

CLINICAL MANIFESTATION OF ORAL INJURIES CAUSED BY FIXED ORTHODONTIC TREATMENT

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Abstract: Oral mucosal injuries can occur due to the action of different agents from a physical, chemical or thermal nature. Most often, these types of injuries of the oral mucosa can occur as a result of eating hard and hot food, improper tooth brushing, improper restorative and sharp fillings, injury by the teeth (such as biting the oral mucosa) and other. Injuries to the oral mucosa can be caused by iatrogenic damage during the performance of various dental interventions. Oral injuries also can be caused during orthodontic fixed treatment. Based on the aforementioned, the following aim have been created - to realize the enormous importance of oral mucosal injuries through presentation of a three clinical case with mechanical damage to the oral mucosa caused by fixed orthodontic treatment. For the realization of the previously set goal, an appropriate examination was carried out in a private dental office, in Skopje, Republic of North Macedonia. The doctor was specialist in orthodontics. The period of the investigation was between October and November 2022. The set goal was fulfilled with the help of appropriate photos that come from the patients and with them the classic clinical manifestation of the oral mucosal damage is presented. A 23-year-old female patient comes to the office because of oral change present on the buccal mucosa on the right side. Based on the clinical examination and history, it has been concluded that the change on the buccal mucosa is caused by a mechanical cause - briquettes from a fixed orthodontic device. For therapeutic purposes, it was decided that the patient should maintain proper oral hygiene and apply paste for re-epithelialization for several days. Control if needed. An 18-year-old patient comes into the office because of a change in the buccal mucosa. During the anamnesis, the patient reports that the change has been present for one day and that there is pain when the wire from the fixed orthodontic appliance comes into contact with the buccal mucosa. Based on the clinical examination and history, the diagnosis was established- the change is caused by a mechanical cause. For therapy, it was decided to remove the causative agent, and it is expected to epithelialize the change by itself. A 19-year-old female patient comes into the dental office because of a change in the buccal mucosa. Based on the clinical examination and history, it was found that it was change caused by a mechanical cause. For therapy, it was decided to remove the causative agent - shortening the orthodontic arch and it is expected to epithelialize the change by itself. Management of oral injuries or oral lesions present on the oral mucosa is complex, due to the fact that different anatomical parts are involved and the highly contaminated environment to which these lesions are exposed. At the end we can conclude that oral changes occurring during fixed orthodontic treatment are very common. It is of particular importance that the oral changes that occur due to this type of treatment be promptly detected and treated in order to avoid infectious complications.

Keywords: oral changes, fixed orthodontic treatment, oral injuries, orthodontic treatment.

1. INTRODUCTION

Oral mucosa, which is made up from several layers of epithelial cells (keratinocytes), acts as a protective barrier, which may indicate that its primary role is to protect the oral cavity from the action of various factors that can cause damage to the oral mucosa. Different damaging agents from chemical, thermal and mechanical nature or iatrogenic injury, or the action of microbes and toxins can be neutralized through the oral mucosa physical and immunological barrier functions. For example, the oral mucosa protects the deeper anatomical structures and tissues, from mechanical injuries, but it also prevents the penetration of various types of microorganisms and some toxic substances inside the tissues. This is the case if we do not have any damage to the oral mucosa, but if there is any damage, that barrier is broken and there is a possibility of penetration of bacteria and various types of toxins inside the deeper portions of the oral cavity.

The oral mucosa and its great ability to regenerate is providing protection of the oral cavity from continuous damage to the tissue during mastication, from the action of various types of particles and agents, which are potential triggers of the homeostasis of the oral mucosa. Hence, we can conclude that the oral mucosa and the inherent mucosal immune system become very crucial for protecting the integrity of the internal environment.

Oral mucosal injuries can occur due to the action of agents from a physical, chemical or thermal nature. Most often, these types of injuries of the oral mucosa can occur as a result of eating hard and hot food, improper tooth brushing, improper restorative and sharp fillings, injury by the teeth (such as biting the oral mucosa) and other. Also, injuries to the oral mucosa can be caused by iatrogenic damage during the performance of various dental interventions. (Koray & Tosun, 2019).

Oral lesions that are caused by traumatic action are quite a common clinical finding in everyday dental practice. There is a diverse range of disorders and clinical manifestations present on the oral mucosa caused by the action of acute and chronic traumatic factors. Those injuries are manifested on the oral mucosa as acute or chronic ulcerations, white or red lesions of the oral mucosa, in the form of mucositis or reactive hyperplasia. But such changes of the oral mucosa represent a reason for the disruption of oral functions to a considerable extent and also cause difficulties in establishing a diagnosis, especially if it is a question of chronic lesions. However, for any change occurring on the oral mucosa, timely diagnosis and elimination of the causative factor can ensure success in the treatment.

