



(RESEARCH ARTICLE)



## Treatment of gingival enlargement caused by orthodontic treatment

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### Abstract

The aim of this study was to assess the healing process of gingival enlargement in adolescents with and without fixed orthodontic appliances using conventional scalpel treatments over a 3-month follow-up period. 20 patients with gingival enlargement were divided into two groups. The control group, without fixed orthodontic appliances, received mechanical treatment through conventional scalpel. Test group, comprising patients with fixed orthodontic appliances, was treated using conventional scalpel. Follow-up visits were conducted on days 1 and 90. Clinical periodontal parameters, including plaque index, gingival index, bleeding on probing, probing pocket depth, and gingival overgrowth index, were compared across groups at different time intervals from baseline. All groups exhibited statistically significant reductions in clinical periodontal parameters during the study period ( $P < 0.05$ ). Test group, treated with conventional scalpel, showed the fastest and most consistent improvements in the healing process compared to baseline. Conventional scalpel therapy proved to be an effective method for treating gingival enlargement, with no reported discomfort or pain during or after the procedure. Given the challenges patients with fixed orthodontic appliances face in maintaining oral hygiene, they should be scheduled for more frequent follow-ups and given thorough home-care instructions.

**Keywords:** Orthodontic treatment; Gingival enlargement; Periodontal treatment; Fixed orthodontic appliances; Conventional scalpel therapy.

### 1. Introduction

Gingival enlargement is a common soft tissue issue associated with fixed orthodontic appliances, with a prevalence of approximately 10% [1]. It is a characteristic sign of gingival disease, and its classification depends on etiologic factors and pathologic changes. Depending on the extent of the enlargement, patients may experience both functional and aesthetic concerns, such as lip protrusion or chewing difficulties due to excessive tissue growth over the teeth. Chronic gingival inflammation often leads to gingival enlargement, and plaque buildup in these cases may not revert the periodontium to its normal contour. This residual enlargement can complicate oral hygiene and present aesthetic challenges [2]. Surgical recontouring may be necessary to correct this issue in patients with significant gingival enlargement [3]. Postoperative care after extensive tissue resection is crucial. While orthodontic treatment aims to correct malocclusions, it can also exacerbate periodontal problems due to plaque accumulation, especially in patients with fixed appliances. Various studies have examined the impact of orthodontic treatment on periodontal health [4], with Alfuriji et al. highlighting the importance of completing periodontal treatment before beginning orthodontic therapy [5].

Plaque accumulation can be influenced by factors such as orthodontic brackets, bands, or excessive restorations. Orthodontic therapy has been linked to gingivitis and periodontitis due to plaque retention caused by overextended bands and excessive restorations on the teeth and surrounding structures [6]. Clinically, gingivitis is characterized by

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redness, swelling, and increased bleeding upon probing. These signs are usually reversible with the removal of microbial plaque and proper oral hygiene during and after orthodontic therapy. However, when causal therapy is insufficient, gingivectomy procedures may be necessary [7]. Inflammatory gingival enlargement in orthodontic patients is typically localized or generalized, starting at the interdental papillae within months of beginning treatment [8]. While oral hygiene procedures, scaling, and root planing are standard treatments for gingival enlargement, they may not always be effective when the enlargement is severe, and home care is inadequate [9,10].

The hypothesis of this study is that using the conventional methods (scalpel or Orban/Kirkland knives), will significantly reduce bleeding on probing and gingival overgrowth levels while improving patient comfort during and after surgery. Delayed healing is expected due to the presence of orthodontic appliances. The study aims to compare the effects of the conventional methods (scalpel or Orban/Kirkland knives) on gingival tissue healing in orthodontic patients versus conventional gingivectomy tools. The focus is on comparing the periodontal response conventional therapies in patients with and without fixed orthodontic appliances

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## 2. Material and methods

This study included 20 patients with gingival enlargement, divided into two treatment groups. The control group, consisting of patients without orthodontic appliances, was treated mechanically through scaling and root planing, followed by conventional gingivectomy using a scalpel. Test group consisted of patients with orthodontic appliances who were treated mechanically through scaling and root planing, followed by conventional gingivectomy using a scalpel. All participating patients were healthy non-smokers aged 12-18 years, who displayed gingival enlargement on the labial side of the anterior teeth. Patients were excluded if they were medically compromised, taking medications that could cause drug-associated gingival enlargement, or were pregnant or lactating.

