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A HISTOLOGICAL ANALYSIS OF GINGIVAL CONDITION ASSOCIATED WITH ORTHODONTIC TREATMENT WITH CERAMIC BRACKETS

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Abstract

Background: This study was conducted for the histological analysis of gingival condition associated with orthodontic treatment with ceramic brackets.

Material and methods: This study comprised of 20 subjects undergoing orthodontic treatment with ceramic brackets. The subjects were informed about the procedure and were asked to give consent. The study included the subjects who were willing to participate in the study as well as those who were undergoing orthodontic treatment. The subjects unwilling to participate in the study were excluded from the study. The subjects underwent periodontal examination to check for any gingival conditions. The findings were noted. Statistical analysis was conducted using SPSS software.

Results: In this study of 20 subjects, there were 10 males and 10 females in this study. Chronic infection was seen in 10 subjects, gingival enlargement was seen in 5 subjects, mucogingival changes were evident in 4 subjects and permanent bone loss was observed in 1 subject. Papillary hyperplasia was observed in 13 subjects and tears and ulcerations in the gingival epithelium were evident in 7 cases.

Conclusion: The histological analysis of gingiva of subjects undergoing orthodontic treatment revealed papillary epithelia hyperplasia and tears and ulcerations in the gingival epithelium. Clinical conditions like chronic infection, gingival enlargement, permanent bone loss and mucogingival changes were also evident in these subjects.

Keywords: gingiva, ceramic brackets, orthodontic treatment, hyperplasia, tears, ulcerations.

Introduction

Orthodontic appliances, as well as mechanical procedures, are prone to evoke local soft-tissue responses in the gingiva. These effects can either be of positive nature, (physiologic recontouring), helping tooth movement, or negative ones, which should be avoided. The main source of negative outcomes involves orthodontic attachments, which inhibit efficient removal of bacterial biofilms (dental plaque). Undesirable complications are often due to an understandable lack of awareness while the orthodontist focuses on biomechanical matters. While conscientious attention to biomechanical progress justifies this focus, close attention should be paid to infection control and the possibility of iatrogenic side effects.[1]

Gingival and periodontal diseases are influenced by a wide variety of factors, such as host resistance, social and behavioral characteristics, which affect belief values and compliance, respectively, compromised systemic resistance (eg, human immunodeficiency virus status), genetic predispositions, tooth level, and finally both quantitative and qualitative compositions of the bacterial biofilm (dental plaque) at the gingival margin. As new discoveries in molecular genetics and the science of virology and bacteriology progress, refinements in concepts of disease risk factors emerge almost annually.[2]

Ceramic brackets have been understandably welcomed by patients; they are the best attempt so far at producing an orthodontic appliance which combines the aesthetic needs of the patient with the technical performance required by the orthodontist. Nevertheless, the only advantage that ceramic brackets have over stainless steel brackets is one of appearance and serious questions about bracket fracture and tooth damage during bracket removal remain unanswered

at the present time. There is considerable interest throughout the world in the industrial development and use of ceramics and it may be that future generations of ceramic brackets solve some or all of the problems that currently exist. At the present time, however, ceramic brackets should be used cautiously within the limitations of the material and not simply as an alternative to metal brackets. Any adverse incidents concerned with their use should be reported promptly to the supplier.[3]

This study was conducted for the histological analysis of gingival condition associated with orthodontic treatment with ceramic brackets.

Material and methods

This study comprised of 20 subjects undergoing orthodontic treatment with ceramic brackets. The subjects were informed about the procedure and were asked to give consent. The study included the subjects who were willing to participate in the study as well as those who were undergoing orthodontic treatment. The subjects unwilling to participate in the study were excluded from the study. The subjects underwent periodontal examination to check for any gingival conditions. The findings were noted. Statistical analysis was conducted using SPSS software.

Results

Table 1: Gender-wise distribution of subjects.

Gender	Number of subjects	Percentage
Males	10	50%
Females	10	50%
Total	20	100%

There were 10 males and 10 females in this study.

