral health status has been demonstrated [8]. Studies from the 90s showed that the dentist is not motivated to adopt a healthy behaviour himself, with correct oral hygiene practices [9]. Recent data show that along with the education, the level of knowledge, attitudes and healthy habits also increases.

Dental students should be encouraged to be a model in promoting oral health education among family, friends and patients. The oral health behaviors of the sixth year students are generally correct, reflecting the importance of the speciality knowledge accumulated during the years of study. A comparative study carried out in 2006 showed that dental students changed their attitudes and behaviors towards oral health for the better, unlike their colleagues from general medicine [10] or unlike dental technician students or dental hygienists [11], probably also due to the clinical training and the educational curriculum.

The diet is not correctly chosen by the students, neither in terms of content (there is a frequent consumption of cariogenic foods and drinks), nor in terms of frequency of food intakes. Moreover, the behavior after meals and snacks during the day is not the healthy one, which could limit the effects of the acid attack on the teeth.

The behavior of students towards the habit of smoking is worrying, although there are national programs in Romania initiated by the Ministry of Health. Some of the students were smokers before their studies, but there are also students who started after [12]. Students are not receptive to the negative effects of tobacco consumption on oral health and implicitly on general health. Will they advise patients to quit smoking, at least if, through clinical examination, they detect lesions related to this habit? It is necessary to emphasize during the faculty, the role of dentist in preventing and motivating patients for quitting smoking. Dental students should have oral health education in their curriculum prior to their clinical years, when they will come into direct patient contact. The authors consider that this is a key factor in developing the right attitudes and behaviors, allowing them to have a positive impact on the opinions and health habits of patients. It is desirable for the dentist to have an increased level of knowledge to confirm professional recommendations.

CONCLUSIONS

The study revealed a healthy behavior regarding some aspects of oral health (frequency of personal tooth brushing, use of auxiliary means), but also incorrect in other aspects (frequency of check-ups, late presentation to the dentist, only in case of problems or pain, diet with reduced consumption of fruits and vegetables, but frequent consumption of cariogenic foods and drinks or fast food products, and smoking habit).

The level of knowledge and behaviors towards oral health have an important role for the students from the sixth year, because they are not only receivers of information, they are promoters of oral health messages as educators for patients. It is desirable that future dentists have a healthy behavior in order to succeed, in turn, in motivating patients to change umhealthy habits, in order to be able to influence those around them, the community and patients.

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Informed consent in dental medicine



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Abstract

The medical act requires the patient's consent, and the foundation of this condition imposed under the legal provisions is the respect for the physical integrity, freedom and self-determination of each person. In order to carry out this study on the legal and practical implications of informed consent in dentistry, a questionnaire was drawn up consisting of 15 closed questions, which had the role of highlighting the legal consequences produced by the expression of informed consent by the patient regarding dental interventions performed. After completing the completion period, the questionnaires were centralized and analysed statistically. The main conclusion resulting from this study takes into account the need to carry out various campaigns in the future regarding the legal education in the medical field of the staff working in dental offices, and patients in order to offer them increased protection regarding in the relationship with patients.

Keywords: informed consent, the right to medical information, patient, dentist, College of Dentists

INTRODUCTION

Patient consent is a burdensome bureaucratic formality for dentists, who are already overburdened, however is an opportunity and key factor in the efficiency of the medical act [1-3].

Informed consent is regulated both in Law no. 95/2006 [4] regarding health reform, as well as in Law no. 46/2003 [5] regarding the patient's rights, that a medical intervention can only be carried out after the patient has expressed his consent freely and knowingly [6-9]. No medical treatment or procedure cannot be made with ought the patients consent. The medical act involves an ethical component, which includes informing the patient and obtaining his consent and a scientific one, which includes the actual prevention, diagnosis and treatment procedures. Informed consent is no longer seen as a simple administrative formality for dentists, but as a relational process. It contribute to the patient's trust, patients understanding of the medical procedures and the quality of the medical act [10-15].

Aim and objectives

Aim and objectives of this research are to statistically evaluate the knowledge and understanding of the informed consent by patients who request dental care in Timiş County.

MATERIAL AND METHODS

In this study were included 50 subject, 17 males and 33 females with age between 21 and 60. 13 subject belong to 20-30 years of age, 16 subjects belong to 30-40 years of age, 12 subjects belong to 40-50 years of age and 9 subjects belong to 50-60 years of age. 30 subjects are belonging to an urban area and 20 belong or live in a rural area. 30 subjects have a university degree and 20 high school degree.

A questionnaire consisting of 15 closed questions, centred on the role and importance of informed consent in dental medical practice was addressed to a group of 50 patients in different dental practices in Timişoara. Each question included three answer options. Questions about patient's gender, age, the environment of origin (urban/rural) and studies were included in the questionnaire.

The first question concerns if patients were informed in writing about the medical interventions performed, the risks that may occur as a result of each individual procedure, the existing alternatives to the proposed procedures, but also regarding the risks of not carrying out treatment and not complying with medical recommendations. What we wanted to observe if legal obligation, regulated with Law no. 95/2006 on health reform; Law no. 46/2003 on patient rights it is respected. On the other hand, the aim was also to see if patients know that there is currently a legislation in the medical field that recognizes their right to be informed by the dentist regarding all aspects related to their health condition. The second question has the role of analysing if patients are asked to carefully read the content of the document containing their agreement regarding the medical intervention they will undergo, before signing it. The valid expression of consent regarding the medical intervention mentioned in writing in the content of the form and to ensure that the patient has understood exactly what each medical procedure consists of.

The third question was referred to the respect and dentist professionalism, considering that the dentist exhibits an ethical behaviour and respect patient's rights. The fourth question is regarded to estimated costs of the treatment, costs that the patient must know from the beginning. The dentist is under no obligation to communicate the final costs of the treatment

to the patient from the outset, as they may change in relation to subsequent medical interventions that may be necessary. The patient is able to decide whether to accept the medical intervention proposed by the dentist, in relation to the related costs, or the expression of consent in this regard can only take place if this information has been previously transmitted. The fifth question in the questionnaire concerns if the patients know the legislation applicable in Romania in the medical field, which regulates the patients rights in relation to the medical staff. Question six refers to emergency medical intervention which were performed without consent. The legislation gives the dentist the right to intervene without first requesting the informed consent of the patient. Question seven, asks if patients are familiar with the terminology used by the dentist, if they understand it and if they are provided with all the information they need. The patient's informed consent form must be drawn up with utmost diligence, in as much details as possible and in a way that the patients can understand. Question eight, refers to the legislation in the medical field which imposes that the refusal of the treatment expressed by the patient have to be made in written. Ninth question is regarding the expression of consent to the medical act in the case of minor patients or those with special needs. The legislation gives the responsibility to family or tutors. Question number ten analyse the frequency with which patients have so far turned to the College of Dentists to complain about the possible violations of their rights by dentists. However, turning to the College of Dentists to complain about possible abuses cannot take place if patients do not first of all know what the role and duties of this professional body are and how it can protect their interests. Question eleven is related to complaints and trials, question twelve is asking if the patients have knowledge about the College of Dentists and it's obligations and activity and question thirteen is related to the patients consent to be photographed. Question fourteen is referring to the consent requested by the dentist before he transmits data related to patients state of health to any medical interventions or family members and the last question is asking if the patients are felling protected by the legislation of the medical field.

Data were statically processed with the statistic software R. To preview the data it was used barplot function from package ggplot2. The answer's number for each question was analysed using the barplot conditioned by the environment. The collected data and information were coded as follow: rural=0, urban=1. Each answer had three options of answers and were coded as follow: first option of answer for all the questions=0, second option of answer for all the questions=2.

RESULTS

The collected data were analysed according to the environment.

Question 1: Have you been informed in writing by the dentist about the medical intervention proposed to be performed, the potential risks of each procedure, the existing alternatives to the proposed procedures, but also about the risks that may arise with not carrying out the treatment and not following the medical recommendations? 0-Always, having even been handed a copy of the document containing this information was marked by ; 1-Only in the case of certain dental interventions I was given this information in writing, but in the vast majority of cases I was not informed about all these aspects; 2- I was never given this information in writing, only verbally. The results showed that from 27 subjects, 8 from rural and 19 from urban always have been handed a copy of the document, 14 subjects received the content for certain dental intervention and 9 subjects answered that were not informed in written only verbally (Figure 1a).

For question 2 askes if before the dentist handed and asked to be signed the document containing the informed consent regarding the procedures to be performed, did he ask you to

read it beforehand? 0-yes, in all cases read before signing the informed consent form answered 24 of the subjects; 1- only in the case of dental interventions that entailed a certain complexity from the perspective of the operations to be performed answered 18 subject, 2- I was never asked to read the informed consent form before signing it answered 8 subjects (Figure 1b. For question 3, when asked if a copy of the informed consent has been handed by the dentist after each individual medical intervention? 16 from rural and 27 subjects from urban environment answered that in all cases the dentist kept a copy of the informed consent signed by me at the office, without handing me a copy, none of the subjects requested during each dental intervention to be given a copy of the informed consent and 7 subjects encountered situations where they received a refused of the copy of the informed consent-(Figure 1c).





