Doctoral School in Medical Sciences

With the title of the manuscript
CZU: 616.716.1-007.2-07-084(043.2)

SABINA CALFA

DIAGNOSIS AND PREVENTIVE TREATMENTS IN SUPERIOR JAW COMPRESSION SYNDROME

SPECIALTY 323.01 – STOMATOLOGY

Doctor of Medical Sciences Dissertation Summary

Chisinau, 2024

The thesis was developed within the Department of Orthodontics of the "Nicolae Testemițanu" State University of Medicine and Pharmacy.

Drivers:
Lupan Ion, dr. hab. șt. med., prof. univ., m.c. al AȘM
Trifan Valentina, dr. șt. med., conf. univ. _____

Members of the guidance committee:
Gheorghe Mihailovici, dr. șt. med., conf. univ. _____
Maniuc Mihail, dr. hab. șt. med., prof. univ. _____

The presentation will take place on November 6, 2024, at 2:00 p.m. in the premises of USMF "Nicolae Testemițanu", bd. Ștefan cel Mare și Sfânt, 165, office 204 in the meeting of the Commission for public support of the doctoral thesis, approved by the decision of the Scientific Council of the Consortium of 26.08.2024 (report no. 17).

Composition of the Commission for public support of the doctoral thesis:
President:
Ciobanu Sergiu, dr. hab. șt. med., conf. univ. _____
Secretary:
Spinei Aurelia, dr. hab. st. med., conf. univ. _____
Members:
Aunt Diana, dr. hab. st. med., conf. univ. _____
Trifan Valentina, dr. hab. st. med., conf. univ. _____

Official reviewers:
Maniuc Mihail, dr. hab. șt. med., prof. univ. _____
Zetu Irina, dr. hab. șt. med., prof. univ. _____
Cirimpei Vasile, dr. șt. med. _____

Author:
Calfa Sabina _____

Content

INTRODUCTION

Timeliness and importance of the problem addressed.

In previous studies, carried out in the field of orthodontics, AnDM are characterized as primary or acquired growth and development disorders of the dental system or maxillary bone bases, which causes major imbalances in the dento-alveolar and occlusal arches[1]. Maxillary compression syndrome (MCS) is manifested by the transverse and sagittal discrepancy in the volume of the upper and lower jaw, which induces AnDM, masticatory muscle damage and major changes in craniofacial structure. At the basis of the many studies focused on MCS are various disorders of the development of the stomatognathic system, deviations from the norm that ultimately create a specific clinical and paraclinical picture[2].

According to the data of the World Health Organization, AnDM has the third place in frequency after carious diseases of the oral cavity. The index of the population affected by AnDM is highly prevalent in various varieties of dentition. The epidemiological study carried out by several authors from different countries demonstrates that AnDM are increasing and can be detected in different age periods. From the world literary sources it was found that the index of the population affected by AnDM varies depending on the dentition: in the temporary dentition it varies: Germany - 50.2%, Canada - 66.1%, Russia - 24%, Romania - 40%. The prevalence index of AnDM in mixed dentition also shows large variations: Great Britain – 37.5%, India – 38.9%, Russia – 49%, Romania – 75%[1,3,4]. Based on the epidemiological study of dento-maxillary anomalies, carried out in the Republic of Moldova, the incidence of upper jaw compression was determined to be 17.7±0.92%[1].

Compression of the upper jaw is one of the common pathologies, both as an independent malocclusion and as a component element of a basic dento-maxillary anomaly[5]. Over the years, dento-maxillary anomalies and their associated conditions, demand study attention. Research has shown that not only the incidence of AnDM, including maxillary compression, but also the frequency of marginal periodontal disease is increasing, especially in children and young adults[6,7].

Growth and development of the structural components of the dento-maxillary apparatus occur both in prenatal and postnatal ontogeny. The ones noted, in particular, refer to the dental arches. The growth and development of the maxillofacial structures occurs under the influence of hereditary factors, environmental factors and combined factors. The process of growth and development of the jaws, including the dental arches, evolves unevenly over time with accelerations and decelerations and is influenced by the structural and functional state of other bone parts in the facial area[8].

The tendency to increase the frequency of AnDM, described by many authors, shows variations from one community to another. Similarly, in the Republic of Moldova, the prevalence of AnDM in adolescents aged 16-17 years was determined at a rate of 25.2%±0.4%[9].

MCS is characterized by compression in the lateral region with protrusion of the upper block of teeth, modification of the hard palate, transverse and sagittal discrepancy in the volume of the upper and lower jaw, which can lead to AnDM, damage to the masticatory muscles and major changes in the craniofacial structure with the nasal cavity and narrowed alar bony base[10,11,12]. Clinical manifestations in children with MCS are associated with various disorders of both the upper respiratory tract and the neuromuscular system. The study of the clinical manifestations of

the shape of the palatal suture is current and requires a detailed study to prevent transverse developmental deficiency. CMS negatively affects the periodontal tissues through: incorrect position of the tooth in the arch (aka, dento-maxillary anomalies), dental calculus, occlusal trauma, the insertion site and shape of the labial frenulum, carious cavities and incorrect coronal restorations, oral breathing. At the same time, dento-maxillary anomalies have a negative effect on the masticatory apparatus. Poor oral hygiene also worsens the development of AnDM[13,14,15].

The diagnostic methods are well known, but the influence of the shape of the palatal suture on the development stage of the upper jaw in the transverse sense is insufficiently elucidated in the specialized literary sources. The diagnosis of MCS has a direct impact on the median palatine suture, along with the hard palate, maxilla, mandible, TMJ[16]. As reported by V. Burlui, C. Morărașu, the stomatognathic system performs a series of complex functions both at the microsystem and at the macrosystem level[17]. For example, the mandible has specific functions: mastication, phonation, swallowing, physiognomic function, self-maintenance, etc. for the realization of these functions, it is equipped with mobilizing, oro-facial muscles, as well as many others[18]. The growth of the upper arch in children takes place until the age of about 9 years. The presence of the medio-palatine suture favors the development of the upper dental arch. In this sense, the mandibular arch has another development mechanism, namely the periosteal one[19]. Often, AnDM is associated in 20-50% of cases with periodontal diseases and possibly orthodontic therapy needs to be combined with periodontal therapy[6,13,15,20]. In conclusion, prophylaxis and interceptive therapy programs are included in MCS orthodontic assistance.

Based on the specialized literature, the importance of studying MCS through high-precision methods such as densitometry of the palatal suture has been demonstrated. The increase in the frequency of AnDM, the increased addressability, the incidence of associated diseases of the upper respiratory tract, lead to the importance of studying the development deficiency of the upper jaw in patients with AnDM.

The increase in the frequency of AnDM, the increased addressability of patients for orthodontic treatment argues the actuality of the problem addressed and the importance of researching the shape of the median suture of the upper jaw, which leads to some premises for the prevention of jaw compression, for the improvement and personalization of effective orthodontic assistance.

The purpose of the research: Evaluation of diagnostic methods and identification of means of prevention in upper jaw compression syndrome.

Research objectives:

1. Determination of predisposing factors and incidence of maxillary compression syndrome.
2. Comparative analysis of clinical parameters,anthropometric, biometric, cephalometric and imaging indices in patients with maxillary compression.
3. Development of a clinical algorithm for the diagnosis and prevention of upper jaw compression syndrome depending on the dentition.
4. Charting preventive measures in upper jaw compression syndrome to improve quality of life.

Research hypothesis. Improving diagnosis based on clinical, anthropometric, biometric and imaging indices in upper jaw compression syndrome by developing the algorithm and means of prevention.

Scientific research methodology. The comparative analysis of bibliographic sources was the premise for the development of the diagnosis and prevention algorithm of upper jaw compression syndrome. In our research, the study is descriptive and 165 patients aged between 6-18 years were included, the average age being 13.2±0.23 years and the median – 13 years. Among the people included in the study were 104 girls and 61 boys with maxillary compression. Respectively, the patients were assigned to 2 groups, of which group 2 was divided into subgroups: Group 2(1) and Group 2(2).

Scientific novelty and originality.

- ✓ Determination of predisposing factors and correlative analysis of maxillary compression associated with AnDM.
- ✓ Analysis of clinical-anthropometric parameters in patients with upper jaw compression syndrome in association with other AnDM.
- ✓ Comparative evaluation of the degree of ossification of the median palatine suture, based on clinical, imaging and bone density parameters in patients with jaw compression.
- ✓ Elaboration of the diagnostic and prevention algorithm in patients presenting with compression syndrome of the upper jaw with associated conditions. Its application aims at selecting the effective method of treatment, reducing the risks of relapse and drawing practical recommendations depending on the dentition.
- ✓ The identification of vicious habits as factors in the occurrence of AnDM, represents the first and one of the most important steps in the prevention and treatment of occlusal pathology in upper jaw compression syndrome.

Applicative value of the work:

Based on the research objectives, the diagnosis and preventive measures in upper jaw compression syndrome, associated with functional disorders, require individual planning.

The early detection of upper jaw compression syndrome for different age groups allows the development of preventive measures that will contribute to the optimization of orthodontic treatment and ensure the stability of the orthodontic results obtained.

Implementation of scientific results: The results were implemented in the research process in the clinical and methodological activity at the Department of Orthodontics of IP USMF "Nicolae Testemițanu" and in the dental clinic "Calfa Dent SRL".

Approval of thesis results:

The results of the thesis were elucidated and presented at national conferences and congresses: the Congress devoted to the 75th anniversary of the founding of the Nicolae Testemițanu State University of Medicine and Pharmacy, October 21-23, 2020; The Medespera Congress, the 9th edition which took place between 12-14 May 2022; The conference dedicated to the days of the State University of Medicine and Pharmacy "Nicolae Testemițanu"; Biomedical and Health Research: Quality, Excellence and Performance, 18-23 October 2023; Balkan Medical Union which took place between June 7-9, 2023, Chisinau; The annual scientific conference dedicated to the 90th anniversary of the birth of the illustrious doctor and scientist Nicolae Testemițanu, October 16-20, 2017; The annual scientific conference dedicated to the 91st anniversary of the birth of the illustrious doctor and scientist Nicolae Testemițanu, 2018; Annual Scientific Conference Research in Biomedicine and Health: Quality, Excellence and Performance. October

19-20, 2022; Excellence in orthodontics - vision for the future, May 24-26, 2018, Iasi; The 18th edition of the Days of the Faculty of Dental Medicine. 30 years of pediatric dentistry, Iasi; The 6th International Congress of the Romanian Dental Association for education. Performance versus malpractice in current medical practice. Iasi, Romania 2014; USMF annual scientific conference "Nicolae Testemițanu", 2018.

The approval of the thesis theme took place during the meeting of the Scientific Council of Profile 323.01 Dentistry on 11.01.2017 (minute no. 1). Favorable opinion of 27.12.2016 no. 41 and the Research Protocol on the theme of the completed thesis, approved by the Research Ethics Committee of USMF "Nicolae Testemițanu".

The volume and structure of the thesis:

The volume and structure of the thesis is presented on 108 pages of basic text, processed and consists of: list of abbreviations, introduction, 4 chapters, general conclusions, practical recommendations, 108 bibliographic sources, illustrative material includes: 5 annexes, 58 figures, 32 tables.

Keywords:dento-maxillary anomaly, palatal suture, upper jaw compression syndrome, correlative analysis, densitometry.

