

Etiopathogenetic Treatment of Patients with Dentofacial Anomalies Against the Background of Disorders in the Architecture of the Oral Cavity Forecourt

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Abstract. *Aim and objectives of the study:* Improving the effectiveness of diagnostics and comprehensive treatment of patients with dentofacial anomalies against the background of disorders in the architecture of the vestibule of the mouth is relevant, as the frenula of the lips, tongue, and buccal frenula are among the etiological factors in the development of dentofacial anomalies and the cause of relapses after the completion of active orthodontic treatment.

Materials and Methods of the Study: 60 individuals with dentofacial anomalies and disorders in the architecture of the oral cavity forecourt were examined and treated, with an important aspect being the plastic surgeries on the vestibule of the mouth. Patients in Groups 1A and 2A underwent plastic surgery for disorders in the architecture of the vestibule of the mouth using the classical method. Patients in Groups 1B and 2B received the proposed correction, where the wound healed by primary tension using palatal grafts.

Scientific Novelty: The feature of the clinical course of dentofacial anomalies against the background of disorders in the architecture of the vestibule of the mouth was the pronounced changes in the architecture of the vestibule of the mouth (the height of the attachment of the lip frenulum was less than 5 mm, and in 85.0% ($^{5/10}$) of patients, buccal frenula were present in the area of the incisors and premolars). The results of cytomorphometric and reographic studies indicated a deficiency in blood supply in these areas. The clinical and laboratory examination results showed a significant difference between surgical interventions, where the wound healed by primary and secondary tension. The long-term results after the proposed method of correcting disorders in the architecture of the vestibule of the mouth and the use of *Gengigel* in the postoperative period indicated the formation of a normotrophic scar, the absence of relapses and the formation of gingival recession in the projection areas of the buccal frenula, as well as the normalization of clinical and laboratory indicators. The obtained data significantly differ from the indicators in other patient groups ($p < 0.05$).

Conclusions: A detailed examination of the oral cavity forecourt during treatment planning for patients with dentofacial anomalies is an important diagnostic component. Since abnormally fixed buccal frenula are often a prerequisite for changes in tooth position, disruption of blood supply in the areas where they are located, the appearance of gingival recessions, and hypertonia in the area of the circular muscle of the mouth. Preventive plastic surgery of the buccal frenula prevents the onset of these pathological conditions. The use of the technique we proposed, combined with the use of *Gengigel* in the postoperative period, ensures the formation of normotrophic scars and the restoration of blood supply in the vestibule of the mouth.

Етіопатогенетичне лікування хворих на зубощелепні аномалії на фоні порушень архітекτονіки присінка рота

Анотація

Мета і завдання дослідження: Підвищення ефективності діагностики, комплексного лікування хворих на зубощелепні аномалії на фоні порушень архітекτονіки присінка рота є актуальним, оскільки вуздечки губ, язика, букальні вуздечки є одними з етіологічних чинників у розвитку зубощелепних аномалій, причиною рецидивів після закінчення активного ортодонтичного лікування.



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Матеріали та методи дослідження. Обстежено та проліковано 60 осіб із зубощелепними аномаліями та порушеннями архітекτονіки присінка рота, де важливим моментом були пластичні втручання на присінку рота. Хворим груп 1А та 2А проводили пластику порушень архітекτονіки присінка рота класичним методом. Пацієнтам груп 1Б та 2Б — запропоновано корекцію, де рана загоюється первинним натягом із використанням піднебінних трансплантатів.

Наукова новизна. Особливість клінічного перебігу зубощелепних аномалій на фоні порушень архітекτονіки присінка рота полягала у виражених змінах архітекτονіки присінка рота (висота прикріплення вуздечки губи була менше як 5 мм, у 85,0 % ($5\frac{1}{10}$) хворих наявні булакальні вуздечки в ділянці ікол та преолярів). Показники цитоморфометричного та реографічного дослідження вказували на дефіцит кровопостачання у цих ділянках. Результати клініко-лабораторного обстеження показали вірогідну різницю між оперативними втручаннями, де рана загоювалася первинним та вторинним натягом. Віддалені результати після проведення запропонованого способу корекції порушень архітекτονіки присінка рота та застосування *Генгігелю* у післяопераційному періоді вказують на формування нормотрофічного рубця, відсутність рецидивів та утворень рецесії ясен у ділянці проєкцій булакальних вуздечок, нормалізацію клінічних та лабораторних показників. Отримані дані достовірно відрізняються від показників інших груп хворих ($p < 0,05$).