Question 4, when asked if the patient been informed each time by the dentist about the estimated costs of the treatment before its completion? 0- the costs were communicated after the completion of the medical intervention- 9 answers, 5 from rural and 4 urban; 1- the dentist mentioned in writing in the content of the form by which I was requested the informed consent what are the estimated costs for each individual operation- 26 answers, 9 rural and 17 urban; 2- in very few cases I was informed in writing about the estimated costs of each individual intervention-15 answers, 6 rural and 9 urban (Figure 2a).

Question 5, asks if the patients are aware of the fact that there is currently legislation in Romania that regulates the patient's rights, including the right to be informed about the state of health, but also about the medical interventions proposed to be carried out? 0- I don't know concretely what is the law that currently regulates patients' rights- 26 answers, 16 rural and 10 urban; 1- I only researched the patient rights law when I filed a medical malpractice lawsuit against a dentist; -6 answers, 1 rural and 5 urban; 2-I learned about the existence of the law of patients' rights through the knowledge that professes in the legal field. - 18 answers, 3 rural and 15 urban (Figure 2b).

Question 6 refers to the fact in case of emergency dental interventions, the patient's informed consent is not necessary, as the doctor can perform the intervention in his absence? 0- I was informed about this aspect by the dentist during the first visit to the office-10 answers, 5 rural and 5 urban; 1- I documented myself and saw that there are a number of normative acts applicable in the medical field that regulate this exceptional situation in terms of emergency cases- 9 answers, 1 rural and 8 urban; 31 subjects, 14 from rural and 17 from urban were was aware (Figure 2c).



Figure 2. The collected data were analysed according to the environment: a. Question 4 -costs of the treatment before its completion; b. Question 5- current legislation regarding patient's rights; c. Question 6 - informed consent is not necessary is not needed for emergencies

Question 7 askes if the information contained in the patient's informed consent form regarding the medical act is sufficiently detailed, explained in your understanding, and the specialized terminology is adapted to your level of knowledge? The results show that 15 of the patient's informed consent is written in a summary manner, and the specialist terminology is not explained in detail by the dentist. For 23 of them the informed consent was drawn up in detail by the doctor regarding each operation carried out separately, and the specialized terminology was adapted to the level of knowledge; - and for 12 subjects the patient's informed consent must be drawn up by the dentist in collaboration with legal specialists, in order to offer the greatest possible protection to the medical service provider in the event of a medical malpractice lawsuit (Figure 3a).

Question 8, in case the patient did not want to express its consent regarding a medical intervention that was proposed, the dentist requested patients refusal in writing, not before explaining to you the consequences that may arise with this refusal? 14 subjects were not aware of the fact that there is a legal obligation to refuse in writing a possible medical intervention. For 6 patients, in all situations the refusal of medical intervention was expressed verbally, the dentist not asking me to express this refusal in writing. Thirty subjects have not been put in a position to refuse to express my consent regarding a medical intervention, but knew that the refusal must take place in order to be validly expressed (Figure 3b).

Question 9 is referring to the fact that in the case of minor patients or those with special needs, the dentist must request the expression of consent regarding the medical intervention by the legal representative? The majority of the subject, 34 answered that know that there is this requirement in the case of minor patients, given their young age or the special situation they are in, being lacking in discernment or having discernment in the process of being formed (Figure 3c);



Figure 3. The collected data were analysed according to the environment: a. Question 7 - understanding of the informed consent; b. Question 8 - request of the written refusal; c. Question 9 - consent for minor patients and patients with special needs

Question 10 asks if the existence of a record of the patient's informed consent in medical practice contributes to increasing trust in the doctor and improving the communication relationship? For 26 subjects the patient's informed consent contains all the information he needs to be able to express his consent to the medical act in full knowledge of the case and for 23 subjects is not valid in all situations. Only for 1 subject the consent does not increase the trust and improve the communication with the dentist (Figure 4a).

Question 11, asks if patients have turned to the College of Dentists or to lawyers specialized in the field of medical malpractice to claim the violation by the dentist of patients rights, or malpractice. All subjects answered that was not the case until the moment they participated to this research (Figure 4b).

Question 12 asks if subjects are aware of the existence of the College of Dentists in Romania and the role it plays in terms of the relationship between you and the attending dentist? Eleven subject from urban and 10 from rural do not have information related to the role and duties of the College of Dentists; 9 subject from rural and 19 from urban heard about the existence of the College of Dentists, but don't know what its role is and how it can protect their rights. Only 1 subject from urban area knew in detail about the College of Dentists (Figure 4c).



Figure 4. The collected data were analysed according to the environment: a. Question 10 - informed consent in medical practice contributes to increasing trust; b. Question 11- patients that have turned to the College of Dentists for claims; c. Question 12 - awareness about the College of Dentists

When asked for consent by the dentist in order to be photographed in the dental office for the pictures to be used in various scientific studies for 27 subject 7 from rural and 20 from urban in all cases the dentist requested my written consent before taking the photographs (Figure 5a).

Question 14 refers to the fact that dentist has to ask patients consent before he transmits data related to patinet's state of health and medical interventions to other family members? 17 from rural and 28 from urban were informed by the dentist from the first visit to the office that any information related to my state of health will not be transmitted to other people, including relatives, except with my express consent; only 1 subject from urban environment even encountered a situation in which the professional secrecy was violated by the dentist, data of health status being transmitted to various relatives, without prior consent being requested; 3 from rural and 1 from urban environment were not aware until now that the dentist is obliged by law to ask for my consent before disclosing information about my health to my relatives (Figure 5b).

Question 15 refers asks if patients fell protected by medical legislation in their relationship with the dentist? 3 subjects from rural and 14 from urban believe that the legislation in Romania currently does not offer real protection to patients in the relationship with the dentist, being lacunar and ambiguous in various aspects; 14 from rural and 13 from urban do not know the Romanian legislation in the medical field well enough regarding the

rights I have in the relationship with the dentist; and only 6 subject from both rural and urban feel protected by the law at this moment (Figure 5c).



Figure 5. The collected data were analysed according to the environment: a Question 15- consent for photographs; b. Question 14 - patients consent before data transmission, c. Question 15-patients trust and protection by the medical legislation

DISCUSSIONS

All these findings led us to consider it extremely necessary to provide better information to patients regarding their rights in the relationship with the medical staff, but also regarding the entire legislation applicable in the field. These objectives can be achieved by conducting legal education programs in the medical field, supported by legal specialists, to which both dentists and patients have access.

The participation of patients and dentists legal education programs would contribute to the acquisition of solid knowledge and to an increased protection of the rights of patients who use health services. Moreover, once patients know what their rights are during the provision of medical care, they will know how to protect these rights, which will also lead to the reduction of complaints addressed either to the College of Dentists or to the court regarding possible accusations of medical malpractice.

CONCLUSIONS

Upon completion of this study, following a statistical analysis, we found that most of the patients do not know the legislation currently applicable in Romania that regulates their rights through which they benefit in the relationship with the medical staff. Although there is a law of patients' rights, namely Law no. 46/2003, patients are not familiar of it, as there is a lack of information regarding the legislative content of this regulation applicable in the medical field.

Following the centralization of the questionnaires, we found that most patients do not have information about the situations in which the dentist has the right to perform an emergency medical intervention without their consent. Another aspect found with the centralization of the questionnaires and the realization of the statistical analysis, was the fact that, for the most part, patients do not know the role of the College of Dentists in terms of protecting their rights during the provision of medical assistance.

Subjects who live or belong in urban areas and intellectuals are better informed about their rights the informed consent and dentists obligations. Also not all the dentists or dental offices always respect all the stipulation of the law.

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Treatment of maxillary sinus mucoceles by functional endoscopic sinus surgery



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Abstract

Computer-assisted surgery has gained momentum in recent decades. Functional endoscopic sinus surgery (FESS) is a highly sophisticated type of surgery that has revolutionized the surgical management of chronic sinus diseases. This is in constant progress along with technical advances in imaging, instrumentation and navigation. FESS follows anatomical landmarks, guides the surgeon during the procedure and helps to avoid possible complications.

Maxillary sinus mucoceles are benign formations, relatively rare among all paranasal sinus mucoceles. With the introduction of endoscopic sinus surgical techniques, surgeons prefer trans-nasal endoscopic management of sinus mucocele. The aim of this study is to describe maxillary sinus mucocele and to establish the effectiveness of its endoscopic management.

Keywords: mucocele, maxillary sinus, functional endoscopic sinus surgery (FESS)

INTRODUCTION

Endoscopic sinus surgery began to gain momentum in the late 1970s with Messerklinger's studies of mucociliary clearance and its role in the pathogenesis of sinusitis [1]. The popularity of the technique of endoscopic ethmoidectomy with opening of secondary involved sinuses increased rapidly in the latter part of the 20th century. Intranasal endoscopic surgical techniques, as a result of technological progress, have expanded to treat other pathologies besides sinusitis, including conditions of the base of the skull and orbit [2-4].

