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Summary of PhD thesis-

The importance of dental implantology in the restoration of the dento-maxillary architecture. Interferences with sinus pathology

PhD coordinator: **Prof. Dr. Gheorghe Ionel Comşa**

PhD student: **Iulian Damian**

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CONTENS

KEYWORDS: Sinus pathology, alveolar bone, T segments, mucosal thickening, sinus septa, dental implant, CBCT, maxillary lateral edentation, dento-maxillary architecture.

INTRODUCTION

According to the World Health Organization, total or partial absence of natural teeth is a public health problem, affecting quality of life. Edentulism represents a serious impairment of the patient's state of health with local, loco-regional and general repercussions, both morphological and functional.

The replacement of absent teeth has been a permanent concern of the specialists in the field since ancient times. The evolution of the prosthetic procedures and materials has been continuous, now reaching computer technologies and materials with proven biocompatibility, so dental implants are becoming an accepted form of permanent tooth replacement.

Modern implant treatments develop new ways to ensure better understanding of biological principles that influence the development of dynamic interference between living tissue and biomaterials. Implant-prosthetic therapies are common in current dental medicine and offer much higher quality than other types of prosthetic therapies (bridges, removable prostheses). However, implant-prosthetic treatments are more invasive than conventional treatments and are also subject to failure.

Proper implant treatment planning remains the first priority for implant success. Dental imaging is an important tool to accomplish this task, as it is possible to plan and place dental implants more precisely. The emergence of three-dimensional (3D) imaging, and of the surgical planning software for implant placement, profoundly influenced the science of implantology. Advanced imaging technologies can be used to determine the optimal placement of the implant, being available a number of ways such as dentascan, conical beam tomography (CBCT), dental CBCT software, etc., making the diagnostic process more interactive and increasing the diagnostic potential.

The posterior maxilla is an area where relatively difficult and invasive techniques, such as sinus lift and bone addition techniques, are required due to bone atrophy. These techniques may have a number of complications, and require analysis and accurate diagnosis prior to implant prosthetic treatment planning.

The preoperative evaluation of the maxillary sinus is very important to avoid the surgical complications due to the possible associated sinus pathology and the anatomical relations of vicinity between it and the posterior maxillary teeth and / or the edentulous alveolar ridge.

Restoring the dento-maxillary architecture with the help of dental implants, involves performing functional, aesthetic and long-lasting restorations which, in edentulous patients, creates difficulties in terms of placing the implants in the most favorable bone support, the bone augmentation being essential to allow the placement of a proper number of implants, in positions to provide a functional prosthetic restoration.

Bone augmentation is required when the width and vertical height of the residual alveolar ridge in the partially or totally edentulous patient is insufficient for placement of implants of acceptable size.

The techniques used as well as the timing for bone grafting and implant placement differ depending on the particularities of each clinical case.

Before installing dental implants in the maxilla, all possible factors that may influence the outcome of the treatment should be evaluated, that is why patients who need extensive oral rehabilitation should benefit from the treatment performed by a multidisciplinary team.

CURRENT STATE OF KNOWLEDGE

The first part of the thesis, entitled The Current Stage of Knowledge, summarizes the most recent and important aspects regarding the anatomy of the lateral maxillary area and its implications on implant-prosthetic therapy.

Chapter 1 presents specific maxillary and sinus morphological considerations, addressing notions about the maxillary bone, the maxillary sinus and the relationships of the maxillary sinus with maxillary teeth.

Chapter 2 addresses the specific morphological and functional aspects of the alveolar bone after tooth extraction, following bone composition, macro and microscopic structure and how the bone develops and grows, as well as bone regeneration issues.

Chapter 3 identifies diseases and anatomical variations of the maxillary sinus that may interfere with bone augmentation and dental implant insertion procedures.

PERSONAL CONTRIBUTION

The second part of the thesis, entitled Personal contributions, is structured in 4 chapters. The first three chapters present in detail the research directions, and the chapter Clinical cases illustrates the restoration of the dental-maxillary architecture with dental implants in different clinical situations.

The presented cases are included in all the analyzed T-segments, they have thickening of the sinus mucosa included in the grades IM1-IM3, with or without the presence of the sinus septum, each of them requiring different surgical approaches for achieving proper bone support for implant-prosthetic treatment.

1. IMAGISTIC STUDY ON THE RISK OF ODONTOGENIC MAXILARY SINUSITIS

1.1. Objectives:

The aim of this research is to analyze and determine the risk of developing odontogenic sinus pathology in patients presenting for common dental treatments.

1.2. Study structure:

The retrospective analysis of 232 panoramic radiographs aimed to identify:

1. the relation of the lateral maxillary teeth with the sinus cavity,
2. the presence of dental and periodontal lesions,
3. the presence of complete and incomplete endodontic treatments
4. the presence of periapical pathology.

1.3. Materials and methods:

The study was carried out by analyzing a number of 232 panoramic radiographs of patients who have been submitted to treatment in a private dental clinic between 2013 and 2017.

For completing the database, the dental records of the patients registered in the clinic during the mentioned period were used. The information retrieved targeted personal data such as sex, age, teeth relations with the sinus cavity, presence of periapical pathology, incomplete endodontic treatment. According to medical ethics and deontology each patient's informed consent was required for enrollment.

The study included panoramic x-rays of patients with full dentition in the posterior jaw and those lacking only one sinus tooth. Tumor and traumatic pathology, iatrogenia by dental extractions and implant treatments, as well as third molars were excluded.form this study.

Risk was assessed by dividing the clinical situations in four risk categories:

0 – no risk (healthy teeth, away from sinus cavity)

1 – small risk (healthy teeth in close proximity to the sinus cavity (V), cavities (C) or endodontic treatment (TE) located away from the maxillary sinus)

2 –moderate risk (teeth with carious lesions (C), periodontal disease (P) or incomplete endodontic treatments (TEI) located in the vicinity of the sinus cavity (V), small periapical lesions (APm));

3 – high risk (teeth with carious lesions (C), periodontal disease (P) or incomplete endodontic treatments (TEI) in which there is no radiologically visible margin of separation from the maxillary sinus, teeth with large periapical lesions (APM), radiologically visible sinus pathology (PS)).

The patient batch was divided into the following age ranges: under 35 years, between 35 and 55 years inclusive and over 55 years.

The acquisition of the images was performed using the Soredex Cranex 3D orthopantomograph, the values at which the radiographs were performed were: for female patients: 73kV - 8mA, with an exposure time of 16.4 seconds, and for male patients: 77kV - 8mA, with an exposure time of 16.4 seconds.

Analysis of the resulting images was performed using Scanora 5.2.6.3 from Soredex, a program that allows viewing of radiographs and exploring their parameters.

