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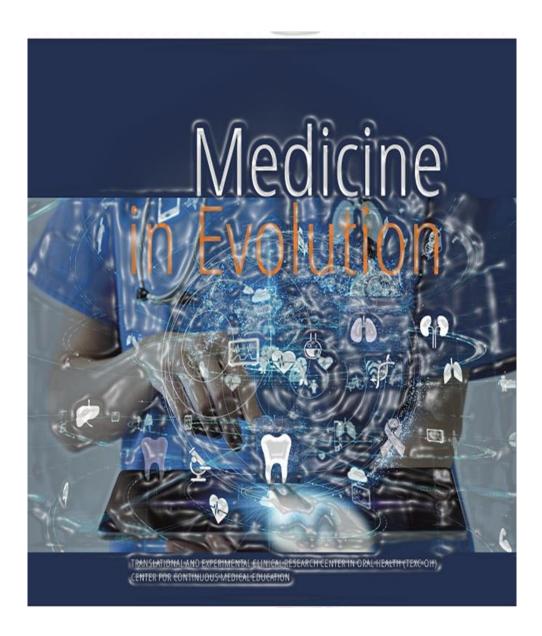


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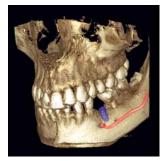
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# Bone remodelation pathogeny in postmenopausal osteoporosis



# Stanescu A.M.A.<sup>1</sup>, Nae A.<sup>2</sup>, Grajdeanu I.V.<sup>1</sup>, Beiu C.<sup>3</sup>, Popescu M.N.<sup>4</sup>, Kozma A.<sup>5</sup>, Simionescu A.A.<sup>6</sup>

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#### Abstract

Osteoporosis is a progressive bone metabolic disorder with socioeconomic serious impact. Osteocytes are the most abundant bone cells. They keep the matrix calcified, and the rapid resorption of the matrix follows their death. While they share most matrix-related activities with osteoblasts, osteocytes also express many different proteins, including factors with paracrine and endocrine effects that help regulate bone remodelling. This article presents the mechanisms involved in the occurrence of postmenopausal osteoporosis based on literature review. Beyond classical mechanisms, molecular mechanisms involving Circ\_0134944, pancreatic and duodenal homeobox 1 (PDX1) and S1P by sphingosine kinase 1 and 2 (SPHK1) are implicate in osteogenesis homeostasis.

Keywords: osteoporosis, menopause, bone resorption, bone density

#### **INTRODUCTION**

Osteoporosis is a quiet and progressive bone metabolic disorder that is often brought to the attention of patients or the doctor only after a fracture. The etiology of osteoporosis is multifactorial and is related to two main processes: the acquisition of maximum bone density at the end of the third decade and bone loss and bone resorption from menopause to old age. The cardinal features of osteoporosis are pain, fracture, and deformity [1]. Measurement of low bone mineral density is the most reliable diagnostic tool in the early stages of osteoporosis [2].

#### STRUCTURAL AND BONE RESORPTION IMPLICATIONS

The primary structural component of the bone matrix is types I collagen and, to a lesser extent, type V collagen. Traces of other types have also been found in the matrix, such as type III, XI, and XIII collagens. All collagen molecules make up about 90% of the total weight of the protein bone matrix [3].

The matrix also contains other proteins that are the primary substance of bone. Nearly a minor component of bone, making up only 10% of the total weight of bone matrix proteins, they are essential for bone development, growth, reshaping, and repair. Both collagen and the soil substance become mineralized and form bone tissue [4]. The four main groups of non-collagenous proteins found in the bone matrix are presented in Figure 1.

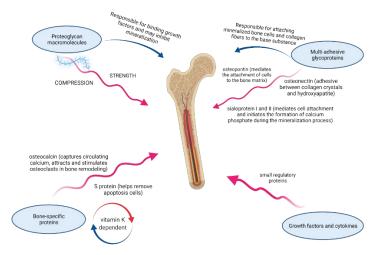


Figure 1. Four main groups of non-collagenous proteins found in the bone matrix

The bone matrix contains gaps connected by a network of canaliculi (Figure 2). There are spaces in the bone matrix called gaps, each containing a bone cell or osteocyte. During the transition from osteoblasts to osteocytes, cells extend many long dendritic processes surrounded by a calcified matrix [5].

Osteocytes are the most abundant bone cells. They keep the matrix calcified, and the rapid resorption of the matrix follows their death. While they share most matrix-related activities with osteoblasts, osteocytes also express many different proteins, including factors with paracrine and endocrine effects that help regulate bone remodeling [6].

The extensive lacunar-canalicular network of these cells and their communication with all other bone cells allows osteocytes to serve as sensitive detectors of stressors, microtraumas induced by bone fatigue and trigger the remedy by activating osteoblasts and osteoclasts. Bone tissue depends on osteocytes to maintain viability [4].

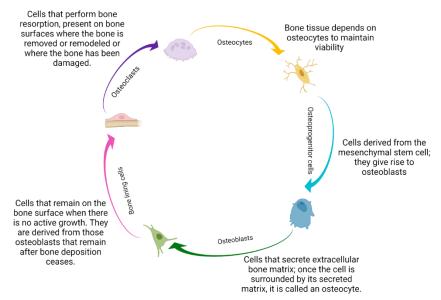


Figure 2. Extensive lacunar-canalicular network of these cells and their communication

Osteoblasts produce the organic components of the bone matrix, including type I collagen fibers, proteoglycans, and matrix cellular glycoproteins such as osteonectin. The deposition of inorganic bone components also depends on the activity of osteoblasts. Active osteoblasts are located exclusively at the surfaces of the matrix bone, to which integrins link them, usually forming a single layer of cuboidal cells joined by adherent and gap junctions [4]. When their synthesis activity is completed, some osteoblasts differentiate as osteocytes trapped in the matrix gaps, some flatten and cover the surface of the matrix as bone lining cells, and most undergo apoptosis [6]. During the matrix synthesis and calcification processes, osteoblasts are polarized cells with ultrastructural features designed for the synthesis and active secretion of proteins [5]. This process of bone growth in apposition is completed by the subsequent deposition of calcium salts in the newly formed matrix. The process of matrix mineralization is not entirely understood [5].

Endochondral ossification takes place inside the hyaline cartilage. This type of ossification forms most bones [5]. Enchondral ossification takes place in the hyaline cartilage, whose shape resembles a small-scale pattern of bone that will form. Most of the bones that make up the skeleton appear by chondral ossification, this model being studied mainly in the development of long bones. The chondral ossification of a long bone consists of a succession of processes. The first bone structure that forms is a bony sleeve that surrounds the diaphysis of the cartilaginous model. This bone sleeve is produced by the activity of osteoblasts in the local perichondrium [7]. The sleeve blocks the diffusion of oxygen and nutrients in the underlying cartilage, causing degenerative changes. Chondrocytes begin to produce alkaline phosphatase and enlarge (hypertrophy), widening the gaps in their location [5]. The changes lead to the compression of the matrix into narrow trabeculae and the calcification of these structures. Cell death of chondrocytes leads to the appearance of a porous structure composed of remaining calcified cartilaginous elements, over which a layer of osteoblasts is formed. The blood vessels in the perichondrium (which has become periosteal) penetrate through the bone sleeve, transporting osteoprogenitor cells into the central porous region. Subsequently, osteoblasts adhere to the structural remnants of the calcified cartilaginous matrix and begin to produce reticular bone tissue. At this stage, the cartilage is basophilic, while the newly formed bone tissue is acidophilic [8].

Through this process at the diaphysis level, the primary ossification center is formed, starting from the first trimester of intrauterine life. Secondary ossification centers appear later in the cartilaginous epiphyses and remodelling. Primary and secondary ossification centers

produce cavities gradually occupied by bone marrow and trabeculae belonging to spongy bone tissue [5].

The sum of the activities of osteoblasts and osteoclasts in a growing bone is osteogenesis, or the process of bone modelling, which maintains the general shape of each bone as it increases its mass. Bone growth involves the continuous resorption of earlier formed bone tissue and the simultaneous establishment of new bone at a rate exceeding that of removal [7]. The rate of bone fluctuation is very active in young children, where it can be 200 times faster than that of adults. In adults, the skeleton is also continuously renewed in bone remodelling involving coordinated cells, localized bone resorption, and bone formation activities [5].

The constant remodelling of the bone ensures that, despite its hardness, this tissue remains plastic and able to adapt its internal structure in the face of stress. A well-known example of bone plasticity is the ability of teeth to change their positions in the jaw bone, to be altered by lateral pressures produced by orthodontic appliances [8]. The bone typically has an excellent repair capacity because it contains osteoprogenitor stem cells in the periosteum, endorsed, and bone marrow and is very well vascularized. Bone repair after a fracture or other injury is performed using cells, signalling molecules, and processes already active in bone remodelling [4]. Surgically created gaps in the bone can be filled with new bone, especially when the periosteum is left in place. The significant phases that usually occur during bone fracture repair include the initial formation of fibrocartilage and its replacement with a temporary callus of bone tissue [5].

#### **REGULATION OF BONE BIOLOGICAL ACTIVITY**

Bone remodelling is the morphological basis of bone turnover and has two biological purposes: maintaining the biomechanical competence of the bone and contributing to mineral homeostasis [9,10].

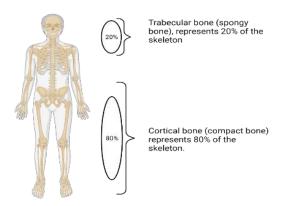


Figure 3. Trabecular and Cortical bone

The proportion between these two types of bone differs depending on the skeletal areas: the trabecular bone predominates in the vertebral bodies, while in the femoral neck, the cortical one predominates (Figure 3). Bone remodelling is a surface process, which makes bone turnover high in trabecular bone and low in cortical bone. Another feature of remodelling is its components' sequential and coupled character: resorption and bone formation occur sequentially, are limited in time, and are quantitatively equivalent, which is called being coupled. In this way, the end of the bone remodelling cycle is constant, and the

functioning of bone remodelling is based on the actions of a cell couple, represented by osteoblasts, which form bone and osteoclasts, which resorb [11].

Exercise under gravity is the most important exogenous factor in maintaining the balance of the bone remodelling process. Sedentary people, as well as prolonged immobilization due to suffering, are firmly at risk of osteoporosis. Also, the marked reduction of gravity (in the case of astronauts) leads to marked and rapid loss of muscle and bone mass [8].

The relationship between the kidneys and the bone is highly complex, and the kidney plays an important role in regulating bone development and metabolism. The kidney is the main organ involved in regulating the homeostasis of calcium and phosphate, which is essential for bone mineralization and development. Many substances synthesized by the kidneys are involved in various stages of bone formation, remodelling, and repair [12]. In addition, some cytokines that can affect the kidneys, such as osteoprotegerin, sclerostin, fibroblast growth factor, and parathyroid hormone, also play important roles in bone metabolism. Most of these cytokines can interact, forming a complex network between the kidneys and the bone. Therefore, the renal disease should be considered in patients with osteodystrophy and bone and mineral metabolism disorders, and treatment for renal dysfunction may accelerate their recovery [6].

The parathyroid hormone, whose production is stimulated by hypocalcemia, acts on three target organs. In bone, it stimulates the activity of osteoclasts and the maturation of proosteoclasts. In the kidneys, it acts directly, increasing calcium resorption, promoting phosphorus excretion, and indirectly inducing the conversion of 25-hydroxycholecalciferol to 1,25-dihydroxycholecalciferol (the active form of vitamin D) due to the stimulation of the specific enzyme 1-a-hydroxylase. The action on the digestive tract is done indirectly through vitamin D, which strongly stimulates the intestinal absorption of calcium and phosphorus [13].

Vitamin D further stimulates tubular calcium resorption by direct action and accelerates osteoclastic bone resorption [14].

These hormonal and vitamin actions are ways to correct changes in serum calcium. Its decrease is compensated by mobilizing deposits (bone), increasing digestive absorption, and amplifying renal resorption. All these processes are mediated by parathyroid hormone and vitamin D [15]. Calcitonin has opposite effects, stopping bone resorption. Its secretion is stimulated by hypercalcemia [14].

Last decades, molecular mechanisms are studied, involving Circ\_0134944, pancreatic and duodenal homeobox 1 (PDX1) and S1P by sphingosine kinase 1 and 2 (SPHK1) and their role in osterogenesis homeostasis [16-19].

A recent study on 115 women demonstrate that stress-related neurobiological activity were correlate with postmenopausal osteoporosis due to the suppression of the differentiation and proliferation of osteoblast, increasing the levels of glucocorticoid in systemic circulation [21-21].

#### CONCLUSIONS

In conclusion, these findings could support the proposed mechanistic relationship between loss bone and osteoporosis in postmenopausal women. Moreover, this study further highlights the multifactorial mechanism and raise the question of high risk assessment of postmenopausal women at risk for osteoporosis.

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# The sinuous canal's lateroantral course and duplication



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#### Abstract

The canalis sinuosus (CS) branches from the infraorbital canal (IOC) and carries the anterior superior alveolar nerve (ASAN) mainly distributed to the upper frontal teeth. Common descriptions indicate a single CS with an infraorbital initial segment, continuing with a transverse facial course within the anterior antral wall. It is reported here a case which was documented in Cone Beam Computed Tomography in which, on one side, the initial course of the CS was not superior to the antrum, but lateral to it. On the opposite side the CS was duplicated. Such variations of the CS should not be ignored during surgical approaches of the maxillary sinus walls, especially of the canine fossa.

Keywords: maxillary sinus; maxillary nerve; infraorbital nerve; canine fossa; superior alveolar nerve

#### **INTRODUCTION**

The canalis sinuosus (CS) of Wood Jones is commonly regarded as branching from the infraorbital canal (IOC) in the roof of the maxillary sinus (MS) (Rusu et al., 2021). Thus, the first segment of the CS is an infraorbital one (Von Arx and Lozanoff, 2016). The following segment of the CS is the transverse facial one coursing through the anterior antral wall beneath the infraorbital foramen (IOF) (Jones, 1939, von Arx and Lozanoff, 2015). The CS carries the anterior superior alveolar nerve (ASAN), branched from the infraorbital nerve (ION), and a branch of the infraorbital artery (Rusu et al., 2021, von Arx and Lozanoff, 2015, Rusu et al., 2017). A rare anatomic possibility of the CS is its course through the MS (Rusu et al., 2021) instead of its common course within the MS roof. When both the IOC and the CS protrude within the MS they form buttresses separated by recesses (Jones, 1939). If referred to the IOC, such recesses are termed infraorbital recesses (Carstocea et al., 2019).

#### Aim and objectives

The aim of this study is checking the course of the canalis sinuosus (CS) in Cone Beam Computed Tomography.

#### MATERIAL AND METHODS

The archived cone-beam computed tomography (CBCT) files of a 48-year-old male patient were retrospectively studied. The patient had been scanned for dental medical purpose using an iCat CBCT machine (Imaging Sciences International, Hatfield, PA, USA) (resolution of 0.250, FOV 130°, image matrix size of 640 × 640). The CBCT data were exported as a single uncompressed DICOM file, which was analysed using the Planmeca Romexis Viewer 3.5.0.R software, an approach that has been applied in other studies (Carstocea et al., 2019, Rusu et al., 2020). The anatomical details were evaluated on planar slices as well on three-dimensional volume renderings. The patient had provided written informed consent for all his medical data (including CBCT scans) to be used for research and teaching purposes, provided that the anonymity and confidentiality were maintained.

#### RESULTS

Morphological features of anterior antral walls were then studied (fig.1). On each side the IOC began immediately anterior to the inferior orbital fissure, continuing extremely short infraorbital grooves. Both IOCs opened at the infraorbital foramina (IOF) above the interproximal septum between the respective two upper premolars. On the left side a single CS left the lateral side of the respective IOC and coursed through the lateral wall of the MS (lateroantral course) to continue with the transverse facial segment in the anterior wall of the antrum inferior to the IOF. Two infraorbital recesses of the left MS were formed: the medial one was on the inner side of the IOC and the lateral one was located between the buttress of the IOC and that of the CS. On the right side a duplicate CS was found. The lower component left distally the IOC, had a lateroantral course, and continued in the anterior antral wall. The upper component of that duplicate CS left proximally the IOC, coursed within the anterolateral antral wall, and continued superiorly to the lower component within the anterior wall of the MS. From medial to lateral three different recesses of the MS were distinguished in the anterior antral wall, a medial infraorbital one, on the medial side of the IOC, and two lateral infraorbital ones, between the IOC and the upper CS and, respectively, between the two components of the CS.

#### DISCUSSIONS

In the case reported here was found the lateroantral course of the CS. This topographic variant probably resulted from a premature distal origin of the ASAN from the ION. Although rare, even the ION could have a lateroantral, and not infraorbital course (Rusu et al., 2015).

There are reports that associate the CS just with the ASAN (Neves et al., 2012). It is however a neurovascular canal (Torres et al., 2015). Therefore, it should not surprise if the neurovascular content courses into separated vascular and neural canals. Moreover, dissections in five cadavers demonstrated that the ASAN continued in the anterior antral walls either as a single trunk (40%), or as two branches (40%), or as three branches (20%) (von Arx and Lozanoff, 2015). Therefore, if the ASAN is branched within the anterior antral wall, distinctive CS could be found. In CBCT just canals are observed, their content being just presumed. Clinicians should be aware that although the ASAN maintains consistent coordinates at specific points along its course through the midface, it could be duplicated, or double, such as in this present report. Such double ASAN trunk with no branches was found in just 10% of maxillae (Robinson and Wormald, 2005).