Endoscopic surgery of maxillary sinus replaces the radical Caldwell-Luc approach in some clinical situations because it is more conservative, has a lower complication rate and a higher cure rate [5]. It is also called functional endoscopic sinus surgery (FESS) because the surgery is performed to restore the way the sinuses work.

Mucocele is a benign, cyst-like formation lined by the mucoperiosteum of the involved sinus [6]. Maxillary sinus mucocele is relatively rare, representing at most 10% of paranasal sinus mucocele [7]. It may be discovered incidentally on a panoramic x-ray or on an x-ray or computed tomography (CT) scan of the sinuses. It is mostly asymptomatic. If it fills the sinus space and exerts pressure on the mucosa, it can cause periorbital, facial pain or headaches [6].

Treatment of maxillary mucocele is surgical, including external approaches, marsupialization, Caldwell-Luc technique and FESS. Endoscopic treatment is not indicated in patients with contraindications to general or local anesthesia, or those with lesions extending into the palate, soft tissue, orbit, lateral frontal sinus depressions, or advanced intracranial extension. In these cases, treatment can be done with a combined surgical approach: open and endoscopic [3,8].

The concept of FESS is to remove tissues obstructing the osteo-metal complex allowing drainage while preserving the normal non-obstructive anatomy and mucous membrane [9].

Images on plain radiography, computed tomography (CT) and magnetic resonance imaging (MRI) are characteristic, allowing differential diagnosis from other pathologies of the maxillary sinus, and histopathological examination confirms the diagnosis. Mucoceles can be associated with other pathologies such as nasal polyposis or neoplasia [10].

Aim and objectives

The aim of this study is to describe maxillary sinus mucocele and to establish the effectiveness of its endoscopic management.

MATERIAL AND METHODS

Preoperative CT imaging of paranasal sinuses reveals partially or completely opacified maxillary sinuses with homogeneous cyst-like lesions (Figure 1a, b).



Figure 1. CBCT image of a right maxillary sinus mucocele: a-coronal section, b-axial section

Sometimes the natural ostium are obstructed, causing the sinuses to expand (Figure 2). In some cases the medial wall of the maxillary sinus is bulging, the mucosa of the ethmoid sinuses is thickened, or there is erosion of the upper wall and bulging in the orbit (Figure 3).



Figure 2. CBCT image of a mucocele opacifying the right maxillary sinus with medial bulging causing sinus expansion and obstruction of the right nasal cavity



Figure 3. MRI with and without intravenous contrast of a right maxillary sinus mucocele that has eroded the right orbital floor

A thorough nasal endoscopy is required preoperatively to visualize the mucocele (Figure 4). The lateral nasal wall near the uncinate and the axilla of the middle turbinate are infiltrated with anesthetic. After removal of the uncinate, the natural ostium of the maxillary sinus is visualized and enlarged posteriorly and inferiorly to avoid damage to the superior orbit and the anterior nasolacrimal duct. Endoscopic ethmoidectomy, middle meatal antrostomy and marsupialization with mucocele drainage are performed. Mucocele can be aspirated and extracted with forceps.



Figure 4. Endoscopic images of a maxillary sinus mucocele

The rigid fiber optic nasal telescope provides intra-operative visualization of the osteomeatal complex, allowing the surgeon to precisely focus on key areas. The image is projected onto a monitor through a small camera attached to the eyepiece of the endoscope.

RESULTS AND DISCUSSIONS

Mucoceles of the maxillary sinuses are rare, expanding, cyst-like benign lesions that develop slowly. They present a secretory respiratory mucosa of pseudostratified columnar epithelium. Mucoceles are mucoid formations and develop after obstruction of the sinus ostium and drainage pattern. The researchers concluded that the release of cytokines would stimulate the fibroblasts to secrete prostaglandins and collagenases, which could stimulate bone resorption, leading to the expansion of the mucocele [11-13].

The cause frequently incriminated in the development of mucocele is represented by sinus ostium obstruction [14].

Mucoceles of the maxillary sinuses are an excellent indication for endoscopic surgery. External approach combined with endonasal surgery is suitable in maxillary sinus mucoceles [15,16].

Martel-Martín *et al.* analyzed 58 patients with paranasal sinus mucocele and found that the recurrence rate was lower in patients treated endoscopically (4.8%) compared to those treated externally (28.5%) [17].

Waizel-Haiat *et al.* in a study of 59 patients diagnosed with mucocele, they found no statistically significant relationship between the type of surgery and recurrence or between the presence or absence of a predisposing factor and recurrence [18].

Literature studies show that most cases treated endoscopically have a recurrence rate that varies from 0.9% to 2.2%. In other studies with fewer patients, this relapse rate increases from 11% to 13% of cases [18,19].

Hadar *et al.* [6] used endoscopic access in 60 patients. In 37 patients it was possible to remove the cyst through the natural opening, in 23 an additional access was necessary (inferior nasal meatus, less often through the canine fossa). The histological examination revealed, in most patients, fragments of tissue covered with ciliated pseudostratified respiratory epithelium and infiltrated by cells with chronic inflammation under the epithelium. The authors highlighted the advantages of the endoscopic approach: it can be performed with local anesthesia, does not require incisions, has a low recurrence rate (3%) and recommends that this approach be used in the management of mucosal cysts of the maxillary sinus.

Busaba and Salman published a study on endoscopically assisted treatment of 13 patients with maxillary sinus mucocele. Treatment involved infundibulotomy, widening of the natural ostium and marsupialization of the cyst, without complete removal of the

membrane. The authors concluded that functional endoscopic surgery (FESS) is the method of choice in the treatment of mucoceles with good long-term results [20].

FESS is a minimally invasive, effective method, but like any surgical intervention it has its risks. There have been reported cases of synechiae, endonasal scarring, which makes it difficult to drain the paranasal sinuses effectively [20,21]. A surgical intervention also entails a psychological stress on the part of the patient, no matter how atraumatic it is.

We have come across articles in which the authors demonstrate that mucocele of the maxillary sinus does not require surgical treatment, but the studies were carried out either on a small number of cases or on a short period of follow-up of patients [22,23].

Halstead showed in a study that 60% of maxillary sinus mucoceles do not increase in size, while 25% gradually shrink or disappear altogether. The follow-up period was less than 20 months and the follow-up period of the majority of cysts that did not change in volume was less than 16 months [24]

Other long-term follow-up studies have generally revealed no significant change in the size of maxillary sinus mucoceles. Some cysts gradually increase in size, but most resolve spontaneously.

Gothberg *et al.* [25] in a study carried out over a period of 32 months determined that 45.4% of these cysts regressed in volume.

Wang *et al.* [26] monitored the natural evolution of incidentally diagnosed maxillary sinus mucoceles in 40 patients for 5 years. 17 patients were monitored for a period from 38 to 102 months, with the help of Waters' view films. In 7 patients (38.9%) the cyst disappeared completely, in 2 (11.1%) it decreased in volume, in 4 patients (22.2%) it did not change in volume, and in 5 patients (27.8%) it increased in volume. The authors concluded that after incidental detection of mucocele and the patient's lack of symptoms, follow-up radiography should be performed after 48 months. In the absence of complications, the strategy is waiting and monitoring and not surgery.

Albu conducted a study that included 80 patients with symptoms caused by maxillary sinus mucocele, in order to determine the relationship between symptomatic relief and endoscopic sinus surgery with or without endoscopic excision of maxillary cysts. He concluded that there were no differences in treatment success between cases where the cyst was excised (the study group) and where it was not (the control group) [27].

CONCLUSIONS

To evaluate any rhinosinusal mass, a thorough clinical, radiological and endoscopic correlation is mandatory for an early and differential diagnosis.

The endoscopic approach to the mucocele is presented as a safer and more effective technique with fewer recurrences than the open sinus approach. It is better tolerated by patients and involves less costs.

The results of endoscopic and open approaches are comparable. The frequent use of open approaches may reflect the effectiveness or lack of expertise and equipment for endoscopic management. Most contemporary authors prefer endoscopic management, limiting open approaches for specific indications (unfavorable anatomy, lateral disease and scarring).

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Smoking - a risk factor for oral health in young people and adolescents



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Abstract

Introduction: Smoking habits not only impact on malignant pathology and cardiovascular disease, but have a direct impact on the oral cavity, causing a wide range of effects, from tooth/dental fillings staining to periodontal disease, increased failure rates in dental implants, as well as oral cancer.

Aim and objectives: The aim of this study was to highlight the implications of smoking in the development of dental plaque.

Material and methods: We conducted an observational, retrospective study in which 157 young people aged 15-21 years were questioned about their smoking habits and then orally assessed.

Results: The oral assessments showed that more than half of the subjects in group 1 had yellowed teeth, compared to less than 20% of those in group 2. Scale as well as yellowed teeth was found in more than 50% of those in group 1, as opposed to only 18% of those in group 2. Halitosis was the next most pronounced symptom observed and more frequently present in young people in group 1 as opposed to group 2. Bleeding gums, gingivitis and periodontitis were present in lower percentages in the young people in the study, but the percentages were still higher in those in group 1 than in group 2.