1. THE DIAGNOSTIC CONCEPT OF UPPER JAW COMPRESSION SYNDROME

Determination of intermaxillary relations, analysis of predisposing factors allow identification and diagnosis of upper jaw compression syndrome for further planning of orthodontic treatment. The early detection of risk factors in the occurrence of CMS and the interdisciplinary approach contribute to ensuring the stability of the treatment. Cooperation with the otorhinolaryngologist allows us to determine abnormalities of the upper respiratory tract that would influence the harmonious development of the facial skull. Contemporary diagnostic methods allow us to establish the anatomical-morphological age peculiarities of the median palatal suture in children, facilitating the analysis of the degree of maturation and selection of the method of expansion of the upper jaw. The multitude of clinical and paraclinical methods, such as objective examination, radiographic evaluation, computer imaging, model study and rhinomanometry provide the opportunity to create an individualized treatment tactic with a high success rate. The variety of orthodontic means for the treatment of CMS are selected according to certain principles: age, severity of the case and the relationship to the adjacent anatomical structures.

Estimating the possibilities of prevention and treatment allows ensuring a development of the stomatognathic system according to age and in accordance with the norm, reducing the occurrence of other concomitant anomalies.

2. MATERIAL AND RESEARCH METHODS

2.1 The general characteristic of the research

The study was carried out within the Department of Orthodontics of USMF "Nicolae Testemițanu" and the dental clinic "CalfaDent" in the period 2016-2022. 165 patients aged between 6-18 years were included in the study, the average age being 13.2±0.23 years and the median – 13 years. Among the people included in the study were 104 (63.0%;95% CI [55.8-70.3])girls and 61 (37.0%; 95% CI [29.7-44.2])boys with upper jaw compression. Respectively,

the patients were divided into 2 groups, of which group 2 was divided into subgroups: Group 2(1) and Group 2(2).

The representative research sample was calculated in the ANOVA Program: fixed effects, omnibus, one-way Analysis based on the following parameters: the confidence interval for 95.0% significance of the results, the statistical power – of 80.0%, the resulting difference between the batches up to 25.0% (f=0.25), adjusting for the estimated non-response rate of 10.0%.

Batch 1 - control group - consisting of 55 patients with upper jaw compression with Angle class I malocclusion, with an average age of 13.1±0.48 years.

Batch 2(1) - research - consisting of 78 patients with upper jaw compression with Class II/1 Angle malocclusion, associated with ENT diseases, with an average age of 13.0±0.30 years.

Batch 2(2) - research - consisting of 32 patients with upper jaw compression with clinical manifestation of class II/2 Angle malocclusion, with an average age of 13.5±0.51 years.

*Inclusion criteria:*patients with compression of the upper jaw during the period of mixed dentition and permanent dentition, patients with chronic and recurrent ENT diseases, vicious habits, subjects of both sexes, both from urban and rural environments, patients aged between 6-18 years, patients living on the territory of the Republic of Moldova, the informed consent of the parents to participate in the study.

*Exclusion criteria:*congenital craniofacial malformations, skeletal facial asymmetries, TMJ dysfunction, severe degree, adult patients, refusal of parents and/or children to participate in the study.

2.2 Methods of examination and investigation

All study respondents L1 and L2(1), L2(2) were examined clinically and paraclinically, medical records were used.

The subjective clinical examination was based on the patient's assessment (stature, posture, psychosomatic development, constitutional type), the patient's data, the motivation for addressing the orthodontist (aesthetic, phonetic, respiratory disorders, mastication), concomitant diseases (especially ENT diseases), history of the disease current, heredo-collateral and personal, dental antecedents.

The objective clinical examination included craniofacial and endooral examination, performed on the basis of inspection, palpation and auscultation.

The endooral examination included the inspection of the mucosa of the oral cavity and the elements of the stomatognathic system (the shape of the dento-alveolar arches, the type of occlusion, the shape of the palatine vault and the palatine torus, the insertion of the frenulum, the state of the periodontium and the inspection of the tongue).

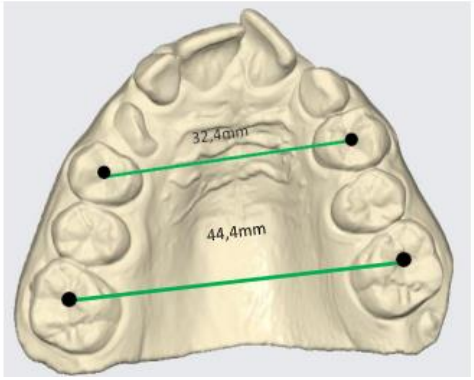
Also, performing functional tests by inspecting periorial muscle tonicity (tone of the internal and external bundle of the orbicularis oris m., examination of respiratory function and determination of respiratory type).

Examination of the tongue (shape, volume, tonicity, position during speech) and the type of swallowing, unconscious and commanded, and the contraction of the m. Temporalis during the act of swallowing.

The clinical examination was completed by the paraclinical one: model study according to Pont, Korkhaus, Schwartz, Nance, OPG, profile teleradiography, computed tomography.

Pont:IP= $\frac{SI*100}{80}$**;**IM= $\frac{SI*100}{64}$ (1)

Korkhaus: $LPsc = IPm / 2;\ LMsc = SI * 0{,}83;\ LPim = LPsc - 2\,mm;$ (2)
$LMic = LMsm - 4\,mm$

a) 

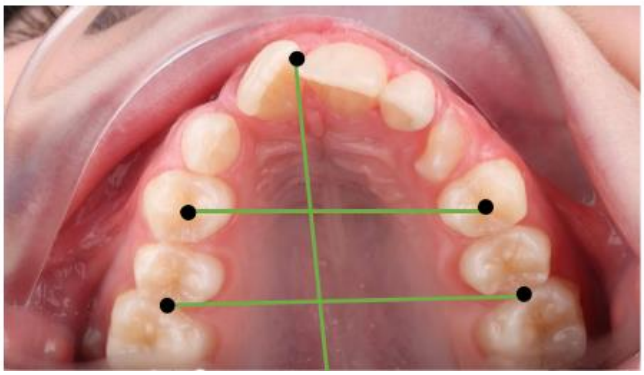
b) 

Figure 1. **Analysis of the study model a) Pont Index, b) Korkhaus Index**

The Pont index gives us the appreciation of the dimensions of the dental arches in the transverse plane with the determination of the type of narrowed or widened arch. The interpretation of the Korkhaus Index shows the shortening or lengthening of the arches at the anterior and posterior level.

The variety of cephalometric study methods: Steiner, Tweed-Marrielield and Ricketts, for each batch studied, presents differences according to the underlying pathology.

The cephalometric analysis according to Steiner creates an image about the development of ApDM, the therapeutic purpose of this analysis is the assessment of the ANB angle and the position of the incisor relative to the facial plane - "N" - "Po" and the assessment of the type of profile. The value of the ANB angle is decisive for establishing the diagnosis with subsequent treatment planning.

For class I skeletal occlusion (Batch 1) it corresponds to an ANB angle of +2°, the norm being between 0 - 4° (Figure 2). This value represents the difference between the angle of SNA and SNB, the gap between the maxillary base and the mandibular base.

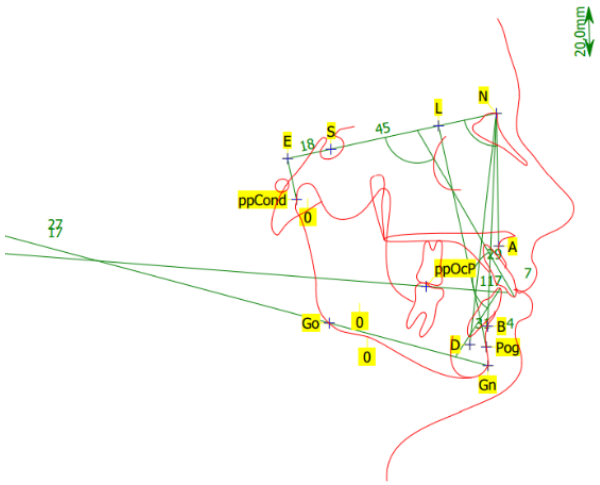


Figure 2. **Determination of the angular value of ANB in class I skeletal occlusion**

For class II skeletal occlusion (Lot 2(1) and Lot 2(2)), the ANB angle has a value above 4.5° (Figure 3).

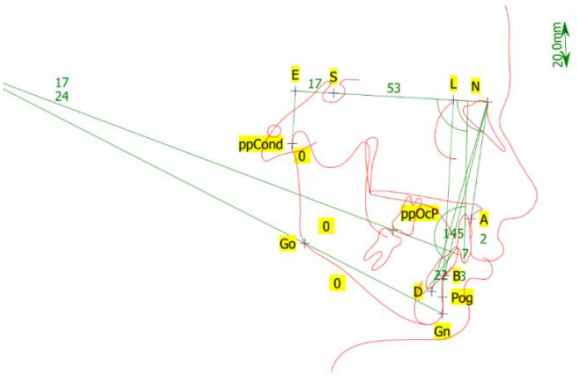
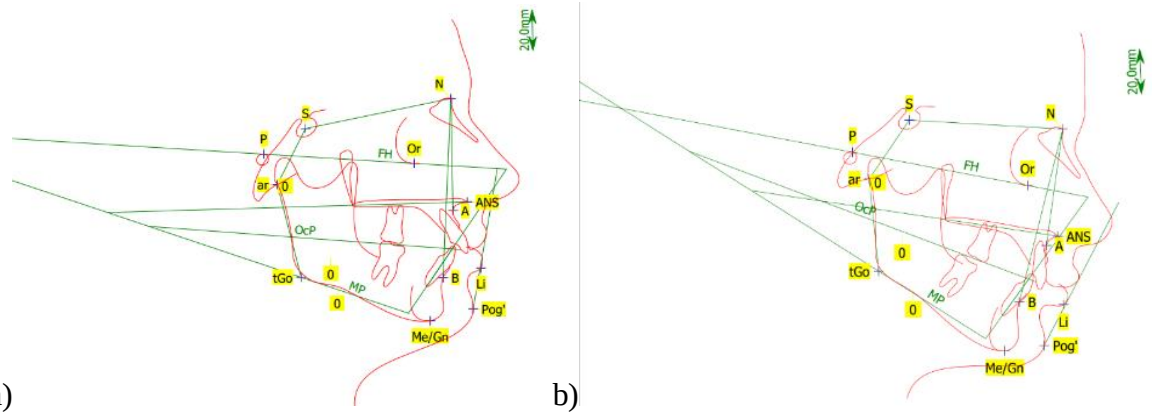


Figure 3. **Determination of the angular value of ANB in class II skeletal occlusion**

Another profile teleradiography interpretation method used in this study is Tweed-Marriefield, which generates information about the mandibular incisor axis, the HF plane and the mandibular plane (Figure 4).



a) b)

Figure 4. **Interpretation of teleradiography according to the Tweed-Marriefield a)class I and b)class II method**

Tweed's triangle consists of angle FMA, IMPA and FMIA. In the case of reduced FMA 16-25 ° unfavorable hypodivergent growth type was established at L2 predominantly, for L1 this angle is within the limits of the 25° norm. The IMPA angle for L1 subjects was determined with a value of 90-92°, for L2 a value increased more than 92° which speaks of the need for lingual version of the incisors. Analysis of the FMIA angle for study respondents was dependent on the deviation of the two angles.

For the cephalometric interpretation according to Ricketts, the growth prediction method is used, which gives an overview of dento-alveolar disharmonies. Analyzing the depth of the face relative to the N-Pg facial angle with HF, the normal value is 86 °. Value lower than 86 ° was characteristic for L 2, and in L1 within the limits of the norm. The anterior height of the face was related to the facial axis Y (S-Gn) and constituted for L1 approximately 90°, for L2 this angle is lower than the norm, the one that determines the term dolichocephalus, respectively posterior rotation of the mandible. The posterior height of the face is analyzed by the taper angle N-Pg-M, the norm of which is 68 degrees. The type of posterior development of the face for L1 predominantly normal, for L2 a reduced angle below 68° which is considered a posterior development insufficiency.