Intractable posttraumatic nerve deficits secondary to injuries of the ION or ASAN are common in patients with midface fractures (Olenczak et al., 2015). Such fractures determine nerve injury through compression, transection, or avulsion (Olenczak et al., 2015). While lesions of the ION lead to hypoesthesia, hyperesthesia, paraesthesia, and pain of the midface, lesions of the ASAN are discriminated by intractable neuropathic pain localized to the premaxilla (Olenczak et al., 2015). Therefore it is important to clinicians to adequately know the anatomy of the maxilla, as the IOC is not the only canal traversing it.

The transverse facial segment of the CS courses inferiorly to the infraorbital foramen and is commonly joined by the lateral antral canal (LAC). The LAC is a vascular one and contains the lateral or alveolar antral artery (arcade, anastomosis) that starts at the tuberosity of maxilla and anastomoses the superior alveolar arteries, posterior and anterior (Ilie et al., 2015). Therefore, the LAC courses inferiorly to the transverse facial segment of the CS in the canine fossa wall. Both canals should be adequately located preoperatively by CT or CBCT, in order to personalize the surgical procedures involving the canine fossa. Nerve injuries occur in approximately 40% of canine fossa trepanations and there is a considerable loss (10-30%) of dental sensitivity after surgery of the outer antral wall (Heasman, 1984, Murakami et al., 1994). The safest entry point for a canine fossa puncture is the vertical line drawn through the mid-pupillary line bisection point by a horizontal line through the floor of the pyriform aperture (Robinson and Wormald, 2005). However, this safe zone was considered without taking into account the course of the LAC. On other hand, the Caldwell Luc antrostomy could be used for resection of superior alveolar nerves and neurolysis of the ION in cases with refractory facial pain (Musavi et al., 2018).

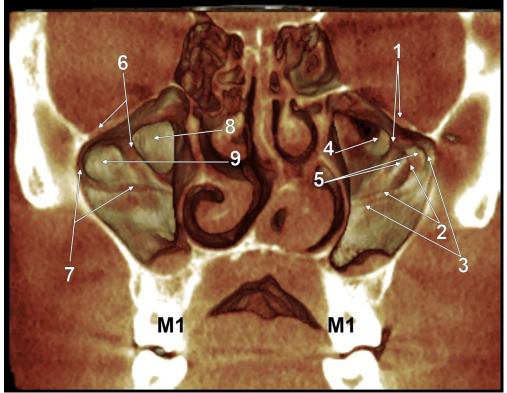


Figure 1. Three-dimensional volume rendering of the anterior antral walls. Right duplicate canalis sinuosus. Endosinus posterior view. 1.right infraorbital canal; 2. upper component of the right canalis sinuosus; 3.lower component of the right canalis sinuosus; 4.medial infraorbital recess; 5.lateral infraorbital recesses; 6.left infraorbital canal; 7.left canalis sinuosus; 8.medial infraorbital recess; 9.lateral infraorbital recess. M1: first maxillary molar

#### CONCLUSIONS

In conclusion, avoidance of unwanted iatrogenic consequences is possible if the possibilities of variation are well known and documented preoperatively.

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# The management of non-syndromic supernumerary teeth - Case report



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#### Abstract

Supernumerary teeth are the most common dental anomalies found in permanent dentition. They are usually present in genetic syndromes, their presence in the absence of these syndromes being quite low. The case presented by us is of a male patient, aged 15 years that presented in order to solve a minor aesthetic problem. Following the paraclinical investigations (Orthopantomography and Cone Beam Computed Tomography) the presence of two supernumerary teeth was highlighted, a mesiodense and a tooth located between the roots of the teeth 12-13. The treatment was surgical extraction.

Keywords: supernumerary teeth, non-syndromic hyperdontia, surgical treatment

#### **INTRODUCTION**

Hyperdontia is the condition of having supernumerary teeth, or teeth that appear in addition to the regular number of teeth. Hyperdontia can be associated with a genetic syndrome or can be related to phylogenetic evolution, heredity, interest any tooth but is usually found in the upper jaw in the frontal area [1]. Supernumerary teeth can be single or multiple, erupted or non-erupted in one or both jaws. In most cases, the presence of supernumerary teeth is the consequence of a genetic syndrome (e.g cleidocranial dysplasia, Gardner syndrome, Rothmund-Thomson syndrome, orofacial-digital syndrome, cleft lip and palate) [2,3]. It is rare to find multiple supernumerary teeth with no associated diseases or syndromes. Hyperdontia can be accidentally discovered on a routine x-ray or there may be suspicion of a supernumerary tooth when giving aesthetic and functional changes [4].

Supernumerary teeth are classified according to morphology, position and location. In primary dentition, the morphology is usually normal or conical. In permanent dentition a greater variety of shapes are described. A classification of numerical dental abnormalities was published by Tomes who defined the following: supplemental tooth characterized by the same shape and function of adjacent teeth with no anatomical differences and supernumerary tooth characterized by an atypical anatomical shape; often these teeth are smaller than normal [5,6]. Bush classified supernumerary teeth as follows: Conic: tooth of a small volume and conic form, with root short and palatinised; Tubercolate: tooth with several cusps, with short root and hook shape; Infundibulform: tooth with a funnel form, with short and conic root [6]. Mesiodens is defined a tooth located between central upper incisors, paramolar a tooth placed in molar region and distomolar a tooth that lies distal to the third molar. The additional supernumerary refers to a duplication of teeth in the normal series and is found at the end of a series of teeth. The most common additional tooth is the permanent maxillary lateral incisor, but additional premolars and molars also appear [7-10].

Supernumerary tooth position can be normal, inverse, transverse or ectopic. They are observed in vestibular or palatal eruption [11-14].

#### Aim and objectives

The aim of this study was to present, in the non-genetic syndromes category, two supernumerary unerupted teeth revealed on the superior jaw.

#### CASE REPORT

The 15-year-old patient presents to the dental office in order to solve a small aesthetic problem related to tooth 13. At the orthopantomography (OPT) (Figure1) and Cone Beam Computed Tomography (CBCT) (Figure 2) examination, the presence in the anterior region of the maxillary bone of two unerupted supernumerary teeth is found, one located between 11 and 21 and the other between 12 and 13.

The anamnesis shows that the patient is not diagnosed with a genetic syndrome and does not have known cases of supernumerary teeth in the family. A thorough general examination and family history confirmed the absence of any kind of disease or syndrome associated with this case. The young patient was affected by numerical dental anomaly in the upper jaw, a mesiodens and a supernumerary tooth located between the roots of the teeth 12-13, both unerupted and with inverse position.



Figure 1. Orthopantomography with the highlighting of the supernumerary teeth

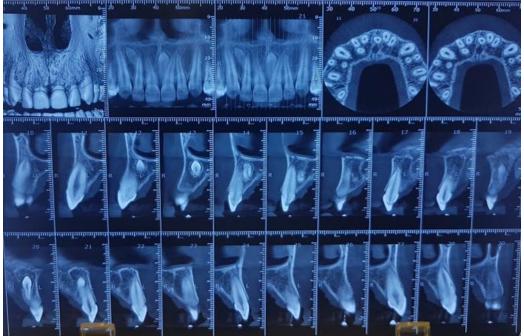


Figure 2. Cone Beam Computed Tomography of the young patient

All radiographic findings and the potential risk of root resorption of adjacent teeth were explained to the patient.

The treatment consisted in the extraction of the two supernumerary teeth by vestibular approach, after obtaining the informed consent of the patient and the legal owner.

The surgical procedure was performed with precise technical standards for the region, under local anesthesia. Extraction should be performed carefully to prevent damage to adjacent permanent teeth. Care should be taken during surgical treatment to avoid complications such as damage to nerves and blood vessels during tooth handling.

After the previous asepsis and antisepsis of the operating field, a trapezoidal flap was performed under local anesthesia, mucoperiostal flap detachment, bone trepanation with straight piece and surgical milling, exposure of supernumerary teeth, extraction, curettage, washings with saline, suture with 4.0. (Figure 3). The patient was cooperative, stable, did not require intravenous sedation



Figure 3. Extraction of supernumerary teeth

Both teeth of our clinical case have a conical crown. The roots of the supernumeraries are completely formed, the tips are not completely closed (Figure 4).

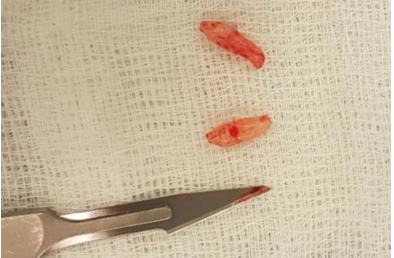


Figure 4. Appearance of extracted teeth

Indications for postoperative care were given immediately after surgery. Antiinflammatory treatment (Ibuprofen 400mg 0-1-0 for 5 days) and analgesic Paracetamol 500 mg 0-0-1 as needed, were prescribed. Rigorous oral hygiene and suppression of sutures at 7 days. The postoperative evolution of the patient was very good.

Seven days after the surgical procedures were performed, the patient returned to the clinic for evaluation and suppression of sutures. According to the clinical evaluation, normal scarring and function was identified.

#### DISCUSSIONS

The prevalence of hyperdontia in various populations is reportedly between 0.1-3.8% with male to female ratio of 2:1 [15]. Cases like this are rare, primarily because it is a non-syndromic hyperdontia and also because an another supernumerary tooth besides the mesiodens is still present on the arch [16,17].

The early diagnosis of supernumerary teeth has a positive impact on the prognosis. They can be asymptomatic, and be casually diagnosed during a routine radiography [18].

Treatment depends on the type and position of the supernumerary tooth and its potential effect on adjacent teeth. The management of a supernumerary tooth should be part of a complex treatment plan and should not be considered in isolation. The usual treatment is

to extract the supernumerary tooth [19]. Removal of a supernumerary tooth that prevents permanent tooth eruption usually results in tooth eruption, provided adequate space is available in the arch [20,21]. When there is adequate space and the permanent tooth fails to erupt, surgical exposure and orthodontic traction are usually required [22]. Clinicians must be alert as sometimes supernumerary teeth are fused with the adjacent tooth structure at crown or root level, which may make the extraction difficult [23,24].

#### CONCLUSIONS

Early detection of these cases of supernumerary teeth is important given the complications they can generate: aesthetics or resorption of the roots of permanent teeth. The treatment of choice is tooth extraction, their approach depending on their position. These cases, starting with the OPT radiograph that signals their presence on the arch as well as the CBCT that gives information about the exact position of these teeth on the arch and directs the surgical approach technique.

It is a great challenge for clinicians to decide on the timely management of supernumerary teeth, to prevent the complications associated with it.

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#### Aesthetic restoration challenges using the stratification technique



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#### Abstract

Aim and objectives: To describe a resin layering and stamp restorative technique based on the biomimetic concept to improve esthetics in a patient with dental defects that affected both enamel and dentin in posterior teeth.

Material and methods: The patient, a 23-year-old girl, presented to the doctor with blackish staining on the teeth in the posterior side and no complaints of discomfort. She needs odontotherapy treatment on the mandible in multiple teeth on the posterior side by using the layering technique.

Results: The layering technique for posterior teeth can reproduce the aspects of a natural tooth, like its different opacities, shades, and translucencies of enamel/dentin, which can be individualized during buildup in an attempt to match with natural structures, and reduction of the shrinkage stress generated by the polymerization contraction.

Conclusion: An important advantage of the incremental layering technique is the possibility to reproduce the aspects of a natural tooth, such as its different opacities, shades, and translucencies of enamel/dentin, which can be individualized during buildup in an attempt to match with natural structures.

Keywords: stratification, aesthetic, posterior, resin

#### **INTRODUCTION**

In the last 20/25 years, it changes the way how to treat dental decay, especially for the needs of the patients even for the aesthetics and toxicity demands that other material could give. For this, it was developed new material and method for the aesthetic restoration in the posterior side that is in continuous evolution. We can restore small or wide lesions with adhesive techniques

Composites can be used on almost any tooth surface. That is why these products are increasingly being used to enhance their performance to adhere to the tooth structure (enamel and dentin) as well as their physical and mechanical characteristics. (1)

The indications for direct posterior composites should be clear and correct enough, and criteria must be respected in all steps because they are very technique-sensitive and if you don't pay attention to the details may result in failures in the future. (2)

The LT is highly desirable in order to decrease the problems generated by resin composite polymerization shrinkage. The insertion of a layer of composite is supported by the principle of C-factor reduction, which is characterized by the number of bonded walls branched by the number of free surfaces. By using an incremental layering technique, the resin composite is bonded to a decreased number of cavity walls that decreases the C-factor, and this is reducing its shrinkage levels. However, the clinical steps become highly sensitive to the clinician for the manipulation, and the final functional and esthetic result may also be compromised. An important benefit of working in increments is the possibility to reproduce different opacities, shades, and translucency characteristics of enamel and dentin, which can be customized during the buildup. The filling technique for posterior teeth should guarantee a correct adaptation of composite, especially to cavity margins, appropriate reconstruction of anatomy, and reduction of the inherent shrinkage stress achieved by the polymerization contraction.

The american dental association (ADA) published in 1998 the recommended indication for direct posterior restoration: Preventive restoration by sealing grooves and fossettes; Treatment of cavity class I and II of small-medium dimensions; Cavity class V; Treatment of cracked teeth; Patients with allergies to alloys. (3,4,5)

#### MATERIAL AND METHODS

The selection of patients was tacking into consideration to have superior or inferior molars with the decay on the occlusal surface, with stable, simultaneous occlusal contacts, good occlusal morphology, no smokers, young patient and without periodontal issue.

On the other hand, we excluded patients with the following criteria:

Poor oral hygiene, smokers, periodontal problems, bruxism, and mental disabilities

The materials utilized for this techniques was Estelite Asteria

The patient, a 23-year-old girl, presented to the doctor with blackish staining on the teeth in the posterior side and no complaints of discomfort. She needs odontotherapy treatment on the mandible in multiple teeth on the posterior side by using the layering technique. The patient filed a medical chart, and it was informed about the undergoing study

After cavity preparation, selective etching of the enamel with 37% phosphoric acid for 30 seconds is done, then rinse and gentle drying is obtained to eliminate traces of moisture from the dam and adjacent teeth, but without directing the air jet directly into the cavity, avoiding dehydration. After etching and before the bonding, the application of a 0.2- 2% chlorhexidine solution was applied, then bonding application with Tokuyama EE Bond, and gentle drying for 5-10 seconds, the surface should appear shiny, and the bonding polymerization for 30 seconds is done. Then an elastic flow composite on the cavity base in a thin layer and its polymerization was performed.

The A 3.5B Estelite Asteria composite was used to fill the bottom part of the cavity, and create the interproximal grooves where it was applied Dark Brown pigmentation (Estelite Color), leaving space for the last layer of the material (Figure 1,2).



Figure 1. Bonded Surface



Figure 2. First layer of composite A3,5B Estelite Asteria Tokuyama dental

In general, it should be done horizontal layering in narrow and deep cavities and direct polymerization, in oblique layering the polymerization through the cusp walls in larger cavities. After, the anatomical layering in several increments with modeling the grooves and cusp slopes is made.

The last incremental layer with OcE composite was applied (Estelite Asteria Tokuyama dental) with the anatomical characterization of grooves and fossettes (Figure.3)

and the polymerization of the various increments was done. In the end Polishing with medium-grain rubber pads, removal of the dam, and verification of occlusal contacts were performed (Figure.4).

In the Figure 5 we can observe the final aspect.



Figure 3. Last layer of composite



Figure 4. Polishing and verification of the occlusal contacts



Figure 5. Final aspect

#### RESULTS

The layering technique for posterior teeth can reproduce the aspects of a natural tooth, like its different opacities, shades, and translucencies of enamel/dentin, which can be individualized during buildup in an attempt to match with natural structures., and reduction of the shrinkage stress generated by the polymerization contraction.

Precision is needed for each clinical step and high importance must be given to materials that become highly sensitive during handling.

#### DISCUSSIONS

The layering technique was established and adapt to the evolution of functional and anatomic restoration applying the esthetic with composite restorative materials that include shades of dentin, enamel and also various translucencies and intensive colors.

This technique is designed to embed various degrees of chroma present in a tooth.

It entails using a higher chroma composite resin in the center of the preparation and a lower chroma resin adjacent to the cusp walls. (6)

The performance of the incremental filling technique is questionable. Versluis et al. demonstrate that additional increments by the incremental filling technique can produce higher shrinkage stresses at the adhesive interface and increase the cuspal deformation of the weakened cusps. (7)

Campodonico et al. says that the incremental layering technique is a time-consuming procedure, may increase the contamination risk, and has voids in the restoration.

On the other hand, a recent in vitro study directed by Bicalho et al. stated that the harmful consequences effects of residual shrinkage stresses could be reduced by using a low fluid shrinkage composite and increments that are not exceeding 2-mm thickness.

Hirata et al. says that the insertion of a layer of composite is supported by the rationale of C- factor reduction, which is defined by the number of bonded walls divided by the number of free surfaces. Adopting an incremental layering technique, the resin composite is

bonded to a reduced number of cavity walls that decreases the C-factor thus reducing its shrinkage levels. (8)

Furthermore, the therapeutic measures become very vulnerable to operator handling, potentially jeopardizing the final functioning and esthetic outcome.

