

Original Research

Clinical Impact of Orthodontic Treatment on Gingival Health

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ABSTRACT:

Background: The present research aimed to investigate the correlation between orthodontic treatment and the well-being of the gums. **Material and methods:** In this study, a total of 400 participants were involved, evenly split between 200 males and 200 females. The research team examined the subjects' medical histories, recording their ages, duration of treatment, and the specific type of orthodontic intervention received. They assessed the incisor angles on lateral cephalometric X-rays both before and after orthodontic treatment. Additionally, intraoral photographs were analyzed to determine the presence of visible plaque, inflammation, or gingival recession. **Results:** According to the study findings, patients who underwent orthodontic treatment with functional appliances before and after treatment did not display significant differences. However, there was a notable increase in visible plaque, inflammation, and gingival recession among those who received fixed orthodontic appliances after treatment. Gingival biotype did not vary significantly between these groups. In patients who received fixed appliances in conjunction with tooth extractions, the study identified a significant association between the position of the lower incisors and the occurrence of gingival recession. Furthermore, among all the teeth, the cuspids exhibited the highest rate of gingival recession. **Conclusion:** The study revealed a significant increase in visible plaque and visible inflammation levels throughout the course of orthodontic treatment. Consequently, it is imperative that patients possess excellent periodontal health prior to commencing orthodontic treatment and maintain it consistently throughout the process. Furthermore, the study identified a connection between the retraction of lower incisors and the development of gingival recession. Hence, it is advisable to closely assess any shifts in lower incisor inclination during orthodontic treatment through more controlled prospective research to mitigate potential adverse effects. Given the established relationship between orthodontic therapy and gingival health, collaboration between patients, orthodontists, and periodontists during orthodontic treatment is essential.

Keywords: Gingival health, orthodontic treatment.

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INTRODUCTION

Adult patients undergoing orthodontic treatment may have both restorative and periodontal needs, making it crucial for a multidisciplinary approach to achieve optimal treatment outcomes. In cases where patients experience pathological tooth migrations and related issues, the orthodontist's role becomes particularly significant. Orthodontic treatment can contribute to enhancing dental aesthetics through various methods, including realigning jaw positions, rectifying dental abnormalities, and creating conditions conducive to improved gingival health. This collaborative approach involving orthodontists, restorative dentists, and periodontists can lead to comprehensive and effective treatment for adult patients seeking orthodontic care.¹⁻

³It is essential to highlight that the key elements of fixed orthodontic treatments can diminish the natural cleansing ability of the tongue and cheeks, which in turn can result in an elevated production of bacterial plaque. This alteration can lead to shifts in the types and amounts of microorganisms in the oral environment. However, it's worth noting that this change in the bacterial flora may only be temporary and is highly contingent upon the maintenance of oral hygiene. Proper alignment of the teeth through orthodontic treatment can potentially reduce occlusal trauma and make it easier to remove plaque, further emphasizing its importance in overall oral health.⁴⁻
⁶While orthodontic treatment is effective in addressing dental and skeletal issues, it's important to

acknowledge that the introduction of orthodontic appliances into a patient's mouth can often lead to changes in their oral hygiene routines and periodontal health.⁷ Orthodontic appliances, along with the mechanical processes involved, can provoke localized soft tissue reactions in the gingival area. The proximity of these appliances to the gingival sulcus, the accumulation of plaque, and the challenges they pose to maintaining good oral hygiene further complicate the task of ensuring effective and beneficial orthodontic care.⁸The objective of this retrospective study was to assess the connection between orthodontic treatment and the well-being of the gums.

MATERIALS AND METHODS

A total of 400 eligible volunteers were considered for participation in this research endeavor. Those with incomplete records were deemed ineligible. All participants below the age of 18 were included in the study. However, individuals who had previously undergone orthognathic surgery, had cleft lip and palate conditions, or were currently taking medications were excluded from participation. The assessment of periodontal health, which encompassed parameters like gingival biotype, gingival recession, visible plaque, and visible inflammation, was conducted using intraoral photographs. The examination of gingival texture and capillary

transparency was performed through visual inspection to ascertain whether the gingival biotype fell into the "thin" or "thick" category. In cases where the lower lip obstructed the frontal view of the gingiva or when the images were unclear, the recordings were considered incomprehensible. A trained periodontist and an expert orthodontist independently reviewed cephalometric films and intraoral clinical images, respectively.⁹To assess interexaminer consistency, the examiners reevaluated the same set of parameters in the same group of patients after a fifteen-day interval following the initial assessment of 60 patients. Remarkably, a high level of consistency was observed during this retesting phase.

To analyze nominal variables, statistical tests such as Fisher's exact test or Pearson's chi-square test were utilized.

RESULTS

A total of 400 patients, comprising 200 girls and 200 boys, met the inclusion criteria for this study. The average chronological age of the entire group was 16.65 years. Among them, 256 patients had undergone treatment with fixed orthodontic appliances, with 180 of them undergoing extraction-based treatment and 76 receiving non-extraction-based treatment. Additionally, 144 patients had been treated with functional appliances.

