

Methods of Local Treatment of Traumatic Injuries of The Mucous Membrane of The Oral Cavity in The Course of Orthodontic Treatment of Tooth-Jaw Anomalies

Novro'zova Nafisa Orzizonovna¹, Saidov Akbar Axadovich*², Axadov Alibek Akbarovich³

^{1,2,3}*Bukhara State Medical Institute Named After Abu Ali Ibn Sino Uzbekistan*

*Email: saidovakbar@bsmi.uz

Abstract: Orthodontic treatment of dentofacial anomalies in children and adolescents is frequently accompanied by traumatic injuries of the oral mucosa, particularly when using fixed orthodontic appliances. The present study aimed to assess the prevalence, clinical characteristics, microbial features, and effectiveness of local treatment methods for traumatic lesions of the oral mucosa during orthodontic therapy. A total of 485 patients aged 10–18 years were examined, among whom 124 (25.7%) presented with acute and chronic traumatic injuries of the oral mucosa associated with removable and fixed orthodontic appliances. Clinical, anthropometric, hygienic (KPO, GI, PMA), microbiological, and quality of life (OHIP-14) assessments were conducted. Statistical analysis was performed using parametric and nonparametric methods. The most common causes of mucosal injury were the protruding sharp ends of orthodontic arches (54.8%), brackets (20.1%), and metal ligature elements. Clinical manifestations included hyperemia, edema, pinpoint hemorrhages, and traumatic ulcers. Microbiological analysis revealed an increased prevalence of opportunistic pathogenic microflora, including anaerobic and facultative anaerobic microorganisms. Patients were divided into two subgroups: one received conventional therapy, while the other received additional local treatment with pomegranate seed oil and ASEPTA propolis gel. The combined therapy demonstrated a 92.5% clinical effectiveness rate, indicating its potential as an effective adjunct in managing traumatic mucosal injuries during orthodontic treatment. The findings confirm that fixed orthodontic appliances significantly increase the risk of oral mucosal trauma and microbial imbalance, necessitating improved preventive and therapeutic strategies.

Keywords: Orthodontic Treatment, Traumatic Injury, Oral Mucosa, Fixed Orthodontic Appliances, Dentofacial Anomalies, Periodontal Microflora, Pomegranate Seed Oil, Propolis Gel, Pediatric Dentistry, Oral Hygiene Indices

Relevance of the Study

In the diagnosis, treatment tactics and prevention of anomalies and deformations of the dentofacial system, the form and function of its organs and systems should be considered from the point of view of the interrelationship of the child's developing organism. As a result of dentofacial and occlusal anomalies, the functions of biting and chewing are impaired, children's speech is impaired and their cosmetic appearance is impaired. In children, problems associated with occlusal anomalies have a negative impact on the child's smile, emotions, social relationships, as well as grades at school, which, in turn, is reflected in their quality of life. Disorders of chewing, speech, breathing, mouth closure and swallowing functions occur in 40-69% of children with occlusal anomalies. Functional and cosmetic changes due to deformations of the dentition in children can occur rapidly, depending on age. Anomalies and deformations in the dental rows can lead to problems with food intake, chewing, pronunciation, the development of pathological changes in the temporomandibular joint, impaired breathing, and impaired swallowing function.

Occlusal anomalies are characterized by deformations of the occlusal surface, changes in the movements of the lower jaw, and dysfunction (disharmony) of the masticatory muscles and temporomandibular joints. Anomalies of dental row occlusion are common in children, especially in young children.

Removable and non-removable orthodontic structures are used in the treatment of dental anomalies. The use of these orthodontic structures eliminates the anomaly of the dental system and improves the aesthetic appearance of the patient and increases the quality of life of the child. However, it should not

be forgotten that during orthodontic treatment, it becomes difficult to clean the teeth, as a result of which plaque and tartar may appear. Also, the surface of the teeth and orthodontic structures may become covered with soft plaque, which can lead to the growth of microorganisms and demineralization of tooth enamel. In addition, a change in the microflora of the oral cavity, which can lead to dysbacteriosis with the growth of pathogenic and conditionally pathogenic microorganisms. Non-removable orthodontic appliances injure the mucous membrane of the oral cavity, which can lead to the formation of erosion, ulcers and sores. This can cause discomfort, pain and difficulty eating for patients.