1.6. Results and Discussions

In this study, 429 first upper premolars (1.4; 2.4) were analyzed, most of them being classified as risk class 0; out of risk classes 1 and 2, the most frequent was risk class 1, especially at the first upper left premolar (2.4); no class 3 risks were detected; the possible cause of odontogenic sinusitis is most frequently related to the close proximity of the apices and to failed endodontic treatments.

In terms of gender incidence, an increased risk is recorded in men; in terms of age, the risk is increased between 35 and 55 years.

Analysis of 428 second upper premolars (1.5; 2.5) shows that risk class 1 is the most frequent one, followed by risk class 2, affecting especially the left side; grade 3 risk is reported in 21 cases; causality is represented, in order, by the close proximity, followed by incorrect endodontic treatments, caries with pulpal involvement, periodontal diseases and small periapical lesions; at the level of the second left upper premolars, large periapical lesions were also observed; risks classes 2 and 3 are increased in males. For the left side, the risks of odontogenic sinusitis are similar for both males and females; the occurrence of the risk of odontogenic sinusitis is also increased for the age range of 35-55 years.

429 upper first molars (1.6; 2.6) were examined, the following characteristics being evidenced: classification in risk classes 1 and 2 on the right and left side is similar; risk class 3 is present in an identical number of patients as in the second premolars; causality is varied but only slightly modified from that of premolars, being, in order of close proximity, closely followed by periodontal disease and by endodontic treatments and carious lesions; we have found cases of sinus pathology without clear odontogenic influence; in terms of gender, at the level of the first molars, an increased risk was noticed for females; in terms of age, the risk of odontogenic sinusitis is increased in the same age range, 30-55 years.

449 upper second molars (1.7; 2.7) were examined, the following characteristics being noticed: most of them are into risk class 1, followed by risk class 2, similarly on the right and left side; risk class 3 is present, but the frequency is inferior to that of second premolars and first molars; the etiology is similar to that of the first molars, respectively: proximity, followed by approximately the same percentage of periodontal diseases, endodontic treatments and carious lesions; sexual affection is also more common in females; the high-risk age is also between 35 and 55 years.

A study performed on 174 patients with unilateral maxillary sinusitis (72 males and 102 females) reveals that the most common etiology is that of dental lesions with periapical impairment (83 patients), followed by periodontal disease (23 patients). Also, the sinus pathology is incriminated in 13 patients. [106]

Another study, including 121 clinical cases of odontogenic sinusitis, incriminates the periodontal factor as being predominant. [107]

A research aimed at determining the aetiology of odontogenic maxillary sinusitis highlights the first option: the vicinity relationship, followed, in order, by periapical diseases, periodontal diseases and endodontic treatments. **[108]**

A recent study using CBCT for evaluating the relationship between lateral maxillary teeth and the maxillary sinus, performed on a total number of 1011 patients, highlights that molars are most susceptible to the possibility of odontogenic sinusitis, due to reports with the maxillary sinus. There are no significant differences between sexes, but it is noted that, with aging, the risk of the disease is much diminished. [109]

Another study, developed on 100 patients (50 females and 50 males), devoted to sexual dimorphism related to the maxillary sinus, concluded that the maxillary sinus, in both quadrants 1 and 2, is wider and bulkier in females, while and the length and height are higher in males. [110]

1.7. CONCLUSIONS

Analysis of 1.735 maxillary premolars and molars concerning the risk of odontogenic maxillary sinusitis led to the following conclusions:

1. The highest risk is found in the first maxillary molar which, according to the results, falls into all risk categories: 1,2,3;
2. the maxillary first premolar has the lowest risk of odontogenic sinusitis;
3. the degree of risk may vary, depending on the type and severity of the condition;
4. in premolars, the most frequent cause for the occurrence of odontogenic sinusitis is the vicinity relationship, followed by failed endodontic treatments;
5. in molars, the most frequent cause is also given by vicinity relationship, followed by periodontal diseases;
6. the age range with the highest susceptibility to sinusitis is in all cases between 30 and 55 years; as to the influence of sex on sinusitis,
7. the male sex is prevalent in premolars and the female sex in molars;
8. quadrant 2 is more prone to sinus involvement especially in females.

2. IMAGISTIC ASSESSMENT OF THE SUB-ANTRAL REMAINING BONE IN PATIENTS WITH MAXILLARY EDENTATIONS FOR THE APPLICATION OF DENTAL IMPLANTS

2.1. Objectives:

The second study analyzes cases of terminal and lateral edentulism in patients seeking to regain dento-maxillary architecture with the help of dental implants

This study aims to establish the degree of bone atrophy and the presence of anatomical variations in the maxillary sinus in patients presenting for implant-prosthetic rehabilitation in the posterior maxilla.

2.2. Study structure:

A total of 120 complete conical beam computed tomography (CBCT) scans were retrospectively analyzed We followed the maxillary sinus anatomical variations and the degree of bone atrophy

2.3. Materials and methods:

The study was carried out on a number of 120 patients who presented in the private clinic for the rehabilitation of the posterior maxillary edentations between 2013 and 2017 by analyzing the conical beam computed tomography (CBCT).

The CBCTs were performed with the radiodiagnosis device Soredex Cranex3D with a field of view of 6x8 cm, and the values at which the purchases were made are: 10 mA - 90 kV with an exposure time of 12.6 seconds .

CBCT can visualize areas up to 35 mm above the occlusal plane and between bilateral retromolar spaces, these being the areas that were evaluated in this study.

The analysis of the resulting images was performed using the CyberMed OnDemand3DApp program, which allows visualization of 3D reconstruction, axial, sagittal and coronary sections at intervals starting from 0.1 mm.

For completing the database, the dental records of the patients registered in the clinic during the mentioned period were used. The information retrieved targeted personal data such as sex, age, the type of edentation, the height and width of the subantral remaining alveolar bone in the corresponding position of the missing teeth.

The patient group was divided into the following age ranges: under 35 years, between 35 and 55 years including, over 55 years.

The following anatomical variations were examined retrospectively:

1. Distribution of edentations (after Costa).

2. The amount of subantral bone remaining at the PM1, PM2, M1 and M2 level. Subantral remaining bone quantity was measured on sections in the transverse direction on CBCT slices (between the buccal and lingual cortical) and axial (between the top of the edentulous ridge and the floor of the maxillary sinus) at the corresponding position of the missing tooth. The maximum values were recorded.

3. Foreign bodies - root residues, dental fragments, dental implants, endodontic filling material - depending on the position - intrinsic, submucosal.