Consequently, the filling technique for posterior teeth should maintain a correct adaptation of composite, especially to cavity margins, proper reconstruction of anatomy, and reduction of the inherent shrinkage stress generated by the polymerization contraction.

An important advantage of the incremental layering technique is the possibility to reproduce the aspects of a natural tooth, such as its different opacities, shades, and translucencies of enamel/dentin, which can be individualized during buildup in an attempt to match with natural structures. (9,10,11–16)

#### CONCLUSIONS

The decision of these technique that have been used depends on the desired aesthetic patients complaint (although results seem very acceptable for these technique), the time available for the operative steps, and the clinician's experiences with the technique and material, or even depending on each clinical case, if it is involved just the enamel or enamel/ dentine.

Although the techniques is sustained by scientific evidence, there seems to be a trend toward simplification of steps, benefits being less treatment time and reduced polymerization contraction stress.

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# Children' perception on facial aesthetics and orthodontic treatment



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#### Abstract

*Aim and objectives:* The aim of this study was to assess the attitude of children towards facial aesthetics and the idea of wearing braces. *Material and methods:* A 5 items questionnaire was applied in the city of Oradea, Romania and distributed to orthodontic patients, with ages between 8 and 11.9 years. *Results:* A number of 256 patients remained in the study, after applying the exclusion criteria. Of the total number of patients, 136 were girls and 120 were boys. Regarding the distribution of the patients according to their living environment, 84 patients were coming from a rural environment, and 172 patients were coming from an urban environment. The majority of patients wanted to have the aspect of their teeth corrected (Item1), and were happy that they were wearing an orthodontic appliance (Item 3). However, more than a third were not happy that they started the orthodontic treatment (Item 5). Most patients were disturbed by the aspect of their face with different scores of gravity (Item 2). At the same time, most patients considered that they were affected by the aspect of their teeth, and had a generally positive attitude regarding orthodontic appliances.

**Keywords:** facial aesthetics, children, orthodontic treatment

#### INTRODUCTION

Dental anomalies are considered a special category of dental alterations [1], that are frequently associated with other pathologies of the oral cavity [2]. They appear as a result of complex interactions between genetic and environmental factors [3] that occur during the morpho-differentiation or histo-differentiation processes of tooth development [1].

Dental anomalies can be mild or severe, with varying degrees of complexity and are caused by disorders that affect the number, shape, position or structure of teeth [4]. Impacted teeth, supernumerary teeth, hypodontia, supraocclusions, infraocclusions [5], dental ectopia, dental malpositions [6] are observed more often in children, and can negatively influence the alignment of teeth on the arch, or the occlusion [5]. Some forms of dental anomalies, such as alterations in the number or shape of teeth, may affect both dentitions [7].

Through the changes they produce in children, dental anomalies can affect the craniofacial development [8], and can also cause functional disorders, occlusal dysfunctions, that are reflected in the change of facial appearance [9].

Facial aesthetics is beginning to become important for children, as well. In this sense, dental anomalies can affect the child physically and psychologically. Self-esteem decreases significantly, which is reflected on the child's social quality [10]. Treating dental anomalies is possible with the help of removable or fixed braces in a short period of time [11], but in children, the motivation for orthodontic treatment is often absent [12].

#### Aim and objectives

The aim of this study was to assess the attitude of children towards facial aesthetics and the idea of wearing braces.

#### MATERIAL AND METHODS

The retrospective study was conducted in agreement with the World Medical Association Declaration of Helsinki-Ethical Principles for Medical Research Involving Human Subjects and approved by the Ethics Committee of the University of Oradea, Romania.

The study was carried out over a period of six months, between March and September 2021. The authors conceived a short questionnaire consisting of 5 items. The questionnaires were printed on paper and applied in two private orthodontic practices from Oradea, Romania. They were distributed to children, aged between 8 and 11.9 years, both girls and boys, from urban and rural areas. The respondents were children with previously diagnosed dento-maxillary anomalies who received the indication for orthodontic treatment and were already wearing an orthodontic appliance. Before filling in the questionnaires, all parents, legal guardians and children were informed that the questionnaires were applied for research purposes, and that by filling in the questionnaires, they confirmed their willingness to participate anonymously in this study. Patients had the possibility to withdraw from the research with no consequences. No financial benefits were promised to the respondents. No time limit was imposed. The language used for the questionnaires was Romanian.

A Likert-type scale was used for items 2 and 4. Participants had to choose a number from 1 to 5 (1 being the lowest possible score and meaning a complete negation, and 5 being the highest possible score and meaning a complete affirmation) in order to assess their attitude regarding the questions. For items 1,3 and 5 participants had to choose from three options, these being" yes", "maybe" and "no". Items are translated in Table I.

Table I. Items

Item 1	"Do you want to have the aspect of your teeth corrected?"
Item 2	"Are you disturbed by the aspect of your face?"
Item 3	"Are you happy that you are wearing an orthodontic
	appliance?"
Item 4	"Do you consider that your facial aspect changed after you
	started wearing an orthodontic appliance?"
Item 5	"Did your habits change after you started wearing the
	orthodontic appliance?"

The following inclusion criteria were applied: children with dento-maxillary anomalies who were wearing removable or fixed orthodontic appliance bonded on the buccal surfaces of the teeth, with ages between 8 and 11.9 years, living in Romania. The questionnaires belonging to patients who answered incompletely or incorrectly were excluded from the study.

The questionnaires were handed out to a number of 270 pediatric orthodontic patients, wearing removable or fixed orthodontic appliances but only 265 agreed to take part in this research and filled in the survey forms. After applying the exclusion criteria, a number of 256 participants remained in the study (Figure 1).

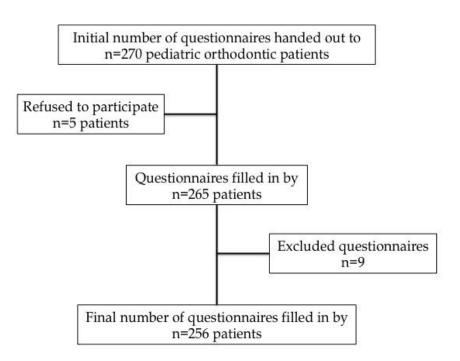


Figure 1. Study profile

The statistical analysis was performed by using IBM SPSS software, version 25 (IBM, Chicago, IL, USA). Quantitative variables were tested for distribution using the Shapiro-Wilk test and were expressed as mean values with standard deviations or medians with interpercentile intervals. The independent quantitative variables with a non-parametric distribution were tested with the Mann-Whitney U test, and all correlations between them were verified with the Spearman's rho correlation coefficient. Qualitative variables were expressed as absolute numbers or percentages.

#### RESULTS

A total number of 256 patients remained in this study. Of the total number of patients, 136 were girls and 120 were boys (Figure 2). Regarding the distribution of the patients according to their living environment, 84 patients were coming from a rural environment, and 172 patients were coming from an urban environment (Figure 3). The mean chronological age of the participants was  $9.89 \pm 1.3$  years, with a median of 10 years, and a range between 8 and 11.9 years.

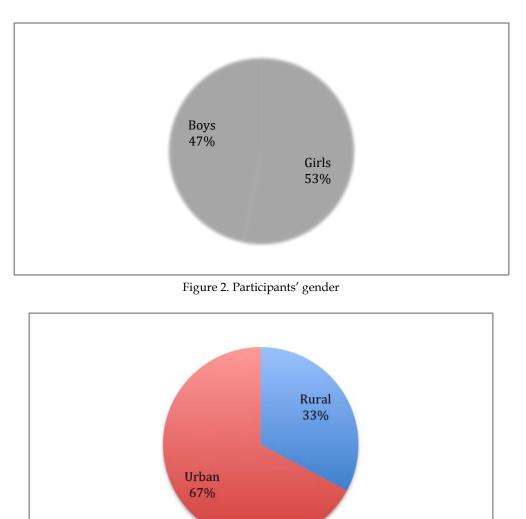


Figure 3. Participants' living environment

Data in Figure 4 shows the distribution of the patients according to the answers provided for items 1, 3 and 5. As such, the majority of patients wanted to have the aspect of their teeth corrected (Item1), and were happy that they were wearing an orthodontic appliance (Item 3). However, more thand a third were not happy that they were wearing an orthodontic appliance (Item 3). Half of the patients declared that their habits did not change after they started the orthodontic treatment (Item 5).

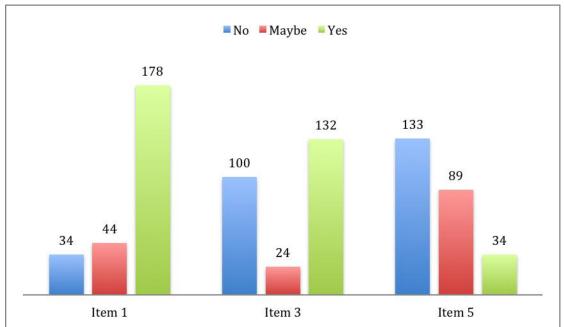


Figure 4. Patients' distribution according to answers provided for items 1,3,5

Data in Figure 5 shows the distribution of the patients according to the answers provided for items 2 and 4. As such most patients were disturbed by the aspect of their face with different scores of gravity (Item 2). At the same time, most patients considered that the aspect of their face improved after they started the orthodontic treatment (Item 4).

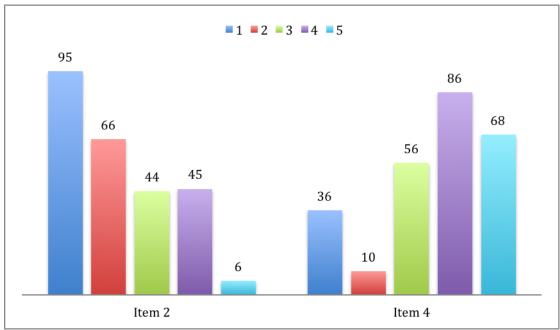


Figure 5. Patients' distribution according to answers provided for items 2 and 4  $\,$ 

Some statistically significant correlative and comparative results were, also, obtained. Data in Table II shows the distribution of the participants according to their living environment and the answers provided for items 3 and 5. The differences between the investigated groups are significant according to Fisher's Exact Test, and Z tests with a Bonferroni correction show that patients that are indecisive regarding their happiness towards the orthodontic treatment (Item 3) are, more frequently, living in a rural environment. Patients that declared that their habits did not change after they started the orthodontic treatment (Item 5) are, more frequently, living in an urban environment.

Living environment/Answer	Rural	Urban	p*								
(Nr., %)			_								
Item 3											
No	34 (40.5%)	66 (38.4%)	0.014								
Maybe	14 (16.7%)	10 (5.8%)									
Yes	36 (42.9%)	96 (55.8%)									
	Item 5		•								
No	35 (41.7%)	98 (57%)	0.012								
Maybe	40 (47.6%)	49 (28.5%)									
Yes	9 (10.7%)	25 (14.5%)									

Table II. Patients's distribution according to the living environment and items 3, 5

\*Fisher's Exact Test

Data in Table III shows the comparison of the answers provided for item 4, in relation to the participants' living environment. According to Mann-Whitney U Test, the differences between the investigated groups are significant. As such, patients who were living in an urban environment, more than patients living in a rural environment, considered that the aspect of their face improved after the beginning of the orthodontic treatment.

Table III. Comparison between answers provided for item 4 according to patients' living environment

Living environment	Mean ± SD	<b>p</b> *
Rural (p<0.001**)	$3.29 \pm 1.26$	0.012
Urban (p<0.001**)	$3.67 \pm 1.31$	

SD: Standard Deviation; \*Mann-Whitney U Test, \*\*Shapiro-Wilk Test

Data in Table IV shows the distribution of the patients according to their desire to have the aspect of their teeth corrected, and the happiness towards wearing an orthodontic appliance. The differences between the investigated groups are significant according to Fisher's Exact Test, and Z tests with a Bonferroni correction show that patients that are neutral towards the desire to have the aspect of their teeth corrected (Item 1) are, more frequently, unhappy with wearing and orthodontic appliance (Item 3).

Answer (Nr., %)	Unhappy	Neutral	Нарру	<b>p</b> *
Correction -	8 (8%)	2 (8.3%)	24 (18.2%)	0.002
Neutral	26 (26%)	6 (25%)	12 (9.1%)	
Correction +	66 (66%)	16 (66.7%)	96 (72.7%)	

Table IV. Patients distribution according to answers provided for items 1 and 3

\*Fisher's Exact Test

Data in Table V shows the comparison between answers provided for items 3 and 4. The distribution was non-parametric according to the Shapiro-Wilk Test. The differences between the groups are significant according to Krusak-Wallis H Test, and post-hoc tests show that patients that are happy to wear an orthodontic appliance, considered that their face changed more, in comparison to patients that are unhappy about wearing an orthodontic appliance.

Table V. Comparison of answers provided for item 4, according to answers provided for item3

	P
$3.3 \pm 1.17$	< 0.001
$2.75 \pm 1.11$	
$3.88 \pm 1.33$	
	$2.75 \pm 1.11$

SD: Standard Deviation; \*Kruskal-Wallis H Test, \*\*Shapiro-Wilk Test

#### DISCUSSIONS

Dental anomalies in children are very common, and can affect both temporary and permanent teeth. There are a number of previous studies that confirm the occurrence of dental anomalies in the temporary dentition [13–16], as well as in the permanent dentition [17–9].

Dental anomalies with multifactorial etiology, have an important impact on the mental and social well-being of children and can influence the development of their personality [20]. The facial aspect plays a fundamental role in shaping self-esteem and self-image, but also in establishing interpersonal social relationships [21]. Smile and dental aesthetics have a significant contribution in the development of self-esteem and facial attractiveness [22]. The perception of dental aesthetics is decisive in the formation of children' personality [23], so that visible dental anomalies affect the quality of social life, and lowers self-esteem in children [24].

Despite the young age, children are often aware of the existent dental anomalies. They are aware of the affected facial appearance, and of the phonatory or masticatory difficulties they encounter. As a result of these dental anomalies, many children are negatively impacted, feel different from other children and acquire behavioral changes over time, become introverted, no longer socialize, no longer smile, precisely out of the desire to hide existing defects. To limit the negative effect on children, if certain dental anomalies cannot be prevented, interceptive orthodontic treatment can be applied during mixed dentition, by wearing removable orthodontic appliances or fixed orthodontic appliances [25]. In this study, most patients were disturbed by the aspect of their teeth and were happy to wear an orthodontic appliance, meaning that children are already aware of their appearance.

Early orthodontic treatment prevents many of the complications caused by dental anomalies and the occurence of a malocclusion [26]. The choice of the type of dental appliance must suit the clinical situation of the child, this requiring a good prior documentation. Also, the orthodontic treatment must be acceptable to the child, it should cause only little and temporary pain or discomfort, is should prove its clinical effectiveness and ensure the preservation of the results obtained over time, and should be affordable [26].

In this study questionnaires were applied, because they are considered a valid method that can be used in order to analyze patients' opinions regarding a specific topic [27]. There are many methods in which questionnaires can be applied, such as online platforms [28,29], websites [30,31] e-mail addresses [32] or in a combined version of both online and on paper [33]. In this study, the questionnaires were printed on paper and applied in the orthodontic office, in order to evaluate the perception of children with dental anomalies and with the indication of an orthodontic treatment, on facial aesthetics and the idea of starting an orthodontic treatment with braces. In addition, any ambiguities in the formulation of the questions could be easily clarified, but without influencing their answers and without promising them certain rewards.

#### CONCLUSIONS

The majority of patients wanted to have the aspect of their teeth corrected, and were happy that they were wearing an orthodontic appliance. Most patients were disturbed by the aspect of their face with different scores of gravity. At the same time, most patients considered that the aspect of their face improved after they started the orthodontic treatment. Although, children were negatively affected by the aspect of their smile, the attitude towards orthodontic appliances was, generally, positive.

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## Correlation of the treatment method according to the time elapsed since the occurrence of oro-sinusal communication



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#### Abstract

Aim and objectives: Taking into account the age of oro-antral communication, patients, as well as the diameter of the opening, the aim is to develop a surgical therapeutic guide. The main points of interest are the closure of oro-antral communication, as well as the preservation of soft tissues and pain.

Material and methods: Radiographs of 7 patients up to 35 years of age and over 35 were investigated.

The obtained results confirmed that there was a connection between the age of the oro-antral communication, the age of the patients and the diameter of the oro-antral opening.

Results: The obtained results confirmed that there was a connection between the age of the oro-antral communication, the age of the patients and the diameter of the oro-antral opening.

Conclusions: Therapeutic behaviour in case of oro-antral communication and the prognosis of its healing are influenced by the patient's age and the age of oro-antral communication.

Keywords: communication, sinusitis, plastic surgery, rehabilitation, prophylaxis, flap

#### **INTRODUCTION**

Oro-sinusal communication is a solution of continuity between the oral cavity and the maxillary sinus. Oro-antral communication occurs (pathogenesis) by the dissolution of osteomucosal structures (maxillary sinus mucosa, bone wall of the alveolo-sinusal septum, mucosa of the oral cavity) that anatomically separates the two cavities (sinus and oral) [1]. The most common cause of oro-sinusal communication is the extraction of lateral teeth in the upper jaw. There are many methods and techniques for closing oro-sinusal communication. In the current study, the traditional method was used by creating mucoperiosteal flaps in order to heal the wound depending on the time elapsed since it's production. We chose this topical topic to present the importance of the surgical therapeutic guide in dentistry and the healing results obtained depending on the patients age correlated with the time since the oro-antral opening occurred.