This research was conducted at the Department of Periodontology and Orthodontics, patients were fully informed about the study, and written consent was obtained. The research was carried out in compliance with the World Medical Association Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects.

Initial therapy for all patients consisted of mechanical treatment, including scaling and root planing using scalers and curettes, along with oral hygiene instructions. Plaque scores were assessed at each scaling and root planing session. Oral hygiene education, including motivational sessions and professional dental prophylaxis for plaque and calculus removal, was provided over a 90-day period.

Following the completion of initial therapy, patients were re-evaluated. Periodontal charting was repeated to assess the response to therapy, with the main criterion for surgery being persistent gingival enlargement.

Clinical periodontal parameters were assessed by the same periodontist, who was unaware of the treatment methods to minimize bias. The parameters assessed included Plaque Index (PI), Gingival Index (GI), Bleeding on Probing (BOP), Probing Pocket Depth (PPD), and Gingival Overgrowth Index (GOI). These parameters were evaluated at baseline, and on days 1 and 90 post-treatment.

Data analysis was conducted using SPSS Statistics software, version 19.0.0 (SPSS Inc., Chicago, IL, USA). Changes in periodontal parameters over time were analyzed using repeated-measures ANOVA. Intragroup comparisons between the baseline and post-treatment days were made using paired t-tests, while intergroup comparisons were made using Student's t-test. A significance level of  $P < 0.05$  was set for all tests.

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## 3. Results

The mean age of the 20 participants (12 female, 8 male) was  $12.10 \pm 3.2$  years. No statistically significant difference in age was observed among the two groups ( $P > 0.05$ ). In terms of clinical periodontal indices, the increase in the PI between the control group and test group was not significant on day 1 post-operation. The increase in the GI in test group was significantly less than in the control and test group on day 1. Test group showed slower GI recovery the end of the 90 day, GI values were similar across all groups. After three months, the lowest GI levels were observed in the control group, but the difference was not statistically significant ( $P > 0.05$ ). BOP levels in test group decreased by half on day 1 post-operation, while the control group and test group remained at 100%. it was less pronounced. By day 90, there was no significant difference in BOP levels between the groups ( $P > 0.05$ ). No significant changes in PD were observed between the groups during the treatment period. Generally, gingival overgrowth levels were higher in patients with orthodontic appliances (test group) compared to the control group. The decrease in GOI was significant and

markedly higher in test group. By day 90, the control group had lower GOI levels, but the difference was not statistically significant ( $P > 0.05$ ).

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#### 4. Discussion

Patients with orthodontic appliances often experience hypertrophy of the gingival margins or across the entire gingiva, often accompanied by inflammation. In cases of gingival hyperplasia, a surgical approach is usually recommended because hyperplasia involves an increase in the number of cells, resulting in fibrotic tissue, not edematous tissue. Scaling and root planing alone are ineffective in reducing the number of cells. Gingival hypertrophy, on the other hand, refers to an increase in the size of the cells within the tissue, with edema being a key distinguishing factor. In these cases, scaling and root planing can resolve the edema, and surgical intervention is not typically necessary, as it may disrupt the biological width [11]. Tony et al. reported a randomized controlled parallel clinical trial with orthodontic patients, where the test group received periodontal treatment gingivectomy and the control group received only nonsurgical treatment. Five periodontal parameters were assessed in both groups at baseline, 1 month, 3 months, and 6 months: PI, GI, BOP, PPD, and GOI similar to the parameters in our study [12].

One notable finding in our study was that the periodontal treatment did not produce the unpleasant smell of burning tissue, which was a positive experience for both patients and dentists.

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#### 5. Conclusion

Our study concludes that soft tissue wound healing is faster, smoother, and virtually painless, with less bleeding, when using conventional gingivectomy procedures. The treatment of gingival overgrowth showed significant improvement, particularly in orthodontic adolescent patients. The periodontal treatment in such patients proves to be a comfortable, reliable, and predictable treatment method. An important factor in the healing process, regardless of orthodontic appliances, was the successful execution of self-oral care techniques. However, further studies are needed to validate and expand upon these findings for more accurate results.

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#### Compliance with ethical standards

##### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

##### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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