Table 2: clinical gingival conditions witnessed

Gingival condition	Number of subjects
Chronic infection	10
Gingival enlargement	05
Mucogingival changes	04
Permanent bone loss	01
Total	20

Chronic infection was seen in 10 subjects, gingival enlargement was seen in 5 subjects, mucogingival changes were evident in 4 subjects and permanent bone loss was observed in 1 subject.

Figure 1: Bone loss due to orthodontic treatment.

Figure 2: gingival enlargement due to orthodontic treatment.

Table 3: Histological analysis of gingival conditions

Histological Changes	**Number of subjects**
Papillary epithelial hyperplasia	13
Tears and ulcerations in gingival epithelium	07
Total	20

Papillary hyperplasia was observed in 13 subjects and tears and ulcerations in the gingival epithelium were evident in 7 cases.

Discussion

The zone of attached gingiva in health is defined as the amount of keratinized tissue from the gingival margin apical to the mucogingival junction, minus the depth of the gingival sulcus. Assessment of the mucogingival status is considered to be a very important part of the intraoral examination, if orthodontic treatment is to be planned and rendered. It has been surmised by anecdotal evidence and case studies that extreme labial or lingual positioning of teeth may be associated with gingival recession and an inadequate zone or thickness of attached gingiva.[4,5] However, a strong predictive coefficient of correlation has not yet been unequivocally demonstrated. Thus, while some recession (gingival dehiscence) may be predicted in orthodontic cases epidemiologically, the lack of strong correlation coefficients makes individual patient proclivity so problematic and the emergent pathosis so unforeseeable by the practicing orthodontist.

Orthodontic mechanotherapy is capable of producing local changes in the oral microbial ecosystem and altering the composition of the bacterial plaque qualitatively and quantitatively. Generally, as plaque accumulates, especially subgingivally, relatively benign Gram-positive cocci (commensal organisms) forms relent to the development of more pathogenic Gram-negative rods, spirochetes, and motile forms that define the pantheon of putative pathogens

(periodontopathic bacteria), many of which are uncharacterized and not culturable for in vitro analysis. The development of a stable pathogenic milieu tips the host-parasite homeostasis in favor of the pathogen and manifests as clinical inflammation. This trend is evident by the increased severity of gingival inflammation observed immediately after fixed appliance placement. Fixed appliances frequently encroach on the gingival sulcus, inhibiting effective oral hygiene maintenance.[6]

This study was conducted for the histological analysis of gingival condition associated with orthodontic treatment with ceramic brackets.

In this study of 20 subjects, there were 10 males and 10 females. Chronic infection was seen in 10 subjects, gingival enlargement was seen in 5 subjects, mucogingival changes were evident in 4 subjects and permanent bone loss was observed in 1 subject. Papillary hyperplasia was observed in 13 subjects and tears and ulcerations in the gingival epithelium were evident in 7 cases.

Sinclair and coworkers[7] demonstrated an increase in the percentage of streptococci and a decrease in percentage of actinomyces in subgingival plaque from orthodontic patients. These findings, which are concordant with other authors, suggest that the increase in streptococcal flora can also lead to a higher incidence of caries. However, their study is encouraging to clinicians, because it failed to demonstrate either an increase in the plaque level around the appliances or in the percentage of potentially pathogenic Gram-negative organisms. This observation is consistent with anecdotal evidence that a high level of oral hygiene maintenance adopted by the study subjects can reduce plaque accumulation to reasonable and less pathogenic levels.

Redlich and coworkers[8] outlined the histological changes at sites of extraction space closure, in the form of papillary epithelial hyperplasia. The newly formed collagen in these regions was coiled and compressed, in the shape of a "football." There are, however, other reports that state that the space closure mechanics can lead to loss of collagen in the hyperplastic gingiva.[9]

Conclusion

The histological analysis of gingiva of subjects undergoing orthodontic treatment revealed papillary epithelia hyperplasia and tears and ulcerations in the gingival epithelium. Clinical conditions like chronic infection, gingival enlargement, permanent bone loss and mucogingival changes were also evident in these subjects.

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