CBCT is a contemporary paraclinical diagnostic method, with high precision, facilitates interpretation in orthodontic treatment planning. This allows establishing the legitimacy of the age

dynamics of the hard tissues of the dento-maxillary system (dental inclusions, the presence of supernumerary teeth or hypodontia, determining joint and periodontal pathologies). CBCT can give extremely valuable information in cases with congenital malformations, in skeletal anomalies that have as an indication for orthognathic surgery, or in the evaluation of the airways. Imaging parameters in patients with maxillary compression can evaluate bone density, analysis of the degree of ossification of the median palatine suture (figure 5).

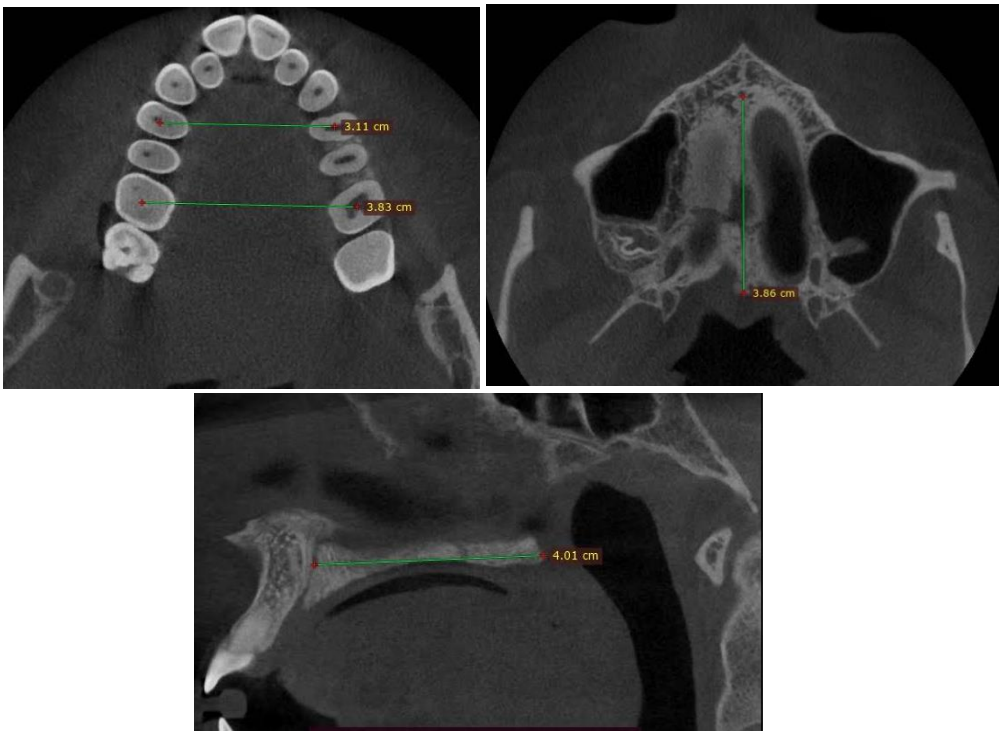


Figure 5. Assessment of midpalatal suture maturation transversely and sagittally after CBCT

The evaluation of the CBCT images was performed according to the qualitative methodology for the individual assessment of the maturation of the median palatine suture proposed by Angelieri. To achieve standardization of head position in all 3 planes, the transverse-sagittal section was oriented parallel to the horizontal axis of the software, to position the palate horizontally. The central section of the cross-section passing through the center of the hard palate was selected for assessment of sutural maturation. Earlier MSP was observed in a greater number of girls compared to boys.

2.3 Mathematical-statistical processing

Descriptive statistics of continuous variables were performed, which included the mean, the 95% confidence interval for the mean, the standard deviation, the median, the interquartile deviation, the minimum and maximum value, the data being visualized through histograms and the box-plot graph. The comparison was performed by the ANOVA procedure with the use of the Bonferoni post hoc test in the case of comparison between subgroups. Descriptive statistics for nominals included absolute frequency, relative frequency (percentages) as well as 95% confidence interval, the indicators being visualized through pie chart and bar graphs. The Pearson test corrected for 2x2 tables was used for the comparison of nominal variables.χ_2 . The program used to process the data of the material collected for the current research was IBM SPSS Statistics 26.0. The Excel component of the Microsoft Office suite was used to construct the graphs.

3. COMPARATIVE ANALYSIS OF DIAGNOSTIC CRITERIA IN SUPERIOR JAW COMPRESSION SYNDROME AS A FUNCTION OF DENTATION

3.1. Determination of clinical-anthropometric parameters in patients with upper jaw compression syndrome

The average age of all patients included in the study was 13.2±0.23 years, without large deviations according to the group (Table 1), with no statistically significant difference between the groups (F=0.303, p=0.739).

Table 1. **Average age of patients included in the study according to the study group, years.**

	Lot 2(1)	Lot 2(2)	Lot 1	Total
Mediate	13.0	13.5	13.1	13.2
DS	2.8	2.9	3.2	2.9
Median	13	13.5	13	13.0
IIQ	4	4	5	5

Half of the children included in the study have vicious habits – 83 (50.3%; 95% CI [42.4-57.6]) cases and it is important to note that Batch 2(1) differs considerably from the other two batches, by the fact that 57 (64.8%; CI 95% [54.8-74.8]) of the patients have these skills (Figure 6). This phenomenon induces a statistically significant difference ($\chi 2$=15.801; gl=2; p<0.001).

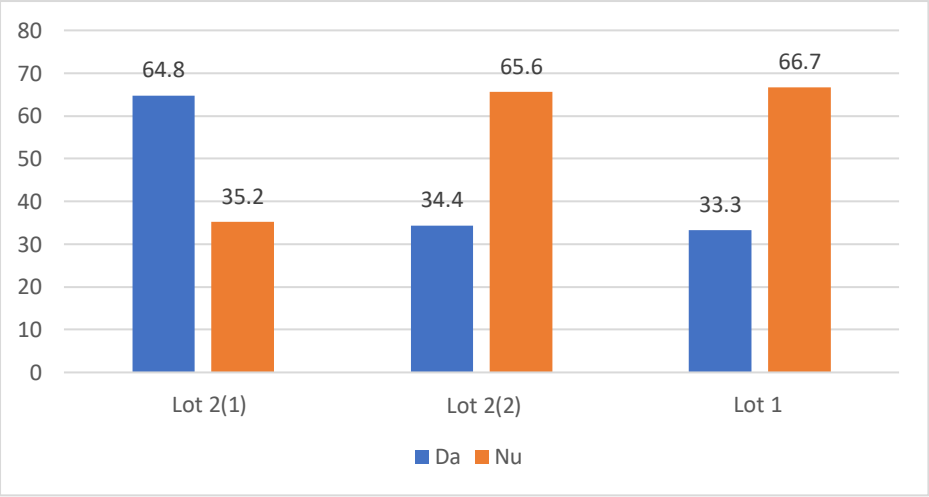


Figure 6. **Identification of vicious habits according to the study group, %.**

In some children in the study, the presence of the hereditary etiological factor was identified in the anamnesis - 30 (18.2%; CI 95% [12.1-24.2]) cases, the majority of them being from Lot 2(2) – 28 (87.5%; CI 95% [76.0-99.0]) cases, with the presence a statistically significant difference between the groups ($\chi 2$=128.333; gl=2; p<0.001).

Only 7 (4.2%; CI 95% [1.8-7.3]) children from the entire group received previous orthodontic treatment, without statistically significant difference between groups ($\chi 2$=0.123; gl=2; p=0.940) .

The mean size of the IZARD zy-zy width indicator in the general study sample is equal to 124.6±0.64 (95% CI [123.3-125.8]) mm, and the median is 120.0 mm. The average values according to each study lot do not differ significantly and are reproduced in (figure 7).

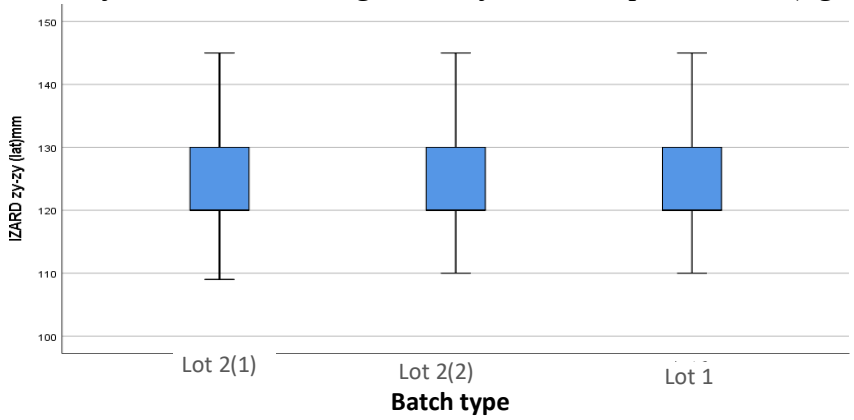
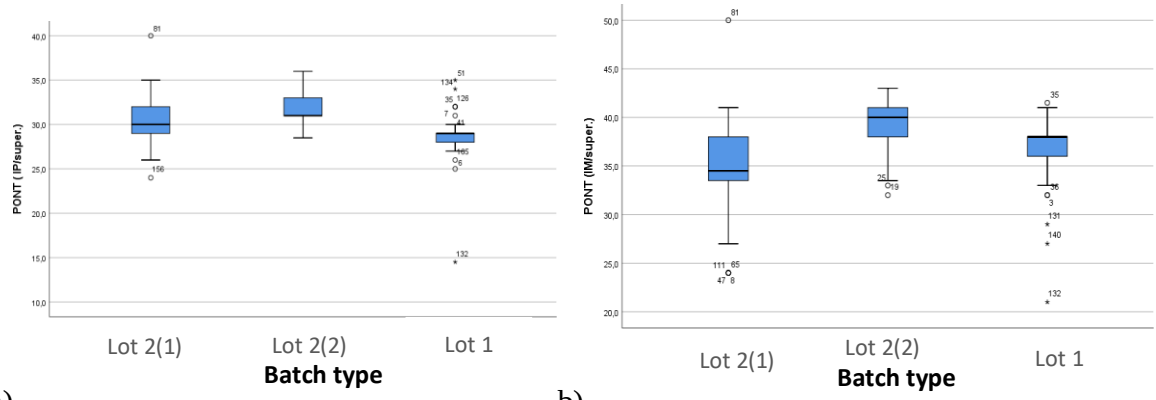


Figure 7. Boxplot representation for IZARD zy-zy (width) according to the study group, mm.

The mean value of the PONT index (PI/superior) in the total study sample is 30.2±0.21 (95% CI [29.8-30.6]), and the median is 30.0. Within the study groups, these values are different, thus identifying a statistically significant difference (F=13.360; p<0.001).

Performing the multiple comparison with the Bonferoni correction, we also found differences between two-by-two groups. Thus, between Batch 2(1) and Batch 2(2) – p=0.047, between Batch 2(1) and Batch 1 – p=0.001, between Batch 2(2) and Batch 1 – p<0.001. Graphical visualization of PONT index values (IP/upper) according to batch is shown in (figure 8 a).



a) b)

Figure 8. **Boxplot representation for the PONT index a) IP/superior and b) IM/superior by study group.**

The average value of the PONT index (IM/superior) in the research set of 36.3±0.32 (CI 95%[35.6- 36.9]), and the median is 38.0. These values differ according to the study groups, and a statistically significant difference was also identified (F=11.145; p<0.001). The intensity of the correlation between the upper and lower Korkhaus LP indicators for the maxilla and mandible is very strong rxy=0.744, p<0.001 (figure 9 a). Likewise, a very strong intensity correlation was also established for Korkhaus LM for maxilla and mandible rxy=0.791, p<0.001 (figure 9 b).