The anatomical characteristics of the maxillary sinus, of the teeth, as well as the ratios between these two components represent one of the primary causes of the appearance of oroantral communication (COA) following the surgical interventions at the level of the superior alveolar process.

The morphological research carried out by Troškova, elucidated the fact that more than 6 hours after the appearance of oro-antral communication, the installation of reactive edema of the sinus mucosa takes place [2]. More than 48 hours after the appearance of oroantral communication, signs of septic inflammation appear and the jaw sinusitis of infectious etiology or in other words perforative sinusitis develops [2].

Oro-antral communication can determine local and general symptoms, the intensity of which depends on the causal factor, the general condition of the body. The characteristics of oro-antral communication depend on the time elapsed since the appearance of communication, the presence or absence of foreign bodies in the maxillary sinus.

The causes that can lead to the appearance of oro-antral communication can be traumatic as well as infectious. From an anatomical-clinical point of view, the ratio between the dental apexes and the maxillary sinus must be taken into account; the teeth with sinus ratio after N. Gănuță are, in descending order: molar I, molar II, premolar II, molar III, premolar I and less often canine [29]. Odontogenic cysts led to the appearance of oro-antral communication in 10% of cases according to data from the COMF Clinic. In most situations, oro-antral communication is created by the upper molars and premolars (50%), tumors (18.5%), bone infections such as osteomyelitis (11%), operations with access to the sinus (7.5%), trauma (7.5%), dentigen cyst (3.7%), septal corrections (3.7%) [2].

The diagnosis of oro-antral communication must be established immediately after the accident. Preventive diagnosis of oro-antral communication includes: accusations, history of the disease and local clinical examination.

If the mucosa is not damaged, but the bone tissue is missing, the sinus opening is small below 2 mm, after tooth extraction it is necessary for the alveolus to be filled with clot, so it will be protected from infection. At the average sinus opening of 2-6 mm, the suture of the mucosa is applied.

Odontogenic sinusitis can usually be clinically differentiated from rhinogenic sinusitis, primarily by the unilaterality of sinus involvement. Along with the clinical signs (local pain, cacosmia, purulent discharge through the respective nostril, general septic condition), complementary examinations (anterior rhinoscopy, diaphanoscopy, puncture) and first of all the radiological examination provides pathognomonic elements for diagnosis. The pathological process has an acute character (sinus empyema, catarrhal sinusitis, acute suppurative sinusitis) or chronic, being maintained by the dental outbreak with decreased virulence [2].

#### Aim and objectives

The aim of this study was to develop a surgical therapeutic guide depending on the time elapsed from the oro-sinusal communication. The objective is to identify if there is a significant difference in the healing process of oro-sinusal communication in correlation with the age of the patient, the time elapsed since the occurrence of the oro-antral communication compared to the therapeutic guide. It is followed whether the size of the opening plays a major role in the therapeutic conduct. A defining therapeutic role will be given by the size of the oro-antral opening, which will influence the treatment steps.

#### MATERIAL AND METHODS

A number of seven patients were selected for complicated dental extractions with the formation of oro-sinusal communication. The age of the patients as well as the age of the opening of the oro-antral communication were the factors that were the basis of the selection. Thus, the patients were grouped into two samples consisting of people up to 35 years of age, respectively patients over 35 years of age. The sex of the patients was not taken into account in the study, but was specified. Patients with systemic diseases were excluded. Sinus perforations larger than 2 mm in diameter were chosen. Subjects being systemically healthy without clinical or radiological signs. Smokers were excluded. Informed agreements were signed by all patients participating in the study. Each patient received a specific code to keep their identity and also to be easier to identify. Detailed radiological and clinical data of each patient were recorded. Oro-sinus communications were determined, diagnosed and confirmed by clinical and radiological evaluation. Clinical visibility at inspection was confirmed. Non-absorbable sutures were used. Radical sinus treatment was performed with antiseptic solution, Metronidazole. The root length of the extracted tooth was measured. If the root no longer existed, the depth of the cavity was measured. The Valsalva maneuver was also performed to confirm the oro-sinusal communication, the diameter being measured with the help of modified button probes, having different dimensions. The cavity was irrigated and carefully cured to remove debris or granulation tissue if it was present. The inter-root bone was partially removed and any other sharp bony protrusions were smoothed. The sutures were made without tension. The Wassmund-Rehrmann method was used, which consists in creating a trapezoidal mucoperiostal vestibular flap, with a large base in the bottom of the vestibular sac. The operating field is processed and the related anesthesia is performed. A trapezoidal flap is made, through two divergent oblique incisions, distal and mesial of the dental alveolus that caused the oro-antral communication, parallel or below about 10 degrees with the tooth axis from the gum to the transition envelope with the bilateral extension of the horizontal incision on the envelope transition to the tooth level. The closure was carried out on the same day or as soon as possible. Routine standard postoperative indications were given to each patient. Patients were trained in proper hygiene, recommending antiseptic solutions for home therapy, as well as medication consisting of antibiotics, anti-inflammatory and analgesic. Also, the patients were monitored, called for the suppression of the wires after 7-10 days and the evaluation of the healing stage.

The treatment will start with a radiological examination. CT is the best method of visualizing the paranasal sinuses. Radiological exploration of the facial sinuses, mastoids and temporal rocks gives us information on pneumatization, configuration and stretching of cavities, but also on pathological processes that translate either radiologically by changing the transparency, contents of the sinus cavity or their bone contour [2]. Radiographic examination provides the following data: presence or absence of root debris, their topography, presence or absence of bone defect and its size, condition of the bone adjacent to the alveolus, condition of the mucosa, presence or absence of foreign bodies (obturator material, broken instruments at the apex dental, implant, bone augmentation material, cysts, granulomas) fractures of the alveolar process.

Intravenous sedation was used as anesthesia. This is an additional technique to local anesthesia in which intravenous drugs are used. The benefits of this technique include superior control over the duration and depth of sedation. The indications for intravenous sedation are: anxious, agitated patients, difficult and long interventions, patients with mental disorders, uncooperative children. The mechanism of action is by inhibiting neurotransmission [3]. The substances used in intravenous sedation are: 1. Axiolytic agents (sedatives) -Benzodiazepines with short action, Midazolam (Dormicum) 1 mg / 2 min, Diazepam (Valium) 1mg / min.

2. Analgesics: NSAIDs (non-steroidal anti-inflammatory drugs), morphine derivatives (Fentanyl, Ultiva), Antidote-Anxiety, Alternative-Propofol (rapid elimination) [3].

#### RESULTS

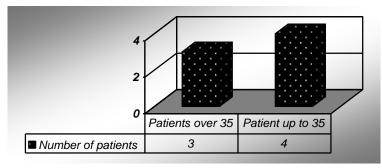


Figure 1. Age group

The diagram shows the number of patients who included in the study, 4 patients up to 35 years of age and 3 patients overs 35 years old.

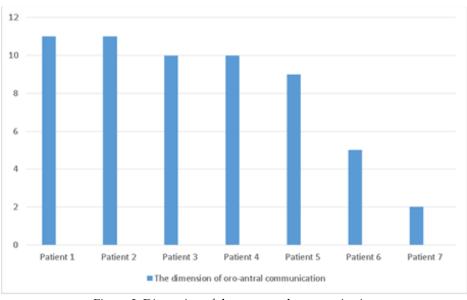


Figure 2. Dimension of the oro-antral communication

The largest opening was 11mm, present in two of the subjects. The 10 mm size was present in 2 of the patients. One patient present a size of 9 mm and another one a size of 5 mm. The smallest size was 2mm.

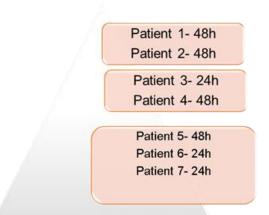


Figure 3. Time elapsed vs treatment start

The image shows the time elapsed from the production of oro-antral communication to the start of treatment for each patient. In most cases, the time elapsed since the production of the oro-antral opening was 48 hours, but there were also cases in which the opening occurred 24 hours ago.



Figure 4. Oro-sinusal communication defect

The first figure highlights the oro-antral communication of a patient. The size of the defect was 11 mm and the time elapsed since the production of oro-antral communication was over 48h.



Figure 5. Radiographic image of the maxillary sinuses

X-ray of the anterior sinuses (Waters) confirms the existence of the pathology at the level of the left maxillary sinus.

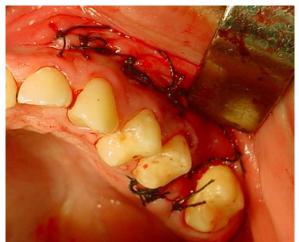


Figure 6. Surgical closure of the oro-antral communication

A trapezoidal mucoperiostal vestibular flap (Wassmund-Rehrmann Method) was made with a large base in the bottom of the vestibular sac. Mobilization (periosteum) of the flap performed through an incision in the upper part of the flap (at its base). The operative wound is processed, but also the maxillary sinus with antiseptics. Non-resorbable sutures were used, the suture being made without tension. Along with the defect plasty, the radical sinus cure was performed.

The patient received medication for 7 days consisting of antibiotics, antifungals, analgesics.



Figure 7. Endooral exam first step



Figure 8. Endooral exam second step

In these images is presented another patient who has an oro-sinus communication of 11 mm. The time elapsed since the production of the oro-antral communication was over 24h.

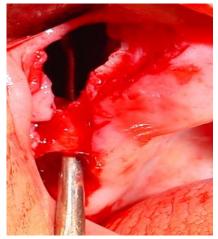


Figure 9. The defect



Figure 10. Surgical approach

The two images show the defect and incision in the edentulous alveolar ridge. A trapezoidal mucoperiostal vestibular flap was made (Wassmund-Rehrmann Method) with a large base in the bottom of the vestibular sac (Fig.9;10). The operative wound is processed, but also the maxillary sinus with antiseptics. (Fig.11.). Non-resorbable sutures were used, the suture being made without tension.



Figure 11. Suture of the flap

The objectives of this study were fully achieved, demonstrating that there is a significant difference in the healing process of oro-sinusal communication in correlation with age of the patients, age of opening of oro-antral communication compared to the therapeutic guide.

#### DISCUSSIONS

According to the literature, existing studies have shown the importance of using different treatment methods in the case of oro-sinusal communication.

It is necessary to mention that the frequency of oro-antral communication according to several cited authors indicates a different percentage depending on: country, standard of living, culture. Ippolitov and co-authors mention that the perforation of the maxillary sinus that will not lead to the appearance of perforating sinusitis is recorded in only 7.14% of cases of patients with tooth extractions from the upper arch. Kitagawa conducted a study in Japan in 2038 of dental extractions, oro-antral communication was recorded in 77 cases which accounted for 3.8% of patients examined and treated. Bojan Gacic from Serbia, concerned about the treatment of COA with absorbable materials indicates a frequency ranging from 0.31% to 4.7%. Studies by Susan H. Vissxber on COA plastics with synthetic bioabsorbable materials indicate COA in 5%.Oro-antral communication occurs (pathogenesis) by the destruction of osteomucosal structures (maxillary sinus mucosa, bony wall of the alveolo-sinusal septum, oral mucosa) that anatomically separates the two cavities (sinus and oral) [4, 5, 6].

The new methods come to complete the arsenal of oral surgery possibilities and to solve the shortcomings of the old ones. Namely the disadvantages of the proposed methods are the promoter of studies and the emergence of other surgical techniques. Moreover, the clinical situations are not standard, having the solution with a single method of treatment. In each clinical case, the most optimal treatment method for the individual case was applied. The optimal method of treatment is a concern of researchers of all times. It would mean: short duration of treatment, early rehabilitation, low cost, minimal manipulation, as little tissue trauma as possible [1,7,8,9].

According to some authors YU.I.Bernadskiy, TSMuhametzânova the presence of oroantral communication occupies the leading place in the etiology of odontogenic sinusitis between 41.2% and 77.2%, and the decreasing tendency of the number of oro- antral and its complications, is not attested [7]. V. Cabac and co-authors report that the most common form of maxillary sinusitis is chronic form with 42.22% [20]. Specialists in otorhinolaryngology report that the odontogenic etiology prevails over the rhinogenic one. A problematic aspect is presented by the surgical treatment of oro-antral communication. Statistical data show that recurrence of plastic surgery V. P. Yppolytov and co-authors, mention that the perforation of the maxillary sinus that will not lead to perforative sinusitis occurs in only 7.14% of patients with dental extractions on the upper arch [19]. Kitagawa conducted a study in Japan in 2038 of dental extractions, oro-antral communication was recorded in 77 cases which accounted for 3.8% of patients examined and treate. Bojan Gacic from Serbia, concerned with the treatment of oro-antral communication with absorbable materials indicates a frequency ranging from 0.31% to 4.7% [16]. Studies conducted by Susan H. Vissxber on plasticity methods of oroantral communication with synthetic bioabsorbable materials, indicate oro-sinus communication in 5% [7].

Amărescu M. tells us that tooth 6 is involved in 55.12% and the left maxillary sinus is also affected in the same percentage. Hernando J. and co-authors, mention that the extraction of the upper molar in 80% of cases leads to the opening of the maxillary sinus, maxillary cysts 10-15%, benign and malignant tumors in 5-10% and trauma in 2-5% [8].

#### CONCLUSIONS

In the case of the presence of oro-sinusal communication in the patient, the main task is not only to close the communication, but also to preserve the soft and hard tissues. Extraction of the infected tooth by establishing oro-antral communication and treating it as a perforating sinusitis. Informing the patient about oro-antral communication. The plastic method of oro-antral communication needs to be adjusted to the specific clinical case. It was found that the patient's age is an important factor in wound healing, and the size of the opening plays a key role in therapeutic conduct.

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## Shade evaluation of pressed ceramic and milled zirconia crowns. A qualitative study.



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#### Abstract

Despite high aesthetics, shade of full ceramic restoration can be a difficult task specially in case of anterior single crown restorations.

For the first group, ten ceramic crowns for anterior teeth were made from IPS e.max Cem. The pressed ceramic cores were veneered with feldspathic ceramic IPS e.max.Ceram. For the second group were milled ten samples zirconium oxide cores and veneered with feldspathic ceramic IPS e.max.Ceram. The evaluation of core influence over the final shade is checked with a spectrophotometer and standard shade guide.

The shades of the samples of two groups were registered in three areas of the buccal surface: third incisal, third middle and third cervical. The shades were digitally registered with Vita Easy Shade Compact and with standard Vital Classical shade guide.

Samples that require accurately individualized aesthetics may encounter final shade modification.

The digital system for shade registration have high precision and avoid human error.

Keywords: Pressed ceramic, zirconia, spectrophotometer

#### **INTRODUCTION**

Restorative prosthodontic uses dental materials which accomplish two main features: aesthetics and mechanical resistance [1]. Research and development in the field of dental materials introduced performant and highly aesthetic dental materials [2, 3].

Though zirconia is a very popular dental material, the white shade limits the natural appearance of the restauration and for this reason, the shaded zirconia blocs and pigments for veneering ceramic can be used to achieve a natural appearance. Some researches state that the pigments may negatively affect the mechanical characteristics of zirconia [4]. Many researches of the last decades were dedicated to dental materials shades [5.6]. CAD-CAM a promising technology is currently used in prosthodontics and with limitation in orthodontics and surgery [6]. The type of zirconia and the thickness of the veneering ceramic [7] can influence aesthetic aspect of prosthetic restoration made on zirconium cores and veneered with ceramic [8]. The use of zirconium based on Ytriu in the restauration of anterior teeth is limited because of the optical properties of this material. The low translucency and high opacity of zirconia may have a direct impact over aesthetics [9, 10]. The polycrystalline ceramic has a complex optic characteristic at direct and indirect light [7]. The shade of dental materials and dental hard tissue are check with classic shade guides, or digital devices, which register, and process the information collected after scanning the dental tissue or dental material [11, 12] Spectrophotometer is designed to quantify the light reflected by an object and identify in this way the object's shade [13].

#### MATERIAL AND METHODS

Pressed and milled cores were made with the same CAD-CAM technology. The samples of first group were made from zirconia and veneered with ceramic. The cast was scanned with Vinyl scanner (Smart Optics) which is compatible with the Exocad software that can work for the CAD system. First, in the software are chosen the teeth, then the limit of the marginal preparation is selected. It is also stetted the thickness for the luting cement (fig.1). The crowns digital design is made after a selection from the library. The software is reducing the size of the crown until the restauration perfectly fits to the abutment and to dental arch size but in the same time is calculating the needed space for veneering ceramic.



Figure 1. Digital design of the zirconia coping on the scanned cast

After the design is done, the information and parameters are imported in the CAM software. For this study was used the shaded zirconia IPS e.max ZirCad (Ivoclar Vivadent, Schann, Lichtenstein), shade LT2 which is compatible with the shade of veneering ceramic. After the disc is scanned is settled the milling strategy and it is made a simulation to verify the collected and settled data (fig.2).

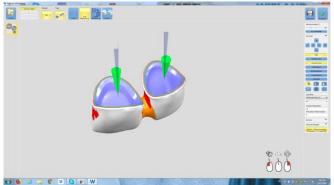


Figure 2. The chosen milling strategy

Zenotec Select Hybrid (Wieland Dental, Germany) milling device was engaged for the milling technological procedure, two cores are milled in 25 minutes. The cores and rods are cut from the disc with dedicated high speed burs and the surface finished. After the milling process, zirconium has a chalk like aspect and need to be sintered for 8 hours and 44 minutes at 1500°C.