Conclusion: Smoking is a predictor of tooth decay and has a negative impact on oral health.

Keywords: Dental plaque, smoking, social behavior

INTRODUCTION

Smoking is one of the major risk factors for human health, directly causing lung cancer and cardiovascular disease [1,2]. The impact of tobacco use on overall mortality is severe, according to the World Health Organization 6 million people die each year due to it [3]. However, the prevalence of tobacco use remains high globally, with a rate of 21% [4]. In Europe, more than 50% of adult males smoke an average of 15 cigarettes per day. Smoking has increasingly taken hold among young people.

Smoking habits not only impact on malignant pathology and cardiovascular disease, but have a direct impact on the oral cavity, causing a wide range of effects, from tooth staining/dental fillings to periodontal disease, increased failure rates in dental implants, and oral cancer [5]. According to the International Agency for Research on Cancer, the estimated number of incident cases of lip and oral cavity cancer worldwide in 2012 was 300,000, with an estimated 145,000 deaths [6]. Numerous studies have shown that tobacco plays an important role in the genesis of dental plaque and scale. Thus, a higher amount of scale was found on dental surfaces in smoking patients compared to the group of non-smoking patients. Most studies are limited to these clinical observations without elucidating the underlying mechanism(s) of plaque and scale.

As described above systemic and oral diseases share common risk factors, thus, in a recent review appropriate risk factor management procedures have been suggested to be adopted in both dental and other medical specialties such as [7]: smoking cessation, sugar reduction and weight control which have been proposed for patients at risk of developing periodontal disease, cavities, diabetes, heart disease and certain cancers.

Dental caries is known to be the most prevalent disease worldwide [7], yet most of these lesions are often concentrated in disadvantaged social groups: increased odds for dental caries (21-48%) have been recorded in patients with low educational/professional level, but also in those with low income [8] According to a population-based study that was conducted in Sweden between 1983 and 2003, the relatively unchanged tobacco consumption together with a significantly lower frequency of visits to dental services of smokers compared to non-smokers revealed a probable increasing trend in the prevalence of dental caries [8].

The influence of smoking on dental caries has been the subject of further research, with some authors suggesting an association between an increased risk of dental caries and smoking [9-11]. However, other authors in two of these studies (systematic reviews) [9,12] pointed to an overall poor quality of the included studies which prevented validation of the association between smoking and dental caries.

Aim and objectives

The aim of this study was to highlight the implications of smoking in the development of dental plaque.

MATERIAL AND METHODS

In order to achieve the proposed objectives, we conducted a retrospective observational study in which 157 young people aged 15-21 years were interviewed. The subjects who took part in this study were both smokers and non-smokers, and their choice was also based on the intention to obtain a group as homogeneous as possible in terms of age, living conditions and intellectual level. All the young people involved agreed and found it particularly beneficial to deal with this perceived difficult topic. The questionnaires were anonymous, relying on everyone's honesty in completing them. The questionnaire identified

people by age and gender only. Otherwise, it comprised 18 multiple-choice questions where young people only had to circle what suited them. The aim was to find out how old they were when they started smoking, the reasons for this habit, how much they smoked normally or in different environments.

These young people were also given an oral assessment and divided into two groups, one comprising smokers, ex-smokers and occasional smokers, and the second group consisting only of non-smokers.

The data obtained from the application of the questionnaire was entered into Excel, creating a database, which was then statistically processed, mainly looking at frequencies that were put into graphical representations.

RESULTS

Of the 157 people surveyed 43% were female and 57% male. While in the past smoking was mainly present in males, nowadays more and more females are taking up the habit, with more females than males being smokers.

The statistical analysis showed that 56.39% of the young people surveyed had never smoked, 10.16% smoked occasionally, 4.28% were former smokers and 21.96% were current smokers, which is similar to the global smoking rate presented in the introduction. It has also been observed that with increasing age more young people start smoking, this upward trend is supported by studies up to the age of 21- 23 years and then a decrease in this phenomenon and an increase in those who start to quit smoking. When asked why they started smoking, 40% of permanent smokers and 35% of occasional smokers answered influenced by friends, 31% of permanent smokers and 41% of occasional smokers took up smoking because they wanted to fit in. From these data we can draw, as in the graph above, the conclusion that it is the entourage that greatly influences the onset of the habit among young people and future adults. 24% of occasional smokers started out of curiosity and only 17% of permanent smokers, while the family environment seems to have a fairly strong influence, with 11% of permanent smokers claiming that their family made them smokers (Figure 1).



Figure 1. Frequency of smokers, non-smokers, occasional smokers and ex-smokers

Around the age of 19-20, the reason for smoking is often related to the erotic aspect of intimate life. From the desire to please, to the calming of conflictual situations caused by sentimental failures, apparently justifies the appeal to the "help" of cigarettes. At the same time, the use of alcohol and coffee is often associated with this, subjecting the body to numerous negative effects.

Among occasional smokers, it has been found that occasional smokers never smoke at home, unlike permanent smokers, but their number is not very high either, as they are probably young and fear their parents' reaction. Most young people smoke constantly at school, in the city on terraces and in clubs, so we could say that collective smoking predominates among young people and not solitary smoking. It was also found that 53% smoke less than 5 cigarettes a day and 29% smoke between 6 and 10 cigarettes a day, and only 18% could not give an answer to this question as they do not smoke daily.

Regarding the amount of tobacco consumed per day reported by permanent smokers it was found that 14% consume less than 5 cigarettes per day, 46% between 6 and 10 cigarettes per day 23% consume between 11 and 20 and 17% consume more than 21 cigarettes per day.

When asked why they started smoking 40% of permanent smokers and 35% of occasional smokers answered influenced by friends, 31% of permanent smokers and 41% of occasional smokers took up smoking because they wanted to integrate. From these data we can draw, as in the graph above, the conclusion that it is the entourage that greatly influences the onset of the habit among young people and future adults. 24% of occasional smokers started out of curiosity and only 17% of permanent smokers, while the family environment seems to have a fairly strong influence, with 11% of permanent smokers claiming that their family made them smokers. Around the age of 19-20 the reason for taking up smoking is often linked to the erotic aspect of intimate life. From the desire to please, to the calming of conflictual situations caused by sentimental failures, the appeal to the "help" of cigarettes is apparently justified. At the same time, the use of alcohol and coffee is often associated with this, subjecting the body to numerous negative effects. Occasional smokers admit that 41.93% smoke for relaxation, 22.58% do not know why, 22.58% are influenced by friends and 12.90 by boredom (Figure 26). Among permanent smokers 49.42% smoke for relaxation, 21.84% do not know why they smoke, 20.69% for boredom and 2.30% because of friends who smoke.

Both occasional smokers and permanent smokers admitted to suffering from certain problems related to smoking. 9.67% of occasional smokers admitted to being tired, 9.67% suffer from halitosis, 9.67% have scale deposits, and 70.96% suffer from nothing. Among permanent smokers 13.80% are tired, 24.80% suffer from halitosis, 35.63% have nothing, and 26.43% have scale deposits.

Following the oral evaluations, it was observed that more than half of the subjects in group 1 have yellow teeth, as opposed to less than 20% in group 2. Scale as in the case of yellowed teeth was found in more than 50% of those in group 1 as opposed to only 18% of those in group 2. Halitosis was the next most pronounced symptom observed and more frequently present in young people in group 1 as opposed to group 2. Bleeding gums, gingivitis and periodontitis were present in lower percentages in the young people in the study, but the percentages were still higher in group 1 than in group 2 (Figure 2).



Figure 2. Results of oral evaluation

On objective examination of the oral cavity, 62% of the young people in group 1 had untreated carious lesions, compared with 44% in group 2. The number of fillings was higher in group 2, so we could also deduce that the oral hygiene of group 2 is better than group 1. At least one extracted tooth was found in 34% of the youngsters in group 1, as opposed to 22% of those in group 2 (Figure 3) Although the percentage is higher in those in group 1, we can state that the percentages in both groups is worrying if we refer to the age of the youngsters taken in the study.



Figure 3. Tooths status after oral evaluation of the two groups

DISCUSSIONS

This study demonstrated an association between smoking habits and the prevalence of dental cavities, dental yellowing, and halitosis, with a 30% increase in the risk ratio for developing dental cavities in smokers compared to non-smokers. In a systematic review [11] the effect of tobacco smoking on dental cavities in adult smokers was evaluated and revealed, that there is a significant association between smoking exposure and an increased risk of

dental cavities. Bernabé *et al.* [12], in a study that included 955 adult patients, evaluated the impact of daily smoking on the 4-year net increase in the number of decayed, filled and missing teeth, also reported an increased incidence of dental cavities in smokers, with the authors concluding that smoking was independently related to cavity development, with a 70% increase in the incidence rate of decayed teeth for smokers compared to non-smokers.