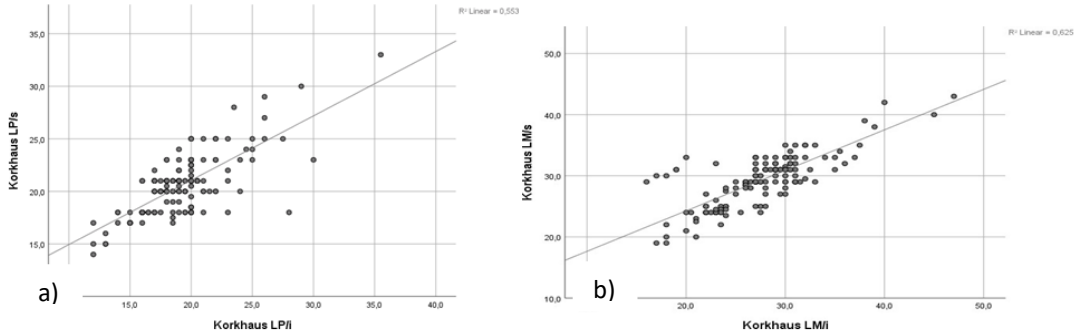


Figure 9. Correlogram of dependence of the Korkhaus indicators a) LP sup/inf and b)LM sup/inf.

During the exobuccal clinical examination, the shape of the face was assessed, which is relatively proportionally divided as a whole. The separate analysis of the study groups finds that the dolichocephalic form is predominant in Group 2(1)-56.4% II 95% [49.1-64.2]. This fact leads to a statistically significant difference between batches=104,004; gl=2, p<0.001. Analysis of biometric indices according to: Pont, Nance, Korkhaus, determined a statistically significant difference in patients with MCS manifestation patterns. The inter-premolar and inter-molar distance for both jaws, the size and shape of the dental arches, the discrepancies between the jaws, the length of the dental arches and the analysis of the length of the lateral sectors were assessed (table 2).

Table 2. Evaluation of paraclinical indices.

Variables	**Lot 1**	**Lot 2(1)**	**Lot 2(2)**	**P**
Girls	30	55	19	63.03%
Boys	23	27	11	36.97%
Dolichocephalous	7	82	4	56.4%
Mesocephalic type	38	6	28	43.6%
Tip (Top IP)	28.7	30.4	31.6	<0.001
Tip (upper IM)	36.6	35.2	38.9	0.124
Bridge (lower ip)	28.2	30.9	30.1	<0.001
Bridge (inferior im)	35.8	35.3	36.1	0.593
Korkhaus (Top LP)	20.2	21.0	19.6	0.041
Korkhaus (Upper LM)	26.3	30.4	29.6	<0.001
Korkhaus (lower lp)	19.4	19.1	18.9	0.833
Korkhaus (lower lm)	25.7	28.1	28.1	<0.001
Higher nance	96.6	91.5	97.8	<0.001
Lower nance	97.7	96.5	94.3	0.148

3.2. Comparative and Correlative Evaluation of Manifestation Patterns in Maxillary Compression Syndrome and Associated Anomalies

Facial symmetry is preserved in all study participants. Chin deviation, likewise, was not observed in any child.

Among the types of profiles, the convex one predominates - 131 (79.4%; CI 95% [72.7-85.5]) cases. At the same time, it is important to mention that in Lot 1 there are many straight-type profiles - 18 (40.0%; CI 95% [25.7-54.3]) cases, which causes a statistically significant difference between the lots ($\chi 2$= 25.014; gl=4; p<0.001).

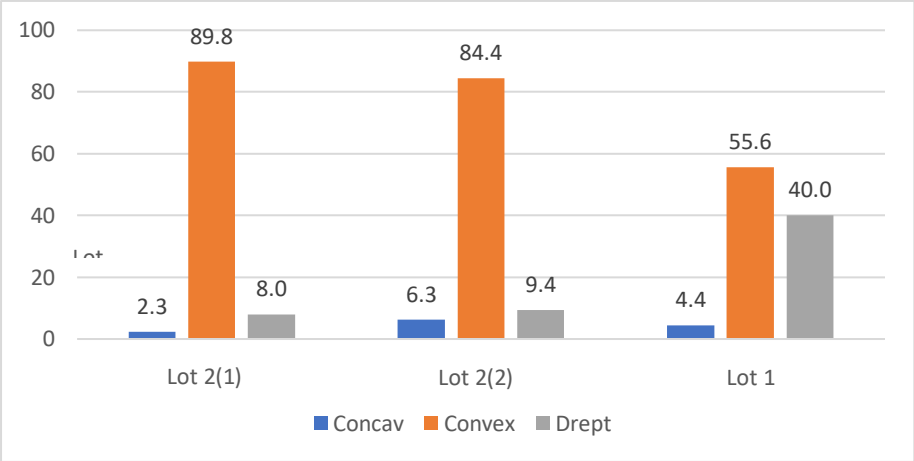


Figure 10. **Determination of profile types according to the study group, %.**

The predominant type of breathing in the children included in the study was nasal –127 (77.0%; CI 95% [70.3-83.6]) cases, followed by oral –36 (21.8%; CI 95% [15.2-28.5]) cases. We mention that only in Lot 2(1) were registered two cases of mixed breathing, which constitutes 2.3% (CI 95% [0.0-5.4]). The highest share of oral breathing was present in children from Lot 2(1) –28 (31.8%; CI 95% [22.1-41.5]) cases (figure 11). The diversity of the predominant type of breathing causes a statistically significant difference between groups ($\chi 2$=13.942; gl=4; p=0.007).

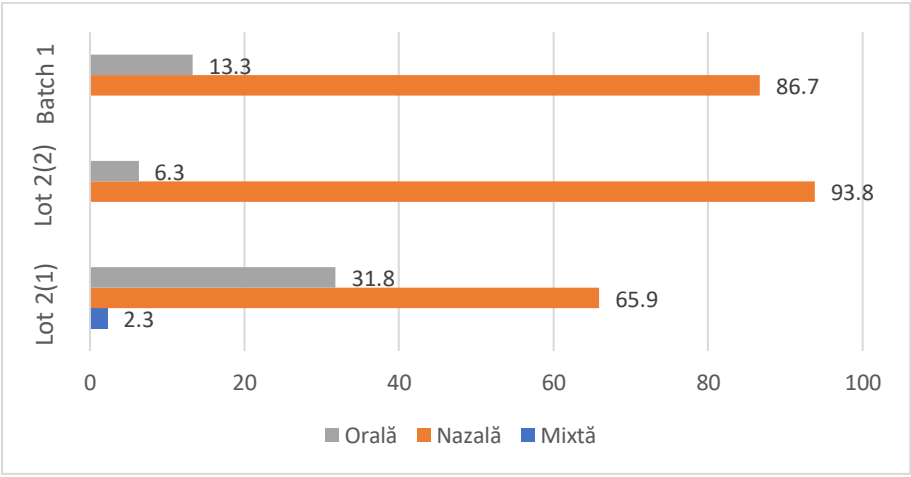


Figure 11. **Determination of the type of breathing according to the study group, %.**

The type of swallowing in most patients included in the research was adult–139 (84.2%; CI 95% [78.8-89.7]) cases, in the rest the swallowing being infantile –25 (15.2%; CI 95% [9.7-20.6])

cases, but there was also a case of atypical swallowing in Group 1. However, statistically significant difference between the groups is not observed ($\chi2$=5.183; gl=4; p=0.269).

The type of mastication is mainly divided into two types: bilateral –82 (49.7%; CI 95% [41.8-57.0]) cases and laziness –70 (42.4%; CI 95% [34.5-50.3]) cases. Carrying out a separate analysis according to the study group, we can see that lazy chewing predominates in Group 2(1) – 54 (61.4%; CI 95% [51.2-71.5]) cases, and in Groups 2(2) and 1 the bilateral one –23 (71.9%; 95% CI [56.3-87.5]) cases and respectively33 (84.2%; CI 95% [60.4-86.3]) cases (figure 12). This distribution induces a statistically significant difference between the groups ($\chi2$=32.731; gl=4; p<0.001).

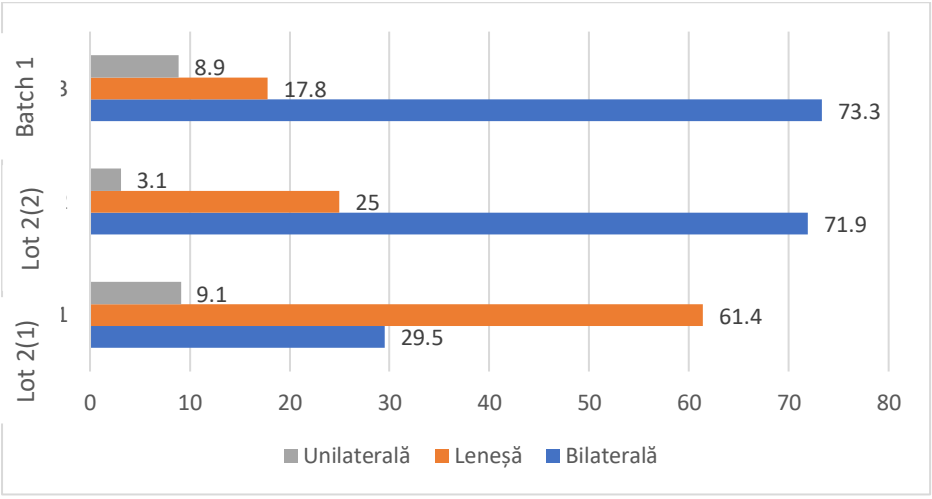


Figure 12. **Determination of the type of mastication according to the study group, %.**

During the exobuccal clinical examination, the shape of the face was assessed, which is relatively proportionally divided in total: dolichocephalic–93 (56.4%; CI 95% [49.1-64.2]) cases and mesocephaly –72 (43.6%; CI 95% [35.8-50.9]) cases. Analyzing the study groups separately, we find that the dolichocephalic form is predominant in Group 2(1), and the mesocephalic one - in Groups 2(2) and 1 (table 3). This fact leads to a statistically significant difference between the groups ($\chi2$=104.004; gl=2; p<0.001).

Table 3. **Determination of face shape according to study group.**

	Lot 2(1)		**Lot 2(2)**		**Batch 1**		**Total**	
	Abs.	P, %	Abs.	P, %	Abs.	P, %	Abs.	P, %
Dolichocephalus	82	93.2	4	12.5	7	15.6	93	56.4
Mesocephalus	6	6.8	28	87.5	38	84.4	72	43.6

The endooral clinical examination included the evaluation of several components: the frenum of the upper lip, the frenum of the lower lip, the frenum of the tongue, the dimensions of the tongue, the vestibule of the oral cavity, the mucosa of the oral cavity, the type of dentition, the hygiene of the oral cavity, the type of dental arches.

The shape of the dental arches in the patients included in the study is predominantly trapezoidal - 68(41.2%; CI 95% [33.3-49.1]) cases and V-shaped – 71(43.0%; CI 95% [35.8-50.3]) cases, the crossed and omega being also present. The distribution of dental arch shapes according to the study group differs as follows: in Group 2(1) there are more cases of V-shaped arch – 50(56.8%; CI 95% [46.5-67.2]) children, in Lot 2(2) – trapezoidal – 21(65.6%; IÎ 95% [49.2-82.1]) children, and in Lot 1 the types of shape are more dispersed, the highest share also returning to the

trapezoidal shape – 21(46.7%; CI 95% [32.1-61.2]) children. This diversity causes a statistically significant difference between batches ($\chi 2$=31.596; gl=6; p<0.001) (table 4).

