

**UNIVERSITATEA DE MEDICINĂ ȘI FARMACIE
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DOMENIUL MEDICINĂ

**CURRENT ASPECTS OF ETIOLOGY AND TREATMENT
STAGES IN DENTAL RHINOSINUSITIS**

-PHD THESIS SUMMARY-

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Odontogenic maxillary sinusitis (OMS) is one of the most common types of chronic rhinosinusitis, as it is the result of pathological interactions between the adjacent dento-periodontal structures and the maxillary sinus. Of all chronic maxillary sinusitis, recent data have identified an incidence of odontogenic maxillary sinusitis up to 40%, which represents a major difference compared to 10 years ago, when the incidence was only 10-12 % (1–3). This aspect is largely due to a higher addressability of patients to the dentist, the increased number of dental procedures, but also due to the more elaborate dental techniques. In the case of chronic maxillary sinusitis, with or without extension to the other paranasal sinuses, the odontogenic origin appears in approximately 75% of the unilateral cases (4,5).

OMS requires special attention because it differs significantly from the rest of the rhinosinusal diseases, both in terms of pathophysiology and microbiology, and in terms of diagnosis and management. Although in current clinical practice, it is most often treated as a chronic rhinosinusitis, the persistence of symptoms and the appearance of complications are alarm signals that prove incorrect management and inadequate treatment (6–8).

The diagnosis may seem intuitive, consisting in the diagnosis of sinusitis and the confirmation of the dental source. However, this represents a challenge due to the need for a multidisciplinary assessment of the patient. The medical assessment of the rhinosinusitis is necessary, as well as that of the dental pathology. Since it is not differentiated by many clinical elements from rhinosinusitis of other etiology, it is possible that the dental cause is often overlooked. Similarly, in the case of a more intense dental disease, sinus involvement may be downplayed and ignored. With the diagnosis of odontogenic sinusitis, multidisciplinary collaboration must be maintained also for its treatment. This type of rhinosinusitis involves a polymodal therapy, through medicinal, surgical and last but not least, etiological treatment. It is essential to identify and treat the dental source, relieve the sinus inflammation and follow up the disease after treatment to prevent recurrences.

The idea of the present study arose from the increasingly need in the current clinical practice to manage OMS as quickly and efficiently as possible. The increase in the number of patients diagnosed with odontogenic maxillary sinusitis is most likely due to a high number of dental interventions, but the fact that dental hygiene is still deficient in our country must also be taken into account. Although it is a common pathology, there is still a general lack of information regarding the stages of diagnosis, evolution and management of this disease. In appearance, the

patient with rhinosinusal symptoms seems a relatively easy case to manage, but the underlying symptomatology can be complex and may involve a staged, multidisciplinary treatment. This aspect can be a challenge, the collaboration between doctors from different fields being most often very difficult. For optimal results, a correct and complete management, involving at least two medical specialties (ENT, dentistry), is necessary.

The aim of this study was to identify associations between the evolution of patients after treatment (ENT and/or dental) and the type of surgical procedure performed, using the SNOT-22 questionnaire and the Lund Mackay (L-M) score. The secondary objectives included the identification of demographic characteristics and comorbidities of patients diagnosed with OMS, the etiological and risk factors involved in its etiopathogenesis (the association of the etiology with the clinical and paraclinical aspects of the sinus disease), as well as the associations between the evolution of OMS and a number of demographic, clinical and paraclinical parameters. Through this study, we aim to precisely define the staging of multidisciplinary treatment and establish clear indications for the surgical treatment of OMS. This aspect could prevent unnecessary surgical interventions, thereby reducing the rate of possible complications and the cost of treatment. In addition, the results could improve the patient's quality of life.

We conducted an observational (experimental), prospective, non-randomized study on a sample of 451 patients with odontogenic maxillary sinusitis, diagnosed and treated in the Otorhinolaryngology and Cervico-Facial Surgery Department from "Saint Mary" Clinical Hospital in Bucharest. The study took place over a period of 5 years, between June 2019 and May 2024. The patients were divided into 2 groups: group A consisting of 246 patients who initially received ENT treatment and group B consisting of 205 patients who initially received dental treatment. Group B consisted of 2 subgroups: 95 patients in whom dental treatment was considered effective (group B1), and 110 patients in whom dental treatment failed and who received secondary ENT treatment (group B2).