In other studies, it has been shown that smoking may influence the incidence of dental cavities through its negative impact on patients' saliva, which includes a higher number of bacteria (Streptococcus mutans) [13] and a decreased buffering effect that may increase susceptibility to develop dental cavities [13, 14], accounting for 25% of the variability in cavity risk [23]. Furthermore, in other studies smoking has been associated with lower concentrations of salivary secretory immunoglobulin A (IgA) [15], which has a proven role in specific defense mechanisms in the oral cavity [16]. Together with other antimicrobial substances, IgA action limits microbial adhesion to epithelial and dental surfaces thus contributing to the stable maintenance of the oral cavity [17, 18]. Smoking is also associated with lower salivary cystatin activity, and cystatin C [19] which contributes to oral health by inhibiting certain proteolytic enzymes is suggested to have a contributory effect on the formation of cavity lesions when in interaction with acid demineralization [20].

With increasing age, there is a greater likelihood of patients with missing or filled teeth and therefore a conditional lower likelihood of incident dental cavity lesions.

Dental caries lesions consist of a dynamic process resulting from an imbalance between demineralization and remineralization of the tooth surface [21]. The onset time of dental cavities recorded in the present study was 13.5 months. As far as the authors are aware, this is the first time such a statistic has been calculated. Despite the methodology implemented in the patient data collection and monitoring system, these statistics should be interpreted with caution as they depend on recall appointments. Further refinement is needed to obtain more accurate measurements due to the possibility of earlier diagnosis.

Smoking is considered a risk factor, but educating the patient only on smoking cessation is not enough to prevent periodontal disease in a person, but as mentioned above this prophylaxis should be combined [22, 23]. If young people, who take up smoking, would be inspired to learn more about the unhealthy practice, if they would receive good and convincing advice at the right time, if they would realize from the first signs of intoxication the danger of the poisons they want to put into their lungs for the rest of their lives, perhaps, or certainly countless further sufferings could be avoided without any expense, on the contrary, with an obvious gain.

Following the reform and the wishes of the population in general, all public institutions have set up smoking places. Thus, even in the Faculty of Dental Medicine in Timisoara, students can smoke in such a place, equipped with an ashtray, set up in the faculty courtyard. First of all, this measure supports non-smokers by giving them the opportunity to choose between passive smoking or not [24].

Their self-image is hard to change, with many smokers unable to get used to the idea of being non-smokers. At the same time, people who have quit smoking say they now find it hard to imagine themselves as smokers. In fact, it is just a matter of habit [25].

Many young people see smoking as "a bad habit", saying: "it's a vice I enjoy, I indulge myself with a cigarette". As a smoker, there is a tendency not to see the addiction but to see smoking as pleasure. This is a misperception. Research shows that tobacco is as addictive as heroin and cocaine. In fact, smoking is a complex whole because it is both a habit and an addiction, these two elements combined make smoking a habit that is very difficult to quit.

Limitations of this study include the short-term follow-up which may have an impact on the prevalence rate of cavity lesions and the lack of control for dietary and oral hygiene habits (given that it was a questionnaire survey based study with questions predominantly related to smoking) which may have provided a more accurate estimate of the effect of smoking on dental cavities. However, the study sample consisted of patients taken in the study who received information about good dietary and oral hygiene habits and smoking cessation as per the protocol on dental hygiene appointments. It has been previously stated in the literature that smoking may be associated with decreased oral hygiene habits with increased plaque accumulation [22, 24, 25] either related to decreased frequency of brushing and flossing or due to increased salivary lipid levels [26]. Further investigations should focus on longer follow-up controlled studies to refine estimates of both the association of smoking with dental cavities and the time of onset for dental cavity lesions.

CONCLUSIONS

Most adolescents and young people smoke constantly at school, in the city on terraces and in clubs, so we could say that collective smoking predominates among young people and not solitary smoking.

It is the entourage that greatly influences the beginnings of this vice in teenagers, young people and future adults.

Smokers who had been smoking for at least one year since their initiation were also asked why they continue to smoke. The vast majority said that they do it out of a sense of pleasure, of relaxation.

Long-term nicotine consumption brings with it dental health problems such as gingivitis and periodontal disease.

In conclusion, and given the limitations of this study, smoking habits are a predictor for dental cavities, having a negative role on oral health, in young people and adolescents.

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The dark side of mast cells and their role in oral pathology



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Abstract

Mast cells (MC) were discovered over 130 years ago, and their function was almost exclusively related to allergic diseases. It is now well known that MC possesses a wide variety of roles in both physiological and pathological conditions. These cells play a key role in inflammatory processes in the oral sphere (dental pulp, periapical tissue and gums). In oral tissues, MC release various proinflammatory cytokines and tumor necrosis factor-alpha that promote leukocyte infiltration in various inflammatory conditions of the oral cavity. The number of mast cells has been found to be altered in various premalignant and malignant conditions developed in the oral sphere. The present review aims to describe the role of mast cells in the initiation and progression of inflammatory processes, but also in premalignant and malignant lesions of the oral cavity.

Keywords: Mast cells, normal oral mucosa, oral pathologies

INTRODUCTION

Mast cells (MC) are a type of innate immune cell that belong to the myeloid lineage. In both humans and animals, MC derives from hematopoietic stem cells. Mast cell progenitors leave the bone marrow as immature cells and enter the blood circulation and with the help of surface molecules, such as integrin $\alpha 4\beta 7$, MAdCAM-1 and VCAM1, migrate to various target tissues [1,2].

Despite the fact that all mast cells derive from a common precursor and have granular cell morphology, they are extremely heterogeneous in terms of phenotype and function [3]. The heterogeneity of mast cells is most likely influenced by the surrounding microenvironment. In rodents, two phenotypes were described: connective CTMCs (connective tissue MCs) and mucosal MMCs (mucosal MCs) that differ in location, mediator content and response to different stimuli. Human mast cells are also divided into two types depending on their content in proteases [4]. Thus, mast cells that contain only tryptase (MCT) in granules and mast cells that contain tryptase but also chymase (MCTC) are described.

Mast cells are located at the interface between the host and the environment, in the immediate vicinity of blood vessels, lymphatic vessels, nerve fibers, but also in the vicinity of some cells of the immune system, including dendritic cells [5]. This strategic location allows mast cells to act as sentinels against microbial invasion, but they can also quickly respond to any change in the surrounding microenvironment due to interactions with other cells involved in the body's physiological and immunological response. Mast cells are found in all connective tissues of the oral cavity, including the dental pulp, periodontal ligament and gingiva.

The induction of inflammation by MC is a consequence of the release of preformed biological mediators as well as secondary mediators [6]. Mast cells were also detected in the inflammatory infiltrate associated with periapical cysts and granulomas, suggesting their role in the inflammatory mechanism of these lesions. Among the cells present in periodontal tissues are also mast cells, which are present both in healthy and inflamed gums [7].

The role of mast cells in the immunological and non-immunological processes of the body is well known, an aspect reflected by the large number of mediators present in the granules through which they influence other cells. These mediators allow mast cells to carry out their functions at the tissue level [8]. However, the role of mast cells in the pathogenesis of oral pathologies is still debatable. Therefore, we set out in this review to explore the role of mast cells in the initiation and progression of pulpal, periapical, periodontal inflammatory processes, but also in premalignant and malignant oral lesions.

Mast cell: morphology and secretory granules

Examined under optical microscopy, mast cells appear as round or elongated cells with a diameter between 5-25 μ m depending on the organ in which they are studied. They present a round or oval-shaped nucleus, and have numerous secretory granules in the cytoplasm. Each MC typically contains between 80 and 300 granules bounded by a double membrane.

Under the influence of some stimuli (physical, chemical, toxins, bacteria, or viruses) mast cells are activated and degranulate explosively, after which they resynthesize their granules or can continuously release solitary granules into the extracellular environment. This process is called "piecemeal degranulation" and has been observed in both the oral mucosa and the skin.

After degranulation, mast cell mediators are deposited in large quantities in the extracellular environment, where they exert effects on endothelial cells, but also on other cell

types. Mast cells can subsequently synthesize and secrete additional mediators that are not preformed in their granules. Preformed mediators are represented by proteases (tryptase, chymase and cathepsin G), histamine, heparin, serotonin, TNF- α (tumor) and interleukin-16 (IL-16). As a result of activation, MCs can synthesize a number of mediators, de novo, such as: IL-1, IL-3, IL-4, IL-5, IL-6, IL-8, IL-10, IL-13 and IL-16, PGD2 (prostaglandin 2), LTC4 (leukotriene C4), MIP 1a (macrophage inflammatory protein), RANTES (regulated on activation, normal T cell expressed and secreted) and PAF (platelet activating factor) [10,11].

Mast cells in dental pulp inflammation

The inflammatory process in the human dental pulp is associated with vascular changes and migration of inflammatory cells to the site of inflammation. Normally in healthy dental pulp

MCs are found in small numbers, but an increase in the number of MCs is observed in pulpitis.