In our scientific research, Bukh State Medical Institute named after Abu Ali Ibn Sina " Educational-Scientific-Practical Dentistry" center under a applied We conducted dental examinations among 124 children aged 10-18 years . They are patients with acute and chronic injuries of the mucous membrane of the oral cavity as a result of the use of removable and non-removable orthodontic apparatus During the examination of the children , anamnesis was collected and analyzed directly from them , the opinions of the children and their parents were listened to about the origin and development of the disease , and a detailed objective examination of the patient was conducted . The dental examination and examination were conducted using a generally accepted standard set of dental tools and equipment: interview, patient complaints, objective examination, examination of the oral mucosa, teeth and dental arches, periodontal tissues, masticatory muscles, and temporomandibular joint . It was determined whether the patient had previously undergone orthodontic treatment or had undergone surgery in the maxillofacial region , and what complaints the patient had. During the clinical examination, we collected anamnesis, paid attention to the presence of local and general diseases of the body, and salivation. During the examination of the teeth, we paid attention to their color, size, location, the presence of cracked and broken teeth, increased or decreased sensitivity, mobility, and the state of the alveolar ridge in the place of the extracted teeth. The movements of the lower jaw were assessed in the vertical, transverse, and sagittal directions. In the functional part of the diagnosis, dynamic tests were performed (breathing, speech, swallowing).

From the clinical and dental examinations: KPO index (kaeris, filled and extracted teeth), GI (hygienic index), RMA (papillary-marginal-alveolar) indices were determined. For the assessment of clinical anthropometric parameters -face parameters N.X. It was measured according to the method of Shomirzaev (1998) . Laboratory methods included microbiological studies of oral fluid and oral mucosal smears . Quality of Life Questionnaire, OHIP-14 – “ Oral Health Impact Profile” . The questionnaire consists of 36 items, which are combined into 9 scales. The research materials were statistically processed using parametric and nonparametric analysis methods. The collection, correction, systematization of primary data and visualization of the results were carried out in Microsoft Office Excel 2016 spreadsheets. Statistical analysis was performed using IBM SPSS Statistics v.26.

Our research has shown that the traumatic injuries of the oral mucosa caused by orthodontic treatment are mainly caused by non-removable orthodontic appliances. Of the 485 patients examined by us, 124 (25.7%) had traumatic injuries of the oral mucosa. Patients complained of several complaints at the same time: 64 (51.6%) patients complained of discomfort and pain when eating, 18 (14.5%) of only pain, 14 (11.2%) of only discomfort when eating, 16 (19.84%) of pain and a change in pronunciation, and 12 (9.66%) of only a change in pronunciation.

The following types of dental and maxillofacial anomalies were found in the treatment with non-removable orthodontic appliances: the presence of several anomalies together - 63.7%, occlusion anomalies - 13.71%, anomalies of individual groups of teeth (vestibular arrangement of teeth) - 14.5%, anomalies of dental rows (dental row crowding) - 8.06%.

It was found that the most common causes of injury to the oral mucosa were the sharp edge of the end of the orthodontic arch protruding from the metal tube in 54.8% (68 patients), the brackets in 20.1% (25 patients), the brackets placed on the metal tube in 9.68% (12 patients), the metal wires in 8.88% (11 patients), and the free part of the arch located between the brackets in 6.45% (8 patients). The following morphological elements and signs were observed in the injured oral mucosa: hyperemia and edema, pinpoint hemorrhages, traumatic ulcers and ulcers.

The results of the preliminary study of the hygienic state of the oral cavity and the state of periodontal tissues in children with anomalies of the dentofacial system are presented in Table 1. This table shows that the PMA index in the main group was $2.9, 1.3 \pm 0.65$; in the control group it was 1.5 times lower $1.2, 0.67 \pm 0.51$. This indicates that the main group had signs of inflammation. Supragingival

and subgingival calculus were also detected in children in the main group. It was found that children in the main group needed professional hygiene. Sick children complained more of bad breath, bleeding gums, and difficulty in eating solid foods.

Microbiological examinations were performed by taking swabs from the oral mucosa of the patients. The following rules were followed when obtaining the material for analysis :

- Patients were prohibited from brushing their teeth before the procedure to obtain the material being studied ;

- rinsing the mouth with any medicinal products is prohibited;

- the study material was taken 2 hours after the meal;

- the studied material was delivered to the bacteriological laboratory within 30 minutes ;

- The material for the study was taken before and after the implementation of qualified oral hygiene and treatment procedures . The distribution of microorganisms and the number of colony-forming units (CFU Log/ml) in 1 ml were studied in the studied groups. CFU Log/ml was calculated as the arithmetic mean of the total number of microorganisms in one periodontal pocket in the group .

The microbial landscape in periodontal pockets of 30 healthy individuals was studied and 11 species of bacteria and 5 species of aerobes were identified: *S. sanguis*, *S. salivarius*, *S. epidermidis* , *C. xerosis*, *Neisseria spr* . and 6 types of anaerobes were identified: *L. buccalis*, *B. longum*, *L. salivarius*, *P. anaerobius*, *V. parvula* , *B. gingivalis*.

Aerobes and facultative anaerobes accounted for 36.3 % , obligate anaerobes - 59.1 % of the total number of microorganisms isolated in the healthy group .