Table 4. **Analysis of dental arch shapes according to the study group.**

	Lot 2(1)		Lot 2(2)		Batch 1		Total	
	Abs.	P, %	Abs.	P, %	Abs.	P, %	Abs.	P, %
cross	4	4.5	-	-	7	15.6	11	6,7
Omega	8	9.1	6	18.8	1	2.2	15	9.1
Trapezoid	26	29.5	21	65.6	21	46.7	68	41.2
V-shaped	50	56.8	5	15.6	16	35.6	71	43.0

Oral hygiene plays an important role in oral health. The level of oral hygiene was assessed according to the OHI-S. The simplification consists in the assessment of plaque and tartar on only 6 surfaces instead of 12, as is done for the assessment of the initial oral hygiene index.

OHI-S = IP – S + IT – S (3)

The plaque or tartar index may have the following values following data collection:
0 = excellent 0.1 – 1.2 = good 1.3 – 3.0 = moderate 3.1 – 6 = poor

The objective of determining these indices is the correction of tooth brushing and scaling. During the clinical endooral examination it was found that in 136(82.4%; CI 95% [76.4-87.9]) cases this was satisfactory. 19 received the "good" qualification(11.5%; CI 95% [6.7-15.8]) children and the qualification "excellent" – 3(1.8%; CI 95% [0.0-4.2]) children with a statistically significant difference of small intensity between groups ($\chi 2$=12.922; gl=6; p=0.044). The grades of oral cavity hygiene according to the study group are shown in table 5.

Table 5. **Determination of the level of hygiene of the oral cavity according to the study group.**

	Lot 2(1)		Lot 2(2)		Batch 1		Total	
	Abs.	P, %	Abs.	P, %	Abs.	P, %	Abs.	P, %
Excellent	-	-	-	-	3	6,7	3	1.8
Well	6	6.8	5	15.6	8	17.8	19	11.5
Satisfactory	78	88.6	26	81.3	32	71.1	136	82.4
LOW	4	4.5	1	3.1	2	4.4	7	4.2

In approximately half (54.5%) of the patients included in the study, the ossification stage of the palatal suture was assessed. The most common stages were found to be A, B and C in the following order: B –40 (24.2%; 95% CI [18.2-31.5]) cases, C–28 (17.0%; 95% CI [10.9-23.0]) cases, A–18 (10.9%; 95% CI [6.7-15.8]) cases. The analysis according to the study group found that in Group 2(1) stage B predominates, and in Groups 2(2) and 1 stage C has the highest frequency, thus a statistically significant difference was found between the groups ($\chi 2$= 109.685; gl=10; p<0.001).

Table 6. **Ossification stage of the palatal suture according to the study group.**

	Lot 2(1)		Lot 2(2)		Batch 1		Total	
	Abs.	P, %	Abs.	P, %	Abs.	P, %	Abs.	P, %
A	17	19.3	-	-	1	2.2	18	10.9
B	37	42.0	3	9.4	-	-	40	24.2
C	23	26.1	3	9.4	2	4.4	28	17.0
d	3	3,4	-	-	-	-	3	1.8
E	1	1.1	-	-	-	-	1	0.6
No stage	7	8.0	26	81.3	42	93.3	75	45.5

The distribution of patients according to the stage of palatal suture ossification was studied. By performing ANOVA multiple comparison with Bonferoni correction, we found two-by-two group differences. Thus, the age of ossification stages A and B differs from the others with a statistical significance p<0.001, and stage C differs from stage D with a difference p=0.023 (figure 13).

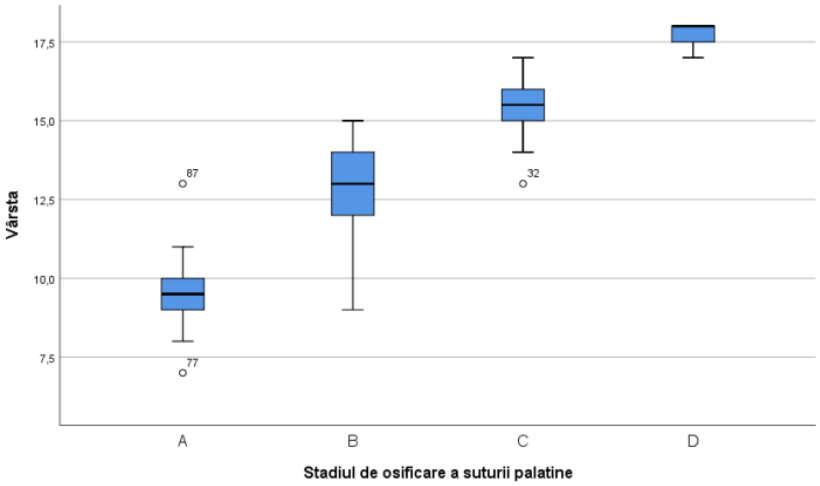


Figure 13. **Boxplot representation for age by palatine suture ossification stage.**

The most common change in the reduction of transverse and sagittal size is the narrowing of the jaw. Genetic damage to the arches is correlated with damage to the entire growth process in the transverse and sagittal plane, with manifestation in both arches, sometimes with quite pronounced narrowing. The upper arch is more influenced by external factors; environmental factors that have the potential to alter growth and affect overall development (Figure 14).

The analysis of clinical indices determined the importance of the development of ApDM in growth balance by preserving the integrity of the dental arches at different ages. The variety of studied biometric indices of MCS reveals the deviations detected in all 3 reference planes (Figure 14).

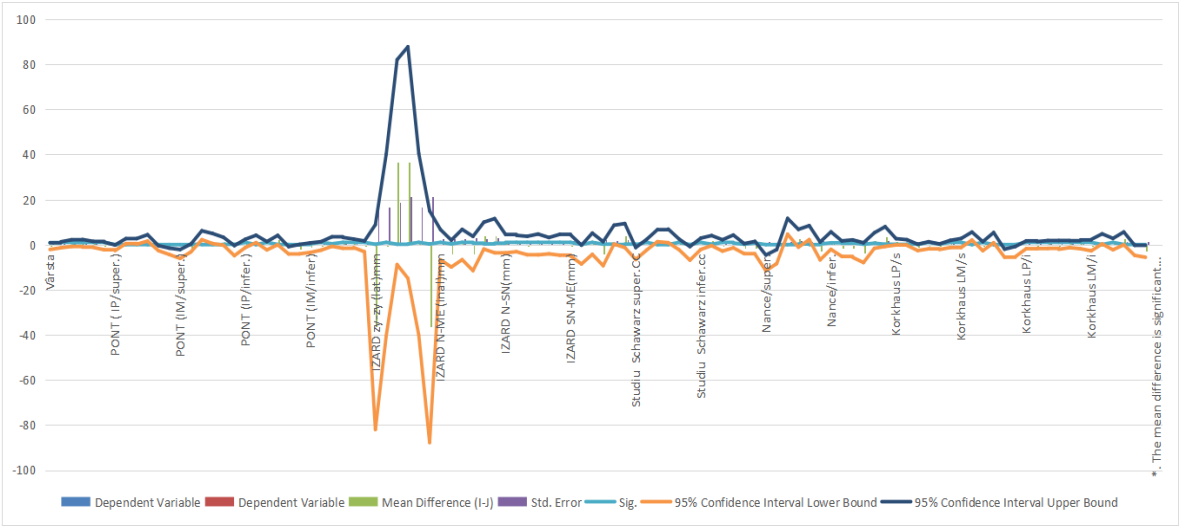


Figure 14. **Biometric indices in upper jaw compression, depending on the analysis varieties**

3.3. Development of the diagnosis and prevention algorithm of maxillary compression syndrome

The results of the conducted research highlight the need to diagnose MCS with associated anomalies through clinical examinations and extensive paraclinical investigations, through the complex and multidisciplinary approach. Thus, the therapeutic objectives are drawn through prophylactic treatment (speech therapy, orthodontic), interceptive treatment, orthodontic treatment itself. In MCS with associated conditions (ENT), therapeutic goals are invoked through ENT treatment, interceptive treatment and orthodontic treatment proper.

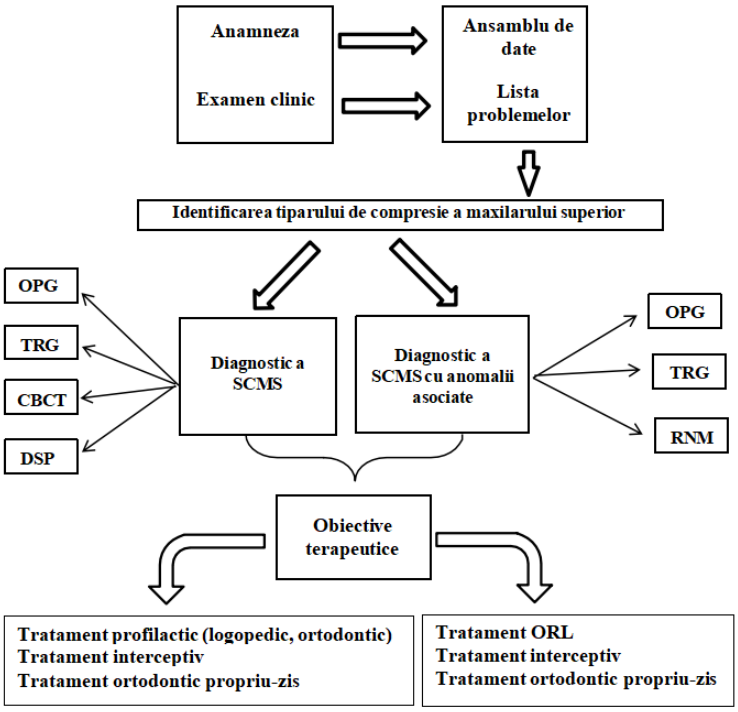


Figure 15.**Algorithm for diagnosis and prevention of maxillary compression syndrome**

4. SYNTHESIS OF THE RESULTS OBTAINED

This section includes the analysis of the data obtained from the field of orthodontics through our research carried out as part of the doctoral thesis in medical sciences with the theme "Diagnosis and preventive measures in upper jaw compression syndrome", carried out in the Department of Orthodontics of USMF "Nicolae Testemițanu".

The great scientist WR Proffit calls orthodontics maxillofacial orthopedics. According to the author's statement, the respective discipline at the current stage is subject to a fundamental revision. In particular, the goals of orthodontic therapy are radically changing. Another main problem is the diagnosis of AnDM. The second problem requires extensive knowledge of the patients' condition in order to compile the problem sheet where the patient's pathological conditions associated with ApDM disorders are included.

During the last decades, orthodontics progresses in the generalization of new techniques that combine practical training with theoretical knowledge, but the increase in the frequency of dento-maxillary anomalies requires orthodontists to refresh and revise their concepts[21]. The frequency

of anomalies by MCS argues the topicality of studying the addressed problem and the need for further research into the particularities of the development of the median palatal suture and its bone density.

The increase in the incidence of malocclusion in the modern era definitely overlaps with technical progress, therefore with the decrease in functional stimuli through the transition to a refined diet, the decrease in size of both teeth and jaws was also noted[21]. The epidemiological study in the Republic of Moldova determined the presence of MCS anomalies - 17.7±0.92%[1].

Knowing the AnDM etiology of the CMS syndrome, it is difficult to imagine those processes that evolve at the early stages of the body's development. An affected primordium, be it dental, bone or soft tissue, as it develops, gives rise to multidirectional pathological processes. First of all, it is about maxillo-facial, skeletal deformities that, at the same time, give rise to dental pathologies. The emergence of AnDM has sparked many controversies and contradictory debates, in particular, in specifying the primary and secondary factors involved in the etiopathogenesis of these conditions. Thus, their appearance is conditioned by both the causative factor and the age and the general and local condition of ApDM[22]. Against the background of dento-maxillary anomalies, the installation of functional, psycho-sociological conditions is not excluded. The mentioned evolves in close connection with the physiological development of the body and is indispensable in the development of emotional functions. In the absence of adequate emotional contact, no doctor can contact the child, the orthodontist is no exception. Dento-alveolar abnormalities with functional and topical-morphological disturbances are also characteristic of MCS.