Inclusion criteria:

- Patients diagnosed with acute or chronic odontogenic rhinosinusitis according to the clinical criteria established in the EPOS 2020 specialist guide.
- Age over 18 years;
- Lack of contraindications for surgical intervention;

- Lack of general anesthesia contraindications;
- Signed informed consent;
- Compliant patients, willing to have periodic check-ups to observe the dynamic evolution of the pathology.

Exclusion criteria:

- Patients under the age of 18;
- Patients with ongoing pregnancy;
- Patients who did not agree to a possible surgical treatment;
- Patients who did not sign the informed consent to participate in the study;
- Patients who do not comply with treatment;
- Patients with severe mental disorders;
- Patients who refused imaging investigations (computed tomography).

The evaluation of the patients included a detailed anamnesis, ENT clinical and endoscopic examination, dental evaluation, bacteriological and mycological tests, as well as imaging investigations.

From the patients' anamnesis, the following data were collected: general informations, social background, allergies, comorbidities, personal history of dental diseases and/or surgical dental interventions. At the same time, the evaluation of the patients focused on the signs and symptoms characteristic of rhinosinusitis. The latter included: pain in the projection area of the paranasal sinuses, facial pressure, nasal obstruction, anterior/posterior rhinorrhea, purulent rhinorrhea, hyposmia/anosmia, fever, headache, halitosis, fatigue, toothache, cough, otodynia/sensation of auricular pressure.

To assess the severity of rhinosinusitis symptoms before starting any treatment, participants in this study completed the SNOT-22 questionnaire. This was completed at the time of the first visit in the ENT and Cervico-Facial Surgery department, as well as 2 months after the end of the surgical treatment performed to resolve the dental/ENT pathology.

Through rhinoscopy, not only the nasal mucosa was evaluated, but also the presence of anatomical variations (nasal septum deviations, hypertrophy of the inferior nasal turbinates, pneumatization of the middle nasal turbinates) and muco-purulent secretions from the middle nasal meatus.

Endoscopic examination was performed both preoperatively and postoperatively to assess healing dynamics and the presence of possible postoperative complications (bleeding, septoturbinal synechiae, persistence of the meatotomy ostium, etc.).

Secretions were collected under endoscopic control from the middle nasal meatus or intraoperatively from the sinus cavity for bacteriological tests. This helped to identify the main bacteria (aerobic, anaerobic) that caused the appearance of the suppurative process.

To provide high-quality spatial resolution with visualization of the osteo-meatal complex and relationships to the orbit and skull base, the craniofacial CT examination was performed in all three planes (axial, coronal, and sagittal). Through the CT images, the relationships between the sinus floor and the dental roots, the degree of maxillary sinus damage, the extension of the pathology to the ipsilateral nasal sinuses, as well as the presence of oculo-orbital or intracranial complications were evaluated. In order to estimate the evolution under treatment, the craniofacial CT examination was repeated 2 months postoperatively. The extent of rhinosinusitis was assessed both preoperatively and postoperatively, using the Lund-Mackay score.

Taking into account that this pathology is found at the interface of the specialties, all 451 patients had a dental check-up during the initial evaluation.

The patients included in the study previously underwent conservative treatment with broad-spectrum antibiotics for 7 days, non-steroidal anti-inflammatory drugs for 5 days, mucolytics for 10 days, intranasal lavage with saline solutions and intranasal decongestants, without clinical response.

After the failure of conservative treatment, the patients were divided into two distinct groups, namely:

- Group A: Patients in whom, following the imaging examination, the presence of a foreign body in the maxillary sinus was detected. In their case, the next step in the treatment of sinusitis was the endoscopic sinus surgery. The surgical treatment was performed by the same ENT doctor.

- Group B: Patients in whom, following imaging investigations, only inflammation of the sinus mucosa was noted, without endosinusal foreign bodies being present. The patients in this group were referred to the dental service in order to solve the dental cause that triggered the sinus condition. All patients were evaluated and treated by the same dentist, with ENT control performed 8 weeks after the dental treatment.