The clinical presentation of the traumatic lesions will depend on the duration of the change, when it occurred and how it occurred, during the clinical examination, the presence of erythema, swelling, inflammation will be noticed, but they are variable depending on the cause and the time after the trauma. Traumatic ulcers are tender, have a yellowish-white color of the change with the presence of erythematous edges. Also, traumatic ulcers can be caused by an inadequate made tooth restoration due to the presence of a sharp filling, usually causing mechanical trauma to the tongue or buccal mucosa. Traumatic ulcers heal a few days after elimination of the causative agent (factor). But, if they persist for more than 7-10 days, it is necessary to suspect another diagnosis and a biopsy should be performed. (Cawson & Odell, 2008).

The oral mucosa responds to mechanical trauma in one of two ways: acute trauma leads to ulceration, while chronic frictional irritation leads to epithelial thickening and hyperkeratinization. The presence of a sharp tooth in the dental row, bad habits such as biting the cheeks or lips, as well as long-term wearing of inadequate total and partial dentures and fixed orthodontic treatment are causes of chronic friction of the oral mucosa, which occur due to a mechanical cause. (Odell et al, 2005)

Over half the participants reported that they had oral ulcerations caused by fixed orthodontic treatment (63.6%) and most of them lasted for less than 2 weeks (77.2%). (AlDahash et al, 2020)

Damage on the oral mucosa is a common types of lesions in the oral cavity and is one of the most common oral problems encountered in everyday dental clinical practice. Oral damage can occur in all individuals, regardless of age, they appear equally in the male and female population, but above all there are certain predisposing factors that contribute to their occurrence, so it is necessary to identify and eliminate them with in order to prevent their progression.

Hence, we formed the main goal of this research - to present the clinical manifestations of different types of damage to the oral mucosa caused by fixed orthodontic treatment.

2. MATERIAL AND METHOD

For the realization of the previously set goal, an appropriate examination was carried out in a private dental office, in Skopje, Republic of North Macedonia. The doctor was specialist in orthodontics. The period of the investigation was between October and November 2022.

The set goal was fulfilled with the help of appropriate photos that come from the patients and with them the classic clinical manifestation of the oral mucosal damage is presented.

Clinical case 1

A 23-year-old female patient comes to the office because of a oral change present on the buccal mucosa on the right side. In the anamnesis, the patient reports that the change has been present for 2 days, and pain is present, too. During the clinical examination, a change of the buccal mucosa was observed on the right side, the change is localized in the area of tooth 43 and 44, it was a well-limited pathological change with an oval shape with a length of 1cm, with presence of white fibrin deposits. Based on the clinical examination and history, it has been concluded that the change on the buccal mucosa is caused by a mechanical cause - briquettes from a fixed orthodontic device. For therapeutic purposes, it was decided that the patient should maintain proper oral hygiene and apply paste for re-epithelialization (Solcoseryl dental adhesive paste®) for several days. Control if needed.



Fig. No. 1. Clinical case No. 1.

Clinical case 2

An 18-year-old patient comes into the office because of a change in the buccal mucosa. During the anamnesis, the patient reports that the change has been present for one day and that there is pain when the wire from the fixed prosthesis comes into contact with the buccal mucosa. During the clinical examination, a diffuse, well- limited change of the buccal mucosa was observed on the left side with the presence of white fibrin deposits, the change is not sensitive to stimuli, but the patient has painful sensitivity when the wire from the fixed prosthesis comes into contact with the buccal mucosa. Based on the clinical examination and history, a the diagnosis was established the change is caused by a mechanical cause. For therapy, it was decided to remove the causative agent, and it is expected to epithelialize the change by itself.



Fig. No. 2. Clinical Case 2

Clinical case 3

A 19-year-old female patient comes into the office because of a change in the buccal mucosa. During the anamnesis, the patient reports that the change has been present for several days and that there is pain when the wire from the fixed prosthesis comes into contact with the buccal mucosa. During the clinical examination, a well- limited change was observed on the right side of the buccal mucosa, it is a solitary change with a round shape, with a size of 1 to 2 cm, the presence of white papules. Based on the clinical examination and history, it was found that it was change caused by a mechanical cause. For therapy, it was decided to remove the causative agent - shortening the orthodontic arch and it is expected to epithelialize the change by itself.