Висновки. Детальний огляд присінка рота у ході планування лікування пацієнтів із зубощелепними аномаліями є важливою діагностичною складовою. Оскільки аномально зафіксовані булакальні вуздечки часто є передумовою до зміни положення зубів, порушенням кровопостачання в ділянці зубів, де вони локалізуються, появою рецесій ясен та гіпертонусу в ділянці кругового м'яза рота. Превентивна пластика булакальних вуздечок попереджає появу зазначених вище патологічних станів. Використання запропонованої нами методики з використанням *Генгігелю* у післяопераційному періоді забезпечує формування нормотрофічних рубців та відновлення кровопостачання в ділянці присінка рота.

Problem Statement

Recent studies have noted an increase in the prevalence of dentofacial anomalies worldwide. According to numerous studies, the prevalence of dentofacial anomalies ranks third in the structure of dental morbidity, following caries and periodontal tissue pathology, and exceeds 80%. Scientists believe that disturbances in the development of the dentofacial system harm the child's health and negatively affect their social adaptation [1, 3–6, 8].

In patients with dentofacial anomalies against the background of disorders in the architecture of the vestibule of the mouth, a deterioration in the hygienic condition of the oral cavity is observed, creating conditions for the emergence of retention points, impaired blood supply in the areas of the marginal periodontium due to the influence of frenula, bands, and a shallow vestibule of the mouth. All these factors worsen the course of the disease and lead to a more aggressive progression of the condition [1, 2, 9, 10].

Some clinical studies indicate that an increasing number of children are exhibiting abnormally

attached lip and tongue frenula and buccal frenums, which impede blood supply in these areas and lead to the protrusion of certain tooth groups [1, 2, 7, 10]. Often, untimely surgical correction of the frenulas leads to gingival recession in the projection areas of the teeth where they are located. However, scientists emphasize that this pathological condition can be prevented by timely elimination of the etiological factors before the onset of the etiopathogenetic chain [1, 2, 10, 11].

According to literature sources, various methods are known for performing surgical correction of disorders in the architecture of the vestibule of the mouth: frenectomy, plastic of frenums, and normalization of the depth of the vestibule of the mouth. The main complication following any chosen method of surgical correction of the vestibule of the mouth architecture is scarring of the mucous membrane of the vestibule of the mouth (in 10–30.5% of patients). When choosing a method of surgical intervention, doctors do not always pay attention to the features of the morphological structure of the mucous membrane of the vestibule of the mouth and the approach to postopera-

tive management, which leads to the appearance of scarring changes in the postoperative period that negatively affect the clinical picture after the completion of active comprehensive treatment [1, 2, 7].

Aim of the Study: To improve the effectiveness of diagnosis and comprehensive treatment of patients with dentofacial anomalies against the background of disorders in the architecture of the vestibule of the mouth.