The data obtained was analyzed using the IBM SPSS Statistics 20 processing program. The procedures used were: Descriptive statistics (to characterize discrete and continuous variables defined at database level), Charts, Parametric Statistical Tests (t-test to compare paired two sample for means), Non-Parametric Statistical Tests (the χ^2 test used for testing the relationships between categorical variables, the Mann-Whitney Test, used to assess the difference between two independent groups).

2.5. Results and Discussions

From the point of view of the location of the edentulous spsces, the study reveals an increased rate of lateral edentations, followed by terminal and frontal ones. In all cases the female sex is the most affected, and the age range with the highest frequency of edentiations is between 35 and 55 years. Similarities with the present research are observed in the literature. In a study published in Dental Science in 2015 conducted in India on a number of 561 subjects, aged between 13 and 87, the results show that lateral edentation is the most frequent, in the age group 31-40 years, especially in women. [111]

In the study "Partial edentulism and treatment options" conducted at the Faculty of Dental Medicine of Yeditepe University, Istanbul, Turkey, in 2016, on a number of 345 subjects the results showed a large number of lateral type, predominantly on female. [138] (www.journalagent.com/yeditepe/pdfs/YDJ_13_1_31_36.pdf)

Regarding the presence of foreign bodies, none of the 120 cases examined presented these elements. The studies performed as well as the specialized literature present investigations and individualized treatments in particular clinical cases for certain foreign bodies present at the level of the maxillary sinuses, especially the therapeutic attitude in endodontic, implantological iatrogeny and in the cases of facial trauma with bone fragments present at this level.

Dimensional changes in the level of the alveolar ridge after extraction often compromise the optimal stability of the implant and the placement of the implants in the appropriate positions for proper prosthetic treatment. In this regard, the high variability of the measurements in the present study, as compared to Len Tolstunov's study, [112] proves the individual particularities, which depend largely on the etiology of the edentation, its age as well as the extraction particularities at the respective level. Lack of statistical dependence relations confirms that subantral remaining bone width and height does not depend on age or sex of the patient unless other conditions are associated with with other disorders that can impede post-extraction bone regeneration. Thus the measured V-O dimension of the edentulous ridge in the I quadrant (right), started from a minimum of 2.03mm at the PM1 level, reaching a maximum of 12.37mm at the M1 level. Edentulous ridge height (H) in the same quadrant was in the range of 1.35mm at the M1 level and 20.06mm at the PM1 level. Regarding the II

quadrant (left), the V-O dimension started from 1.38mm at the M1 level to a maximum of 14.33mm at the M2 level. The height of the edentate ridge (H) in quadrant II has values between 0.51mm at M1 and 21.03mm at PM2 level.

Considering the large amplitude of the measured values, in many cases the width was favorable, but the height was insufficient or the height was favorable and the width insufficient for the impanto-prosthetic treatment. In order to obtain relevant results, the three types of edentulous segments with standard values for thickness and height were considered as reference values according to the system of classification of maxillary bones in the treatment of edentations through implants from the study conducted by Gintar Juodzbalys and Marius Kubilius, 2013 [113].

Analyzing the total of the 501 edentulous areas, 114 were registered in PM1 area (58 left and 56 right), 123 in PM2 area (64 left and 59 right), 153 at M1 level (77 left and 76 right) and 111 at M2 level (55 left and 56 right). From the total of the registered landmarks, the distribution within the 3 types of edentulous segments of reference was made as follows:

- At the PM1 level (left, right) there are 31 cases falling within T1, 14 cases falling within T2 and 1 case falling within the T3 segment. Of the total of 114 breaches classified in the T segments.
- At the PM2 level (left, right) there were a number of 28 cases falling in T1, 34 cases falling in T2 and no cases falling in the T3 segment. Of the total of 123 breaches classified in the T segments.
- At the M1 level (left, right) there were registered a number of 14 cases falling in T1, 26 cases falling in T2 and 6 cases falling in T3. Of the total of 153 breaches classified in the T segments.
- At the M2 level (stg., dr.) the data obtained showed 11 cases for T1, 12 cases for T2 and 4 cases for T3. Of the total of 111 breaches classified in the T segments.

The final results reveal the following:

- 84 cases fall into the first type of reference segment, which means that implant treatment is possible without further intervention;
- 86 of these cases falls within the second reference segment type, meaning that the implant can be inserted, primary stability is ensured, but bone augmentation is required;
- 11 cases that fall into type three, this situation being totally unfavorable and requiring bone augmentation, sinus membrane elevation interventions and late implantation.

2.6. Conclusions

Of the total number of cases analyzed, in relation to the amount of subantral remaining bone for insertion of dental implants, more than half of the patients (56%) fulfill good conditions for implantation, especially in the premolar area. The most affected area requiring augmentation therapy and surgical procedures for sinus lift is the one corresponding to the edentation of the first upper molar and according to the present study, especially in quadrant II (left) and especially in women.

Due to the complexity of the area and the changes it undergoes with tooth loss, implant therapy in the lateral maxillary area requires a good training of the practitioner, a thorough control of the patient, an efficient collaboration between specializations (ENT and dentistry) and the use and of necessary and correct paraclinical investigations each time.

With the help of CBCT examinations, necessary for the planning of implant treatments, anatomical variations in the maxillary sinus have been identified.

The amount and significance of anatomical variations found in this study reinforce the importance of examinations using computed tomography prior to implant treatment planning.

Clinical situations discovered with the help of radiological investigations may modify the treatment plan and may require complex specialized treatments, which is why the role of radiological investigations in the planning of dental treatments, especially in the case of implant treatments, must be recognized.

3. IMAGISTIC STUDY OF ANATOMIC VARIATIONS AND SINUSAL PATHOLOGY IN PATIENTS WITH MAXILLARY LATERAL EDENTATIONS FOR THE APPLICATION OF DENTAL IMPLANTS

3.1. Objectives:

This study aims to determine the incidence of sinus pathology, the presence of the maxillary sinus anatomical variations in patients presenting for implant therapy for maxillary lateral area.

3.2. Study structure:

A total of 120 complete CT scans (CBCT) were analyzed retrospectively. The presence of sinus pathology (determined as a thickening of the sinus mucosa) and anatomical variations in the maxillary sinus were monitored.

3.3. Materials and methods:

The study was carried out on a number of 120 patients who presented in the private clinic for the rehabilitation of the posterior maxillary edentations between 2013 and 2017 by analyzing the conical beam computed tomography (CBCT).

For completing the database, the dental records of the patients registered in the clinic during the mentioned period were used. The information retrieved targeted personal data such as sex, age, thickening of the sinus mucosa, the presence of the septum, superior alveolar artery presence and its position in relation to the floor and the side wall of the sinus.

The patient group was divided into the following age ranges: under 35 years, between 35 and 55 years including, over 55 years.