High concentrations of TNF-a, its source, were detected in the inflamed dental pulp being the mast cell granules released after the degranulation of these cells [12] At the pulp level dental substance P can mediate mast cell degranulation after they are activated ca following the bacterial invasion of the dental pulp during the formation of dental caries [13]. Karapanou et al. hypothesized that MC activation may occur through neuropeptides which are released locally into the pulp and subsequently pro-inflammatory mediators which are released from mast cell granules can participate in the inflammatory process of the dental pulp and serve as diagnostic markers for inflammatory diseases of the dental pulp [14]. The presence of mast cells in the dental pulp and their role in dental pulp inflammation was a controversial issue because past studies have revealed that mast cells are absent in normal pulp tissue and few cells in inflamed tissue [15]. These controversies can be also related to the technique of sampling and processing the dental pulp. Ali Farnoush suggested that the method used to obtain the dental tissues and the fixation process could change mast cell integrity [16]. Studies by Martins et al. and Nica et al. [17] showed a complete absence of mast cells in human and rat dental pulp. They assume that the pulp is a single connective tissue surrounded by a mineralized tissue and is considered a low compliance environment. In that situation, the presence of mast cells could generate the release of vasoactive substances that could produces pain. On the other hand, Zachrisson et al. reported the presence of a few mast cells intact around blood vessels and adjacent to plasma cells in the pulp of young teeth [18]. Dinakar et al. demonstrated the presence of a small number of mast cells on the sections of healthy pulp tissue and a higher number of mast cells in the inflamed pulp tissue, the difference being statistically significant [19]. These results justify the fact that mast cells are activated in during inflammation and releases various vasoactive amines such as histamine, heparin, but also cytokines such as TNF-alpha and interleukin-8 from their granules. Demonstration of increased mast cell density in the inflamed dental pulp throws a shed of light on the fact that mast cells are important in the regulation of pulpal pathology. These cells could have both a protective and destructive role due to the fact that they can cause destruction of connective tissue in inflammation. Because mast cells play an essential role in inflammation, therapies targeting mast cell function may have value in management chronic inflammation of the dental pulp. Moreover, this could also help to treatment planning in pulpitis, because mast cell stabilizers and antihistaminic agents could be used in the future to control pulpal pain and inflammation.

Mast cells in inflammatory periapical lesions

Cysts and granulomas are chronic periapical lesions mediated by a set of mediators of inflammation. The inflammatory infiltrate of periapical lesions is mainly composed of

lymphocytes and plasma cells, but contains other cells such as macrophages and mast cells [20].

Several studies have reported the presence of mast cells in periapical inflammatory lesions. Smith et al. demonstrated the presence of mast cells in the thickness of the cyst capsule, and observed that MCs were more widespread under the epithelium than in the deeper areas of the cyst [21]. The study by Oliviera et al. demonstrated the presence of a greater number of mast cells in periapical cysts than in granulomas. In periapical cysts MC were more numerous in region with active inflammation. In addition, the authors observed that MCs tended to concentrate in the peripheral regions of the periapical lesions, in close proximity to the lymphocytes [22]. The presence of mast cells in periapical chronic inflammatory lesions is demonstrated by many authors and it is suggested that mast cells play an important role in the pathogenesis of lesions chronic inflammatory [23]. After activation, MCs induce the migration of T lymphocytes either directly through the release of chemokines such as IL-16 and MIP-1 or indirectly by inducing expression adhesion molecules on endothelial cells. Histamine increases vascular permeability and favors the adhesion of leukocytes to the endothelium through the transient mobilization of the molecule de P selectin adhesion to the surface of the endothelium [24]. This functional relationship between MC and T lymphocytes has been shown to be bidirectional, performing reciprocal roles of regulation and/or modulation. In addition, T-lymphocyte-derived mediators such as chemokines directly induce mast cell degranulation. In the periapical granuloma, stimulated mast cells can release IL-1, which causes epithelial proliferation, thus being one of the factors that determine the proliferation of epithelial cells from the remains of Malassez thus leading to the formation of the cyst. Mast cell-derived tryptase can activate matrix metalloproteinases that determine the degradation of the extracellular matrix and bone resorption, which allows an increase in lesions [25]. Mast cells can act as antigen-presenting cells in inflammatory lesions periapical and are also involved in the expansion of periapical cysts because it is the only cell from which tumor necrosis factor alpha is immediately released from stores preformed. The effects of TNF-alpha include stimulation of bone resorption by osteoclasts, growth local vascular response and promotion of chronic inflammation in human periapical lesions [26].

Mast cells in gingival inflammation

Mast cells have been consistently reported to be present in healthy gingival tissue. At the level of the gums, mast cells are located both in the connective and intraepithelial tissue [27]. In gingival lesions, plaque products can directly or indirectly induce mast cell proliferation [28]. Proinflammatory cytokines that are released during the initial stage of inflammation influence mast cell migration. Following degranulation, large amounts of mediators are released into the extracellular environment, where they exert effects on endothelial cells, as well as on other types of cells. TGF β (transforming growth factor- β), FGF (fibroblast growth factor), as well as inflammatory cytokines and chemokines are key factors in the inflammatory process, facilitating the recruitment and activation of mast cells.

Mast cells produce mediators such as histamine, heparin and TNF- α , which can influence the proliferation of fibroblasts, the synthesis and degradation of the extracellular matrix. TNF- α also upregulates RANTES expression, which in turn triggers subsequent mast cell degranulation. MC degranulation can lead to chronic gingival inflammation and fibrosis [27].

Gingival inflammation can lead to periodontal disease, in which cytokines activate and stimulate MC to secrete pro-inflammatory molecules that participate in the pathological state of the tissue and therefore play a critical role in inducing inflammation [29]. Increased levels of proinflammatory cytokines, such as IL-1 and IL-6, are secreted by various cells of the immune system, including mast cells. The role of MC in periodontal disease is still not very clear. However, in this pathology there is an increase in the number of mast cells, as well as the production of inflammatory cytokines, thus demonstrating their involvement in alveolar bone resorption.

In the gingival tissue, MC releases cytokines and proteases, such as tryptase and chymase. Thus, the infiltration with leukocytes, the degradation of the extracellular matrix and the appearance of gingivitis and periodontosis are favored [30]. In acute inflammation, histamine released by MCs acts on the endothelium, mediates vascular permeability and promotes platelet adhesion through the adhesion molecule P-selectin.

Periodontal cells and inflammatory-immune cells, including MC, produce cytokines and chemokines, thus mediating local inflammation of the gingival tissue, along with the destruction of the periodontal ligament and alveolar bone [31].

IL-1 and IL-33 are inflammatory cytokines released by mast cells that mediate inflammation and contribute to many key features of periodontitis and other inflammatory disorders [30]. IL-37 inhibits innate and acquired immunity and consequently inflammation, an effect that could complement the treatment of acute and chronic gingival inflammation, including periodontal disease [32]. Blocking IL-1 with IL-37 could result in an inhibition of inflammation in periodontal disease, but all these data need to be confirmed in the future. Thus, it can be hypothesized that IL-37, being a blocker of IL-1, one of the main inflammatory cytokines involved in the pathogenesis of periodontal disease, could be helpful in the therapy of this condition [33].

Mast cells in premalignant lesions

In premalignant lesions of the oral mucosa, such as leukoplasia, oral submucosal fibrosis, and lichen planus, an increased density of mast cells has been observed compared to normal oral mucosa. In a study by Biviji *et al.* observed similar aspects in leukoplakia and concluded that active mediators released from mast cell granules might contribute to an inflammatory reaction seen in leukoplakia. Stimulated mast cells can release interleukin-1, which causes the increased epithelial proliferation seen in leukoplasia. Histamine can cause increased mucosal permeability that could facilitate increased access of antigens to the connective tissue [34].

Sathyakumar *et al.* compared and correlated mast cell density (MCD) and microvascular density (MVD) in normal oral mucosa and oral mucosa with varying degrees of dysplasia. The authors concluded that the number of mast cells and microvessels can be used as indicators of disease progression [35].

Studies on MC were also conducted by Bhatt *et al.* who noticed a higher number of MC in oral submucosal fibrosis (OSMF) compared to oral mucosa normal. The authors suggested that some of the signs and symptoms seen in OSMF might be attributed to mast cell hyperplasia [36]. Mast cell histamine could be responsible for the submucosal edema seen in stages beginnings of OSMF. On the other hand interleukin-1 in MC could cause a response increased fibroblast, and mast cell tryptase causes increased production of collagen type 1 and fibronectin, being the cause of increased fibrosis. Sabarinath *et al.* evaluated MCD and MVD in normal oral mucosa and in varying degrees of OSMF. The results showed a significant increase in MCD and MVD in OSMF cases. May much, a positive correlation was found between MCD and MVD [37]. There are many studies in the literature that suggest that mast cells play a role important in the pathogenesis and evolution of oral lichen planus (OLP). The interactions between MC and T cells, which are related to the disease process, are relevant both to the initiation phases, vaso-induction and effectors of OLP. TNF-alpha released from MC causes increased synthesis of matrix metalloproteinases, such as collagenase, which cause membrane destruction basal cells and cause increased expression of adhesion molecules such

as E-selectin and ICAM. This could probably cause increased leukocyte migration [38]. In oral lichen planus, mast cells were observed in increased numbers at the junction epithelial and connective tissue, in areas with basement membrane rupture. It was also observed increase in mast cell degranulation in this condition. Thus establishing a definite role played of mast cells and their degranulation would possibly provide a way of permanent treatment and effective for oral lichen planus [39].