Materials and Methods of the Study

Sixty patients with dentofacial anomalies against the background of disorders in the architecture of the vestibule of the mouth were examined and treated. All patients were divided into two groups. Group I consisted of individuals with dentofacial anomalies aged 12–15 years. After studying the disorders in the architecture of the vestibule of the mouth, we developed a plan for correcting these anomalies: we propose performing frenuloplasty immediately before orthodontic treatment, ideally at the age of 6–7 years, and correcting the connective tissue bands and forecourt no earlier than 12 years of age, since many scientific studies indicate that the formation of the vestibule of the mouth occurs up until this age period. Patients in Group 1A (15 individuals) underwent plastic surgery for disorders in the architecture of the vestibule of the mouth with secondary tension. Patients in Group 1B (15 individuals) underwent the proposed plastic surgery, where the wound healed by primary tension using mucosal grafts taken from the palate. Group II patients consisted of individuals aged 15–17 years with dentofacial anomalies. Patients in Group 2A (15 individuals) underwent plastic surgery for disorders in the architecture of the vestibule of the mouth with secondary tension. Patients in Group 2B (15 individuals) underwent the proposed correction, where the wound healed by primary tension using mucosal grafts taken from the palate in the postoperative period. According to the instructions, all patients were prescribed a hyaluronic acid-based medication, Gengigel (Italy). All patients underwent clinical, cytomorphometric, and reographic studies before treatment, at 6 and 12 months.

Results of the Study and Discussion

All patients exhibited pronounced changes in the architecture of the vestibule of the mouth. Specifically, in all patients from both groups, the height

of the attachment of the lip frenulum (upper and/or lower) was less than 5 mm. In 85.0% ($^{51/60}$) of patients, connective tissue bands were present in the region of the incisors and premolars (buccal frenums), which were visualized when using a rotor-expander or opra-gate. According to the oral hygiene index results, a significant difference was observed between similar indicators in patients from Groups I and II ($p < 0.05$), and these indicators also significantly differed from those of the comparison group ($p < 0.05$). With the increased patient age, no dynamic worsening of the periodontal tissue condition indices was observed. Expressly, the results of the periodontal index (PI) and the periodontal-marginal-alveolar index (PMA) indicated no dependence of the intensity and prevalence of the inflammatory process in the periodontal tissues on the patient's age group ($p < 0.05$). The bleeding index according to Muhlemann H. (BI) in patients with dentofacial anomalies in Groups I and II significantly differed from the indicators in the comparison group ($p < 0.05$). Still, no significant difference was found between the indicators of Groups I and II ($p < 0.05$). In 78.3% ($^{47/60}$) of patients, catarrhal gingivitis was observed, which we associate with the presence of dentofacial anomalies that prevent the patient from adequately performing oral hygiene and with the emotional state of children due to chronic social stress. The results of our studies on clinical and laboratory indicators showed a significant difference between the use of plastic surgeries in the area of the vestibule of the mouth with primary and secondary epithelialization of the wound, favoring the proposed surgical interventions with the use of free mucosal grafts taken from the palate. Positive results were obtained from plastic surgeries with primary epithelialization in 29 cases across both groups. According to clinical examination results, the maximum wound healing time with secondary tension in patients from Group 1A was (21.4 ± 0.5) days, and in patients from Group 2A — (21.3 ± 0.6) days ($p < 0.05$), which did not significantly differ from the results in Group 1A. The surgical wounds healed with primary tension in Groups 1B and 2B patients. In all patients from both groups, the mucosal grafts were successfully engrafted. In all operated individuals from Group 1B, the mucosal grafts were engrafted at (11.3 ± 1.01) days, and the surgical wound in the area of the hard palate healed in (6.9 ± 1.08) days. In all operated individuals from Group 2B, the mucosal grafts were engrafted

at (12.1 ± 1.04) days, and the surgical wound in the area of the hard palate healed in (7.2 ± 1.04) days. Most patients formed normotrophic scars. The results obtained in Groups 1B and 2B did not significantly differ from each other ($p > 0.05$), but they significantly differed from the results in Groups 1A and 2A ($p < 0.05$).

In both groups of patients, positive dynamics were observed for most of the studied periodontal status indicators during the 6 months after the initiation of complex treatment. After 6 months, group I showed a trend towards a deterioration in the PI, BMA, and BI scores, although they were significantly better compared to baseline ($p < 0.05$). This can be attributed to the commencement of active orthodontic treatment and the lack of motivation for proper oral hygiene in the 12–15-year-old group. After 12 months, the indices of oral hygiene and periodontal status in group II gradually worsened. However, no significant difference was found between the study periods, likely due to the greater awareness of the 15–17-year-old patients regarding the necessity of proper oral care. There were no significant differences in the PI, BMA, and BI scores between Groups 2A and 2B ($p > 0.05$).