In order to perform the surgical intervention, in addition to the complete ENT evaluation, the following clinical and paraclinical investigations were added: cardio-pulmonary X-ray, electrocardiogram, complete set of analyzes (blood count, coagulogram, TGO, TGP, uric acid, blood glucose concentration, C-Reactive Protein Test, ESH, fibrinogen), ATI consult for general anesthesia, skin testing for antibiotic therapy and anesthetic substances. The length of hospitalization was around 24-48 hours, excepting the cases that needed an externally surgical approach. In the case of patients with multiple comorbidities, upon the recommendation of the anesthesiologist, the investigations were supplemented with various specialist evaluations (cardiology, pulmonology, nutritional diseases and diabetes, etc.), which led to an increase in the hospitalization period.

Depending on the type and size of the intrasinus foreign bodies, on the local anatomical variants (deviations of the nasal septum, hypertrophy of the inferior or middle nasal turbinates, the presence of inflammatory polyps located at the level of the middle nasal meatus) and on the damage to the adjacent structures (ethmoid sinus, frontal sinus, orbit), cranial fossa), the optimal method of surgical approach was chosen in order to solve the rhinosinus pathology. For patients with complicated OMS by ophthalmological involvement, additional specialist evaluations were performed (clinical ophthalmological examination, microbiological and additional imaging investigations). Treatment of oculo-orbital complications included empiric parenteral antibiotic therapy, as well as supportive treatment consisting of systemic and/or local steroid anti-inflammatory and anticoagulant medication to avoid thrombotic complications. In the second stage of the treatment, the surgical cure of the complication was performed (if necessary) simultaneously with the endoscopic approach to the affected sinuses.

During the postoperative control carried out at 8 weeks, the following aspects were observed: re-evaluation of symptoms (through the SNOT 22 questionnaire), video-endoscopic control (to assess the stage of healing and the presence of possible postoperative complications, imaging re-evaluation (control craniofacial CT). After performing this control, the patients in group B were divided into 2 subgroups:

- Group B1 - patients with clinical examination and paraclinical investigations within normal limits after dental treatment. They did not require additional treatments.
- Group B2 - patients in whom the infectious-inflammatory sinus pathology persisted or even worsened. In these cases, the next stage was the endoscopic rhinosinus

surgical treatment (performed by the same doctor who performed the procedure for patients in group A). The following postoperative controls were at 2, 4 and 8 weeks.

The R program, version 4.4.0 Copyright (C) 2024 The R Foundation for Statistical Computing, R Core Team (2024) was used for the statistical analysis of the collected data. A: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org>. The following additional packages were used: gtsummary, lme4, lmerTest

The first chapter of personal contributions focused on the statistical analysis of the patients included in the study from the point of view of standard parameters (age, sex, background, comorbidities). Thus, in the study it was observed that the age of the patients was between 24 and 78 years old, most of them being between 41-50 years old (27.49%). From the point of view of gender distribution, it was noted that this pathology was more frequent among women (51.66%). Regarding the subject's environment of origin (rural or urban), a higher frequency of this pathology was noted in urban patients (73.39%). Present comorbidities included: obesity, hypertension, diabetes, and atrial fibrillation. Data analysis revealed obesity (41.59%) as the most common comorbidity found in this study.

In the second chapter of personal contributions, the variety of etiological factors involved in the occurrence of SMO was analyzed, with the following objectives:

- identification of the most frequent etiological factors involved in the occurrence of OMS;
- identification of the types of foreign bodies present in the maxillary sinus;
- identification of the most frequently involved teeth in the development of sinus diseases;
- correlations between the intensity of the signs and symptoms of OMS and the dental pathology;
- correlations between imaging changes identified in the paranasal sinuses and the dental pathology;
- correlations between the etiology of OMS and the identified microorganisms.