The following anatomical variations and lesions were examined retrospectively:

1. ***The thickening of the sinus mucosa*** (IM) that was defined as the existence of soft tissues with a thickness greater than 0.1 mm, appreciated by measuring their thickness perpendicular to the bony plane, from the level of the floor of the maxillary sinus to the upper edge and was classified as follows:
    a. IM_1- 0.1-2 mm;
    b. IM_2 2-5 mm;
    c. IM_3 > 5mm;
    d. Full opacification.
2. ***The presence of the sinus septum*** - axial images were used to identify the presence of the sinus septum;
3. ***Superior alveolar artery*** presence and its position in relation to the floor and the side wall of the sinus.

The maximum values were recorded

The CBCTs were performed with the radiotherapy device Soredex Cranex3D with a field of view of 6x8 cm, and the values at which the purchases were made are: 10 mA - 90 kV with an exposure time of 12.6 seconds .

CBCT can visualize areas up to 35 mm above the occlusal plane and between bilateral retromolar spaces, these being the areas that were evaluated in this study.

The analysis of the resulting images was performed using the CyberMed OnDemand3DApp program, which allows visualization of 3D reconstruction, axial, sagittal and coronary sections at intervals starting from 0.1 mm.

The data obtained was analyzed using the IBM SPSS Statistics 20 processing program. The procedures used were: Descriptive statistics (to characterize discrete and continuous variables defined at database level), Charts, Parametric Statistical Tests (t-test to compare paired two sample for means), Non-Parametric Statistical Tests (the χ^2 test used for testing the relationships between categorical variables, the Mann-Whitney Test, used to assess the difference between two independent groups).

3.5. Results and discussions

3.5.1. Thickening of the maxillary sinus mucosa

Of the total 120 cases analyzed, the majority showed the left and right maxillary sinus damage, which was evidenced by thickening of the mucosa.

Out of the 120 patients examined, 94 (78.3%) had thickening of the sinus mucosa in the left maxillary sinus greater than 0.1 mm.

Gender distribution of the left maxillary sinus mucosal thickening presence, of all cases analyzed, showed a frequency of 40.8% in males and 37.5% in females.

Regarding the thickening of the sinus mucosa on the left maxillary sinus according to sex, out of the 94 cases in which the thickening of the mucosa was identified, 49 (52.1%) were male and 45 (47.9%) female.

Regarding the distribution of cases with thickening of the mucosa of the left maxillary sinus over the age ranges considered, we observe that out of the total of 94, 8 (8.5%) are in the interval (...- 35] years, 53 (56.4%) are in the range (35-55] years, and 33 (35.1%) are in the range (55 -...) years.

The thickening of the sinus mucosa at the level of the left maxillary sinus was between 0.82 mm and 29 mm, with an average value of 6.58 mm and a standard deviation of 5.81 mm.

The sex distribution shows a thickening of the sinus mucosa in men between 0.8-29 mm with an average value of 8.21 mm and a standard deviation of 6.47 mm, and in women between 1.15-20.28 mm with an average value of 4.80 mm and a standard deviation of 4.41mm. Between the mean values of the sinus mucosal thickening measured in men and women, they are found to differ statistically ($t = 2.955$, $df = 92$, $p = 0.004 < \alpha = 0.05$, Independent Samples Test).

From the total of 120 patients included in the study group, at the level of the left maxillary sinus, the analysis of the thickening of the mucosa shows that in 19 cases (15.8%) it is between 0.1-2mm (IM1), in 34 cases (28.3%) is between 2-5 mm (IM2) and in 41 cases (34.2%) it exceeds 5 mm (IM3). In a number of 26 cases (21.7%) no sinus mucosal thickening was identified at the level of the left maxillary sinus.

Regarding the classification within the thickness limits considered according to sex, out of the total 94 left maxillary sinuses analyzed, within the range (0.1-2] mm were 19, out of which 6 (31.6%) were male and 13 (68.4) %) were female, within the range (2-5] mm were 34, of which 15 (44.1%) for men and 19 (55.9%) for women, and in the range (5 -...) mm were 41, of which 28 (68.3%) were male and 13 (31.7%) were female.

The two variables under study IM stg. * sex have a dependency relation: $\chi 2calc = 8.382$, $df = 2$, $p = 0.015 < \alpha = 0.05$ (Chi-Square Tests).

Regarding the distribution of the degree of thickening of the sinus mucosa at the level of the left maxillary sinus over the considered age ranges, we observe that out of the total of 94, in the interval (0.1-2] mm, 1 (1.1%) is in the interval (...-35] years, 11 (11.7%) are in the range (35-55] years and 7 (7.4%) are in the range (55 -...) years; in the range (2-5] mm, 3 (3.2) %) are in the range (...- 35] years, 18 (19.1%) are in the range (35-55] years and 13 (13.8%) are in the range (55 -...) years; in the range (5 -...) mm, 4 (4.3%) are in the range (...- 35] years, 24 (25.5%) are in the range (35-55] years and 13 (13.8%) is in the range (55 -...) years.

Of the 120 patients examined, 95 (79.2%) had thickening of the sinus mucosa at the level of the right maxillary sinus greater than 0.1 mm.

Gender distribution of the presence of thickening of the mucosa of the right maxillary sinus in all the analyzed cases reveals a frequency of 40% in the male and 39.2% in the female.

Regarding the thickening of the sinus mucosa at the level of the right maxillary sinus according to sex, out of the 95 cases in which the thickening of the mucosa was identified, 48 (50.5%) were male and 47 (49.5%) female.

Regarding the distribution of the cases with thickening of the mucosa of the right maxillary sinus over the considered age ranges, we observe that out of the total of 95, 8 (8.4%) are in the range (...- 35] years, 56 (58.9%) are in the range (35-55] years and 31 (32.6%) are in the range (55 -...) years.

The thickening of the sinus mucosa at the level of the right maxillary sinus was between 0.20 mm and 23.67 mm, with an average value of 6.07 mm and a standard deviation of 5.36 mm.

The sex distribution shows a thickening of the sinus mucosa in men between 0.78 and 23.67 mm with a mean value of 6.97 mm and a standard deviation of 5.81 mm, and in women between 0.20 and 17.86 mm with an average value of 5.15 mm and a standard deviation of 4.73 mm. Between the mean values of the sinus mucosal thickness measured in men and women, it was found that they did not differ statistically ($p = 0.098 > \alpha = 0.05$; Independent Samples Test)..