Samples of group 2, pressed ceramic, were made on the same digital design. The pattern of the cores are milled in wax. Zenotec Select Hybrid (Wieland Dental, Germany) combines a computer numerical control (CNC) milling system and uses five simultaneous milling axes. The wax pattern is placed on the wax disc and the milling process can start. One coping of 2 elements is milled in 10 minutes.

The cores milled in wax were invested with JP Vest, Just Pressables, UK investment material and liquid. LT A2 (Low Translucency A2) shade was used for all the samples. The ceramic ingot is placed in the Programmat EP 3000 (Ivoclar Vivadent, Schaan, Lichtenstein) are heated and pressed by an isolated piston -to avoid the ceramic bonding to the piston. After slow cooling the investment material is removed through sandblasting with  $Al_2O_2$  250  $\mu$ m at a pressure of 2 Barr.



Figure 3a. zirconia copping



Figure 3b. Pressed ceramic coping

The core of both zirconia and pressed ceramic samples were veneered with feldspathic IPS e.max Cem (Ivoclar Vivadent). It was painted a layer of Opal Effect followed by sintering with Foundation program at 750°C. For the veneered dentin were used three types of ceramic: Deep Dentin A2 is laid on the entire core surface and Deep Dentin A1 for the lobules; these two ceramics were sintered together at 750°C with the Dentin/Incisal program (Fig.4). The last sintered ceramic layer was Enamel Transpa neutral.

For the shade individualization were used pigments. It was used a combination between Opal Effect Violet- pigment with violet shade and Opal Effect 1 –pigment with yellow shade and Powe Incisal 1 combined with Transpa Neutral – pigment with blue shade (Fig. 4). These layers were sintered at 750°C. If it was necessary, the ceramic was processed after sintering. The last layer of ceramic was Enamel Transpa neutral 1/3 ceramic and the rest Power Incisal 1 followed by sintering. The last layer was the glaze Ivocolor followed by sintering with the proper programme.



Figure 4. Ceramic layering

#### RESULTS

Spectrophotometer VITA Easyshade Compact was engaged in the shade evaluation of pressed veneered ceramic and zirconia veneered crowns. The shade registrations are made in three areas of the buccal surface of all samples: third cervical, third middle and third incisal. (Fig 5.a, b and Fig. 6.a, b). The registered results are compared with the ones registered with Classical Vita shade guide.

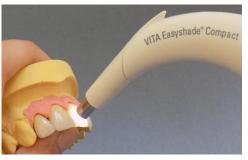


Figure 5a. Shade registration for zirconia crowns



Figure 6a. Shade registration-pressed ceramic crowns



Figure 5b. Shade of sample 5 group 2



Figure 6b. Shade of sample 2 group 1

Spectrophotometer's registering probe is placed perpendicular and in full contact with the crown. The device can register the main shade of the crown but in the same time have the option to register the shade of third cervical, third middle and third incisal area. After the same criteria was used the shade registration with Vital Classical shade guide.

The same protocol is applied for both groups of samples; group 1 – veneered pressed ceramic core (Table 1) and group 2- veneered zirconia core (Table 2). The main registered shades were A3 in third cervical, A2 in third middle and A1 in veneered zirconia core third incisal for veneered pressed ceramic core crowns (Table 1).

The matching shade of the veneered zirconia crowns with Vita Classical were A3.5 in the third cervical, A2 for third middle and A1 for third incisal area (Tabel 2).

Only three samples of both groups registered differences only in the third cervical area. Possible due to more thicker layer of veneering ceramic and quantity of pigment.

ne .	21. Group 1 veneered pressed ceramic crown registered with vita Easy Shade and vita Classical											
	Sample No.	Thrid Cervical	Third Middle	Third Incisal	Vita Classical							
		Easy Shade	Easy Shade	Easy Shade	Shade Guide							
		Compact	Compact	Compact								
	1	A3	A2	A1	Identic							
	2	A3	A2	A1	Identic							
	3	A3	A2	A1	A3,5, A2, A1							
	4	A3	A3	A2	Identic							
	5	A3	A2	A1	Identic							
	6	A3,5	A3	A2	Identic							
	7	A3,5	A3	A2	Identic							
	8	A3	A2	A1	Identic							
	9	A3	A2	A1	Identic							
	10	A3	A2	A1	Identic							

Table 1. Group 1.- veneered pressed ceramic crown registered with Vita Easy Shade and Vital Classical

Table 2. Group 2 Shade of zirconia veneered crowns registered with Vita Easy Shade and Vital Classical

1		0	<i>.</i>			
Sample No.	Thrid Cervical	Third Middle	Third Incisal	Vita Classical		
	Easy Shade	Easy Shade	Easy Shade	Shade Guide		
	Compact	Compact	Compact			
1	A3	A2	A1	Identic		
2	A3.5	A2	A1	Identic		
3	A3	A2	A1	Identic		
4	A3,5	A3	A2	Identic		
5	A3	A2	A1	Identic		
6	A3,5	A2	A1	A3, A2,A1		
7	A3,5	A2	A1	Identic		
8	A3,5	A2	A2	A3, A2,A1		
9	A3,5	A2	A1	Identic		
10	A3,5	A2	A1	Identic		

#### DISCUSSIONS

Dental materials and modern technologies can achieve highly aesthetic indirect restauration, which can accurately reproduce the natural morphology and shades. Indirect restorations of anterior teeth demand beyond good mechanical properties also precise ceramic layering techniques for high mechanical and optical properties [14, 15, 16]. For achieving natural tooth appearance dental ceramic need to fulfil the optical characteristics of natural teeth like translucency, opacity, reflection are the consequence of partial transmission of light. The sintering process may influence the translucency especially if pigments are layered. The thickness of core and veneering ceramic may directly influence the shade. [17, 18].

Specific to the spetrophotometer measurents is the light emitid by the measuring tip is reflected by the tooth surface back in the spectrophotometer. Measuring color in a translucent incisal edge can produce a false result because of the amount of grey shade perceived by the spectrophotometer can be influenced.

The Classical Vita shade guide is a standard widely used shade guide with sixteen shades that are covering the natural shades of the teeth. The disadvantage of colour registration with this guide is related to the light source and the human error. [19]

Veneering ceramic has a great impact over aesthetics, especially for zirconia crown. Zirconia is highly opaque, has a dominant white shade and the natural translucencies of enamel is difficult to be reproduced. A shaded zirconia core can compensate this disadvantage and associated with veneering ceramic are obtained aesthetical results [20, 21].

IPS e.max Cem (Ivoclar Vivadent) is available in several shades and translucencies and a correct layering can have an excellent aesthetic appearance. Total ceramic thickness can affect the translucency. If the ceramic thickness is increased, the translucency will minimized mainly in the third incisal [22].

#### CONCLUSIONS

One sample of the first group (sample no 3) - veneered pressed ceramic core registered a different shade A3,5 in the third cervical at the Vita Easy Shade Compact spectrophotometer shade registration.

Two samples of the second group veneered zirconia core registered A3 with Vita Classical and A3.5 with Vita Easy Shade Compact spectrophotometer. The difference in shade was also in the third cervical.

The quantity of pigments and thickness of veneering ceramic may influence the shade.

The veneered pressed ceramic crowns have better optical appearance and aesthetics due to the chemical composition and optical properties. There are no chromatic significantly differences between the two groups due to the use new generation of shaded zirconia. The application of pigments can influence the final shade of the crowns for both groups. The digital system for colour registration have their advantages, are used for shade registration and validation, and eliminates the human errors.

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## Luting space assessment of metal free fixed partial prostheses. A qualitative study.



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#### Abstract

The aim of this *ex vivo* study is to assess with digital microscopy the thickness of luting space of metal free FPP made with technologies: selective laser sintering, milling and pressing.

Twelve metal free FPP were designed after two technological protocols. The first group was made with pressed ceramic (IPS E.max Ceram). The veneering was made with feldspalthic ceramic IPS (E.max Ceram). The second group of samples was made with CAD/CAM subtractive technology. The metal free infrastructures were digitally designed for milling in zirconium oxide discs (IPS E.max ZirCAD). The prostheses adaptation was measured and checked with dedicated silicone.

The evaluation of internal adaptation with optical microscope is more accurate.

The silicone has a resilient characteristic and may influence the results. The measurement made with digital microscope are accurately higher.

Keywords: full ceramic, luting, optical microscopy

#### INTRODUCTION

The aesthetical standards are rising along with metal free fix partial prostheses. The evaluation on long-term success, consider the following criteria: the quality of marginal adaptation, fracture resistance, aesthetic appearance and response of pulp and marginal periodontium [1]. Subtractive alternative technologies, CAD-CAM, has a high success rate of fix partial prostheses longevity [2]. Internal and external marginal adaptation is important for indirect restauration along with the space for cement. Recent studies demonstrated that a 100-200µm cement thickness is clinically acceptable for a good prognostic on long term [3].

Evaluation of metal free restorations consider two important factors: mechanical resistance and marginal adaptation [4]. Evaluation of external and internal marginal adaptation of metal free prostheses is essential for mechanical resistance and prevention of abutments cervical carries. CAD-CAM technology for full ceramic prostheses is using a milling process and volume reduction of ceramic blocks until the finally designed shape.

The additive technology is used for fast prototyping when it is necessary to obtain highly individualized prostheses [5, 6]. The specifications of these technologies relies on the use of varied thermos-plastic powder, which will tolerate high geometric precision [7]. At this phase, possible encountered mistakes become evident and are usually irreparable [5].

The inner surface off metal free prostheses needs a chemically or micro-mechanically conditioning to improve the luting cement. The best surface conditioning for zirconium is sandblasting with  $Al_2O_3$  prior luting. Etching and silan conditioning are not efficient on zirconium because it is an inert material without a sensitive matrix for acids and silans. Long-term clinical studies are necessary to evaluate and confirm the stability of cements and zirconium interface [8].

Zirconium has a polycrystalline microstructure with high fracture and acid resistance; for this reason, the adhesion of resin cements is weak. Adhesive cements have a different composition and the lack of information about their properties and their interaction with the zirconium can lead to long term compromises [9]. The design of the abutment must accomplish specific conditions to support the retention and stability of prosthetic restauration. Crowns retention depends by abutments geometric shape, inner crowns roughness, restorative materials, type and thickness of luting cement [5]. The acceptable values for film cement thickens are between 25-200  $\mu$ m. The application of a spacer on the cast assure the space for cement film. [5].

The modern optic microscope can magnify up to 1500 x with a limit of  $0.2\mu\text{m}$  in spatial resolution and is engaged in the evaluation of luting space. Optical microscope with lighted field cannot change the lightening phase and transparent specimens become invisible when are investigated [11, 12]. The measurement of luting space has to be the best specially at the marginal limit of the preparation. If the technological processing is correctly done, no remarkable differences are detected in the oral cavity [13].

#### MATERIAL AND METHODS

For this study were made two 12 full ceramic prostheses. For the first group were made 6 prostheses after the following protocol: wax patter, investment, and ceramic pressing (IPS E.max Ceram, Ivoclar Vivadent, Schaan, Lichtenstein). Rods of 3.0mm diameter and length of 3-8mm are attach to the wax pattern followed by investment with Just Pressables and Vest Liquid (Ivoclar Vivadent). The setting time of investment material lasts 45 minutes, the assembly is placed in the oven Programmat EP300 (Ivoclar Vivadent). It is chose the colour of the ceramic ingot and placed in the piston (IPS Alox Plunger, Ivoclar Vivadent,). For individual morphology, the pressed ceramic is veneered with (IPS E.max Ceram, Ivoclar Vivadent). Samples of the second group are make with the subtractive technology: the

infrastructure was made from zirconia with CAD-CAM system using Exocad program and the individualization was made with sintered ceramic. The design of the wax patterns and milled infrastructure was made digitally in zirconium oxide shaded discs IPS E.max ZirCAD, (Ivoclar Vivadent) milled for 25 minutes. The copings are removed and the rods are cut and finished. The samples were placed on the working casts along with Fit Checker Advanced Blue (GC, Japan). Advantages of Fit Checker silicone are: low viscosity under pressure, minimal film thickness for a precise fit of the restauration on the abutment and transparent blue colour that allows the occlusal evaluation even at a thickness film below 100µm [15].

Two measurements were made for all the samples. First the Fit Checker silicone was layed on the inner surface of the retainer and placed on the abutment. (Fig.1). After the setting of the silicone the retainer was removed. The silicone material remained in the retainer and after setting three measurements were made with Ritter Dent micro-meter in pre-established areas, marked on the buccal, oral, and incisal/occlusal surface of the retainers For each samples were made six measurements; 3 with the Fit Checker and 3 without Fit Checker. The space reserved to the cement film was calculated (Fig.2). After the setting, the silicone is gently removed from the retainer and measured in the same agreed points of the first measurement technique. (Fig.3)



Figure 1. Layering of silicone on the inner surface of the samples of group 2



Figure 2. Sample 3, measurements of occlusal thickness with and without Fit Checker silicone



Figure 3. Direct buccal measurement of silicone thickness, sample 1, group2

The third measurement was made with digital microscope. The 12 samples were placed on a wax for stability and measured with the microscope's software.

#### RESULTS

Measurements were made for all twelve samples using the two different techniques with the micro-meter and optical microscope. The measurements made with the digital microscope were mainly in the cervical area (Fig. 4, 5, 6).

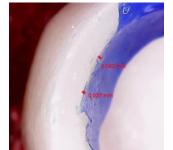


Figure 4. Digital measurement of the silicone thickness on the buccal face, sample 5, group 2

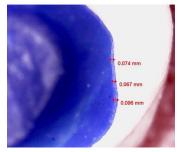


Figure 5. Digital measurement of the silicone thickness on the oral face, sample 7, group 1

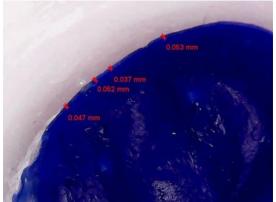


Figure 6. Digital measurement of the silicone thickness on the oral face, sample 10, group 1. Silicone thickness-0.047mm, 0.052mm, 0.037mm, 0.053 mm

The measurements with the first technique (3 with the Fit Checker and 3 without Fit Checker) the difference between the measured values with silicone and without silicon registered the higher values for group 2 samples 8, 9, 11; the average value was 166,6  $\mu$ m, meaning a higher clinical resistance to fracture and fissures. The lowest value 83,3 $\mu$ m was registered for sample 5 of group 1 meaning a higher risk for fracture.

Sample	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	
Buccal	100	100	100	50	100	150	150	200	200	150	200	200	
μm													
Oral	150	100	150	100	50	100	100	200	200	150	150	150	
μm													
Occlusal	150	100	100	150	100	150	100	100	100	150	150	150	
μm													
Avarage	133	100	116,6	100	83,3	133	116,6	166,6	166,6	150	166,6	166,6	ØTOTAl
Ø -µm-													130,2

Table 1. The measurements made using the thickness difference (3 with the Fit Checker and 3 without Fit Checker)

The second protocol measured directly the thickness of the silicone. The highest thickness registered for the second protocol were registered by group 2 samples 8 and 9. The average value is 133,3 $\mu$ m and is considered to be optimal for a good mechanical resistance. The minimal value of the second measurement protocol was registered for group 1 sample no 4 and 5. The average value was 50 $\mu$ m, which represents a higher risk for fracture. The total average (Tab.2) of measured thicknesses of each sample is lower for the second measurement protocol with an average difference of 40,8 $\mu$ m. The second measurement protocol delivered lower or equal results with the ones delivered by the first measurement protocol. All the measurements were made in the same points of the retainer.

Table 2. Direct measurements of the silicone layer

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	Sample	P1	P2	P3	P4	Р5	P6	P7	P8	P9	P10	P11	P12	
ĺ	Avarage	83,3	66,6	83,3	50	50	83,3	100	133,3	133,3	83,3	116,6	100	ØTOTAL
	Ø -µm-													89,4

The total average for all the measurements is 130,2  $\mu$ m for the first measurement protocol and 89,4  $\mu$ m for the second protocol and 63,06 $\mu$ m for the optical microscopy.

Sample	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	
Buccal	96	101	86	89	82	94	91	103	98	92	99	98	
μm													

Oral	42	35	40	46	33	38	44	48	45	36	49	45	
μm													
Occlusal	53	60	57	49	45	47	54	60	55	56	58	55	
μm													
Avarage	63,66	65,33	61	61,33	53,33	59,66	63	70,33	66	61.33	68,66	66	ØTOTAL
Ø -µm-													63.06

The lowest values registered with the optical microscope belongs to group 1 sample no. 5- higher risk for fracture. The highest value was registered for group 2 sample no 8- high fracture resistance.

#### DISCUSSIONS

Non-invasive evaluation of marginal and internal fir of zirconia crowns register values between  $50\mu m$  up to  $170\mu m$ . These values are clinically acceptable and with a good prognostic on long term [3].

Research studies related to cement thickness film demonstrates that the film thickness ca vary between  $10\mu m$  up to  $152\mu m$ , depending by the luting material [16].According to ISO Standards the cement thickness for full ceramic restorations has to be equal or smaller than  $50\mu m$  for resin cements [17].