The conducted study identified two major categories of causes that led to the development of odontogenic sinusitis. The first category was represented by intrasinus foreign bodies (54.54%) which led to the development of local inflammation and later to the colonization with various

microorganisms, and the second category consisted of infectious apical pathologies (45.46%), which by contiguity led to sinus damage. Regarding the intrasinusal foreign bodies, the presence of root filling material was most frequently identified (44.72%). In terms of frequency, it was followed by: implant screws (24.39%), bone grafting material (24.39%), tooth fragments (4.06%), gutta-percha cones (1.22%), Kerr needles (0.81%) and dental bur (0.40%). Among the patients with infectious-inflammatory dental pathologies, an increased frequency of apical periodontitis was noted (50.73%). They were followed by radicular cysts (21.95%), apical granulomas (16.10%), dental caries (9.75%) and radicular abscesses (1.46%). Further in this chapter, the teeth involved in the development of odontogenic maxillary sinusitis were analyzed. From the centralization of the data, it was found that the first molar was the tooth most frequently involved in the occurrence of SMO (47.45%), followed by the second molar, (28.16%) and the second premolar (17.29 %). It was noted that only a small proportion of patients had involvement of the third molar (3.54%), first premolar (3.10%) or canines (0.44%). The aspects regarding the impact on the patients' quality of life were analyzed by correlating the data obtained after the patient completed the SNOT-22 questionnaire with the etiology of OMS. The aspects regarding the impact on the patients' quality of life were analyzed by correlating the data obtained after the patient completed the SNOT-22 questionnaire with the etiology of sinusitis. It was found that, overall, the SNOT-22 score had a mean value of 20. Regarding the separate analysis of the two groups of patients, a mean value of 23 in the SNOT-22 score for group A is noteworthy, compared to group B whose average value was 15 (p -value <0.001). This proved a greater impact of symptomatology for patients with intrasinusally migrated foreign bodies. At the same time, in this chapter the average L-M scores of the two groups of patients were compared, highlighting that its average value was 3.41 for patients with foreign bodies in the maxillary sinus (group A), while patients with pathology dento-alveolar (group B) had an average L-M score of 2.50. Analyzing the data regarding the infectious-inflammatory damage at the level of the maxillary sinus, it was observed that the intrasinusal presence of the root filling material produced, in addition to the local inflammatory changes present in all patients, the development of fungal colonies in 62.72% of them. Subjects diagnosed with apical periodontitis, in addition to local inflammation, presented bacterial infections in 74.03% of cases, while mixed infections were noted in 9.61% of patients.

In the last chapter of this doctoral study, we followed the evolution of patients after treatment (ENT and/or dental) from a clinical point of view with the help of the SNOT-22

questionnaire and paraclinically with the Lund Mackay imaging score, as well as the type of surgical procedure performed. Therefore, the objectives pursued in this chapter included:

- identification of the optimal surgical approach depending on the intrasinus foreign body and the extension of the pathology;
- identification of dental pathologies whose dental treatment must be completed with ENT surgical treatment;
- evaluation of treatment efficiency through subjective scores (SNOT 22) and paraclinical investigations (craniofacial CT);
- identification of some associations between the evolution of patients with OMS, and a series of demographic, clinical and paraclinical parameters, considered important and followed in the study;
- identification of complications associated with OMS and the particularities regarding their management.

The first thing analyzed in this chapter is the type of surgical approach performed. From the total of patients included in group A (patients who presented intrasinus foreign bodies), 88.62% of them underwent antrostomy, 10.16% of patients underwent lower meatotomy, while only 1.22% of patients underwent external surgical intervention (at the level of the canine fossa). Regarding group B (patients with dento-alveolar pathology), only 46.34% were declared cured following somatological treatment. The remaining 53.66% patients required endoscopic surgery to treat rhinosinusitis disorders. Patients treated surgically were treated exclusively by endoscopic approach. Also, in this study it is noted that 83.65% of patients diagnosed with apical periodontitis required ENT surgical treatment. complementary. From the point of view of symptomatology, patients in group A preoperatively presented an average value of the SNOT-22 score of 23.48, while postoperatively the average value was 5.27. Thus, the postoperative SNOT-22 score (ORL) was 18 points lower than the preoperative one, with an improvement in the patients' condition after the application of endoscopic surgical treatment ($p < 0.001$). The global analysis of group B of patients revealed that they had an increase in the postprocedural SNOT-22 score. The initial mean value was 15.45, and at the second visit, it increased to 22.25, showing a worsening of the patients' condition after dental treatment ($p < 0.001$). It is interesting to note that the initial average value of the SNOT-22 score in the case of patients in group B was significantly lower compared to the