From the total of 120 patients included in the study group, at the level of the right maxillary sinus, the analysis of the thickening of the mucosa shows that in 23 cases (19.2%) it is between 0.1-2mm (IM1), in 32 cases (26.7%) is between 2-5 mm (IM2) and in 40 cases (33.3%) exceeds 5 mm (IM3). In a number of 25 cases (20.8%) no thickening of the sinus mucosa at the level of the right maxillary sinus was identified.

Regarding the classification within the thickness limits considered according to sex, out of the total right maxillary sinuses that showed thickening of the mucosa (95), in the interval (0.1-2] mm 8 were classified (8.4%) in the male and 15 (15.8%) in the female, in the range (2-5] mm, 18 (18.9%) in the male and 14 (14.7%) in the female, in the range (5 -...) mm, 22 (23.2%) for males and 18 (18.9%) for females.

Regarding the distribution of the degree of thickening of the sinus mucosa at the level of the right maxillary sinus over the considered age ranges, we observe that out of the total of 95, in the interval (0.1-2] mm, 2 (2.1%) are in the interval (...-35] years, 12 (12.6%) are in the range (35-55] years and 9 (9.5%) are in the range (55 -...) years; in the range (2-5] mm, 4 (4.2) %) is in the range (...- 35] years, 17 (17.9%) are in the range (35-55] years and 11 (11.6%) are in the range (55 -...) years; in the range (5 -...) mm, 2 (2.1%) are in the range (...- 35] years, 27 (28.4%) are in the range (35-55] years and 11 (11.6%) is in the range (55 -...) years.

In the study by Bornstein et al. (2018) [114], regarding the evaluation of the pathology of the maxillary sinuses by analyzing a number of 137 CBCTs, over half, respectively 63.1%, did not show thickening of the sinus mucosa. Regarding the pathology 17.5% of the subjects had a thickening of the membrane greater than 2 mm.

The context of the study "The relationship of Schneiderian membrane thickness and membrane perforation in sinus lift procedure: a systematic review": [115] Schneiderian membrane thickness (SMT) was considered to be a key factor in influencing membrane perforation during implant treatment, which which may endanger the final clinical result of sinus augmentation. Therefore, a systematic review of the literature aimed at studying mean SMT and further investigation of individual risk factors of patients, which may have an impact on SMT, was performed. In addition, as a secondary objective, the association between SMT and membrane perforation rate was studied. Three independent reviewers reviewed studies on this topic in several databases, including MEDLINE, EMBASE, and the Cochrane Oral Health Group. This review was written and conducted in accordance with the PRISMA and MECIR guidelines. A quantitative evaluation was performed of articles that met the inclusion criteria for investigating mean SMT, risk factors and influence on membrane damage and surgical complications. Three independent reviewers performed a qualitative assessment of included studies. Thirty-one studies that reported maxillary SMT were considered for qualitative analysis. Nineteen were further meta-analyzed. The mean overall SMT was 1.17 mm (SE 0.1 mm-95% CI 0.89-1.44). While the mean SMT for the "3DR" group (CBCT and CT) was 1.33 mm (95% CI 1.06-1.60), for the "histology" group was 0.48 mm (95% CI 0.12-1.1). Although, apparently, there is a larger SMT thickness determined using 3DR compared to histological analysis, such a difference did not reach statistical significance ($p = 0.15$). In conclusion, the thickness of the Schneiderian membrane is on average 1 mm in healthy conditions. In addition, the use of three-dimensional SMT technologies is often overestimated compared to histological analysis..

3.5.2. Complete opacification

From the total left maxillary sinuses analyzed, in 4 cases (3.3%) a complete opacification was found.

Gender analysis of the presence of complete opacification in the left maxillary sinus reveals a frequency of 3.5% in males and 3.2% in females.

Regarding the presence of complete opacification in the left maxillary sinus according to sex, out of the total 4 situations identified, 2 (50%) were male and 2 (50%) female.

Of the total right maxillary sinuses analyzed, in 6 cases (5%) a complete opacification was found.

Gender analysis of the presence of complete opacification at the level of the right maxillary sinus reveals a frequency of 7% in males and 3.2% in females.

Regarding the presence of complete opacification at the level of the right maxillary sinus, according to sex, out of the 6 identified situations, 4 (66.7%) were male and 2 (33.3%) female.

In the study by Lim et.all (2012) [116] on a number of 262 CTs (524 maxillary sinuses), 44 (16.8%) presented thickening of the mucosa, 6 (2.3%) partial opacification and 7 (2.7) %) total opacification, concluding that there is an increased rate of accidental CT diagnosis of sinus pathology.

Most studies in the literature refer to particular cases of treatment in the field of ENT related to opacification..

In the study by Chan et all. (2010) [117], on a number of 830 patients, the most frequent diagnoses were as follows: chronic rhinosinusitis (52.6%), sinus mycetoma (29.3%), antral polyp (2.6%), benign tumor (10.4%), and malignant tumor (5.1%). The sinus mycetoma (fungus ball) was the most common diagnosis (10/18, 55.6%) in the subgroup of patients with

opacity of the maxillary isolated sinuses without disease in the other sinuses. Nasal secretion and foul-smelling breathing were more common in inflammatory disease than in neoplastic disease.

3.5.3. Presence of sinus septa

Of the total 120 left maxillary sinuses analyzed, 30 (25%) had sinus septa. Of these, 5 (4.2%) were complete and 25 (20.8%) incomplete.

From the total left maxillary sinuses analyzed, sinus septua was identified in 30 (25%) cases, analysis by sex reveals a frequency of 13.3% in the male and 11.7% in the female.

Gender distribution of the complete left sinus septum reveals a frequency of 3.3% in males and 0.8% in females.

Gender distribution of incomplete left sinus septum reveals a frequency of 10% in males and 10.8% in females.

120 right maxillary sinuses were analyzed and 31 (25.8%) had sinus septa. Of these, 10 (8.3%) were complete and 21 (17.5%) incomplete, gender analysis showing a frequency of 15% in males and 10.8% in females.

The sex distribution of the complete sinus septum reveals a frequency of 14% in males and 3.2% in females.

Gender distribution of incomplete sinus septum reveals a frequency of 17.5% in males and 17.5% in females.

In the cross-sectional study by Sigaroudi et all. (2017) [118] CBCT images were evaluated from 222 patients, respectively 444 maxillary sinuses, between the ages of 20 and 81 years. Of these, 152 had complete or incomplete septate sinus, 93 female and 59 male. A total of 42.1% of 152 patients had septum only in one maxillary sinus, and 57.9% had septum in both maxillary sinuses.