Mast cells in malignant tumors of the oral cavity

Mast cells tend to concentrate around blood vessels, in inflammatory foci and neoplastic and later to accumulate near the tumors before the onset of angiogenesis associated with the tumor [40]. They also have an important function in regulating neovascularization physiological and pathological [41]. Mast cells are a major source of pro-angiogenic factors. In various malignant tumors solid, mast cells are arranged on the periphery of tumor areas to facilitate angiogenesis through release of preformed mediators. Sometimes a large number of mast cells are seen even before from the appearance of neovascularization from certain malignant tumors. A pioneering study by Tomita et al. they cited two reasons for the reports contradictory regarding the role of MC in malignant tumors and their associated angiogenesis [42]. First, when MCs infiltrate the tumor tissue, the cytotoxic function of they suppress the activity of tumor cells. However, after infiltration, the cells tumors could instigate the angiogenic properties of MCs while suppressing their functions cytotoxic, thus leading to tumor angiogenesis. Second, the cytotoxic effects of MCs are reported when the MC-to-tumor ratio is > 20:1. Instead, these effects are abrogated when the MC-to-tumor ratio is increased from 10:1 to 1:100, leading to tumor progression. Therefore, the effect of MC against cancer cells might depend on the concentration of mast cell mediators released in the microenvironment. Based on these findings, researchers hypothesized that reversing this process, i.e. improving cytotoxic functions of MCs and suppression of their angiogenic functions, could lead to a new treatment strategy anticancer [43]. Malignant tumors of the oral cavity represent a public health concern at the level world. The most common malignant tumor is oral squamous cell carcinoma (OSCC), which accounts for nearly 90-95% of all oral cancers. It is an invasive malignant epithelial tumor and aggressive. It is often preceded by the development of potentially malignant conditions that present histologically different degrees of epithelial dysplasia. The most important potentially malignant disorder affecting the oral cavity is oral leukoplakia. Some studies on the involvement of mast cells in oral squamous cell carcinomas, show an increase in mast cell density in these malignant tumors. This aspect was noticed by Rojas et al. in squamous cell carcinoma of the lip [44]. A significant correlation between MC and density was also observed microvascular in oral squamous cell carcinoma (OSCC). Also in oral squamous cell carcinoma a linear increase in the number of MCs and OSCC progression was also observed. The authors suggested that mast cells may regulate angiogenesis in OSCC, possibly by releasing mast cell tryptase. Through therefore, the number of MCs can be used as an indicator of disease progression [45]. The study by Kalra et al. suggested that angiogenesis in OSCC and could be used as an index to express the aggressiveness of the disease, however MC represents only a part of the complex process of angiogenesis, together with other factors secreted by the tumor [46]. Another study by Laishram et al. demonstrates a significant increase in microvascular density (MVD) and mast cell density (MCD) in carcinoma cases oral squamous cell carcinoma, followed by cases of leukoplakia with dysplasia, leukoplakia without dysplasia, and normal gingival tissue. Therefore, it is concluded that MC can play a significant role in angiogenesis by releasing proangiogenic factors that can favor, in turn, progression premalignant lesion to a malignant one [47]. Patil, in his study, suggests that MC by releasing a variety of mediators have regulatory function on angiogenesis, and inflammation can facilitate the transformation of leukoplakia into invasive squamous cell carcinoma [48]. Other studies in specialized literature demonstrate a reduced number of mast cells in oral squamous cell carcinomas. Thus, the study carried out by Teófilo *et al.* showed a decrease in the number of mast cells in oral squamous cell carcinomas, but observe a vascularization increased in these malignant tumors. Following these observations the authors suggest that angiogenesis begins when the malignant transformation begins, which seems to be inversely associated with the number of mast cells [49]. MC/OSCC interactions affect tumor cell characteristics and thereforetumor progression, making them interesting candidates for targeted tumor therapy. In his study Hemmerlein *et al.* identified CCL2 for the first time in OSCC as a potential mediator of this interaction. Data suggest that CCL2 may promote tumor cell proliferation. Further studies should characterize the functional relationships [50]. Mast density itary (MCD) and the role of these cells in oral squamous cell carcinoma a has been reported differently in the specialized literature. Some studies have shown an increase in mast cell density, while others demonstrated a decrease in MCD. Thus, the role mast cells in angiogenesis, progression and metastasis of oral squamous cell carcinomas still remains unclear.

CONCLUSIONS

Mast cells play a critical role in the development of inflammation in the dental pulp and periodontium, acting both in the early stages and during the transition from acute to chronic inflammation. In the future, it may be possible to develop new approaches that influence the release of proinflammatory molecules or neuropeptides to ameliorate mast celldriven inflammation.

Mast cell function can vary depending on the type of cancer and clinical stage. More detailed studies are needed to elucidate the varied roles of MC. However, the present findings indicated the relevance of mast cells as a diagnostic and therapeutic target in oral squamous cell carcinomas.

From the results of this review, it can be concluded that additional research studies on mast cells can improve our knowledge of their exact role in the pathogenesis of various oral pathologies.

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Treatment approaches for maxillary sinus cysts



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Abstract

Maxillary sinus cysts are frequently asymptomatic and are often discovered accidentally on radiographs. Panoramic radiography and plain radiography of the skull can be used in routine practice to highlight these cysts, which usually appear as rounded, dome-shaped masses located on the floor of the maxillary sinus. Computed tomography (CT) should be used to determine their dimensions or relationship to neighboring anatomical structures.

Treatment of maxillary sinus cysts is consistent with their size, location, pathology and potential for recurrence. Interdisciplinary treatment planning is important in its long-term success. The following surgical methods are described as treatment methods: marsupialization, enucleation or radical cure (extirpation of the cystic membrane) and radical cure by the rhinological method and as an exceptional, sometimes transient method, the drainage of the cystic content through a polyethylene tube.

Keywords: maxillary sinus cysts, treatment methods, marsupialization, enucleation

INTRODUCTION

The maxillary sinus was first illustrated by Leonardo da Vinci, but the first scientific description was made by the British surgeon Nathaniel Highmore [1].

The maxillary sinus is located infraorbital, posterior to the anterior wall of the maxillary bone and superior to the alveolar bone. It has a pyramidal shape with average dimensions of 33 mm vertically, 23 mm transversely, 34 mm sagittally and a volume of approximately 15 cc (Figure 1) [2].



Figure 1. The average dimensions of the maxillary sinus: 1 - inferosuperior 33 mm, 2 - mediolateral 23 mm, 3 - anteroposterior 34 mm

Maxillary sinus cyst is a cavitary lesion consisting of an epithelial sac, containing liquid or semi-solid material and surrounded by a capsule of fibrous connective tissue. The origin of the epithelium delimiting the cyst cavity divides cysts into odontogenic or non-odontogenic. Odontogenic cysts are more common and often come from ectomesenchymal structures involved in odontogenesis [2,3]. The World Health Organization divides odontogenic cysts into developmental and inflammatory cysts. The most common types of developmental cysts are follicular (denting) cysts and odontogenic keratocysts, and inflammatory cysts are mainly radicular [4,5].

Maxillary sinus cysts can arise either from the lining of the sinus (intrinsic cyst) or from adjacent tissues (maxillary bone, maxillary tooth). Mucous retention cyst is the most common intrinsic cyst of the maxillary sinus. It usually arises from the floor or walls of the sinus. Large cysts can cause facial deformity. On imaging, an opacification is usually seen in the maxillary sinus. Computed tomography (CT) should be used to assess the nature, size, or relationship of cysts to adjacent anatomical structures. Most extrinsic maxillary sinus cysts are dental in origin and are most likely dentigerous cysts. Other dental cysts in the maxillary sinus are odontogenic keratocyst, radicular cyst, median palatine cyst and nasopalatine duct cyst. Root cysts are associated with the tip of the root of a tooth with complicated decay and are usually a few millimeters to a centimeter in size [6-8]. Large cystic mass that grows to occupy almost the entire maxillary sinus is rare and has rarely been reported in the literature [6,9,10].

Maxillary sinus cysts are frequently asymptomatic and discovered incidentally on radiographs. Some of them grow in size and cause symptoms by obstructing the maxillary sinus. Rarely they may protrude into the middle meatus and mimic antrochoanal polyps, or erode the bony walls and emerge into the inferior meatus by making a defect in the medial wall of the maxillary sinus [11-13].

When a common pathology has an unusual presentation, it is important to evaluate it gradually to avoid misdiagnosis. The final diagnosis of these cystic lesions is possible only after their histological evaluation.