average values recorded for those in group A. However, a percentage of 46.34% of patients initially treated dentally (group B1), reported an improvement in symptoms, with a decrease in SNOT-22 from an initial mean value of 16.36, to 3.98 postprocedurally ($p < 0.001$). Regarding the L-M imaging score, patient group A had an initial mean L-M score of 3, while after surgical treatment the O.R.L. it decreased to 0 ($p < 0.001$). For the patients in group B, however, a global increase in the mean imaging scores was observed after the dental treatment (mean value 5), compared to the initial ones (mean value 2), with a worsening of the imaging changes ($p < 0.001$). However, the imaging evolution of those treated dentally was much different. Those who presented symptomatology resolution after dental therapy (group B1), had a median L-M score 2 points lower than the initial one. On the other hand, for patients in group B2, the imaging evolution after the dental treatment was unfavorable, through a worsening of the sinus pathology proven by a difference of 4 points between the L-M scores recorded pre and postprocedurally. These variations in imaging changes reinforce the idea that most OMS can't be solved by dental treatment alone, requiring the clinician's guidance on the most efficient management of the pathology. The choice of treatment method should be chosen according to the severity of the sinus involvement both from a clinical and paraclinical point of view. Next, it was highlighted that there are certain demographic, clinical or paraclinical factors that could influence the evolution of the disease. In the first stage, the influence of demographic factors and comorbidities on the evolution of OMS was analyzed. This was quantified by the SNOT-22 score and the L-M imaging score. The results showed that older age is associated with higher SNOT-22 scores and more severe progression, with each year added to age leading to an increase in SNOT-22 by 0.12 points. Another parameter associated with higher SNOT-22 scores was female sex. It was interesting to observe that, in the context of patients without diabetes, the SNOT-22 scores are, on average, 5.6 points higher, showing a more noisy pathology in the case of these patients. This may be due to the lower sensitivity of diabetic patients who associate neuropathies. In the context of diabetes, the severity of symptoms can often be masked. Similar results were obtained when evaluating the evolution of SMO by the L-M score. Female patients showed a 26% increase and those without diabetes a 70% increase in mean L-M score. The analysis regarding the influence of etiology on the course of OMS did not show statistical significance in terms of the SNOT-22 score, but the data showed that in patients without apical periodontitis, there is a halving of the mean L-M score. This aspect supports other studies that have shown that thickening of the sinus mucosa is more likely in the

presence of apical periodontitis (9). Data regarding the evolution of SMO according to complications, particular anatomical aspects and the type of infections developed were also analyzed. Thus, it was revealed that for patients without oculo-orbital complications, the SNOT-22 values were, on average, 18 points lower and that there was a decrease of more than half of the mean L-M score. For those with septal deviation, the mean SNOT-22 was 3.5 points higher and the imaging score increased by approximately 30%. Regarding the association of nasal polyposis, there was a 22% decrease in imaging score. The presence of bacterial infections resulted in a 12-point increase in the mean SNOT-22 score. Additionally, in those without bacterial infections, there was a 58% decrease in mean L-M score. The study also followed the influence of affected teeth on the evolution of OMS, quantified by imaging. Compared to patients with canine or premolar involvement, in those with molar involvement, the imaging changes were more important. In the case of M1 involvement, the mean L-M score was 81% higher, in those with M2 involvement 92% higher, while in those with M3 involvement it was 77% higher. These results are consistent with the anatomical relationships between the maxillary tooth roots and the sinus floor. Closest to this is the root of the second molar, showing a distance of approximately 1.97 mm. It is followed by the root of the first and third molar (10). Analysis of data on the influence of types of intrasinus foreign bodies on the evolution of sinus pathology, revealed an influence of the presence of root filling material, implant screws and other materials such as gutta-percha cones, dental burs and Kerr needles. These types of intrasinusally penetrated materials most often cause an important chronic inflammatory response in the sinus mucosa, leading to significant imaging changes. At the same time, regarding the type of surgical intervention, the results showed that for patients in whom antrostomy was not performed, the average L-M score was almost 2 times lower. The result obtained may be due to the fact that, within the antrostomy, both the release of the middle nasal meatus (in the case of the existence of nasal polyps) and the surgical cure of the ethmoid and frontal sinuses, if necessary, are performed. This aspect would therefore imply a higher L-M score for sinusitis.