The impact of the respiratory factor in MCS is also determined by the type of breathing, with the highest share of oral breathing being determined in group 2(1) – 31.8% of cases. According to some data, oral breathing leads to muscle imbalance, because the anterior-inferior seat of the tongue, of the hyoid bone becomes the cause of functional and morphological changes. Among them can be modified: the vestibular inclination of the upper incisors (their posterior inclination is not excluded), the narrowing of the upper dental arch, the lower incisors more often have a retro-inclination, reverse lateral occlusion, hypertrophy of the lower lip, hypotonia and shortening of the upper lip . Consequences of the downward movement of the mandible are known. They are based on the increased pressure of the air circulating through the oral cavity, because the air pressure circulating through the nasal cavity is relatively low. In such conditions the palatine veil keeps its high position.

From those noted, dental occlusion disorders on a narrow arch can be admitted. For example, the installation of a narrow upper arch leads to the fixation of the mandible in a slightly more posterior position. As a result, the lower incisors without antagonists will regress with the installation of deep occlusion in the roof after Gollaro I. It is known that at the basis of the malformation of the compression syndrome of the jaw are disorders of development of the mandible in the sagittal plane.

So, upper jaw compression is externalized through multiple facial, oral, radiological signs and functional changes, which are the result of the interaction of complex etiological factors with various skeletal, neuromuscular and soft tissue hereditary patterns. These characteristics can be more obvious or more discrete depending on how all these factors acted in the same direction or in opposite directions, or compensatory phenomena intervened.

The types of occlusion are analyzed for each patient: static, dynamic and individual, and functional occlusion is described in more detail in the dentition: temporary, mixed and definitive. Mixed dentition includes functional temporary teeth whose roots are subject to resorption, and permanent teeth have erupted, although their roots are still forming. During this period, the alveolar apophyses have an intense growth dynamic[23].

In the diagnosis of MCS, as well as other conditions, it is important to correctly interpret the patient's allegations, especially when they are presented by parents or another adult. Determination of intermaxillary relations, analysis of predisposing factors allow identification and diagnosis of upper jaw compression syndrome for further planning of orthodontic treatment.

The diagnosis of MCS is based on the analysis of somatic and dental anamnesis, clinical data, photographs, jaw models and radiological information. The respective data is contained in the problem sheet. The latter, aka the diagnosis, constitutes the basis of the treatment plan, which necessarily includes the consent of the patient or his parents.

The clinical examination of the patients consisted of the visual exobuccal analysis with the determination of the facial type, the facial profile, the presence/absence of facial symmetry, the condition of the soft tissues of the maxillofacial skeleton. Facial symmetry is preserved in all participants in the study, the expressiveness of the chin groove, the coupling of the lips and the presence of the gingival smile determined a statistically significant difference between the groups with $p<0.001$. The presence of the gingival smile in the conducted study constituted 63.6%, which is a basic accusation in addressing the orthodontist.

As mentioned, facial signs vary greatly from case to case and are also the most accessible to both the patient and those around him. So pay attention to the long, narrow face (leptoprosop type), dolichocephaly, narrow nose, aquiline. Dolichocephalic face shape was appreciated in 56.4% and mesocephalic in 43.6% cases. The dolichocephalic form is predominant in L2(1), and the mesocephalic one in L2(2) and L1, this fact leads to a statistically significant difference between groups $x2=104.004$, $gl=2$, $p<0.001$.

The photometric examination concluded that the evaluation of the IZARD parameters (zy-zy, N-ME, N-SN), confirms the homogeneity of the facial type of MCS patients in all 3 study groups, not having large oscillations, the mean and median values being practically identical. The face type is determined after the growth process is completed. The same principle also applies to the shape of the teeth, dental retention (more often of the canines), etc.[24,25].

Contemporary orthodontics has focused on the aesthetics of the smile, the dimensions of the transverse arch and the minimization of the oral corridor[26,27].

Functional charges were determined with the same weight for each batch. The presence of vicious habits in 50.3% of children, but in 64.8% of group 2(1) a statistically significant difference was detected with $p<0.001$. In patients with MCS, the type of lazy mastication predominates, attesting 61.4% for group 2(1). Determining the type of swallowing in 15.2% of the respondents was infantile swallowing, the majority of patients included in the study have an adult type of swallowing.

The harmful influence of vicious habits results in the appearance of changes in the active period of formation, growth and development of ApDM. As a result, the deconditioning of vicious habits is necessary to carry out from the period of mixed dentition. Combating the vicious habit is desirable through complex methods, appropriate to the concrete situation, where the age of the

patient and the clinical evolution of the pathological process are taken into account. The patient must be aware of the need for treatment, and in response establish cooperation with the orthodontist, speech therapist and psychologist. The latter provides for the execution of all the doctor's recommendations, such as quitting bad habits, practicing nasal breathing, including respiratory gymnastics in line with the general one, for the development of the costo-diaphragmatic respiratory type, etc.

The early detection of risk factors in the occurrence of CMS and the interdisciplinary approach contribute to ensuring the stability of the treatment. Cooperation with the otorhinolaryngologist allows us to determine the abnormalities of the upper respiratory tract that would influence the harmonious development of the facial skull. The shape of the studied dental arches highlights the characteristic type for MCS is the "V" shape - 56.8% - for L2(1), in L2(2) - trapezoidal shape 65.6%, for L1 - the shapes are dispersed . This diversity causes a statistically significant difference between batches $p<0.001$. The width of the dental arches can be established at the level of temporary and permanent canines, as well as at the level of molars - M2 or M1. The width of the dental arches, in the area of the front teeth, increases annually by 0.5 mm in representatives of both sexes[13]. The endobuccal examination included the analysis of the dento-alveolar complex, the degree of presence of dental anomalies, the determination of compression of the upper jaw, the condition of the periodontium, the position and articulation of the tongue.

The determination of the occlusal ratios in the sagittal plane constitutes a distalized ratio - 72.1% on the right side. The left molar ratio was determined to be 69.7%. These data highlight occlusal derangements in MCS. Statistically significant value $p<0.001$.

Analysis of the parameters of the diagnostic models of all patients included in the study according to the PONT index, which aims at the correlation between the sum of the mesio-distal diameters of 4 upper incisors (SI) and the inter-premolar (IP) and inter-molar (IM) distance in the jaw upper and lower, denotes: The superior PONT IP index according to the study group determined the significant statistical difference $p<0.001$, the superior PONT IM index, likewise, is determined in the study groups with a significant statistical difference of $p<0.001$.

Resulting from the average value of the PONT IP index and the mathematical superior IM conclude about the narrowing of the upper jaw with insufficient space for dental alignment. The PONT index measured for the lower arch anteriorly and posteriorly also shows a narrowing of the lower jaw. In MCS, the dento-alveolar arches are deformed, expressed by the reduction of its width.

The Korkhaus sagittal pattern study index identifies a statistically significant difference between groups 2(1) and 2(2), with a $p<0.001$. Interpretation of the Korkhaus Index identifies a comparative statistical difference between groups $p<0.001$. The analysis of the Nance Index according to the study group identified a statistical difference between L2(1) and L2(2) with $p<0.001$, which speaks of the presence of DDA through crowding.

In dentistry, radiological methods make it possible to establish the legalities of the age dynamics of the hard tissues of the dento-alveolar system during tooth change [108]. Radiovisionography allows establishing the quantitative and qualitative changes in the hard tissues of the dento-alveolar system [108,109]. The multitude of clinical and paraclinical methods, such as objective examination, radiographic evaluation, computer imaging, model study and rhinomanometry provide the opportunity to create an individualized treatment tactic with a high success rate.

The data of the cephalometric analysis determined a vestibular inclination of the upper front group of teeth, the reduction of the lower floor of the face, the hypodivergent type of growth.
Determining the degree of ossification of the palatal suture and densitometry through CBCT will provide data on the need to obtain functional and aesthetic results. In 54.5% of the patients included in the study, the stage of ossification of the palatal suture was assessed. For L2(1), stage B predominates, which constitutes 24.2%, stage A for 10.9%, stage C constitutes - 17.0% for L2(2) and L1. Significant correlation is determined between MSP in the female gender compared to the male gender.
Contemporary diagnostic methods allow us to establish the anatomical-morphological features of the age of the median palatal suture in children, facilitating the analysis of the degree of maturation and the selection of the method of expansion of the upper jaw.
MCS's orthodontic care is diverse. The interceptive treatment is applied during the period of mixed dentition and follows a continuity in the permanent dentition. The varieties of MCS orthodontic treatment are multiple, but the goal of orthodontic treatment is to normalize the dental ratio in all 3 reference planes: vertical, transverse, sagittal, with obtaining an optimal, functional and aesthetic result of ApDM. Since the morbidity of AnDM is extremely well known, and orthodontic assistance is the primary factor in the stability of ApDM, modern orthodontics aims to achieve a more balanced balance of occlusion, facial and dental aesthetic results over a long period of time. The proposed algorithm of MCS will allow to increase the effectiveness of diagnosis and treatment, prevent the recurrence of complications and increase the stability of long-term post-treatment results.
MCS being considered a growth and development disorder, influenced by various factors (regional, local and functional), requires a prophylactic approach. The variety of orthodontic means for the treatment of CMS are selected according to certain principles: age, severity of the case and the relationship to the adjacent anatomical structures.
MCS anomaly prevention involves a set of detection measures, removal of causal and conditional factors, which could cause these changes to occur[28]. It is important to ensure optimal conditions for the growing organism to achieve a somatic balance of all elements of ApDM, a fact that would facilitate obtaining functional relationships and reports. Prophylaxis starts from the prenatal period, in which we aim to ensure the differentiation and development of ApDM in the fetus, which would include a balanced diet of the mother, neuro-endocrine balance, but also ensuring a natural birth, without involving the use of forceps. This continues postnatally from the first days, to preserve a state of normality and ensure the harmonious modeling of the maxillofacial skeleton. Also, a crucial role is played by the performance of the functions of the stomatognathic apparatus (mastication, phonation, breathing, swallowing) balanced against each other. In the case of the appearance of a DDA, muscle training and functional re-education, the involvement of ENT specialists, speech therapists, and pedodontists are necessary, even mandatory, in order to combat and minimize their consequences. Another aspect for MCS prophylaxis is to ensure the integrity of the alveolo-dental arches by avoiding the early loss of temporary teeth, otherwise, the application of space maintainers and the guidance of physiological tooth eruption. Dispensing, as a method of prophylaxis, includes the examination of school or preschool groups, with planned sanitation, periodic rechecking and reducing the risks of relapse.

GENERAL CONCLUSIONS

1. As a result of the proposed research, the influence of predisposing factors in the occurrence of MCS through upper respiratory tract conditions was found - oral breathing 38.1%, CI 95% [22.1-41.5] cases; the presence of vicious habits in 50.3%, CI 95% [42.4-56.6] cases. The epidemiological study carried out in the Republic of Moldova determined the incidence of MCS in 17.7±0.92% respondents.
2. The determination of clinical, anthropometric and imaging indices in patients with MCS determined the presence of transverse development deficiency of the upper jaw at the anterior and posterior level rxy=0.663, p<0.001, in the sagittal plane the correlation rxy=0.791, p<0.001, which confirm the presence of MCS. The correlative analysis of the cranio-facial growth determined predominantly the dolichocephalic type 56.4%; CI 95% [49.1-64.2] cases, with hypodivergent FMA assessment. Following the evaluation of the imaging parameters, the degree of ossification of the median palatal suture was estimated, stage B in 24.2%; CI 95% [18.2-31.5] cases in 13-year-old patients with subsequent selection of orthodontic treatment.
3. Following the investigations carried out, we have developed a comprehensive algorithm for the diagnosis and prevention of patients with MCS. This algorithm emphasizes the etiological and pathogenic particularities of the clinical manifestations, facilitating the implementation of multidisciplinary treatment strategies.
4. The preventive measures in MCS provide for the normalization of ApDM dysfunctions, the removal of vicious habits, the implementation of prophylactic and dispensary examinations of children through the interdisciplinary assistance of orthodontists, speech therapists, and otorhinolaryngologists.