Fig. No. 3. Clinical case 3

3. DISCUSSION

Damage to the oral mucosa differs in terms of the color of the change, there are variations in the characteristics of the surface of the change, the presence of edema, loss of integrity of the surface of the oral mucosa, etc. Predisposing risk factors contribute to the appearance of damage to the oral mucosa, including local trauma or irritation, systemic diseases, consumption of alcohol, tobacco or drugs, various types of medications, etc. Mostly these changes or damage to the oral mucosa are reversible changes and require local or sometimes systemic treatment, it is necessary to diagnose and treat them in a timely manner because they affect the quality of life of patients by having an impact on the functions of the stomatognath system – in relation to mastication, swallowing and speech. (Zhou & Li, 2021)

The detection of changes in the oral mucosa should initiate a diagnostic process that usually goes through several stages. At the end of this process, a diagnostic hypothesis is obtained, which is often formed before starting the treatment. Diagnosing means identifying and comparing with other clinical changes that correspond or do not correspond to patients' symptoms. To diagnose the change, the first step is to take an anamnesis. The history includes questions about the patient's medical health status as well as oral health. During the clinical examination, which consists of inspection and palpation, it is necessary to describe the change of the oral mucosa. In certain cases, if necessary, additional diagnostic procedures such as radiological examination, biopsy for pathohistological analysis, etc. can be carried out. All these steps are important to clinician in establishing an accurate diagnosis in order to implement appropriate treatment and to have success in treating the change. The data obtained from the anamnesis, the clinical examination and, if additional tests were carried out, will allow the clinician to make a diagnosis, to classify the lesions in one of the main groups of mucosal changes that are characterized by a common main symptom. General health factors such as the age and gender of the patient, the incidence of suspected disease, the region where the lesion is present must be taken into account for differential diagnosis. In most cases these steps will assist the clinician and serve as a basis for initiating treatment. If certain doubts arise, which is quite a common occurrence among oral pathologists, the need can again be imposed to carry out additional tests, including - laboratory tests, excisional biopsy, etc. (Wolfgang,2010)

It is a well-known statement that the oral cavity is a "mirror" of our health. Some changes in the oral mucosa can be manifested due to various general pathological disorders such as: diabetes, skin diseases, immune deficiencies and blood disorders, allergic and toxic reactions, gastrointestinal diseases, lack of vitamins and minerals, etc. In addition, oral health has an obvious impact on functional, psychological and behavioral quality of life.

However, the health condition of the oral mucosa can change due to the presence of various external factors that affect the oral cavity. Such factors include, among others, mechanical trauma and irritation, reduced salivation, mucosal skin diseases, malnutrition, lack of vitamins and minerals, diabetes mellitus, hypertension, heart diseases, gastrointestinal diseases, medications used for the treatment of various diseases, the intake of tobacco and the use of cigarettes, and as the most important factor insufficient and improper maintenance of oral hygiene with various mental or physical limitations as well as the presence of specific dental disorders. All previously mentioned factors that contribute to changes on the oral mucosa must be taken into account during the process of diagnosis and treatment of lesions present on the oral mucosa.(Radwan-Oczko et al, 2022)

Some injuries to the oral mucosa can also be caused by iatrogenic damage during the performance of dental intervention or treatment performed in the oral cavity.

Mechanical and chemical lesions of the oral mucosa are common conditions that any dental healthcare team can deal with. Identifying the etiology of such lesions present on the oral mucosa is important in determining appropriate treatment modalities to improve the oral care of patients. If the etiology of the lesion cannot be identified or if the lesion persists for more than two weeks, appropriate referral to a specialist is necessary in order to carry out additional diagnostic procedures in order to establish a definitive diagnosis. All dental healthcare teams are integral in identifying these lesions and initiating treatment, referral and/or education in a timely manner to ensure optimal patient care. Such an interprofessional approach will lead to better patient outcomes. (Yao et al, 2022)

Management of oral injuries or oral lesions present on the oral mucosa is complex, due to the fact that different anatomical parts are involved and the highly contaminated environment to which these lesions are exposed. In this thesis, a clinical presentation of the various causes of changes of a mechanical, chemical, thermal or radiological nature and how they are manifested on the oral mucosa, how it is necessary to identify and eliminate them, how to diagnose the changes and the treatment that needs to be carried out in these changes of the oral mucosa. (Anura, 2014)

According to Baricevic et al (2011) oral mucosal lesions are more present in wearers of orthodontic appliances than in children with malocclusion. Gingival inflammation, erosion, ulceration, and contusion were the most common findings in orthodontic patients.

Over half of the patients reported experiencing oral ulcers during orthodontic treatment, and orthodontic practitioners (55.3%) also think that oral ulcers are because of the orthodontic treatment.(Mainali, 2013)

4. CONCLUSION

Fixed orthodontic appliances can lead to different types of injuries to the oral mucosa that can be caused by different parts from the appliances. Clinicians must be prepared to detect and treat these changes. It is also of importance to consider whether primary practitioners provide adequate supportive management to oral ulceration caused by orthodontic fixed appliances.

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