The most common complications of OMS found in this study were oculo-orbital complications. There was only one case of osteomyelitis associated with sinusitis secondary to intrasinusally migrated bone graft material. From a demographic point of view, men were most frequently affected (73.8%), women representing a percentage of only 26.2%. Regarding the type of oculo-orbital involvement, the most common complication was preseptal cellulitis (47.62%), followed

by orbital cellulitis (26.19%), subperiosteal abscess (19.04%) and orbital abscesses (7.14%). Most patients with complicated OMS were diagnosed with apical periodontitis (54.76%). The following dental causes associated with oculo-orbital complications were represented by intrasinus migrated bone addition material (30.95%), dental caries (9.52%) and dental abscesses (4.77%). Next, it was noted that the main affected teeth in the case of complicated OMS are the molars (M1 in 69.06% of cases and M2 in 16.66% of cases). Only a small part of the patients who presented ophthalmological complications required decompression of the orbit. Endoscopic surgical treatment of the affected sinuses associated with conservative treatment (antibiotic and anti-inflammatory) administered intravenously, was effective in patients with preseptal and orbital cellulitis. For patients who presented subperiosteal or orbital abscesses, it was necessary to drain them under endoscopic control.

CONCLUSIONS

1. Odontogenic maxillary sinusitis is a particular clinical entity with dental origin etiology and special evolutionary aspects.
2. The etiology of this condition is generally represented by dental iatrogenes and apical infectious pathology.
3. The exponential increase in dental procedures such as dento-alveolar or implantological surgery, has determined the increase in the frequency of odontogenic maxillary sinusitis. Root canal filling paste, implant screws, bone grafting material, gutta-percha cones and endosinusally migrated root debris are the most common causes of foreign body sinus pathology.
4. Dental infections can also be a cause of sinus involvement, spreading via vascular or contiguity. Apical periodontitis (50.73%), radicular cysts (21.95%) and apical granulomas (16.10%) are among the most common infectious-inflammatory dental pathologies underlying the development of sinusitis.
5. The anatomical aspects regarding the close relationships of the dental roots with the sinus floor facilitate the expansion of infectious-inflammatory processes and the development of OMS. The most frequently affected teeth were the first molar (47.45%), the second molar (28.16%) and the second premolar (17.29%). Third molar (3.54%), first premolar (3.10%) and canine (0.44%) were less frequently involved.
6. Following the intensity of the symptomatology expressed by the SNOT-22 score in relation to the dental origin that led to the development of the sinus pathology, its highest value was associated with the bone addition material, followed by intrasinusally migrated dental fragments. They produce an important inflammatory response in the sinus mucosa, having a direct proportional impact on the symptoms.
7. In many cases, the symptomatology of sinus conditions does not correlate with the changes identified in the acquired CT images. However, the present study highlights that the most important imaging changes quantified by the Lund Mackay score were associated with bony attachment material, followed by intrasinusally migrated tooth fragments and dental paste. These aspects were similar to those found in the context of correlations between the SNOT-22 score and dental etiology.
8. Regarding the type of endosinus infection, bone grafting material and implant screws are associated with fungal infections, root canal filling paste with fungal aspergillar infections, and

other types of foreign bodies (dental burs, kerr needles , dental fragments), determined only inflammatory changes in the sinus mucosa.

9. The treatment of odontogenic maxillary sinusitis is complex, interdisciplinary and aims the extraction of the foreign body, the resolution of the sinusitis as well as the associated dental cause.

10. Functional endoscopic surgery is the method of choice in the treatment of sinus conditions. The external approach was necessary in only 1.22% of cases, being used in the context of large foreign bodies (dental fragments migrated intrasinusally).

11. The optimal therapeutic strategy consists of combined treatment (medical, dental and ENT treatment). Treating only the dental cause is insufficient for the majority of cases. 83.65% of the patients diagnosed with apical periodontitis needed complementary surgical ENT treatment.

12. Patients initially treated with endoscopic sinus surgery showed favorable outcomes, with a significant decrease in SNOT-22 and post-procedural L-M score. Conversely, dentally treated subjects generally showed worsening of these scores, with the vast majority subsequently requiring sinus surgery.