PRACTICAL RECOMMENDATIONS

1. The dispensary of early dento-maxillary anomalies of a medical and social nature through collective examinations, rehabilitation and rehabilitation in case of relapses.
2. Early detection of triggers in maxillary compression syndrome.Consultations with ENT specialists and speech therapists are recommended for the identification and removal of predisposing causes in various dispensary groups.
3. The complex rehabilitation of dental occlusion during the period of mixed dentition by removing dysfunctions and vicious habits in patients with AnDM, the anatomical-morphological study of the median palatal suture in children of different ages, their distribution in distinct periods provides ample information for determining personalized orthodontic treatment.
4. The application of educational methods to inform parents and children about the importance of nasal breathing, swallowing, oral cavity hygiene and the harmonious development of the stomatognathic apparatus.

SELECTIVE BIBLIOGRAPHY

1. Trifan V., Lupan I., Trifan D., Calfa S. Morbiditatea prin anomaliile dento-maxilare în Republica Moldova. *Medicina Stomatologică* 2015; 1: 47–51.

2. Antipin A.M., Calfa S. Metode de diagnostic în endoalveolia de maxilar superior . *Medicina Stomatologică* 2018; 2–3: 134–143.
3. Breckon. Evidence-based Orthodontics. *Eur J Orthodontics* 2014; 36: 122–123.
4. Brizuela M., Palla A. *Posterior Crossbite*. Stat Pearls 2022.
5. Calfa S., Trifan V., Șeptilici A.-M. Maxillary compression syndrome: a literary review. *Moldovan Journal of Health Sciences* 2024;
6. Avornic L. *Evaluarea afecțiunilor parodontale în tratamentul ortodontic complex al anomaliilor dento-maxilare.* . 2008.
7. Cangialosi TJ. Skeletal morphologic features of anterior open bite. *Am J Orthod* 1984; 85: 28–36.
8. Enache A.M. *Anomalia clasa II/1 Angle cu îngustarea arcadei superioare-etiopatogenie și clinică.* . ARS Docendi București, 2005.
9. Granciuc Gh. *Clasificarea medico-geografică a nivelului prevalenței anomaliilor dentomaxilare la adolescenții Republicii Moldova*. Probleme actuale de stomatologie.Materialele Congesului XII național al stomatologilor din Republica Moldova, 2003, 76–79.
10. Wriedt S, Kunkel M, Zentner A, Wahlmann UW. Surgically assisted rapid palatal expansion. An acoustic rhinometric, morphometric and sonographic investigation. *J Orofac Orthop* 2001; 62: 107–15.
11. Bicakci AA, Agar U, Sökücü O, Babacan H, Doruk C. Nasal airway changes due to rapid maxillary expansion timing. *Angle Orthod* 2005; 75: 1–6.
12. Galbiati G, Maspero C, Giannini L, Guenza GC, Zanoni F, Farronato G. *Orthodontic--surgical treatment and respiratory function: rhinomanometric assessment.* Minerva Stomatol 2017; 66: 91–97.
13. Boboc Gh., Bratu D., Boboc V. *Colajul în practica ortodontică.* . Făclia Timișoara, 1987.
14. Franchi L, Baccetti T, McNamara JA. Mandibular growth as related to cervical vertebral maturation and body height. *Am J Orthod Dentofacial Orthop* 2000; 118: 335–340.
15. Mazen Husni A. Al Momani. *Tratamentul ortodontic a deformaţiilor zonei oro-maxilo-faciale la pacienţii cu despicături unilaterale ale buzei şi palatului.* 2007.
16. Reis L., Ribeiro R., Farinazzo R., Reis H., Devito K. Classification of the midpalatal suture maturation in individuals older than 15 years: a cone beam computed tomographic study. *Surg Radiol Anat 2020*; 42: 1043–1049.
17. Burlui V. *Gnatologie*. Apollonia Iași, 2000.
18. Burlui V. *Malrelațiile cranio-mandibulare.* . Apollonia Iași, 2002.
19. Голиуллина М.В. *Диагностика и лечение зубочелюстных аномалий при сужении фронтальнрого участкая верхней челюсти.* 2008.
20. Peck S, Peck L, Kataja M. The gingival smile line. *Angle Orthod* 1992; 62: 91–100, 101–2.
21. Орехова Л.Ю. *Сравнительная характеристика информативной ценности различных методов лучевой диагностики*. . 2008.
22. Загорский В.А., Макеева И.М., Загорский В.В. . плотность твердных тканей зубов. . *Росс Стом Жур* 2012; 2: 29–31.
23. Katz JL. *The structure and biomechanics of bone.* Symp Soc Exp Biol 1980; 34: 137–168.

24. Proffit WR. Equilibrium theory revisited: factors influencing position of the teeth. *Angle Orthod* 1978; 48: 175–86.
25. Trifan V. *Impactul medico-social al anomaliilor dento-maxilare asupra sănătății orale și calității vieții pacienților. Chișinău,* 2024.
26. McNamara JA. Maxillary transverse deficiency. *Am J Orthod Dentofacial Orthop* 2000; 117: 567–570.
27. A. P. Rădulescu. *Prevalența anomaliilor dento-maxilare și determinarea necesarului la copii cu dentiție mixtă la copiii din Municipiul București*. 2017.
28. Fratu A.V. *Ortodonție. Diagnostic, clinică, tratament.* Vasilina 2002.

LIST OF SCIENTIFIC PUBLICATIONS

- **Articole în reviste științifice naționale acreditate:**
- **articole în reviste de categoria B**

1. **Calfa S.**, Trifan V., Storojov I., Șeptelici A-M. Maxillary compression syndrome: a literary review. În: *Moldovan Journal of Health Sciences*, 2024 nr. 11 (1) , Chișinău. Republica Moldova.
2. Trifan, V.; Lupan, I.; Trifan, D.; **Calfa, S**. Morbiditatea prin anomaliile dento-maxilare în Republica Moldova. În: *Medicina Stomatologică.* 2015, nr.1 (34), 47-51. ISSN 1857-1328
3. Condrea, C.; **Calfa, S.**; Lupan, I. Obiceiurile vicioase-factor de risc în dezvoltarea anomaliilor dento-maxilare. În: *Medicina stomatologică* , 2017, nr. 1-2(42-43), pp. 65-70. ISSN 1857-1328
4. **Calfa, S**.; Storojov, I. Inocluzia verticală în funcţie de dentiţie. etiologie, diagnostic şi tratament. În: *Medicina stomatologică* , 2021, nr. 1-2(58), pp. 44-50. ISSN 1857-1328

- ✓ **articole în reviste de categoria C**

5. Antipin, A.; **Calfa, S**. Metode de diagnostic în endoalveolia de maxilar superior. În: *Medicina stomatologică* , 2018, nr. 2-3(47-48), pp. 134-143. ISSN 1857-1328
6. Горя, Ю.; **Calfa, S**. Диагностика пациентов с глубоким прикусом. In: *Medicina stomatologică* , 2013, nr. 1(26), pp. 54-58. ISSN 1857-1328
7. Lupan, I., Sachin, S.; Eyad, S.; **Calfa, S**. Perspective clinice şi de laborator al bonding-ului ortodontic perfecţionat la smalţul normal, hipoplazic şi fluorozic. În: *Medicina stomatologică*. 2010, Nr. 4(17), pp. 61-65. ISBN 978-9975-52-006-5.
8. Leșan, N.; **Calfa, S**. Disarmonia dento –maxilară cu spaţiere dentară - diastema. În: *Medicina stomatologică* , 2012, nr. 4(25), pp. 21-28. ISSN 1857-1328

- **Rezumate/abstracte/teze în lucrările conferințelor științifice naționale și internaționale:**

9. Șaban, T. ; Palii, M. ; Trifan, V. ; **Calfa, S**. Influența obiceiurilor vicioase în dezvoltarea anomaliilor dentomaxilare. În: *Cercetarea în biomedicină și sănătate: calitate, excelență și performanță*, Ed. 1, 18-20 octombrie 2023, Chişinău. Chișinău, Republica Moldova: 2023,

p. 734. ISSN 2345-1476.

10. Avornic-Ciumeico, L.; Trifan, V.; **Calfa, S**.; Cazacu, I.; Ciumeico, Igor. Aliajele nichel-titan în ortodonție. Actualități, varietăți, utilizare. În: *Congresul consacrat aniversării a 75-a de la fondarea Universității de Stat de Medicină şi Farmacie „Nicolae Testemiţanu”*, 21-23 octombrie 2020, p. 692
11. **Calfa, S**.; Trifan, V.; Crăciun, D.; Untilă, C. Dizarmonia dento-alveolară cu înghesuire. În: *Congresul consacrat aniversării a 75-a de la fondarea Universității de Stat de Medicină şi Farmacie „Nicolae Testemiţanu”*, 21-23 octombrie 2020, p. 699
12. **Calfa, S**.; Avornic-Ciumeico, L.; Untilă, C. Tratamentul ortodontic în două etape în anomaliile clasa II Angle. În: *Congresul consacrat aniversării a 75-a de la fondarea Universității de Stat de Medicină şi Farmacie „Nicolae Testemiţanu”*, 21-23 octombrie 2020, p. 700
13. Madan, C.; Avornic-Ciumeico, L.; **Calfa, S**.; Trifan, V. Retention in orthodontics. clinical aspects and methods of implementation. In: *Balkan Medical Union. Abstract book. June 7-9, 2023*. p. 55. ISSN 1584-9244
14. Popa G.; **Calfa S**. Dental number anomalies. În: *Abstract book MedSpera,* 12-14 mai 2022 p. 344. ISBN 978-9975-3544-2-4.86
15. Lelic I.; **Calfa S**. Principles of orthodontic treatment planning in Angle class I malocclusion. În: *Abstract book MedSpera,* 12-14 mai 2022 p. 367. ISBN 978-9975-3544-2-4.
16. Sîrbu, M.; **Calfa, S**.; Avornic-Ciumeico, L.; Trifan, V. Incidența anomaliilor dento-maxilare în urma pierderii precoce a dinților temporari. În: *Cercetarea în biomedicină și sănătate: calitate, excelență și performanță*, Ed. 1, 18-20 octombrie 2023, Chişinău. Chișinău, Republica Moldova: 2023, p. 698. ISSN 2345-1476

- **Brevete de invenţii, patente, certificate de înregistrare, materiale la saloanele de invenţii:**

17. **Calfa S.,** Trifan V. Metoda de diagnostic în sindromul cu compresie de maxilar superior în funcție de dentație. Certificat de Inovator nr. 6211; 11.03.2024.

- **Participări cu comunicări la forumuri ştiinţifice:**

• internaționale

18. Trifan V.; **Calfa S**.; Obiective de tratament ortodontic în malocluzia de clasa III-a Angle. În: Zilele francofone medicale dentare. Ediția a XVIII-a Zilelor Facultății de Medicină Dentară. 30 de ani de stomatologie pediatrică la Iași. Al 6-lea Congres Internațional al Ascoiației Dentare Române pentru educație. Performanță versus malpraxis în practica medicală curentă. Iași, România 2014, pag. 38.

