



THE HISTOPATHOLOGICAL CHANGE OF ORAL MUCOSA IN PATIENT WITH ORTHODONTIC APPLIANCE

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| Article history: | Abstract: |
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| <p>Received: June 11th 2022 Accepted: July 14th 2022 Published: August 21st 2022</p> | <p>Oral mucosal lesions are caused by irritation from malocclusion or orthodontic appliances. Wearers of orthodontic appliances some times are suffering from mucosal lesions, buccal mucosa of orthodontics patient have many pathological change such as binucleation and micronuclei and sveral types of inflammatory cell .Aims of current article was to investigate the histopathological observations and cytomorphological changes of epithelial cells component of oral mucosa present in direct attachment with orthodontic appliances via usage of exfoliated cytology technique. This study is designed to deal with 25 patients with orthodontic treatment in addition to 10 healthy persons as a control group to compare with them .Histological smears were obtained from oral mucosa of the healthy and treated groups along 3 - 6 months after the bingeing of orthodontic appliances traetment. Slides stained with giemsa dye and scrutinized by a light microscope. Many samples exhibited histopathological findings and cytomorphological changes which composed of many degrees of hypertrophy in mucosal epithelial cells, binucleation, micronuclei, perinuclear halos, and infiltration of inflammatory cells. In addition to that the epithelial cells of oral mucosa reveal cytomorphological alterations in patients who were wearing orthodontic appliances.</p> |

Keywords: Inflammatory cells, Epithelial cells morphology, Fixed orthodontic therapy.

INTRODUCTION

Orthodontic treatment is a procedure that consuming long time, so, materials which used in oral cavity to short and long -term must be absolutely warranty for both safety and biocompatibility [1]. Orthodontic appliances may be the reason for irritation onto oral mucosa which will lead to presence of ulcers, which is a traditional suffering as a result of the friction of the used materials, especially between mucosa and brackets. However, irritation decrease after a few weeks due to tissue alteration [2].

Several researchs reported the emergence of a number of changes at the cytoplasmic and nuclear levels after using orthodontic materials. These changes included the following: Changes in the size and shape of cells and nuclei alike, in addition to a change in the ratio of nucleus to the volume of cytoplasm, as well as damage to the DNA level. which in particular conditions may lead to premalignant changes [1,3].

There are many hypotheses said that the individuals who placed fixed orthodontic appliances will show a number of cytomorphological changes of oral mucosal cells compared with normal individuals. so, the aims of this study were to evaluate the histomorphological changes of oral mucosal epithelial cells in direct exposure to fixed

orthodontic appliances via exfoliated cytology technique [4].

Damage of tissue is considered as a one of oral risks when wearing orthodontic appliances [4]. Ulcers, pains, and inconvenience are recurrent side effects, These symptoms are mainly caused by orthodontic appliances [5.6]. Despite the painful and unpleasant lesions. Rapid recovery due to rapid oral mucosal metabolism in young and healthy orthodontic wearers [7].

Further, oral mucosal lesions may be caused by reactions of dental cast alloys and oral tissues as well. These reactions result from bacterial adhesion, toxic and semi-toxic effects, allergic reactions caused by metal ions, and allergic reactions [8]. Interactions between periodontal tissues and orthodontic appliances can be a major challenge [8].

In addition to that, during usage of orthodontic treatment with fixed appliances, Oral health challenge due to both of restricted food and oral waste around brackets of orthodontic appliances can be involved to development of gingivitis [9].

A few researches dealing with recurrence and kind of lesions in oral mucosa during wearing

orthodontic appliances. On the contrary, Motivation and duration of orthodontic treatment will be negatively affected by the occurrence of lesions in the oral mucosal epithelia for the wearer of orthodontic appliances, especially when the suffering of the impact of these lesions becomes throughout the day and is widespread [10].