Table 1: gender-wise distribution of subjects

Gender	No. Of Subjects	Percentage
MALE	200	50%
FEMALE	200	50%
TOTAL	400	100%

Table 2: orthodontic treatment

Orthodontic Treatment	No. Of Subjects	Percentage
Fixed Orthodontic Treatment	256	64%
Functional Appliances	144	36%
Total	400	100%

While no statistically significant differences were observed in the therapy groups when considering patient gender, differences were identified within the treatment groups based on patient age and the duration of treatment. Among patients who underwent treatment with fixed orthodontic appliances, the mean values for visible plaque, visible inflammation, and gingival recession were 4.63 ± 6.77 , 4.41 ± 7.23 , and 0.47 ± 0.21 , respectively, prior to treatment. Notably, all of these parameters exhibited significant increases after treatment, with values of 6.84 ± 10.21 , 18.36 ± 17.45 , and 0.88 ± 2.47 , respectively.

Out of the 256 patients who received treatment with fixed orthodontic appliances, 180 of them underwent treatment without extraction, while the remaining 76 underwent treatment with extraction. It's important to note that in both groups, there were statistically significant increases observed in the parameters of

visible plaque, visible inflammation, and gingival recession during the course of orthodontic treatment. In the non-extraction group, prior to treatment, the mean values for visible plaque, visible inflammation, and gingival recession were 4.12 ± 8.74 , 2.23 ± 6.21 , and 0.73 ± 0.67 , respectively. After treatment, these values increased to 6.17 ± 8.87 , 18.44 ± 20.73 , and 0.99 ± 0.66 , respectively. In contrast, in the extraction group, before treatment, the mean values for visible plaque, visible inflammation, and gingival recession were 4.07 ± 4.48 , 3.44 ± 8.23 , and 0.07 ± 0.66 , respectively. Following treatment, these values rose to 8.57 ± 8.85 , 18.36 ± 16.15 , and 0.57 ± 1.54 , respectively.

When the data were analyzed based on tooth type, it was evident that the cuspids were the most affected teeth in the study.

DISCUSSION

Young patients referred for orthodontic treatment frequently experience plaque-related gingivitis. Many dentists hesitate to recommend adult patients for orthodontic treatment if they display evident signs of periodontal disease, such as chronic periodontitis. Periodontal disease affects a significant portion of the population at some point in their lives, and its severity can vary widely¹⁰. It's noteworthy that nearly all patients with fixed orthodontic appliances will develop gingivitis at some stage during their treatment. Gingival enlargement and inflammation are often temporary and typically resolve within weeks after the removal of the orthodontic appliance. Recent observations suggest that using bonded orthodontic appliances instead of banded ones may lead to reduced gingivitis¹¹. Fixed orthodontic appliances can contribute to increased bacterial counts around the bracket and band's ecosystem¹³. This involves a decrease in facultative anaerobes and an increase in anaerobic rods, spirochaetes, and other motile microorganisms.¹²

Boke et al.¹⁴ conducted an assessment of the relationship between orthodontic treatment and gingival health. The study encompassed a total of 200 patients, consisting of 150 girls and 50 boys. The patients' treatments were administered by postgraduate students, and their folders were meticulously analyzed, taking into consideration factors such as age, treatment duration, and the type of orthodontic treatment received. The study involved an analysis of intra-oral photographs to determine the presence or absence of visible plaque, visible inflammation, and gingival recession. Additionally, incisor inclinations were evaluated using lateral cephalometric films both before and after orthodontic treatment. Interestingly, the analysis revealed that there was no statistically significant difference in patients treated with functional appliances before and after their orthodontic treatment.

Zanatta et al.¹⁵ conducted a study to explore potential associations between gingival enlargement (GE), periodontal conditions, and sociodemographic variables in patients undergoing fixed orthodontic treatment. The research involved a cohort of 300 patients who had been undergoing fixed orthodontic treatment for a minimum of 8 months. A single, carefully calibrated examiner assessed their samples to determine plaque and gingival indexes, probing pocket depth, clinical attachment loss, and the presence of GE. Oral interviews were also conducted to gather information on the patients' socioeconomic backgrounds, the duration of their orthodontic treatment, and their use of dental floss. The study found that an increase in the prevalence of GE was linked to gingival bleeding and the presence of excess resin around brackets. Furthermore, higher levels of anterior GE in patients undergoing orthodontic treatment were associated with proximal anterior

gingival bleeding and the presence of excess resin around brackets.

CONCLUSION

The study revealed a significant increase in the average levels of visible plaque and visible inflammation during the course of orthodontic treatment. This underscores the importance of patients having excellent periodontal health before commencing orthodontic treatment and maintaining it throughout the treatment process. Furthermore, the research established a connection between the retraction of lower incisors and gingival recession. Therefore, it's advisable to closely evaluate lower incisor inclination shifts during orthodontic treatment, and further controlled prospective research is warranted to prevent potential adverse effects. Given the evident link between orthodontic therapy and gingival health, it is advisable for patients, orthodontists, and periodontists to collaborate and communicate effectively during the course of orthodontic treatment to ensure the best possible outcomes for the patients.

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