• naționale

19. Crăciun D., **Calfa S.**, Vârsta optimă de tratament în funcție de forma clinică a anomaliilor dento-maxilare. Conferința științifică anuală USMF "Nicolae Testemițanu", 2018.
20. Sultan O., **Calfa S.**, Aspecte clinice ale dezvoltării ocluziei în limitele fiziologice. Conferința științifică anuală USMF "Nicolae Testemițanu", 2018.

- **Participări cu postere la foruri ştiinţifice:**

✓ **naționale:**

21. **Calfa S.**, Lupan I., Condrea C., Frecvența obiceiurilor vicioase la copii cu anomalii dento-maxilare. Conferința științifică anuală consacrată aniversării a 90-a de la nașterea ilustrului medic și savant Nicolae Testemițanu, 16-20 octombrie 2017.
22. **Calfa S.**, Ciobanu L., Calfa C., Îngustările de maxilar: Frecvență, diagnostic și tratament. Conferința științifică anuală consacrată aniversării a 90-a de la nașterea ilustrului medic și savant Nicolae Testemițanu, 16-20 octombrie 2017.
23. Untilă C., **Calfa S.**, Compresiunea de maxilar. Abordare interdisciplinară. Conferința științifică anuală consacrată aniversării a 91-a de la nașterea ilustrului medic și savant Nicolae Testemițanu, 2018.
24. Untilă C., **Calfa S.**, Ciumeico L., Two-Phase treatment of class II Malocclusion. Congresul consacrat aniversării a 75-a de la fondarea USMF "Nicolae Testemițanu", 20-23 octombrie 2020.
25. Semeniuc M., Trifan V., **Calfa S**., Efectul trainerelor pre ortodontice în dentiția mixtă. Conferința științifică anuală Cercetarea în biomedicină și sănătate: Calitate, excelență și performanță. 19-20 octombrie 2022.

✓ **internaționale:**

26. **Calfa S.**, Ciobanu L., Maxillary Narrowings. Frequency and diagnostic. Excellence in orthodontics- vision for the future, 24-26 mai 2018.
27. Madan C., Ciumeico L., **Calfa S.**, Trifan V., Retention in orthodontics: Clinical aspects and methods of implantation. The 37th Balkan Medical Week,7- 9 iunie 2023.

ADNOTARE

Calfa Sabina
„Diagnostic și conduite de prevenție în sindromul cu compresie de maxilar superior”
Teză de doctor în științe medicale, Chișinău, 2024

Structura tezei. Volumul și structura tezei este expusă pe 108 pagini de text bază, procesate și constituie: lista abrevierilor, introducere, 4 capitole, concluzii generale, recomandări practice, surse bibliografice 108 , materialul ilustrativ include: 5 anexe, 58 figuri, 32 tabele. Rezultatele obținute sunt publicate în 27 lucrări științifice.
Domeniul de studiu: 323.01-Stomatologie.
Cuvinte-cheie: anomalie dento-maxilară, sutura palatină, sindrom cu compresie de maxilar superior, analiză corelativă, densitometrie.
Scopul lucrării: Evaluarea metodelor de diagnostic și identificarea mijloacelor deprevenție în sindromul cu compresie de maxilar superior.
Obiectivele cercetării: Determinarea factorilor predispozanți și incidența sindromului cu compresie de maxilar superior. Analiza comparativă a parametrilor clinici, antropometrici, biometrici, cefalometrici și indicilor imagistici la pacienții cu compresie de maxilar superior. Elaborarea unui algoritm clinic de diagnostic și prevenție al sindromului cu compresie de maxilar superior în funcție de dentație. Trasarea conduitelor de prevenție în sindromul cu compresie de maxilar superior pentru îmbunătățirea calității vieții.
Noutatea și originalitatea științifică: Determinarea factorilor predispozanți și analiza corelativă a compresiei de maxilar superior, asociate cu AnDM. Analiza parametrilor clinico-antropometrici la pacienți cu sindromul de compresie a maxilarului superior în asociere cu alte AnDM. Evaluarea comparativă a gradului de osificare a suturii palatine mediane, în baza parametrilor clinici, imagistici și a densității osoase la pacienții cu compresie de maxilar. Elaborarea algoritmului de diagnostic și prevenție la pacienții care prezintă sindrom de compresie a maxilarului superior cu afecțiuni asociate. Aplicarea acestuia urmărește selectarea metodei eficace de tratament, micșorarea riscurilor de recidivă și trasarea recomandărilor practice în funcție de dentație. Identificarea obiceiurilor vicioase ca factori în apariția AnDM, reprezintă primul și unul din cei mai importanți pași în prevenția și tratamentul patologiei ocluzale în sindromul cu compresie de maxilar superior.
Ipoteza de cercetare: Ameliorarea diagnosticului în baza indicilor clinici, antroprometrici, biometrici și imagistici în SCMS prin elaborarea algoritmului și mijloacelor de prevenție.
Valoarea aplicativă a lucrării: Reieșind din obiectivele cercetării, diagnosticul și conduite de prevenție în sindromul cu compresie de maxilar superior, asociate cu dereglări funcționale necesită planificare individuală. Depistarea precoce a sindromului cu compresie de maxilar superior pentru diferite categorii de vârstă, permite elaborarea conduitelor de prevenție care vor contribui la optimizarea tratamentului ortodontic și asigurarea stabilității rezultatelor ortodontice obținute.
Implementarea rezultatelor științifice. Rezultatele au fost implementate în procesul de cercetare în activitatea clinică și metodologică la Catedra de ortodonție a IP USMF ”Nicolae Testemițanu” și în cadrul clinicii stomatologice ”Calfa Dent S.R.L.”.

АННОТАЦИЯ

Калфа Сабина
«Диагностика и профилактика компрессионного синдрома верхней челюсти»
Докторская диссертация медицинских наук, Кишинев, 2024 г.

Структура диссертации. Объем и структура диссертации изложены на 108 основных страницах текста, обработаны и составляют: список сокращений, введение, 4 главы, общие выводы, практические рекомендации, 108 библиографических источников, иллюстративный материал включает: 5 приложений, 58 рисунков, 32 таблицы. Полученные результаты опубликованы в 27 научных работах.
Область обучения: 323.01 – Стоматология
Ключевые слова: зубочелюстная аномалия, небный шов, компрессионный синдром верхней челюсти, корреляционный анализ, денситометрия.
Цель работы: оценка метода диагностики и определение средств профилактики компрессионного синдрома верхней челюсти.
Цели исследования: определение предрасполагающих факторов и частоты развития компрессионного синдрома верхней челюсти. Сравнительный анализ клинических, антропометрических, биометрических, цефалометрических показателей и показателей визуализации у больных с компрессионным синдромом верхней челюсти. Разработка клинического алгоритма диагностики и профилактики компрессионного синдрома верхней челюсти в зависимости от зубного ряда. Схема профилактических мероприятий при компрессионном синдроме верхней челюсти для улучшения качества жизни.
Научная и оригинальность: определение предрасполагающих факторов и корреляционный анализ компрессии верхней челюсти, связанной с АНСД. Анализ клинико-антропометрических показателей у больных с компрессионным синдромом верхней челюсти в сочетании с другими АНСД. Сравнительная оценка степени оссификации срединного небного шва на основе клинико-визуальных показателей и показателей плотности костной ткани у пациентов со сужением верхней челюсти. Разработка алгоритма диагностики и профилактики у пациентов с компрессионным синдромом верхней челюсти и сопутствующими заболеваниями. Его применение направлено на выбор эффективного метода лечения, снижение рисков рецидивов и составление практических рекомендаций в зависимости от зубного ряда. Выявление порочных привычек как факторов возникновения АНСД представляет собой первый и один из важнейших этапов профилактики и лечения окклюзионной патологии при компрессионном синдроме верхней челюсти.
Гипотеза исследования: совершенствование диагностики на основе клинических антропометрических, биометрических и визуализирующих показателей при компрессионном синдроме верхней челюсти путем разработки алгоритма и средств профилактики.
Прикладная ценность работы: исходя из задач исследования, диагностики и профилактических мероприятий при компрессионном синдроме верхней челюсти, связанные с функциональными нарушениями, требуют индивидуального планирования. Раннее выявление компрессионного синдрома верхней челюсти у разных возрастных групп позволяет разработать профилактические мероприятия, которые будут способствовать оптимизации ортодонтического лечения и обеспечивать стабильность полученных ортодонтических результатов.
Внедрение научных результатов. Результаты были внедрены в исследовательский процесс в клинико-методическую деятельность на кафедре ортодонтии Государственного Университета Медицины и Фармации «Николае Тестемицану» а также в стоматологической клинике «Calfa Dent SRL».

ANNOTATION

Calfa Sabina
„Diagnosis and preventive measures in upper jaw compression syndrome”
Doctoral thesis in medical sciences, Chișinău, 2024

Structure of the thesis. The volume and structure of the thesis is presented on 108 pages of basic text, processed and consisting of: list of abbreviations, introduction, 4 chapters, general conclusions, practical recommendations, bibliographic sources 108 , the illustrative material includes: 5 appendices, 58 figures, 32 tables. The results obtained are published in 27 scientific papers.
Keywords: anomaly dento-maxillary, palatine suture, upper jaw compression syndrome, correlational analysis, densitometry.
Purpose of the paper: Evaluation of diagnostic methods and identification of preventive measures in upper jaw compression syndrome.
Research objectives: Determination of predisposing factors and the incidence of upper jaw compression syndrome. Comparative analysis of clinical, anthropometric, biometric, cephalometric parameters, and imaging indices in patients with upper jaw compression syndrome. Development of a clinical algorithm for the diagnosis and prevention of upper jaw compression syndrome based on dentition. Establishment of preventive guidelines in upper jaw compression syndrome to improve quality of life.
The novelty and scientific originality: Determining the predisposing factors and the correlational analysis of upper jaw compression associated with AnDM. Analyzing the clinical-anthropometric parameters in patients with upper jaw compression syndrome in association with other AnDM. Comparative evaluation of the degree of ossification of the median palatine suture, based on clinical parameters, imaging, and bone density in patients with jaw compression. Developing a diagnostic and preventive algorithm for patients presenting with upper jaw compression syndrome with associated conditions. The application of this aims to select an effective treatment method, reduce the risks of recurrence, and outline practical recommendations based on dentition. Identifying harmful habits as factors in the onset of AnDM represents the first and one of the most important steps in the prevention and treatment of occlusal pathology in upper jaw compression syndrome.
Research hypothesis: Development of algorithm and means of prevention based on clinical, anthropometric, biometric and imaging indices in SCMS.
The practical value of the work: Based on the objectives of the research, diagnosis and preventive conduct in upper jaw compression syndrome, associated with functional disorders, require individual planning. Early detection of upper jaw compression syndrome for different age categories allows for the development of preventive conducts that will contribute to optimizing orthodontic treatment and ensuring the stability of the achieved orthodontic results.
Implementation of the results. The results have been implemented in the research and clinical proceses at Catedra de ortodonție a IP USMF ”Nicolae Testemițanu” and the private dental office ”Calfa Dent S.R.L.”

CALFA SABINA

DIAGNOSTIC ȘI CONDUITE DE PREVENȚIE ÎN SINDROMUL CU COMPRESIE DE MAXILAR SUPERIOR

323.01 – STOMATOLOGIE

Rezumatul tezei de doctor în științe medicale

Aprobat spre tipar: 01.10.2024
Hârtie ofset. Tipar ofset
Coli de tipar: 2,0

Formatul hârtiei: A4
Tiraj 50 ex.
Comanda nr. 9

Tipărit la ”Samrust Plus” SRL
MD-2044, Chișinău, bd. Mircea cel Bătrân 5/1, Tel: (+373) 068338383