Aim and objectives

In this study we summarized the different surgical treatment modalities performed for cystic lesions of the jaws.

METHODS OF TREATMENT OF MAXILLARY SINUS CYSTS

1. *Marsupialization,* also called the Partsch I operation or cystotomy, involves making an incision in the capsule of the cyst, lowering the intracystic pressure and evacuating its contents. The edges of the cyst are frequently sutured to the healthy surface of the oral mucosa to make a large, permanent opening (Figure 2a). Maxillary cysts can also be marsupialized in the maxillary sinus or nasal cavity (Figures 2b, 2c) [14-16].



Figure 2. Marsupialization of a maxillary cyst: a) to the oral cavity, b) into the sinus, c) to the nasal cavity

2. *Decompression* is the treatment method by which the pressure inside the cyst is reduced through a small opening that is maintained with the help of a drain or obturator (Figure 3). It is removed daily and the cyst cavity is irrigated. Thus the cyst decreases in size and tissue damage is reduced during its subsequent enucleation [17,18].



Figure 3. Decompression of a maxillary cyst in the oral cavity with a drainage tube

The Odontogenic Cyst Evacuator (Evocyst) (Figure 4) is a vacuum-like device used to apply active negative pressure inside a cyst and stimulate osteogenesis [19]. The device provides a negative pressure of 45 mmHg. The intraoral unit is a two-way tubing system: irrigation and decompression. A lavage solution (normal saline solution 0.9%) is introduced through the irrigation tube. A suction or decompression tube is attached to the irrigation tube.

The distal ends of both tubes are inserted into the cavity. The anterior end of the decompression tube connects to the apparatus [20-22]. The intraoral unit is fixed to the teeth with orthodontic wire (Figure 5) [21].



Figure 4. Evacuator for odontogenic cysts (Evocyst) [21,22] (Modified image); a) Component parts: A - extraoral unit (vacuum), B - intraoral unit, a double-way tubing system (irrigation and decompression tubes); b) Liquid collected in outdoor unit



Figure 5. Intraoral unit fixed with orthodontic wire to the teeth: upper - decompression tube; lower – irrigation tube (a needle port – green arrow) [21] (Modified image)

3. *Enucleation*, also called the Partsch II operation or cystectomy, is a surgical technique in which the pathological tissue is completely removed and the edges of the wound are sutured. The attitude towards the cystic membrane is radical, with its complete removal [23]. Enucleation is indicated for unicystic ameloblastomas of the luminal and intraluminal subtype that do not show extraosseous spread: dentigerous cyst, radicular cyst, glandular odontogenic cyst, botryoid odontogenic cyst [24]. The enucleation and curettage procedure is limited in the treatment of multicystic lesions because the enucleation process may not completely remove the pathological tissue and physical and chemical curettage may not be able to access or remove all remnants of the cystic lesion. [25]. To facilitate cyst removal and ensure complete enucleation, various modifications of this method have been proposed, which attempt to address residual tissue to prevent recurrence [26]. Enucleation followed by superficial cautery may be used for some aggressive maxillary cysts [27]. Other proposed adjuvant treatments are: cryotherapy (freezing) with liquid nitrogen and the use of Carnoy's solution (absolute ethanol, chloroform, acetic acid, formalin) in the cyst cavity after enucleation [28, 29].

The classic Caldwell-Luc surgical technique is over 125 years old and involves opening the maxillary sinus at the level of its anterior wall through a gingival-labial incision, ensuring surgical drainage in the inferior meatus, to evacuate the pathological contents. The incision is made 3 mm above the reflection line, from the lateral incisor to the second molar. The mucoperiosteal tissue is reflected inferiorly and superiorly over the canine fossa to the infraorbital foramen so as not to injure the nerve (Figure 6). The surface of the jaw bone is exposed. With spherical cutters at low speed or with chisel and hammer, a circular opening of approximately 1.5-2 cm is made in the maxillary antrum, between the canine and the first premolar (canine fossa). Cystectomy is performed and the membranes of the inflamed sinuses are enucleated [30-32].



Figure 6. Detachment of the muco-periosteal flap with the exposure of the cystic lesion

4. *Functional endoscopic sinus surgery (FESS)* replaces the radical Caldwell-Luc approach, for several reasons: it is more conservative, has a higher cure rate and a lower complication rate [33-35]. Cystectomy can be performed in three ways: through the natural sinus ostium, through the inferior meatus or through the canine fossa (Figures 7,8). The cyst is extracted through the cannula or lower antrostomy [36].



Figure 7. Endoscopic approach to the maxillary sinus with a trocar: a - through the natural ostium, b - through the inferior meatus, c - through the canine fossa [33] (Modified image)



Figure 8. Endoscopic image of a mucocele

RESULTS AND DISCUSSIONS

Aggressive surgical treatments for maxillary sinus cysts, such as partial resection, have a low risk of recurrence, but have the major disadvantage of leading to jaw deformity and the need for subsequent reconstruction [37].

Marsupialization/decompression are treatments that last from 2 to 80 months, with an average of 6-14 months, so they are not accepted by all patients. Most studies consider these techniques to be necessary prior to treatment with enucleation and curettage [38-40]. Nakamura *et al.* evaluated the effects of marsupialization on odontogenic keratocysts, finding that this method is effective as a preliminary treatment [41]. Al-Moraissi *et al.* concluded that cystectomy is necessary after marsupialization to reduce the recurrence rate [42]. Castro *et al.* demonstrated in their study a lower recurrence rate in decompression, followed by enucleation compared to pure enucleation [43]. Tabrizi *et al.* compared the recurrence rate between marsupialization and decompression in the treatment of keratocystic odontogenic tumors with or without adjuvant treatments. They concluded that the recurrence rate for decompression without adjuvant treatment may be lower than for marsupialization, this being no different when enucleation was performed after marsupialization/decompression [44].

The decompression of the cystic cavity determines the achievement of a negative pressure that facilitates the formation of new bone. Because it is a method that requires time and patient compliance, the combined use of platelet-rich fibrin (LPF) and bone meal, which promotes osteoblast proliferation, has been promoted in recent years [45,46].

Endoscopically assisted surgical treatment of maxillary cysts can reduce the surgical trauma to some extent and help the doctor to determine whether the residual cyst tissue has been completely removed. At the same time, damage to the tissues around the cyst is avoided and operative time is reduced, as most of the affected teeth can be saved [47-49].

In the endoscopic era, the Caldwell-Luc surgical technique is often used because it provides easy access to the maxillary sinus when endoscopic sinus surgery (ESS) is insufficient. These two methods can be used simultaneously, the surgical instruments and the

endoscope can help each other due to the presence of two openings in two different planes [50].

CONCLUSIONS

Indications for such marsupialization and decompression are large cysts with thin bony walls that may cause spontaneous fracture, cysts that are very close to structures such as the n. alveolaris inferior or nasal floor, and infected cysts. Marsupialization/decompression should be used in cooperative patients to avoid complications and relapses.

For large cysts, a two-stage therapeutic approach, marsupialization followed by enucleation, allows preservation of important structures, reduces sequelae and the need for aggressive and expensive surgical reconstruction.

Treatment of maxillary sinus cysts depends on the extent, location and associated infections of the cystic lesion, histopathological features, as well as the characteristics of each patient.

Endoscopic sinus surgery is an effective treatment for odontogenic cysts.

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Original studies must include a structured abstarct of maximum 150 words, containing the following titles and informations: Aim and objectives; Material and methods; Results; Conclusions; Key words: give 3-5 key words; The abstract will be translated into an international circulation language.

Keywords: Innovation, technology, research projects, etc. [Book Antiqua 9].

INTRODUCTION [Book Antiqua, 11, bold, left alignment]

Introduction presentation of general aspects, in the context of the approached theme.

Introduction include **Aim and objectives** – Define the aim of the article. Briefly expose the rationale of the presented study or observation. Make strictly pertinent referals and do not exhaustively review the subject. Do not include data or conclusions from the paper.

There is a limitation of 4/6 pages. All pages size should be A4 (21 x 29,7cm). The top margins should be 2 cm, the bottom, right, margins should be 2cm and left margins should be 2,85 cm. All the text must be in one column and Book Antiqua font, including figures and tables, with single-spaced 10-point interline spacing.

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The text included in the sections or subsections must begin one line after the section or subsection title. Do not use hard tabs and limit the use of hard returns to one return at the end of a paragraph. Please, do not number manually the sections and subsections; the template will do it automatically.

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MATERIAL AND METHODS [Book Antiqua, 11, bold, left alignment]

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RESULTS [Book Antiqua, 11, bold, left alignment]

Present results in a logical succession as text, tables and illustrations. Emphasize or briefly describe only important observations. [Book Antiqua, 11 point, normal, justified alignment].

DISCUSSIONS [Book Antiqua, 11, bold, left alignment]

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

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Organize conclusions which emerge from the study. In the end state: a) contributions to be acknowledged but which do not justify paternity right; b) thanks for technical support;

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Content of the paper for case report will respect indications for original articles.

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

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

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

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

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