The prevalence of the presence of septum, in total analyzed cases, in the female and male groups, was 29% and 35.2% respectively. Out of the total 444 sinuses analyzed, 240 presented septum. The prevalence of the presence of the maxillary septal sinus was 68.4% in the CBCT images of the studied patients and 54.05% of the maxillary sinuses evaluated. Van Zyl and Van Heerden [119] reported a prevalence of 69% in CT scans in 200 patients with one or more septal sinuses and 56% in the maxillary sinuses evaluated. Rancitelli et al. [120] reported 38.1% as prevalence of maxillary sinuses septated in 228 maxillary sinuses from CBCT images. However, in several other studies, the prevalence of septal maxillary sinus in CT scans [121, 122, 123, 124] has been reported to be 24% - 37%.

Gosau et al. [125] examined 65 cardaver heads and reported an incidence of sinus septation of 27%.

Ella et all. [126] studied the bodies and tomographyes of male patients. In their study, 39% of the maxillary sinuses had septate sinuses. In other cadaver studies, Rosano et al. [127] and Naitoh et al. [128] found that the incidence of septate sinus was 37% and 33.3%, respectively. Their studies had limited sample size: 30 and 15 human skulls respectively. This variability could be related to the differences between the populations examined, the sample sizes, the evaluation methods and the inclusion criteria.

Malkinson et al. [129] evaluated sinus septation during sinus lift surgery. Separation was reported in 40% of cases. Krennmair et al. [130] reported a prevalence of 27.7% in 65 clinical cases examined orthopantomographically and 16% in 200 CT - examination of the maxillary sinuses. Shen et al. [131] evaluated CT scans obtained from 423 patients; 30% of patients had septate sinuses.

3.5.4. Position of posterior superior alveolar artery

Of the total left maxillary sinuses analyzed, the left superior alveolar artery was identified in 96 of the cases (80%). The position of the superior alveolar artery at the level of the lateral wall of the sinus was intraosseous in 27 cases (22.5%), externally lateral in 13 cases (10.8%) and externally medial in 56 cases (46.7%). In 24 cases (20%) the left upper alveolar artery was not identified.

Of the total right maxillary sinuses analyzed, the right superior alveolar artery was identified in 88 of the cases (73.3%). The position of the superior alveolar artery in the lateral wall of the sinus was intraosseous in 28 cases (23.3%), external lateral in 11 cases (9.2%) and external medial in 49 cases (40.8%). In 32 cases (26.7%) the right superior alveolar artery was not identified.

The detection rate of arteries exceeds the average of other studies Güncü et al. (2011) [132] (64.5%), Elian et all. (2005) [133] (52.9%), Mardinger et al. (2007) [134] (55%), and Kim et al. (2011) [135] (52%).

Regarding the position of the posterior superior alveolar artery, the present study indicates a high prevalence of the medial external localization, compared to the intraosseous and the external lateral localization. In the studies presented above, the most frequent localization was intraosseous. These differences may arise due to the variability of the number of cases studied as well as of the individual anatomical particularities of the constitutional, somatic typology, as well as of the environmental area from which the clinical cases came..

As a result of the measurements, the following results have been obtained regarding the maximum, average and minimum distance at which the superior alveolar artery is located relative to the floor of the maxillary sinus:

- on the left side we obtained a maximum distance of 19.91 mm, a minimum of 3.41 mm, and the average distance of 10.42 mm, with a standard deviation of 4.07 mm
- on the right side we obtained a maximum distance of 22.39 mm, a minimum of 1.26 mm, and the average distance of 10.85 mm, with a standard deviation of 3.89 mm.

Arterial injury during surgical procedures may cause bleeding that obstructs visibility in the operative field and may lead to perforations of the sinus membrane, all of which lead to prolonged surgical time. [136]

3.6. Conclusions

Of the total number of cases analyzed, a significant percentage (over 70%) have thickening of the sinus mucosa that may indicate sinus disease, which may represent an impediment to treatment success..

Although the differences are not significant between the sexes, the study reveals a higher frequency of sinus pathology in males, in the age range 35-55 years.

Of all the cases with sinus pathology, the large thickness of the mucosa (over 5 mm) is the most frequent, which represents a major risk for the implant-prosthetic treatment.

The partial or total opacification of the sinuses, uni or bimaxillary, is necessary to be evaluated very carefully interdisciplinarly in order to be able to perform the implant treatment.

Although the opacity of the maxillary sinus is usually of inflammatory origin, fungal sinusitis and neoplastic disorders are also to be considered. A thorough anamnesis, a thorough examination of the head and neck, including nasal endoscopy and CBCT evaluation are all imperative in order to correctly diagnose the case. ENT pathology leading to opacification may delay or even cancel of implant treatment, depending on the type of diagnosis and the risks involved.

The presence of the sinus septum, complete or incomplete, its position and direction, modifies the surgical approach of the maxillary sinus in the case of addition maneuvers, requiring a correct preoperative identification.

The position of the posterior superior alveolar artery with medial external localization, predominant in this study, favors the removal of the sinus membrane together with it, the risk of its injury being lower than in the case of the other locations..

Radiological investigations with the help of CBCT are very important for the patients candidates for implant treatment in the posterior maxillary area, because the investigation only with the help of the panoramic radiographs does not correctly and completely reveal the presence of the sinus pathology (the changes of the thickness of the sinus mucosa), the presence of the sinus septa and their position. , as well as the position and diameter of the posterior superior alveolar artery, which may lead to the wrong therapeutic solutions, with important infectious complications and failures of implant-prosthetic therapy.

4. DENTO-MAXILLARY ARCHITECTURE RESTORATION - CASE STUDIES

Clinical case 1 shows the restoration of the dento-maxillary architecture in the case of a maxillary latero-lateral edentulism with bone support within the T2 segment (with a horizontal defect of the alveolar ridge at the premolar level and a vertical deficit at the molar level), which requires bone expansion techniques and shorter implant placement to avoid maxillary sinus.

Clinical case 2 presents the restoration of the dento-maxillary architecture in the case of a maxillary latero-lateral edentation with bone support within the T2 segment (with a horizontal defect of the alveolar ridge), which requires augmentation by osteo-expansion. In this case it was chosen as the variant of increase of the bone supply in a horizontal sense by means of split-crest, and for the drilling for the implant socket, osteotomes were used. PRF membranes were applied to stimulate healing

Clinical case 3 presents the restoration of the dento-maxillary architecture in the case of a maxillary laterol-lateral edentation with bone support in the T2 segment (with a vertical defect of the edentulous crest at the level of the second premolar). T2 segment, requires subantral bone augmentation in order to place the implant. In this case, the subantral aaugmentation was performed by a lateral approach of the maxillary sinus.