Patients of research groups In the material obtained from the periodontal pocket , anaerobic microflora *V. parvula*, *L. salivarius* , *B. dentium* , *P. niger* , *B. gingivalis* were detected. This microflora is present in the normal flora of the oral cavity of most people , but when various changes occur in the oral environment, the number of these microflora increases in the focus of inflammation , which leads to the development of various pathological and prepathological processes.

the study groups, the following gram-negative anaerobic opportunistic spore-forming bacteria were identified from periodontal pathogenic microorganisms: *L. buccalis* , fusobacteria *F. nucleatum* and *Fusobacterium sp* . , pathogenic aerobes *S. aureus* , *S. epidermidis* , *S. mutans* , *Neisseria spp* ., etc. Aerobic and facultative anaerobic Gram-negative non-spore-forming rods *C. xerosis* and *C. pseudodiphthericum* were most frequently observed.

From the above data, it can be seen that 13 types of microorganisms, 8 types of facultative anaerobes and aerobes were detected in all patients in the main group. In the patients of the main group , *S. mutans* 3 , 26 ± 0.13 CFU Log/ml , *S. epidermidis* 6.54 ± 0.21 CFU Log/ml , *S. aureus* 5.89 ± 0.19 CFU Log/ml were detected. In the patients of the main group , *C. xerosis* 6.34 ± 0.20 CFU Log/ml , *C. pseudodiphthericum* 5.37 ± 0.11 CFU Log/ml were detected. In the main group, *Neisseria spp.* 5.63 ± 0.17 CFU Log/ml , *Fusobacterium spp.* 5.01 ± 0.18 KHQB Log/ml , *F. nucleatum* 5.21 ± 0.16 KHQB Log/ml , *B. dentium* 5.41 ± 0.21 KHQB Log/ml , *B. gingivalis* 6.09 ± 0.22 The CRP was determined in Log/ml.

The main group of patients was divided into 2 subgroups according to the treatment procedures. AG-1 (n=62) received traditional treatment procedures. AG-2 (n=62) received pomegranate seed oil and Asepta propolis gel in addition to traditional treatment. complex therapy was carried out .

In summary, 25.7% of 485 patients had traumatic injuries to the oral mucosa. It was found that the most common injuries to the oral mucosa were caused by the sharp edge of the end of the orthodontic arch protruding from the metal tube (54.8%), the brackets (20.1%), the brackets placed on the metal tube (9.68%), the metal wires (8.88%), and the free part of the arch located between the brackets (6.45%). We achieved a 92.5% effective result in the treatment of oral mucosal injuries with the recommended pomegranate seed oil and ASEPTA propolis gel.

REFERENCES

- Аверьянов, С.В. Лечение зубочелюстных аномалий техникой прямой дуги / С.В. Аверьянов. - Уфа, 2016.
- Бандура, Е.А. Общее и местное влияние брекет-систем / Е.А. Бандура, А.А. Серова, Ю.А. Шевякова // Бюллетень медицинских интернет-конференций. - 2015. - Т. 5, № 10. - С. 1211-

1212.

- Ботова, Д.И. Особенности течения и лечения заболеваний слизистой оболочки полости рта у пациентов на ортодонтическом приеме / Д.И. Ботова, С.Ю. Косюга // Евразийский Союз Ученых. - 2015. - № 11-1 (20). - С. 139-140.
- Ботова, Д.И. Эффективность комплекса мероприятий по профилактике и лечению стоматологических заболеваний у лиц молодого возраста, находящихся на ортодонтическом лечении: автореф. дис. ... канд. мед.наук. - Пермь, 2018. - 19 с.
- Гаврилова, О.А. Изменения тканей и органов полости рта во время ортодонтического лечения зубочелюстных аномалий и деформаций / О.А. Гаврилова, Ю.В. Червинец, А.С. Матлаева // Стоматология детского возраста и профилактика. - 2015. - Т. 14, № 1 (52). - С. 29-33.
- Демина, М.А. Положительные и отрицательные аспекты работы с ортодонтическими конструкциями, критерии выбора / М.А. Демина // Бюллетень медицинских интернет-конференций. - 2017. - Т. 7, № 9. - С. 1440-1442.
- Alternative preparation of propolis extracts: comparison of their composition and biological activities / L. Kubiliene [et al.] // BMC Complement Altern. Med. - 2015. - № 15. - P. 156.
- Antioxidant, cytotoxic and DNA protective properties of *Achillea eriophora* DC. and *Achillea biebersteinii* Afan. extracts: A comparative study / M. Varasteh-Kojourian [et al.] // Avicenna J. Phytomed. - 2017. - Vol. 7, № 2. - P. 157-168.
- Development and evaluation of a patient decision aid for young people and parents considering fixed orthodontic appliances / Z. Marshman [et al.] // J. Orthodont. - 2016. - Vol. 43, № 4. - P. 276-287.