Another study investigated different types of luting cements, and more exactly the effects of film thickness over stress distribution for full ceramic restorations and an optimal thickness is approximately  $90\mu m$ . The size of this film thickness can reduce the stress present at the cement film and restorative material interface [18].

In case of composite resin cements and adhesive resin cements, the film thickness can be higher than  $25\mu$ m because in these materials have low solubility and are elective for full ceramic restauration [14].

#### CONCLUSIONS

The evaluation of internal fit of full ceramic restorations, made with optical microscopy is a more accurate technique because of the digital factor of this technology. The measurements are more précises and avoid the possible errors related to silicon's resilience.

Though the check with the silicone is optimal for clinical check, it's resilience may significantly influence the *in vitro* results.

The first two measurement techniques registered higher values than the measurements made with the optical microscope and makes them less accurate.

The most accurate and error free measurement was made with the optical microscope.

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## Knowledge and behaviors regarding cariogenic nutrition in a group of adolescents from Bucharest



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#### Abstract

The study aims to assess the level of knowledge and behavior regarding eating habits of adolescents aged 15 to 19 years old. In this cross-sectional study were included 111 adolescents, with mean age 16.91 years old (SD  $\pm$  0.44), from Bucharest. Subjects completed a questionnaire about their food preferences, sweets consumption and knowledge related to the impact of cariogenic diet on the oral cavity. Results: Most teenagers (93.7%) consume sweets between and after meals, and 22.5% consume sweets every day. Among the respondents, 62.1% know that sugars affect tooth enamel and can cause dental decay. Conclusion: it was identified the need to promote oral health education on cariogenic diet in schools and dental offices.

Keywords: eating habits, health promotion, adolescents

#### INTRODUCTION

Adolescence is a fragile period and the risk of adopting unhealthy behaviour is high. Risky behaviours regarding their health are alcohol and tobacco consumption, cariogenic diet and physical inactivity. Adolescents' lifestyle is easily and usually influenced by socioenvironmental factors, such as friends, colleagues, family and the media. Adolescents are a population group in which the possibilities to improve health are great, so increasing the understanding of the nutritional concept will lead to healthy eating habits and can prevent any diseases developed in adulthood. Health education programs in schools are the first step in assessing adolescents' nutritional knowledge and improving their habits.

#### Aim and objectives

The objectives of the study were to assess the level of knowledge about nutrition and eating behaviour among a group of adolescents; also, identifying the need for health education in schools and dental offices, according to the results obtained.

#### MATERIAL AND METHODS

This cross-sectional study included 111 adolescents aged 15-19 years. The target group consists of 10<sup>th</sup> and 12<sup>th</sup> grade students from the "Ștefan Demetrescu" Adventist Theoretical High School, from Bucharest. The questionnaire was distributed in electronic format, through the Google Forms platform and included questions to determine students' knowledge and behaviour related to cariogenic nutrition and the assessment of food preferences, as well as socio-demographic data. The subjects were assured of data confidentiality.

#### RESULTS

The mean age of the students was 16.91 years (SD  $\pm$  0.44), and 60.3% were females. Socio-demographic data are presented in Table I.