Both, brackets and bands adhered to the surface of tooth result in constant buccal rubbing and the oral mucosal tissues causing ulcers and pains [11]. Just a small number of researches in the obtainable scientific sources that talk about the effects of the orthodontic treatments on oral mucosal tissues and cells [12-15]. Chronic irritation is considered as a decisive factor for premalignant and malignant conditions [16]. Some articles have also mentioned the effects of sharp tooth, inability to swell and semi-functional habits in causing adverse effects on the tissues of the oral mucosa [16,17,18].

MATERIALS AND METHODS

Medical history was reported for all patients , oral checking was completed during which buccal tissue lesions were diagnosed and reported comprehensive both of gingivitis and mucosal inflammation in addition to oral hygiene condition. The medical history included data regarding systemic diseases and confirmed sensitivity to known allergens and drugs. The study was designed on patients attending the Teaching Hospital of the College of Dentistry / Tikrit University, their ages ranged from (13-25) years, samples were obtained from 25 patients wearing orthodontics

appliances, for the healthy mucosa groups (control group) , samples were obtained from other 10 healthy individuals to comparison . Samples were collected from healthy individuals at 3 to 6 months after orthodontics appliance wearing with a preapproval from them to participate in this study. Two samples were obtained from each patient, one via using cotton swab which passed on oral mucosa and the other was by collected samples of saliva. samples immediately carried on a microscopical slides and stained directly by giemsa dye which remained for 3-5 minutes and then gently washed by using distilled warm water and investigated under the microscope [22]. This practical part done from 24 February to 28 February 2022.

RESULTS

Via microscopic investigation of smears which obtained from oral mucosa of control group, the cells revealed in its normal size without any defects in the cytoplasm or nucleus (fig.1). While that smears which obtained from oral mucosa of the orthodontic patients, revealed many cytomorphological changes. These changes were represented by binucleation, micronuclei, perinuclear halos, vesicular degeneration , cellular hypertrophy, furthermore the presence of considerable number and several types of inflammatory cells, such as neutrophils, macrophages and plasma cells (fig.2-7).

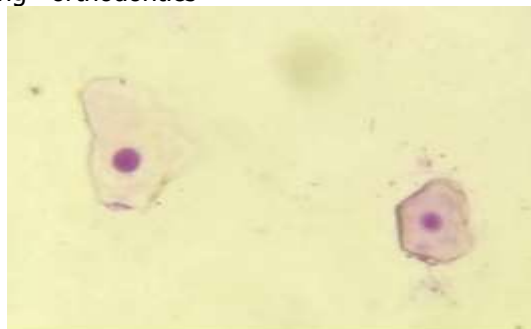


Figure 1. Microscopic view from buccal mucosa of control group shows normal epithelial cells Giemsa stain (400x).

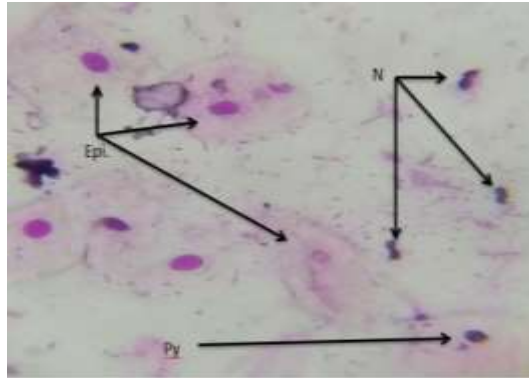


Figure 2. Microscopic view from buccal mucosa of treated patient shows: neutrophils (N), normal epithelial cellc (Epi), pycnotic nucleus of epithelial cell (Py). Giemsa stain (400x).