A comparative analysis of the cytomorphometric results between Groups 1A and 1B, as well as between Groups 2A and 2B, showed a significant difference in the index of cell differentiation (ICD) on days 14 and 21 post-surgery ($p > 0.05$). The comparison of cytological results between groups 1A and 2A revealed no significant difference in ICD ($p > 0.05$). This suggests that surgical intervention on the tissues of the oral vestibule, where the surgical wound heals by primary tension, is more effective, as supported by the results in Groups 1B and 2B. The study of regional blood circulation in the oral vestibule tissues using rheography in patients of Groups 1A and 2A showed an improvement in local blood circulation in the operated area over 12 months. However, the rheographic indicators in these groups were significantly different from the comparison Group ($p > 0.05$). No significant differences in rheographic indicators were observed in Groups 1B and 2B ($p > 0.05$). Nevertheless, 6 months after treatment,

significant differences in rheographic indicators were observed in Groups 1A and 1B ($p > 0.05$). Similarly, 6 months after treatment, significant differences were noted in rheographic indicators in Groups 2A and 2B ($p > 0.05$). It is critical to note that in patients of Groups 1B and 2B, normalization of blood circulation in the oral vestibule tissues was observed in both quantitative and qualitative indicators, not only at early but also at late follow-up periods after treatment. This indicates a sustained improvement in regional blood circulation, which reduces the risk of developing gingival recession after completing active complex therapy for patients with dentofacial anomalies against the background of vestibule architecture disturbances.

Conclusions

1. A detailed examination of the oral vestibule during treatment planning for patients with dentofacial anomalies is an important diagnostic component. Abnormally fixed buccal frenula are often a precondition for changes in tooth position, impaired blood supply to the area where the teeth are located, the development of gingival recessions, and hypertonia in the region of the orbicularis oris muscle.

2. The clinical course of dentofacial anomalies against the background of disturbances in the architecture of the oral vestibule was characterized by significant changes in the oral vestibule's architecture (the height of the frenulum attachment of the lip (upper and/or lower) was less than 5 mm, in 85.0% ($^{51/60}$) of patients, there were connective tissue bands in the area of the incisors and premolars, and in 78.3% of patients, catarrhal gingivitis). The clinical research results were confirmed by cytomorphometric and rheographic studies, indicating a deficiency in blood supply in these areas.

3. Preventive plastic surgery of the buccal frenula prevents the development of the above-mentioned pathological conditions.

4. Our proposed technique, when combined with Gengigel during the postoperative period, promotes the formation of neurotrophic scars and restores blood circulation in the area of the oral vestibule.

REFERENCES / ЛІТЕРАТУРА

1. Golovko, N. V. (2005). Prevention of dental and maxillofacial anomalies. Vinnytsia: Nova kniga. 272 p. [Головко Н. В. (2005). Профілактика зубощелепних аномалій. Підручник. Вінниця: Нова книга, 2005. 272 с.]. ISBN 966-8609-21-2.