Variables	N (%) all subjects	10 <sup>th</sup> grade students (N)	12 <sup>th</sup> grade students (N)
Gender			
Female	67 (60.3%)	34	33
Male	44 (39.7%)	22	22
Age			
15 years	4 (3.6%)	4	-
16 years	45 (40.5%)	45	-
17 years	20 (18%)	7	13
18 years	41 (37%)	-	41
19 years	1 (0.9%)	-	1
-	```		

Table I. Socio-demographic characteristics of adolescents included in the study

Schoolchildren' preferences regarding the types of sweets consumed show that most students consume chocolate (45%), 18% claiming to eat any type of sweets, while 10% say they do not consume sweets at all (Table II).

	N (%) all subjects	10th grade students (N)	12 <sup>th</sup> grade students (N)
Chocolate	50 (45%)	21	29
I don't eat sweets	11 (10%)	5	6
Any kind of sweets	20 (18%)	13	7
Jellies, cakes, cookies,	21 (18.9%)	14	7

Table II. Types of sweets consumed by teenagers

snacks			
Dark chocolate,	5 (4.5%)	2	3
homemade sweets			
Fruits	4 (3.6%)	1	3

The percentage of students who prefer natural fruit juices is 34.3%, while 38.7% prefer soft drinks and a small number of students (7.2%) prefer plain water (Table III).

	N (%) all subjects	10 <sup>th</sup> grade students (N)	12 <sup>th</sup> grade students (N)
Natural fruit juices	38 (34.3%)	23	15
The water	8 (7.2%)	5	3
Milk/sweetened tea	5 (4.5%)	3	2
Sugar-free drinks	7 (6.3%)	3	4
Soft drinks	43 (38.7%)	18	25
Natural fruit juices/ milk/sweetened tea	10 (9%)	4	6

Table III. Types of drinks consumed by subjects

Nearly half (42.4%) of the subjects consume sweets two or three times a week. There is a considerable percentage of students (22.5%) who consume sweets every day and a small group of students (5.4%) who do not consume sweets at all (Table IV). Regarding the time of day when teenagers consume sweets, the majority (93.7%) consume between and after meals (Table V).

Table IV. Behaviour regarding the frequency of consumption of sweets

	N (%) all subjects	10 <sup>th</sup> grade students (N)	12 <sup>th</sup> grade students (N)
Daily	25 (22.5%)	14	11
Two or three times a	47 (42.4%)	28	19
week			
Once a week	33 (29.7%)	12	21
I don't eat sweets	6 (5.4%)	2	4

Table V. Behaviour regarding the time of day when consuming sweets

	N (%) all subjects	10 <sup>th</sup> grade students (N)	12 <sup>th</sup> grade students (N)
Before meals	4 (3.6%)	0	4
After meals	39 (35.2%)	27	12
Between meals	50 (45%)	24	26
After and between	15 (13.5%)	5	10
meals			
Anytime during the	3 (2.7%)	0	3
day			

Among the respondents, more than half know that sweets can cause tooth decay. However, there is a percentage of 9.9% who do not know the causal relationship, and 2.7% do not consider sugar to be a causal factor (Table VI). Regarding the students' knowledge about the effect that soft drinks have on the teeth, 40.6% consider that they affect the tooth enamel, but 4.5% consider that it does not affect the tooth at all, and 13.5% state that they do not know the effects (Table VII).

Table VI. Knowledge of the impact of sweets on teeth

	N (%) all subjects	10 <sup>th</sup> grade students (N)	12 <sup>th</sup> grade students (N)
Sweets cause cavities	60 (54%)	29	31
Sweets affect the tooth	21 (19%)	15	6

Sweets affect the	9 (8.1%)	3	6
enamel			
I don't know	11 (9.9%)	8	4
Sweets favour the	4 (3.6%)	0	4
multiplication of			
bacteria and alters the			
pH			
Sweets change the	3 (2.7%)	0	3
colour of the tooth			
Does not affect the	3 (2.7%)	2	1
tooth			

Table VII. Knowledge of the effect of soft drinks on teeth

	N (%) all subjects	10th grade students (N)	12 <sup>th</sup> grade students (N)
Soft drinks cause cavities	18 (16.2%)	7	11
Soft drinks affect the enamel	45 (40.6%)	22	23
Soft drinks affect the teeth	10 (9%)	7	3
Soft drinks change the colour of the teeth	6 (5.4%)	2	4
Does not affect the teeth	5 (4.5%)	2	3
Soft drinks promote tooth sensitivity	9 (8.1%)	6	3
I don't know	15 (13.5%)	10	5
Soft drinks affect the gums	2 (1.8%)	0	2
Soft drinks cause the formation of bacterial plaque	1 (0.9%)	0	1

Most adolescents (96.4%) know that sugars, oral hygiene and plaque are the causative factors of tooth decay (Table VIII). Among the subjects, 71.2% consume plain water before bed, but 28.8% say they consume soft drinks or snacks (Table IX).

Table VIII. Knowledge related to the causal factor in the occurrence of dental caries
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	N (%) all subjects	10th grade students (N)	12 <sup>th</sup> grade students (N)
Diet (sugar)	43 (38.8%)	22	21
Oral hygiene	35 (31.5%)	18	17
Nutrition and oral	25 (22.5%)	13	12
hygiene			
I do not know	3 (2.7%)	2	1
Nutrition, oral hygiene	2 (1.8%)	0	2
and genetic factors			
The causative factor is	1 (0.9%)	1	0
not sugar			
Bacterial plaque	2 (1.8%)	0	2

Table IX. Adolescents' behaviour related to eating habits after tooth brushing in the evening

	N (%) all subjects	10 <sup>th</sup> grade students (N)	12 <sup>th</sup> grade students (N)
Plain water	79 (71.17%)	34	45
A snack	12 (10.8%)	7	5
A snack and plain	11 (9.9%)	10	1
water			

<b>Soft drinks</b> 9 (8.1%) 5 4
---------------------------------

When teenagers were asked if they thought chewing gum helped reduce cavities, 69.4% said no, and 26.1% said they did not know (Table X).

	N (%) all subjects	10 <sup>th</sup> grade students (N)	12 <sup>th</sup> grade students (N)
Yes	5 (4.5%)	1	4
No	77 (69.4%)	39	38
I do not know	29 (26.1%)	16	13

Table X. Adolescents' knowledge about the role of chewing gum in preventing tooth decay

#### DISCUSSIONS

Although there have been numerous attempts to prevent oral health problems, sugar consumption is increasing, which has led to an increase in the incidence of tooth decay (1). It is noted that a decrease in the amount and frequency of sugar consumption is fundamental for a low carious occurrence (2).

In this study, it was observed that most subjects consume sweets two or three times a week, 25 of them consume sweets daily and only six adolescents do not consume sweets at all. More alarming results were indicated in adolescents in Iaşi, where the daily consumption of sweets was 56.8% of the studied group (3).

The present study shows that most adolescents (65.7%) are aware of the negative effects of diet on tooth enamel. By comparison, a survey of adolescents in Bucharest showed that only a third of them know the risk factors associated with dental caries and less than 10% are familiar with the causal factors of periodontal disease. Following these results, it was also found that the level of knowledge is directly proportional to the level of personal dental hygiene (4).

#### CONCLUSIONS

Adolescents in the study group have some knowledge about the impact of diet on dental conditions, but their behaviour is not appropriate. Personal beliefs about eating habits and their perception of oral health need to be improved.

Future research directions should include changing unhealthy behaviours towards oral health in adolescents, as well as improving the level of knowledge about cariogenic potential nutrition. In addition, in accordance with the above, there is a need for oral health education among adolescents, in schools and dental offices that aims to increase interest in adopting a healthy lifestyle and motivate to choose a non-cariogenic diet in daily life.

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# The management of the inferior third molar in the mandibular fracture line



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## Abstract

The treatment approach concerning the mandibular fractures is often challenging and requires an accurate local and radiographic examination. The presence of the teeth in the fracture line is an important aspect that can influence the outcome of the treatment. **The aim** of the present study is to evaluate the management of the inferior third molar localized in the fracture line. Our retrospective study included a number of 12 subjects diagnosed with mandibular fractures with the involvement of the third molar in the fracture line. The results revealed the fact that the treatment option related to the presence of the third molar was in 67% of the cases the decision to maintain it in position, while in 33% the indication was for the odontectomy. The management of the third molar in the fracture line should take into consideration the consequences upon the final treatment of the fracture and the possible complications associated to the presence of the tooth.

Keywords: mandibular fracture, third molar, odontectomy, complications, maxillofacial fractures

#### INTRODUCTION

The therapeutic approaches concerning the teeth that are situated nearby the fracture line are of a high importance. The existent studies sustain the idea of the maintenance of the tooth that is localized in the fracture line, due to its high implication in the further correct repositioning of the detached fragments.

The extraction of the teeth in these situations can determine numerous complications and various supplementary compressions in the fracture lines. In case of the conservative treatment and the maintenance of the involved teeth, a periodic clinical and radiological evaluation is recommended. Severe dental destruction, high mobility (grade II or III) or other pathological lesions that prevent the correct anatomical reduction of the fractured segments, are part of the indications for extraction of the implicated teeth.

The mandible is the largest bone of the human cranium and it sustains the inferior teeth, having an active role in the mastication process. It is formed by the body and two vertical ramus, joining together and forming the mandibular angle [1,2]. In the superior part, the condylar processes articulate with the temporal bone, creating the temporo-mandibular joint. The mandible is the only mobile bone of the cranium with a direct implication in multiple actions [2]. The mandibular canal is localized within the mandible and contains the inferior nerve, inferior alveolar artery and vein. It is an important anatomical structure that can have various topographical variations that can complicate the further surgical treatment in the area [1].

The wisdom teeth are the ones with the highest variety and frequency of secondary pathological issues that can occur in the development and eruption process. The inflammatory complications can be localized or extended, determining nervous disorders, mechanical alterations of the soft tissue or nearby teeth [3,4]. Based on the incidence, the lower wisdom teeth are the ones that are the most predisposed to be impacted, compared to the superior ones, developing in the region delimited by the ascendent ramus and the lower jaw's body [5].

The mandible is the largest and most resistant bone of the visceral cranium. The fractures of the mandibular angle represent the highest percentage of incidence and most often occur due to car accidents or human aggressions [6]. There are two main reasons why the mandibular angle is frequently exposed to this type of trauma: first is the existence of the third molar that weakens the bone consistency and second is the thin vestibular and lingual bone wall in the area [7,8, 9,10]. The fractures of the mandibular angle represent a challenge for surgeons, being associated with a high rate of post operatory complications. The complications have a higher incidence in males (60-80%) and especially young adults between 20-45 years. Also, these types of fractures often affect children, due to the direct impact upon the menton during an accidental fall [9,11,8].

1.2 Etiology of mandibular fractures

The causes that lead to the occurrence of mandibular fractures can be subdivided into three main categories: trauma, pathological and surgical. Trauma is the most frequent cause that leads to these fractures, in the first place being aggression, followed by accidental falls, car and work accidents and sports [6,12]. The pathological causes represented by several disorders and lesions that determine a bone resorption that eventually leads to a fracture [6,7,13]. Surgical causes include those of an iatrogenic cause (third molar extraction or during the excision of endosseous tumours) or a planned surgical procedure that involves the sectioning of the facial bones [6,7,14].

1.3 Classification of mandibular fractures

The classification of the mandibular fractures can be based on the number of the fracture lines (unique, double, triple or communitive) [6], based on the degree of bone destruction (incomplete or complete) [6], on the relationship with the exo-oral environment

(closed/simple or open) [6], the energy of the trauma (low or high) or based on the anatomical localization of the fracture line (corps, angle, ramus, coronoid or condyle) [15].

The treatment of the patients with mandibular fractures aims for the regain of the function and a proper local healing [16]. The correct immobilization of the fragments, pain medication, an accurate oral hygiene and alimentation is mandatory to avoid the possible complications [6, 16]. In case of the teeth localized in the fracture line, the decision is whether they can remain or need to be extracted is based on a previous clinical examination and a radiologic evaluation [17, 18].

## Aim and objectives

The aim of the present study was to identify and establish a proper therapeutical approach related to the management of the third molars that are localized in the fracture area, based on anatomic and functional considerations.

## MATERIAL AND METHODS

The study was conducted between July 2020 - January 2021 in the Maxillo-Facial Clinic from Timisoara County Hospital and included 12 subjects that were diagnosed with mandibular fractures. The inclusion criteria were the diagnosis of mandibular fracture, both sexes, age over 18 and the presence of the third molar in the fracture line. The exclusion criteria were the absence of the third molar in the fracture line, age under 18. All the included patients were informed, agreed and signed an informed consent that followed the guidelines of the Declaration of Helsinki. A statistical analysis was performed taking into consideration the sex, age of the subjects and the management of the third molar in relation with the mandibular fracture line and the possible consequences.

## RESULTS

The age distribution among the included patients was divided into three groups: group I (age 20-25 years), group II (age 26-30 years) and group III (over 30 years). The study revealed a prevalence of the age group II (26-30 years), the young adults being more exposed to accidents, aggression and falls with a direct impact upon the lower jaw (*Table 1*).

Group age	No. of patients
Group I (20-25 years)	4
Group II (26-30 years)	6
Group III (over 30 years)	2

Table 1. Age group distribution

The graphic below shows in percentages the group distributions, 17% of the cases belonging to age group III, 33% percent to group I and 50% of the cases to group II (*Figure* 1).

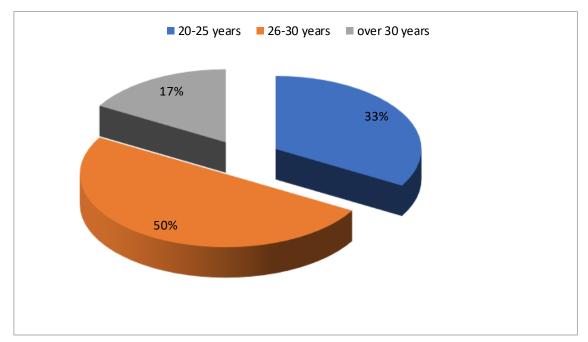


Figure 1. Percentages of each age group

The sex distribution of the included patients revealed the fact that 11 of them were males (representing 92%) and 1 was a female (representing 8%) (*Table 2, Fig. 2*). These results can outline the fact that males are more predisposed to trauma in the maxilla-facial area.

Table 2. Sex distribution

Sex	No. of patients
Females	1
Males	11

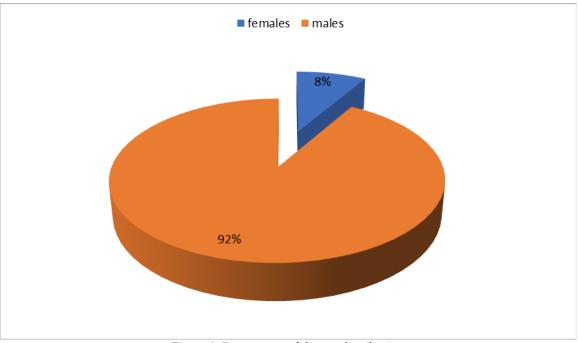


Figure 2. Percentages of the sex distribution

The treatment approach related to the management of the third molar that is localized in the fracture line was as follows: in 4 case odontectomy was performed, and in 8 cases the decision was to maintain the molar in its position (*Table 3*).

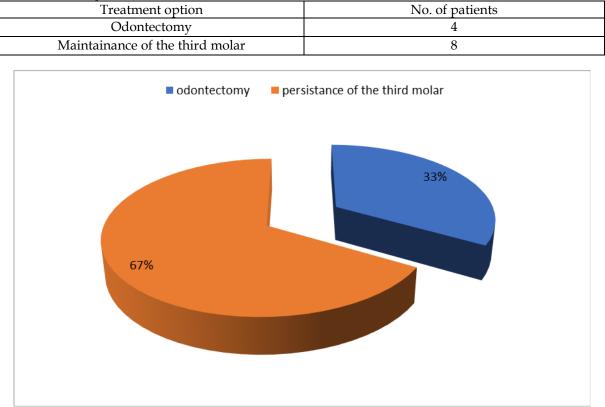


Table 3. The management of the third molar

Figure 3. Therapeutic approach in case of the third molar

*Figure 3* outlines the percentages of cases in which the treatment decision was for the odontectomy of the third molar (33% of the cases) and for the maintenance of the third molar as part of the fracture treatment (67% of the cases) (*Fig. 4, Fig.5*).

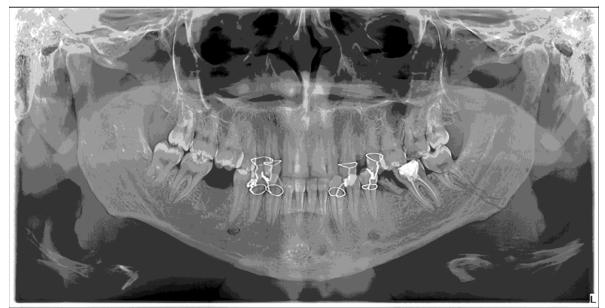


Figure 4. Radiography of one of the included cases in which the treatment option was the extraction of the lower left third molar in order to proceed with the proper treatment of the mandibular angle fracture



Figure 5. Radiography of one case in which the therapeutical approch was to maintain the lower third molars localized in the fracture lines on both sides and proceed with an intermaxillary imobilization

## DISCUSSIONS

The existing research indicate numerous clinical situations related to the mandibular fractures and the management of the third molar localized in the area of the fracture line, suggesting rather a difficult treatment approach. In the present, clinicians need to focus on a treatment option according to the possible evolution and the contemporary treatment principles [19. 20]. There are situations where the indication is for extraction of the mobile teeth localized in the fracture area, due to the fact that even after a correct treatment their mobility will persist, and they can become a future connection with the septic buccal environment. Therefore, if the tooth is mobile the indication will be for extraction. Another situation that implies the extraction is if after the radiological examination there is a fracture of the tooth or roots [21].

In situations where there is a good implantation, and the teeth have no periapical infections, the indication is to maintain the tooth in position. If the mandibular fracture is with displacement, the tooth can be maintained if its position doesn't interfere with the reduction of the fractured fragments. There are certain clinical situations in which the presence of the teeth in the fractured area helps and guide the clinician to correctly reposition and fix in place the fragments. If the mandibular fracture is without displacement, the argument for the maintenance of the teeth localized in the area is the fact that during the potential extraction manoeuvres, an eventual movement of the fractured fragments can occur. In case of the existence of periapical infections, the indication for extraction is mandatory due to the high risk of septic complications [7]. A periodic follow-up is essential for the surveillance of these teeth in order to assure a proper healing.

The management of the molars localized in the fracture line implies a correct locoregional clinical examination and a radiographic image that will provide information for a further treatment.

## CONCLUSIONS

The surgical treatment options of the mandibular fractures and the teeth localized in the area needs to focus on a simple, fast and efficient treatment approach with good outcomes

for the future functionality and aesthetics of the patient. It is important to acknowledge the potential risks related to the management of the third molars in the area of a fracture line and minimize the further complications.

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# Smoking-related attitude adopted by dentists among their patients



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## Abstract

Aim: The purpose of this study was to identify smoking-related behaviors adopted by dentists and their attitude regarding smoking among their patients.

Material and Method: Cross-sectional study conducted between November and December 2020 on a group of 55 dentists, using a questionnaire of 12 items, distributed on-line.

Results: Regarding the opinions and behaviors related to smoking among the dentists included in the study, 6 out of 10 dentists advice their patients to quit smoking and 3 out of 10 recommend reducing the number of cigarettes. As for the attention paid to their smoking patients, they consider that more focus should be given to the adolescents, as they are at an age when habits are easier to correct. More than half of the doctors in the study group consider that additional training is needed regarding the integration of anti-smoking programs in the dental practice.

Conclusion: By receiving proper training and seriously dedicating themselves to smoking cessation counseling, dentists could play an important role in reducing smoking prevalence. There is also the advantage that visits to the dental office are generally more frequent than the other specialties, allowing the doctor to prevent or correct this vicious habit from the beginning and to observe the evolution of their patients through the smoking cessation program.

Keywords: behavior, dentists, smoking, patients

#### **INTRODUCTION**

Smoking is a health risk factor that can cause a wide variety of diseases and even death. It has been shown to affect oral health in many ways, from physiognomic conditions such as tooth discoloration to life-threatening conditions such as oral cancer. The effects of smoking on oral health include increased susceptibility to periodontal disease, delayed healing after surgery, decreased success rate of implant treatment, an increased risk of oral cancer and precancerous lesions of the oral cavity [1]. As smoking is a major risk factor for a wide range of pathologies, both general and dental practitioners should be involved in smoking prevention and smoking cessation counseling.

#### Aim and objectives

The purpose of this study was to identify smoking-related behaviors adopted by dentists and their opinion related to the integration of anti-smoking programs in the activities within the dental practice.

The objectives of this study were: to identify the attitude adopted by dentists regarding smoking, the main conditions for which they recommend patients to quit smoking, their opinion on the involvement of dental practitioners in anti-smoking programs and to identify the methods of anti-smoking education they consider to be the most effective.

## MATERIAL AND METHODS

A number of 55 dentists from Romania represented the target group. The questionnaire was applied in November and December of 2020, distributed on-line, through Google Forms. The questionnaire included 12 items and during the 2 months, 55 responses were registered. The collected database was exported and processed in Microsoft Excel.

#### RESULTS

Out of the total number of doctors, 25.5%, say they smoke daily, 14.5% smoke occasionally, 36.4% do not smoke but have tried in the past and 23.6% have never smoked (Table I).

	Ν	%
Smoke daily	14	25.5
Smoke occasionally	8	14.5
Do not smoke but have tried in the past	20	36.4
Have never smoked	13	23.6

Table I. Dentists' smoking habits

It was found that 12.7% of doctors were trying to quit smoking, 25.5% want to quit in the future, 34.5% do not want to quit and 27.3% do not smoke (Table II).

Table II. Dentists' smoking cessation behavior

	Ν	%
Trying to quit	7	12.7
Want to quit in the future	14	25.5
Do not want to quit	19	34.5
Do not smoke	15	27.3

63.6% say they advise patients to quit smoking, 31% advise patients to reduce the number of cigarettes, 3.6% advise them to quit smoking only if they have certain lesions of the

oral mucosa and 1.8% consider that it is not within the competence of the dentist to get involved in anti-smoking activities (Table III).

Table III. Dentists' attitude towards smoking patients

	Ν	%
Advise patients to quit smoking	35	63.6
Reduce the number of cigarettes	17	31
Advise them to quit smoking only if they have certain oral lesions	2	3.6
Consider that it is not their responsibility to get involved	1	1.8

Out of the 55 subjects, 78,2% say that the dentist should help their patients to quit smoking, 7.3% do not know if the dentist should play a role in anti-smoking programs and 14.5% believe that dentists should not get involved (Table IV).

Table IV. Dentists' opinion regarding their role in patients' smoking cessation

	Ν	%
Dentist should help their patients to quit smoking	43	78.2
Do not know	4	7.3
Dentists should not get involved	8	14.5

As of the anti-smoking education methods, the most recommended were short informative discussions (72.7%), 5.5% recommend informative videos, 7.3% recommend counseling centers for smoking cessation and 14.5% do not apply any form of anti-smoking education method (Table V).

Table V. Anti-smoking education methods

	Ν	%
Short informative discussions	40	72.7
Informative videos	3	5.5
Counseling centers for smoking cessation	4	7.3
Do not apply any form of anti-smoking education method	8	14.5

Results show that 86.9% believe that adolescent smokers need more attention from the doctor, 16.4% give them the same amount of attention as in the case of adults, 1.8% prefer not to get involved and another 1.8% claim to not know whether they should pay special attention to them or not (Table VI).