Clinical case 4 presents the implant-prosthetic rehabilitation of the edentulous maxilla in the context of an accentuated bone resorption due to the periodontal pathology. In this case it is proposed as a treatment plan, the extraction of the hopeless maxillary teeth (2.3, 2.5, 2.7), as well as of the lower left third molar (3.8), socket preservation and immediate bone regeneration using autologous dentin, implant insertion to be performed after a minimum period of 4 months. Autologous dentin was obtained by grinding the fresh extracted teeth with the Smart Dentin Grinder (Kometa Bio, Israel). After 4 months, dental implants are applied. For the areas with vertical bone deficiency, short implants were used.

Clinical case 5 presents a complete and complex oral rehabilitation involving multiple treatment stages. For the restoration of the architecture of the maxillary arch, the following treatment plan is proposed: ablation of existing prosthetic works, extraction of unrecoverable maxillary teeth (1.7, 2.5, 2.7), apical resection and cystectomy 2.1 and implant-prosthetic rehabilitation of the maxillary terminal edentations. The mucosa thickness of the left maxillary sinus is 3.47 mm, corresponding to IM2 segment. The presence of incomplete sinus septum is identified on the left side. In the context of the presence of thickening of the sinus mucosa, the ENT examination is indicated. The thickening of the sinus mucosa with sufficient ventilation of the maxillary sinus (ostium permeable) does not contraindicates subantral bone augmentation. Bilateral sinus lift and bone augmentation is performed and the implants are inserted.

Clinical case 6 presents the implant-prosthetic rehabilitation of the maxillary edentations in the context of the presence of sinus pathology. The CBCT analysis shows that the remaining bone is in the T2 and T3 segments, with a vertical bone deficit and the presence of mucosal thickening on the left sinus in the IM2 segment and on the right sinus in the IM3 segment, due to the presence of a cystic formation in the posterior area of the sinus. The ENT examination confirms the presence of the sinus mucocele without other sinus pathology. In quadrant 1, due to the insufficient height of the bony ridge (T3) and the presence of the cystic formation in the posterior area of the right maxillary sinus, it is decided to perform the sinus lift with lateral approach, bone grafting and insertion of a single implant in position 1.4. Posterior implants will be inserted after the integration of the graft material, at an interval of at least 6 months. The sinus membrane

elevation is uneventfull, but during the bone graft insertion, the sinus membrane is perforated with an opening of more than 5 mm., which requires the removal of the graft material already inserted and aborting of the procedure. The enucleation of the mucocele located in the posterior area of the right maxillary sinus is also performed. Postoperative evolution is favorable, without infectious complications. The area is reassessed after 6 months by CBCT and it shows no inflammatory sinus reaction. ENT clinical and imaging evaluation concludes the absence of any pathological elements that may contraindicate bone grafting and implants placement. Due to the insufficient bone supply (T2), in quadrant 2, sinus lift with lateral approach and bone grafting is performed using MP3 Osteobiol (Technoss, Italy) and implants are inserted at level 2.4, 2.5 and 2.6, the height of the bone crest ensuring their primary stability.

Clinical case 7 presents a complete and complex oral rehabilitation involving multiple treatment stages. For the restoration of the architecture of the maxillary arch, the following treatment plan is proposed: ablation of existing prosthetic works, extraction of unrecoverable maxillary teeth (1.7, 1.6) and implant-prosthetic rehabilitation of the maxillary terminal edentations. The CBCT analysis shows that the remaining bone is in the T1 and T2 segments and the presence of mucosal thickening on the right sinus in the IM1 segment; at the level of the left maxillary sinus there is a large cystic formation (mucosal thickening over 23 mm); The ENT evaluation confirms the diagnosis of sinus cyst and recommends its surgical approach. It was decided that the intervention should be done in the dental clinic with the participation of a multidisciplinary team. The sinus is approached through the lateral wall, the cyst is enucleated the sinus cavity is cleaned and PRF membranes are applied in the sinus cavity. The immediate postoperative evolution is favorable. The control CBCT is performed at a period of 4 months, and shows the persistence of sinus pathology. It is recommended to take the patient for treatment by the ENT specialist, the therapeutic attitude for the rehabilitation of the left maxillary terminal edentation to be established after the complete remission of the sinus phenomena. Due to the insufficient bone supply (T2), in quadrant 1, sinus lift with lateral approach and bone grafting is performed using MP3 Osteobiol (Technoss, Italy) and implants are inserted at level 1.5, 1.6. Prosthetic rehabilitation of this area was performed at 6 months after implant placement.

Clinical case 8 presents the implant-prosthetic rehabilitation of the maxillary edentations in the context of the presence of sinus pathology. For the restoration of the architecture of the maxillary arch, the following treatment plan is proposed: ablation of existing prosthetic works, extraction of unrecoverable maxillary teeth (1.7, 3.6, 4.7), and implant-prosthetic rehabilitation of the maxillary resulting edentations. The CBCT analysis shows that the remaining bone is in the T1 and T2 segments and a thickening of the mucosa of the right maxillary sinus corresponding to IM3. The presence of thickening of the mucosa at the level of the right maxillary sinus requires examination by the ENT specialist. A multidisciplinary team is formed that performs the surgical approach of the right maxillary sinus, in the dental clinic. Transmucosal sinus cystectomy and sinus mucosal suture with resorbable thread is performed., together with bone grafting using Novabone Putty® (Novabone Products, S.U.A.) and implant insertion at 1.4, 1.5, 1.6. Also, three implants were applied in quadrant 4 (4.4, 4.5, 4.6). This case demonstrates, first of all, the possibility of condensation of the stages in certain situations, but also a specific bone biotransformation curve, in correlation with the type of material used, but also with the particularities of bone metabolism of the patient.

5. GENERAL CONCLUSIONS

1. From the morphological and structural point of view, the maxillary lateral areas represent a challenge in the implementation of the dental treatment plans, starting from the dental, periodontal, orthodontic and surgical pathology.

2. The maxillary lateral area is a complex area in which pathologists from the dental, ENT and neurological spheres converge.

3. Implant-prosthetic treatments require a detailed knowledge of the anatomy of the recipient area, from a local, loco-regional and general point of view.

4. The need for implant-prosthetic treatment at the level of the maxillary lateral area is the result of tooth loss -with the installation of the lateral and terminal edentulous state.

5. The variability of the etiology of the loss of maxillary lateral teeth causes major changes in the bone architecture of the area, having direct implications on the type of prosthetic rehabilitation.

6. The complex pathology of the maxillary lateral teeth and the position of their roots in close proximity relation with the maxillary sinus can determine sinus pathology of odontogenic cause, decisively influencing the type and timing of implant therapyt.

7. The greatest risk of occurrence of odontogenic maxillary sinusitis is to be found in first maxillary molars.

8. The type, localization and severity of the dental disease, as well as the late establishment of a treatment, can modify the degree of risk, so that premolar 1 (considered with minimal risk) can determine, directly or indirectly, odontogenic sinusitis.