13. Oculo-orbital complications also had a significant influence on the course of the disease. In patients without oculo-orbital complications, the SNOT-22 values were, on average, 18 points lower and there was a decrease of more than half of the average L-M score. Other aspects pursued in the doctoral study were the influence of bacterial infections on the course of the disease. The analyzed data showed a 58% decrease in the imaging score for patients who did not experience infections of this type.

14. The present study highlighted the efficiency of the antrostomy in patients with important imaging changes, respectively high L-M scores. The obtained results showed that the patients surgically treated by this method presented an average L-M score approximately 2 times higher than those who underwent other types of endoscopic approaches.

Personal contributions

By conducting this doctoral study on a significant group of patients diagnosed with OMS, the following aspects regarding the etiology of this condition were identified:

1. The two large categories of patients who presented OMS - apical infections and dental iatrogens (chapter VII.2 paragraph 1);

2. The most frequent intrasinus migrated foreign bodies, as well as the main dento-alveolar pathologies involved in the development of SMO (chapter VII.2 paragraph 1 and 2);
3. The teeth most frequently involved in the occurrence of dental sinusitis (chapter VII.2 paragraph 3);
4. Inflammatory and/or infectious changes resulting from sinus damage (chapter VII.2 paragraph 9).

Regarding the treatment and management of OMS complications:

1. We have identified the optimal type of surgical treatment (VIII.2 paragraph 1);
2. Using the SNOT-22 score, we quantified and compared the impact of symptoms on patients diagnosed with OMS, both preoperatively and postoperatively (VIII.2 paragraph 6)
3. With the help of the Lund-Mackay score, we quantified and compared the imaging changes at the sinus level, before and after the surgical treatment (VIII.2 paragraph 11)
4. We identified the main comorbidities that had a negative impact on the evolution of the disease (VIII.2 paragraphs 19 - 23)
5. Through the SNOT-22 score and the Lund-Mackay imaging score, we identified associations between the evolution of patients with OMS and a number of demographic, clinical and paraclinical parameters, considered important and monitored in the study (VIII.2 paragraphs 19 – 33)
6. We demonstrated that, in the case of OMS, dental treatment is in most cases insufficient for the complete treatment of this pathology (VIII.2 paragraph 2)
7. We identified the most common dental pathologies that led to the development of oculo-orbital type complications (VIII.2 paragraph 30)

In conclusion, I would like to emphasize that odontogenic maxillary sinusitis, frequently encountered in the current clinical practice, represents a complex pathology whose management requires a multidisciplinary collaboration and an individualization of the therapeutic plan. Through this study, we aimed to establish the therapeutic stages and outline the indications for the surgical treatment of patients with this condition, aspects that could be the basis for the development of a treatment protocol. Thus, once the diagnosis of dental sinusitis has been established, the appropriate treatment can be quickly instituted, reducing the rate of possible complications and additional costs.

List of published scientific papers

Articles published in specialized journals

1. **Mihai-Alexandru Preda**, Codruț Sarafoleanu, Gabriela Cornelia Mușat, Andreea-Alexandra Preda, Lupoi Daniel, Ramona Barac, Monica Pop. „Management of oculo-orbital complications of odontogenic sinusitis in adults” Romanian Journal of Ophthalmology, Volume 68, Issue 1, January-March 2024. pp 45-52; *BDI Pubmed*
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2. **Mihai-Alexandru Preda**, Gabriela Mușat, Codruț Sarafoleanu „Surgical Endoscopic Treatment Of Odontogenic Sinusitis” Chirurgia-Official journal of the Romanian Society of Surgery, Volume 119, Issue 1, January-February 2024. pp 76-86, *ISI Pubmed F.I. 0.6*
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3. **Mihai-Alexandru Preda**, Ovidiu Mușat, Caius Codruț Sarafoleanu, Ioana Stella Popescu, Andreea Mușat, Ruxandra Pîrvulescu, Ramona Barac, Cătălin Petru Tătaru, Gabriela Cornelia Mușat. „Oculo-orbital complications of odontogenic sinusitis” Romanian Journal of Ophthalmology, Volume 67, Issue 2, April-June2023. pp 175-179; *BDI Pubmed*
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