Table VI. Attention given to adolescent smokers

	Ν	%
Adolescent smokers need more attention	44	80
The same amount of attention as in the case of adults	9	16.4
Prefer not to get involved	1	1.8
Do not know whether they should pay special attention	1	1.8

32.7% say they have not been able to help any patient quit smoking, 47.3% do not know if

they have helped any, 14.5% have helped between 1 and 5 patients and 5.5% have said they helped more than 5 patients (Table VII).

	Ν	%
None	18	32.7
Do not know	26	47.3
1-5 patients	8	14.5
More than 5 patients	3	5.5

Table VII. Patients helped by subjects included in the study, to quit smoking

Additional training related to patient counseling on smoking cessation is considered useful by 65.5% of doctors, 27.3% consider that the knowledge gained so far is sufficient and 7.2% say that anti-smoking programs are not part of the dentists responsibilities (Table VIII).

Table VIII. Dentists' opinion related to additional training needed

	Ν	%
Useful	36	65.5
The knowledge gained so far is sufficient	15	27.3
It is not the dentists responsibility	4	7.2

Regarding the influence of the Covid-19 pandemic on cigarette consumption, 45.5% claimed that cigarette consumption increased considerably during the Covid-19 pandemic, 9.7% consider that it did not increase and 44.9% do not know if tobacco use was influenced (Table IX).

Table IX. The influence of the Covid-19 pandemic on cigarette consumption

	Ν	%
Cigarette consumption increased	23	41.8
Did not increase	4	7.2
Do not know	28	51

## DISCUSSIONS

The study showed that 25.5% of doctors say they smoke daily, 14.5% smoke occasionally, of these, 12.7% try to quit smoking now, and 25.5% want to quit in the future.

It was found that 6 out of 10 doctors advise their smoking patients to give up this habit, 3 out of 10 advise their patients to reduce the number of cigarettes. Less than 1 in 10 advise them to quit smoking only if they have certain lesions of the oral soft tissues or does not consider that it is part of their responsibility to get involved in anti-smoking activities. Similar results shown in other studies, the percentage of those who advise their patients to quit smoking in case of oral diseases or regardless of the dental health status, is 86% [2].

Out of all the respondents, 78.2% consider that the dentist should help their patients quit smoking. Similar results have been obtained in other studies, where the percentage of those who consider counseling as part of their duties is 82.2% [1]. Another study conducted in Iran in 2015 shows that about 3 out of 10 doctors consider that they should not be involved in anti-smoking programs [3]. A few studies have highlighted some of the reasons why many dentists do not want to get involved in anti-smoking programs. These include lack of reimbursement of services, lack of time, lack of confidence in one's own ability to help patients and poor training [4-6].

As methods of anti-smoking education, the most recommended were short informative discussions (72.7%), 5.5% recommend informative videos, 7.3% recommend counseling centers for smoking cessation and 14.5% do not apply any form of anti-smoking

education. A study conducted in Australia in 2003 shows that the percentage of those who give informative anti-smoking flyers to patients is 91% [2]. Although the flyers were included as a response to anti-smoking education methods, they were not chosen by the doctors included in the study.

It was found that 8 out of 10 subjects felt that adolescent smokers needed more attention [7], 1 in 10 paid the same attention for them as for adults and 1 in 10 preferred not to get involved or did not know if they should get involved in anti-smoking programs for teenagers. Although about 63.6% of doctors say they recommend that patients quit smoking, only 2 in 10 doctors say they have been able to help their patients quit smoking.

Additional training related to patient counseling on smoking cessation is considered useful by 65.5% of respondents, 27.3% consider that the knowledge obtained so far is enough and 7.2% say that anti-smoking programs do not fall within their responsibilities. A study conducted in Nigeria in 2007 had similar results, with 80.9% of respondents reporting that they would be willing to undergo further training [2].

## CONCLUSIONS

This study shows that more than 6 out of 10 doctors advise their patients to give up smoking and a third recommend reducing the number of cigarettes. Usually the respondents recommend smoking cessation only if patients have certain oral lesions. There are also subjects who believe that it is not part of the dentists' responsibility to get involved in anti-smoking activities.

The most recommended methods of education for smoking cessation in dental offices were brief informative discussions, videos and anti-smoking counseling centers. Regarding the attention paid to adolescent smoking patients, most doctors reported that it should be higher compared to adults, mostly because bad habits are easier to correct at a younger age.

Nearly 7 out of 10 doctors communicate the need of additional training regarding the integration of anti-smoking programs in the dental practice. By receiving proper training and seriously dedicating themselves to smoking cessation counseling, dentists can help reduce smoking. In addition, there is the advantage that visits to the dentist's office are generally more frequent than in other medical fields, which allows the doctor to prevent or correct this vicious habit from its inception and to be traced in time.

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## Anatomo-clinical correlations between canines edentation and their impact on protein metabolism



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## Abstract

Proteins are a group of organic substances, that play multiple roles in the body. The body procures amino acids, indispensable for the biosynthesis of its own proteins.

Edentation is a pathological condition characterized by the absence of one or more teeth on the dental arch. This pathological condition occurs due to tooth loss. Patients suffering from impaired masticatory function, through edentulousness, can adapt the consistency of food to their dental status, or rely on the digestive system, to compensate for the lack of oral preparation of food. The lack of one or more teeth can lead to poor chewing, because larger pieces of food are swallowed, leading to digestive disorders. These circumstances lead to a poor intake of nutrients by decreasing intestinal absorption, or increase the likelihood of digestive diseases. Thus, dysfunction of masticatory efficiency may be detrimental to general health.

Keywords: edentation, proteins, amino acids, digestive disorders

## INTRODUCTION

Proteins are polymers of amino acids linked by α-peptide bonds, which play multiple roles in the body: plastic role, entering the constitution of the body tissues; role of plasma transporter of hormones, lipids (lipoproteins), vitamins; role of biocatalyst (enzymes); role in specific (immunoglobulin) and nonspecific (complement) defense; role in maintaining the acid-base balance (through the amino and carboxyl groups); hydropexic role, water retention (generates oncotic pressure); detoxifying role (conjugation with aminoacids of the toxicant, at the liver level); energetic role, through the use of aminoacids in the energogenic sense and in the neoglucogenic or lipogenic sense [1,2].

The body procures amino acids, indispensable for the biosynthesis of its own proteins from two sources: food, which provides proteins, successively digested under the influence of proteolytic enzymes in juices: gastric (pepsin and gelatinase), pancreatic (trypsin, chymotrypsin, carboxypeptidase elastase) and intestinal (enterokinases, triaminopeptidases and dipeptidases) and biosynthesis in the body of non-essential aminoacids [1,3]. After hydrolysis, protein digestion products (amino acids and small peptides) are subjected to mucosal absorption by specific transport mechanisms [3,4].

Tooth loss leads to a deficit of masticatory function. The most common causes of tooth loss include cavities and their complications and periodontal disease, which can lead to tooth loss causing partial or complete edentation in patients. Teeth are responsible for various tasks, such as cutting, breaking and grinding food [5,6].

Patients with the affected masticatory function can adjust the consistency of food or swallow coarse particles. The lack of one or more teeth can lead to poor chewing, because larger pieces of food are swallowed (example: meat, high protein foods). Thus, food in the oral cavity will not be chewed properly which will hinder digestion and may involve stomach pain, bloating, epigastric pain, intestinal transit disorders, etc. At the same time, the absorption and secretion of nutrients will be diminished, resulting in insufficient resources for the body [7].

Canines have an important role in tearing food, in chewing and, at the same time, an aesthetic role. Canine edentation results in reduced consumption of meat, fresh fruits and vegetables, which leads to lower levels of Hb, vitamin C and increased gastrointestinal irritation [8]. There is a link between masticatory function affected by edentulousness and poor nutrition [7].

The first step in protein food digestion involves chewing. The teeth begin the mechanical breakdown of the large pieces into smaller pieces that can be swallowed. The salivary glands provide saliva to help swallow and pass the food bowl through the esophagus to the stomach. The stomach releases gastric juices containing hydrochloric acid and the enzyme, pepsin, which initiate the breakdown of the protein, into smaller chains of amino acids. They pass into the small intestine, where most protein digestion takes place. The pancreas secretes enzymes (trypsin, chymotrypsin and carboxypeptidase) that further break down the protein fragments. Protein absorption takes place in the small intestine. Amino acids are released into the bloodstream, which leads them to cells in other parts of the body so that they can begin to repair tissues and build muscle.

## Aim and objectives

The aim of this article is to describe the prevalence and risk indicators of edentulism and to demonstrate that there is a causal relationship between canine edentation and the occurrence of digestive disorders in patients over 45 years.

## MATERIALS AND METHODS

During one year (September 2017- August 2018) we have consulted and treated 100 patients over 45 years, both male and female, who had canine edentation. In the patients included in the study, following the anamnesis and the clinical examination performed, we noticed that some of them have digestive pathology. Following the file completed by each patient (Figure 1), we noticed that they presented various digestive symptoms such as: bloating, intestinal transit disorders (constipation, diarrhea), epigastric pain. Also, after the anamnesis we found out that due to edentulousness, patients' chewing is defective.

I. Identification data:
Name/Surname
Age
Sex
Environment: urban / rural
<b>II. Number of daily meals</b> (check the correct answer):
- 1 meal / day
- 2 meals / day
- 3 meals / day
- more than 3 meals / day
<b>III. Have you had any of the following digestive symptoms?</b> Answer with Yes/No - bloating
- intestinal transit disorders: constipation diarrhea
- epigastric pain
IV. What is the period of time after ingestion of food in which the symptoms described
above appear? (Check the correct answer)
<ul> <li>immediately after ingestion of food</li> </ul>
- 2-3 hours after ingestion of food
- more than 2-3 hours after ingestion of food

Figure 1. Patient's medical file

Classification criteria:

- I. After patient's gender (female/male) (Figure 2)
- II. After environment of origin (urban/rural) (Figure 3)
- III. After locating canine edentulousness (Figures 4,5)
- IV. According to the digestive symptoms (Figure 6)

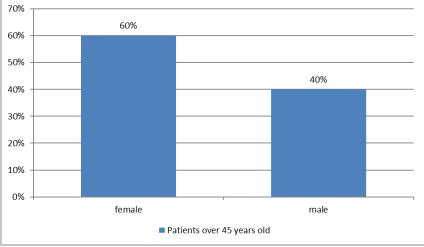
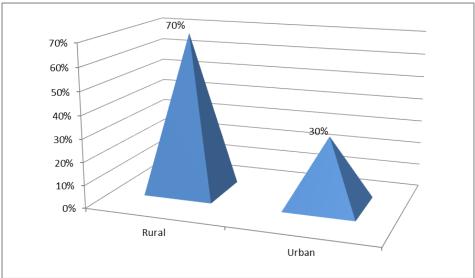
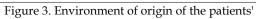


Figure 2. Gender of patients with canine edentation





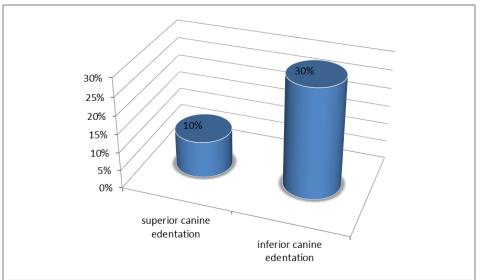


Figure 4. Canine edentulousness in men

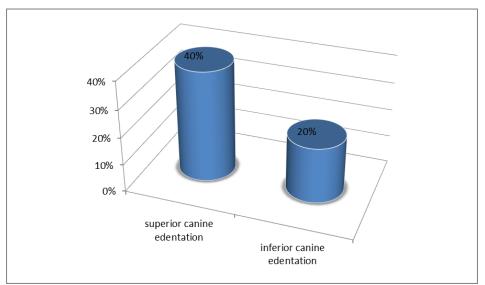


Figure 5. Canine edentulousness in women

## RESULTS

We have noticed that 60% of female have canine edentation compared to men who only 40% of them have canine edentation. Out of the total number of canine edentulous patients, most come from rural areas, more precisely 70% compared to those from urban areas which are in a percentage of 30%.

Of the 40% of men with canine edentations, 30% had lower canine edentations and 10% upper canine edentations. Of the 60% of women with canine edentations, 40% had upper canine edentations and 20% lower canine edentations.

Of the total canine edentulous patients, most had intestinal transit disorders and epigastric pain (Figure 6).

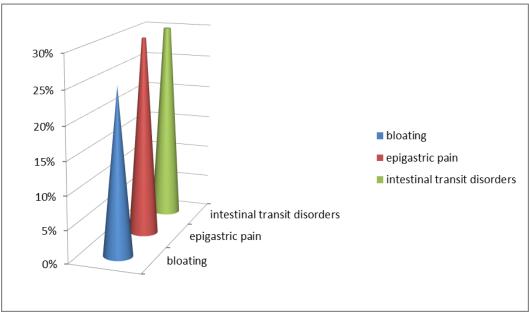


Figure 6. Classification according to digestive symptoms

## DISCUSSIONS

Studies have reported correlation between poor oral health, and particularly tooth loss and chewing deficiency, with nutritional impairment, mainly in vitamins and dietary fibre [7,9-14].

Proper dentition is important for health and quality of life [15]. Dental treatment is important for edentulous people. Impaired masticatory function leads to nutritional imbalances and increased load on the digestive tract, causing more health disorders [16].

Lack of teeth can lead to decreased consumption of fibre and micronutrients and increased consumption of softer foods, easy to chew, rich in saturated fats and cholesterol. These eating habits can be associated with cognitive impairment either through micronutrient deficiencies (i.e., vitamin B12, thiamine) or by adopting unhealthy diets, increasing the risk of stroke and dementia [17]. Mastication might be a protective factor for cognitive decline, as it is related to increased blood flow in specific brain areas (cerebral cortex, cerebellum, thalamus, and hippocampus) [18,19].

Rémond et al have shown that the use of meat proteins for protein synthesis can be affected by a decrease in masticatory efficiency [20].

Malnutrition can adversely affect the health of oral tissues. Deficiencies in vitamins A, C, E, copper, iron, zinc and non-nutritive antioxidants decrease the anti-inflammatory and immune response of oral soft tissues. Limited protein intake can compromise infection response and wound healing [21].

## CONCLUSIONS

Protein is a vital nutrient for almost every part of the body. They are digested in the mouth, stomach and small intestine before being released into the bloodstream as individual amino acids. Edentulous people prefer to use semi-solid and fluid foods that are poor in essential nutrients. The preference is due to ease of chewing, swallowing, preparation and accessibility.

Canine participates in the canine or anterior-lateral guide, so it has great value in the functional occlusal relations, during mastication.

The loss of teeth leads to an increase in the number of masticatory cycles, a decrease in viscosity and an increase in the volume of the food bowl.

Lack of teeth causes damage to mastication, which can lead to improper choice of food, which alters nutrient intake. Based on the existing evidence, many oral health parameters, including extensive tooth loss without prosthetic rehabilitation, hyposalivation, swallowing disorders, and impaired tongue movements, may impair masticatory function.

Recovery of masticatory function in edentulous patients should be combined with adequate health guidance according to patients' condition and individualization of nutrition for complete nutrient intake.

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## The nasomaxillary or septopremaxillary crest



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## Abstract

The nasopalatine (incisive) canal of maxilla (NPC/IC) is commonly assigned a"Y" shape in coronal plane. The two upper arms of that canal are separated by an osseous piece that was indicated as nasomaxillary crest (NMC) in fetuses and is located on the course of the septo-premaxillary ligament. The NMC, or septo-premaxillary crest (SPMC), was not studied previously in human adults. It was therefore performed a Cone Beam Computed Tomography study on a retrospective lot of forty-one cases, ten males and thirty-one females. On coronal slices were found five types of NMC/SPMC: (a) type I – median, long NMC/SPMC, descending into the NPC (51.22%); (b) type II – inclined, long NMC/SPMC, descending into the NPC (244%); (c) type III – median, short NMC/SPMC, above the NPC (21.95%); (d) type IV – median, short NMC/SPMC, absent NPC (4.88%); (e) type V – inclined, short NMC/SPMC, absent NPC (19.51%). Seemingly, the NMC persists in adults as a distinct osseous structure on the course of the septo-premaxillary ligament and determines the variable patterns of the NPC/IC.

Keywords: Hard palate, CBCT, nasopalatine canal, incisive canal, nasal septum

## INTRODUCTION

The nasopalatine canal (NPC), or the incisive canal (IC) of maxilla, connects the anterior nasal floor with the anterior hard palate. Different morphologies were assigned to the NPC in the frontal (coronal) plane, a common one being the "Y"-shaped form (Bornstein et al., 2011). In the "Y" shaped NPCs the two superior arms of the canals are separated between by a bony wall different from the nasal septum (NS).

According to Radlanski et al (2004) the NPC/IC attains its typical pattern in the 24th fetal week, consisting of two nasal orifices, a common palatal one, and a"nasomaxillary crest" separating the bilateral neurovascular elements within the canal (Radlanski et al., 2004). Latham (1970) described in embryo that a median tract descends from the NS to the premaxilla on the side of the interpremaxillary suture (Latham, 1970). He termed that structure" septo-premaxillary ligament" (Latham, 1970). That ligament appears as a bundle of fibers arising from the antero-inferior border of the NS and courses to insert on the anterior nasal spine and within the interpremaxillary suture (Latham, 1970). According to Latham (1970), during morphogenesis, the anterior extension of the vomer bone is limited presumably by the septo-premaxillary ligament (Latham, 1970). Therefore, the septo-premaxillary ligament described by Latham (1970) occupies the anatomical site of the nasomaxillary crest of Radlanski (2004). This crest is anterior to, and different from the nasal crest of maxilla that is joined with the vomer bone.

## Aim and objectives

This study aims to investigate the morphological possibilities of the nasomaxillary or septo-premaxillary crest (NMC/SPMC) in human adults.

## MATERIALS AND METHODS

A retrospective Cone Beam Computed Tomography (CBCT) study of the archived files of 41 adult patients. From the 41 cases, ten (24.39%) were male and 31 (75.61%) were female.

The subjects were scanned with an iCat CBCT machine (Imaging Sciences International [Hatfield, PA, USA]) with the settings: resolution 0.250 mm, FOV 130, and image matrix size 640 × 640 px. The CT data were analysed using the Planmeca Romexis Viewer 3.5.0.R software, as in other previous studies (Carstocea et al., 2019, Rusu et al., 2019, Rusu et al., 2020). The planar reconstructions and three-dimensional volume renderings were evaluated. Relevant anatomical features were exported as image files. The patients have given written informed consent for all medical data to be used for research and teaching purposes, provided the files are anonymized.

## RESULTS

In the lot of 41 patients documented retrospectively were found and classified five types of NMC/SPMC (figs.1,2): (a) type I – median, long NMC/SPMC, descending into the NPC; (b) type II – inclined, long NMC/SPMC, descending into the NPC; (c) type III – median, short NMC/SPMC, above the NPC; (d) type IV – median, short NMC/SPMC, absent NPC; (e) type V – inclined, short NMC/SPMC, absent NPC.

The distribution of the anatomical patterns is presented in figure 3. Type I was found in 51.22% of cases, type II in 2.44%, type III in 21.95% of cases, type IV in 4.88% of cases, and type V in 19.51% of cases. In 6/10 male cases was found the type I of NMC/SPMC. In males was not found the type IV – median crest with absent NPC. In 15/31 female cases was found the type I of NMC/SPMC (fig.4). In 10/41 cases (24.39%) were found absent NPCs/ICs.

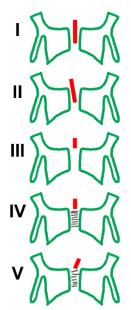


Figure 1. Anatomic diagrams (coronal view of nasopalatine canals) of the nasomaxillary/septo-premaxillary crest types (I-V), as resulted from the present study

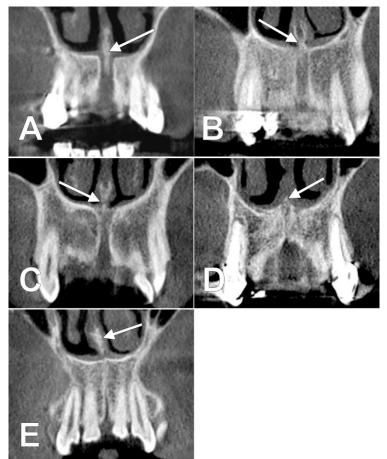


Figure 2. Morphological possibilities of the nasomaxillary/septo-premaxillary crest. Orthogonal coronal Cone Beam CT slices. A. Type I. B. Type II. C. Type III. D. Type IV. E. Type V

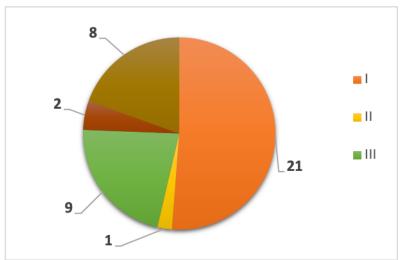


Figure 3. Prevalence (number of cases) of the morphological types I-V of nasomaxillary/septo-premaxillary crest (N=41 cases)

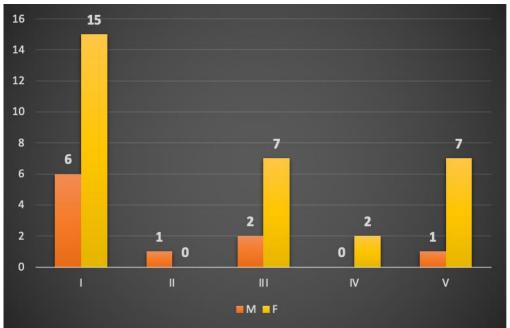


Figure 4. Repartition of cases on genders (M: male, F: female) and types (I-V) of the morphology and topohraphy of the nasomaxillary/septo-premaxillary crest (N=41 cases)

## DISCUSSIONS

The sub-vomerian ossification centre of Rambaud and Renault, or the centre of Huschke, or the infravomerine process, belongs to the premaxilla (Fawcett, 1911, Stout and Collett, 1969). It is wedged in between the incisive and palatine elements beneath the vomer bone and it explains the Y shape of the upper arms of the NPC/IC (Fawcett, 1911). This centre bona fide corresponds topographically to the further NMC/SPMC crest. The growing nasal septal cartilage plays a certain role in midfacial growth and the pressure resulted from this growth is transmitted to an anterior traction force via the septo-premaxillary ligament (Al Dayeh and Herring, 2014). It was discussed that the upper labial frenulum is not just a mucous fold without physiologic importance but it contains the extension of the septo-premaxillary ligament to the upper lip (Hall and Precious, 2013). Therefore, the osseous NMC/SPMC is incorporated within a nasal-labial traction system. Length variations of this crest, such as those determined by this study, could determine discrete functional differences of that nasal-labial traction system.

In cases with unilateral cleft lips there is a hypoplastic growth of the maxilla and pyriform aperture on the cleft side (Pan and Tatum, 2013). It is thought that both the septo-premaxillary ligament and the orbicularis oris muscle are of importance in development of nasal deformities (Pan and Tatum, 2013). The septo-premaxillary ligament is the only attachment of the premaxilla to the nasal septum at the vomero-premaxillary suture (VPS) (Chauhan and Sharma, 2019). Different histological studies found in the bone close to the VPS conglomerates of secondary cartilage with marked differences in the extent and type of cartilage (Friede and Morgan, 1976). Friede (1975) found small conglomerates of cartilage-like cells at the bony margins of the VPS, as well as of the inter-premaxillary suture (Friede, 1975). As the septo-premaxillary ligament is described as a column of cells descending from the NS (Latham, 1970), it is therefore reasonable to regard that ligament as ossifying, or condrifying later in morphogenesis.

## CONCLUSIONS

The different anatomical possibilities of the NMC/SPMC revealed that the NPC/IC also has different appearances on coronal cuts, not just the"Y" shape. This comes in accordance with different previous studies (Abrams et al., 1963, Song et al., 2009) but also indicates an overlooked possibility: the absence of the NPC/IC. This latter needs a further documentation.

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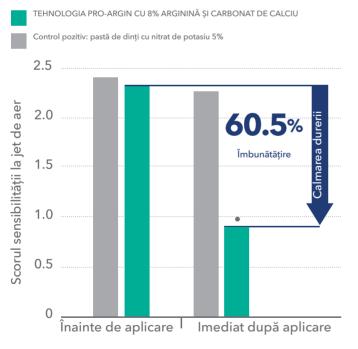
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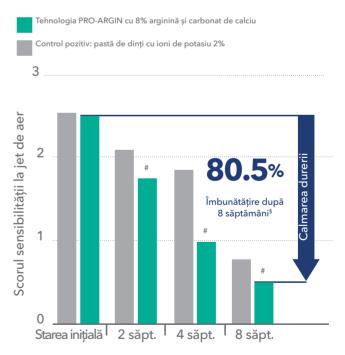
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În comparație cu starea inițială (sunt prezentate doar datele relevante)
 Semnificativ statistic (p<0,001)</li>

## Calmarea semnificativă de lungă durată a durerii din sensibilitatea dentară după 2, 4, și 8 săptămâni de utilizare<sup>4,§,&</sup>



§ 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)</li>

\*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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