9. The most common cause for the occurrence of odontogenic sinusitis at the level of the maxillary lateral teeth is represented by the vecinity reports, failed endodontic treatments, followed by periodontal diseases.

10. From the point of view of age groups, the interval with the highest susceptibility to the onset of sinusitis is, in all the analyzed cases, between 30 and 55 years old, active adults, concerned with the oral health status..

11. Gender analysis of the risk of maxillary sinusitis in dentate patients was found to be increased in premolars at males and molars at females, with a predisposition to occurrence of sinusitis especially in quadrant 2, females.

12. The postextractional anatomy of the bone support is modified, often radically, by resorption and atrophy or directly, following periodontal, periapical or untimely extraction, resulting in the need of a complex treatment to regenerate and restore the bone architecture in order to apply dental implant therapy.

13. From a statistical point of view, the study reveals an increased incidence of lateral edentations, followed by terminal and frontal ones.

14. The increased variability of the dimensions of the remaining bone in the present research depends to a large extent on the etiology of the edentation, its age, as well as on the extractional particularities of the respective level.

15. The lack of statistical dependence relationships confirms that the width and height of the subantral remaining bone does not depend on the age or sex of the patient, as long as they are not associated with other disorders with resonance in the post-extraction bone regeneration process.

16. In many of the evaluated situations, there is a favorable width for the implant-prosthetic treatment, but with insufficient height or vice versa, which is why many of the analyzed cases (over 50%) could not be classified in the T segments.

17. Based on the amount of subantral remaining bone, for insertion of dental implants, approximately 46% of the edentulous spaces enrolled in the T segments, fulfill good conditions for implantation, falling within the first type of reference segment T1.

18. In the T2 segment, 47% of the total edentulous spaces fall, meaning that the implant can be inserted, primary stability is ensured, but bone augmentation is required.

19. Totally unfavorable situations (T3) requiring bone augmentation, sinus membrane elevation interventions and late implantation are found in 6% of cases. In all the other situations of edentulous areas that do not fit into the T segments, the subantral bone augmentation is required.

20. The most affected area that requires augmentation therapy and sinus lift surgical procedures is the one corresponding to the edentation of the first upper molar and, according to the present study, especially in quadrant 2 and especially at females.

21. Sinus pathology of odontogenic and rhinogenic origin may create difficulties in the surgical approach of the maxillary lateral area and may influence the result of the bone regeneration procedures.

22. In the present study, the majority of the patients analyzed had thickening of the sinus mucosa, which indicates diseases of the maxillary sinus, with direct implications on the success of the implant treatment. Based on the number of cases analyzed, the increased incidence of those with high mucosal thickness (over 5 mm) was identified as a major risk for implant-prosthetic treatment.

23. Partial or total opacification of the sinuses has been identified in a small number of cases. This situation must be addressed interdisciplinarly, with the need for ENT treatment. The etiology of opacification of the maxillary sinus requires a complex evaluation, in order to arrive at a correct diagnosis, which requires staging or even canceling the implant-prosthetic treatment plan.

24. The presence of the complete or incomplete sinus septum, its position and direction, modifies the surgical approach of the maxillary sinus for bone grafting, requiring a correct preoperative identification.

25. A major risk factor during surgical operations of bone augmentation is the damage of the posterior superior alveolar artery. Precise identification of the position of the artery at the side wall of the sinus conditions the placement of the osteotomy window.

26. In the present study, the medial external localization of the artery at the level of the lateral wall of the sinus was predominant over the other locations, which, from a surgical point of view, can facilitate the removal of the sinus membrane without injuring it.

27. The anatomical variations and the presence of sinus pathology in the patients who were candidates for implant treatment in this study could only be detected with the help of CBCT. Evaluation by OPG is insufficient, which may lead to the wrong therapeutic solutions, with important infectious complications and failures of implant-prosthetic therapy.

28. Due to the complexity of the area and the changes it undergoes with tooth loss, implant therapy in the lateral maxillary area requires a good training of the practitioner, a thorough control of the patient, an efficient collaboration between specializations (ENT and dentistry).

29. Preventing edentations, especially in the maxillary lateral area, should become a common wish of all dentists, and in cases where extractions are unavoidable, it is necessary to immediately establish a protocol for preserving the alveoli and performing simultaneous or early bone augmentation.

30. Dental implants are expensive medical procedures, and the results of the current study should be interpreted in the light of relatively healthy, active and good financial status patients.

31. In current practice, the implant-prosthetic treatment of the maxillary lateral area has become frequent in many dental offices, being performed by doctors with different specializations and competencies, the risk of ignoring the sinus pathology being increased and leading to the failure of the treatments, with often serious health consequences on the general health of the patient.

32. The restoration of the dento-maxillary architecture in patients with maxillary lateral and terminal edentations presenting sinus pathology requires a long period of treatment and monitoring, and the predictability of the treatments in these situations is dependent on the evolution and the complications of the associated diseases in the ENT area.

6. ORIGINALITY OF THE THESIS

1. Analyzing the previous studies comparatively, the originality of the research consists, first of all, in assessing the possibility of occurrence of odontogenic maxillary sinusitis, by analyzing each dento-periodontal element in the maxillary lateral area, depending on the type of risk and the complexity of the causality.

2. The study demonstrates the difficulty of classifying the remaining bone into standard classifications, due to the individual dimensional variability of resorption and bone atrophy, considering that over 50% of the examined cases cannot be classified in the T classification.

3. Framing edentulous spaces in selected reference segments can be a guide for practical guidance on how and when to insert the implants.

4. We have demonstrated the utility of modern 3 D radiological investigation techniques, compared to 2 D techniques, in accurately identifying anatomical variations and pathological lesions in the lateral area of the jaw.

5. Following this study, relevant peculiarities were identified with resonance in the surgical approach of the maxillary lateral area, due to the interference with both the sinus pathology and the changes of the bone support.

6. I have considered necessary to classify sinus mucosal thickening in degrees, in order to establish the risk in the surgical approach of the maxillary sinus, in case of bone augmentation and implant insertion.

7. In most specialized studies, the position of the superior alveolar artery is intraosseous. This study reveals, in a significant number of cases, its external medial position, a position that could reduce the risk of damaging it while performing the osteotomy window and sinus mucosa lifting.

8. The study demonstrates that the maxillary lateral area must be considered a "key" area in performing implant-prosthetic treatments, due to interferences with the pathology associated with the ENT sphere, which essentially modifies the therapeutic approach of the area, influencing the stages and the treatment mode. The dynamics of this area is not common to any another of the oral and-maxillofacial area.

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