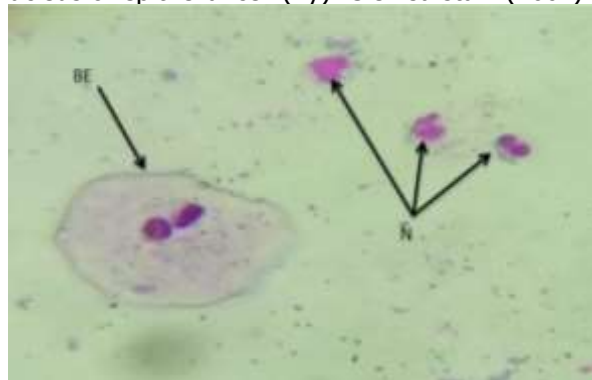


Figure 3. Microscopic view from buccal mucosa of treated patient shows: neutrophils (N), binucleated epithelial cell (BE). Giemsa stain (400x)

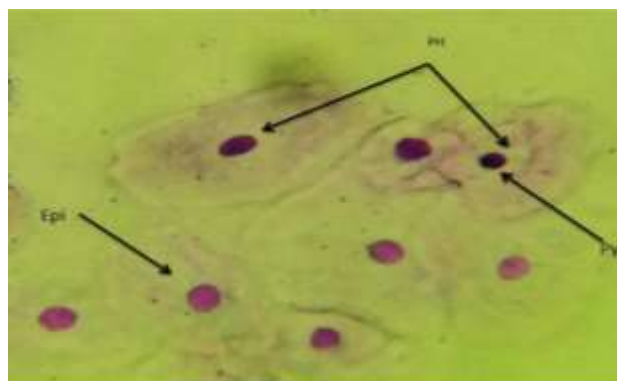


Figure 4. Microscopic view from buccal mucosa of treated patient shows: perinuclear halos (PH), Pycnotic nucleus (Py), normal epithelial cells (Epi). Giemsa stain (400x)

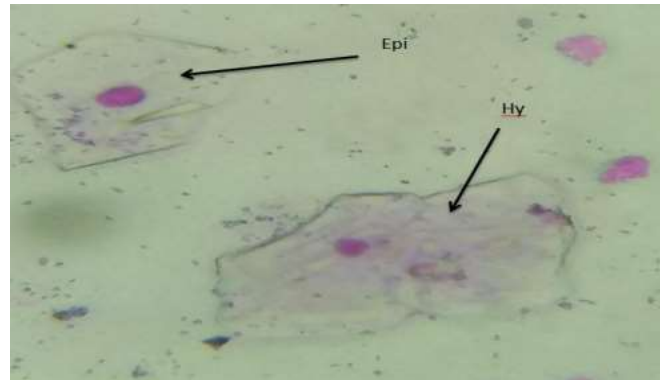


Figure 5. Microscopic view from buccal mucosa of treated patient shows: Hypertrophic epithelial cell with micronucleus (Hy), normal epithelial cell (Epi). Giemsa stain (400x).

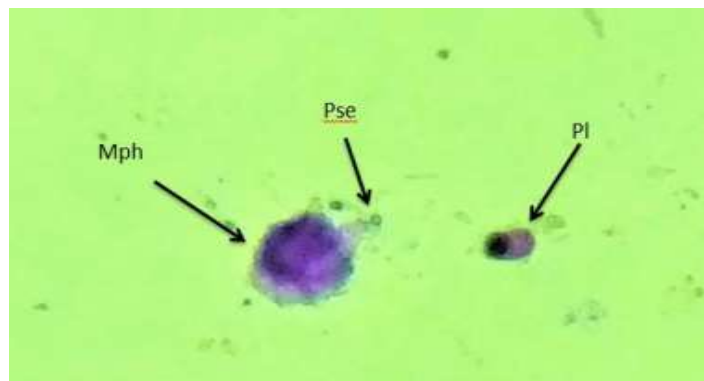


Figure 6. Microscopic view from buccal mucosa of treated patient shows: Macrophage (Mph), pseudopodia (Pse), plasma cell (PI). Giemsa stain (400x).