2. Dvornik, V. N., & Kuz, V. S. (2009). Functional state of the dentofacial system in patients with secondary deformations of the dentition. *Actual Problems of the Modern Medicine: Bulletin of Ukrainian Medical Stomatological Academy*, Vol. 9, Part 2, Issue 4(28): 168–169. [Дворник, В. Н., Кузь, В. С. (2009). Функціональний стан зубощелепної системи у хворих із вторинними деформаціями зубних рядів. *Актуальні проблеми сучасної медицини: Вісник Української медичної стоматологічної академії*. Т. 9, ч. 2, вип. 4(28): 168–169.]. URL: https://www.pdmu.edu.ua/old/journal/journal2/pdf/mag2/2009n28_2.pdf
3. Drok, V. (2018). Prevalence of dentoalveolar anomalies and periodontal diseases among adolescents. *Ukrainian Dental Almanac* (1), 72–74. [Дрок В. О. (2018) Поширеність зубощелепних аномалій і захворювань пародонта серед підлітків. *Український стоматологічний альманах*, (1): 72–74.]. DOI: <https://doi.org/10.31718/2409-0255.1.2018.17>
4. Doroshenko, S. I., & Savonik, S. M. (2020). The prevalence of dento-maxillaire anomalies in children aged 4–17 years. *Actual Dentistry* (5), 70–73. [Дорошенко С. І., Савонік С. М. Поширеність зубощелепних аномалій у дітей віком 4–17 років. *Сучасна стоматологія* (5), 70–73.]. DOI: <https://doi.org/10.33295/1992-576X-2020-5-70>
5. Zaiats, O. R., & Ozhogan, Z. R. (2020). Advancement of dental anomalies among children of the Ivano-Frankiv region. *Actual Dentistry* (1): 68–72. [Заяць, О. Р., Ожоган, З. Р. (2020). Поширеність зубощелепних аномалій у дітей Івано-Франківської області. *Сучасна стоматологія* (1), 68–72.]. DOI: <https://doi.org/10.33295/1992-576X-2020-1-68>
6. Kaskova, L. F., Marchenko, K. V., Berezhna, O. E. (2015). Prevalence of dentofacial anomalies in children with regard to harmful habits and attitudes to orthodontic treatment. *Actual Problems of the Modern Medicine: Bulletin of Ukrainian Medical Stomatological Academy*. Vol 15. Issue 1(49):17–20. [Каськова Л. Ф., Марченко К. В., Бережна О. Е. Поширеність зубощелепних аномалій у дітей з урахуванням шкідливих звичок та відношення до ортодонтичного лікування. *Актуальні проблеми сучасної медицини: Вісник Української медичної стоматологічної академії*, 2015. Т. 15. Вип. 1(49): 17–20.]. URL: https://www.pdmu.edu.ua/old/journal/journal2/pdf/mag2/2015_1_49.pdf
7. Makhlynets, N. P., & Krasiy, M. V. (2019). Rheographic changes in the mucous membrane of the vestibule of the mouth against the background of vestibuloplastic. Abstract of the 88th Scientific Conference of Students and Young Scientists “Innovations in medicine,” p. 99. [Махлинець Н. П., Красій М. В. (2019). Реографічні зміни слизової оболонки присінка рота на фоні вестибулопластичних операцій. *Тези доповідей 88-ї науково-практичної конференції студентів і молодих вчених «Інновації в медицині»*, с. 99.]. URL: https://ifnmu.net.ua/images/diyalnist_universitetu/konferencii/2019/88_konf_tezi.pdf
8. Altug-Atac, A. T., Erdem, D. (2007). Prevalence and distribution of dental anomalies in orthodontic patients. *Am J Orthod Dentofacial Orthop*, 131(4):510–514. DOI: <https://doi.org/10.1016/j.ajodo.2005.06.027>
9. Bilge, N. H., Yesiltepe, S., Agirman, K. T., Caglayan, F., & Bilge, O. M. (2018). Investigation of prevalence of dental anomalies by using digital panoramic radiographs. *Folia Morphol (Warsz)*, 77(2):323–328. DOI: <https://doi.org/10.5603/FM.a2017.0087>
10. Frost, H. M. (1994). Wolff's Law and Structural Adaptations of Bone to Mechanical Usage: An Overview for Clinicians. *Angle Orthodontist*, 64(3): 175–188. PMID: 8060014
11. Joelijanto, R. (2012). Oral Habits That Cause Malocclusion Problems. *IDJ*, Vol. 1(2):88–93. URL: <https://media.neliti.com/media/publications/218515-oral-habits-that-cause-malocclusion-prob.pdf>
12. Perry, J., Popat, H., Johnson, I., Farnell, D., & Morgan, M. Z. (2021). Professional consensus on orthodontic risks: What orthodontists should tell their patients. *Am J Orthod Dentofacial Orthop*, 159(1):41–52. DOI: <https://doi.org/10.1016/j.ajodo.2019.11.017>

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