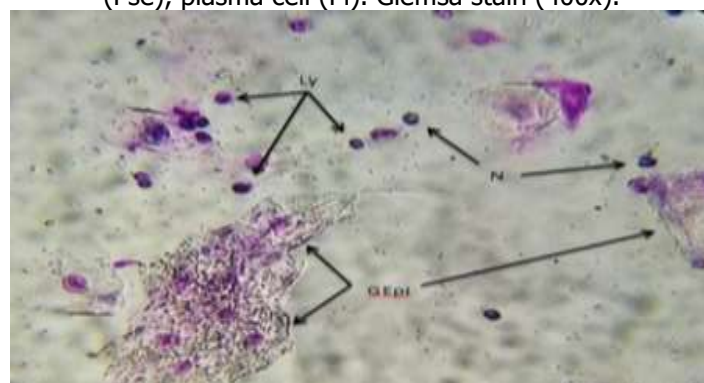


Figure 7. Microscopic view from buccal mucosa of treated patient shows: Granulated cytoplasm (vesicular degeneration) of epithelial cells (GEpi), neutrophils (N), Lymphocytes (Ly). Giemsa stain (400x).

DISCUSSION

Many studies have done to reveal the effects of orthodontic appliances on oral mucosa, and they notify its injurious and virulent effects on the histomorphology of these tissues, this study designed to investigate the histopathological findings that may observed in buccal mucosa of orthodontic patients.

The present study reveals presence of many histomorphological changes at cytological level like

nuclear pycnosis, cytoplasmic granules, perinuclear halos, cellular hypertrophy, and binucleation, all these findings was agree with a study which reports that the cells of the spinous layer predominatingly views intraepithelial edema and incidental vacuolated cells with pyknotic nuclei [21].

Another study demonstrates that orthodontic wires and brackets correlating with elastic ties and metal have the ability to produce an adaptive reaction in the oral mucosa, and it observe increasing of hyperplasia, hypertrophy and little



epithelial hyperkeratosis due to the mechanical stimulation of orthodontics [22], and the relationship between vesicular degeneration and keratinization is well known [9].

patients who wear orthodontic appliances, most oral mucosal lesions were related to trauma caused by these treatments, and the most traditional oral mucosal lesions of fixed orthodontic appliance were erosion and ulceration [23].

Among patients who wear fixed orthodontic appliances, there are 75.8% of them had small wounds, while 2.5% had bad ulcerations, albeit clinical appearance of small wounds was not described [5]. Lesions of the oral mucosa resulted from orthodontic appliances are in specific places, and this is according to what came from the World Health Organization for injuries that occur on the buccal and vestibular mucosal tissues, where both the arch wire and brackets cause erosion and desquamations, and brackets and wire caused ulcerations on the lower lip [5].

Fixed orthodontic patients rivals ulceration and hyperplasia which caused by irritation resulted from the arch wire and bonds or wire existing against the lips, the most frequent finding in the patients who wear removable orthodontic appliances was mucosal inflammation [4]. The cellular reflection of this inflammation will be represented by stimulating the inflammatory cells to migrate to the sites of inflammation, and it is known that the presence of neutrophils indicates the presence of acute inflammation because they are the first line of defense for the immune system, while the presence of plasma cells and macrophages indicates the movement of inflammation from acute to chronic inflammation, and all These cells were seen in this study, which indicates the presence of both types of inflammations [24].

The damaged oral epithelium by orthodontic appliances lesions in which nerve endings in underlined connective tissue are exposed induces a painful feeling. The data of many literatures focus mostly on pain from applying forces to promote movement of the teeth rather than pain from lesions of the oral mucosa [25].

direction of the impaction, shape and size of the roots, the relation of the roots to the inferior dental canal, adjacent second molar, the structure of the investing bone, and any pathologic lesion

CONCLUSION

Orthodontic treatment may be the real cause of irritation and ulceration in buccal mucosa which lead to histomorphological alterations of mucosal epithelia and infiltration of inflammatory cells.

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