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Periodontal Considerations And Management Of Reactive Gingival Enlargement Across Orthodontic Phases: A Case Series

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Abstract: Reactive gingival enlargement is a common clinical finding associated with chronic irritation, often exacerbated by orthodontic therapy due to increased plaque retention and mechanical factors. Its occurrence is not limited to a single stage and may be observed before, during, or after orthodontic treatment, requiring phase-specific periodontal management.

This case series presents three patients demonstrating gingival enlargement at different stages of orthodontic therapy. The first case presented with pre-existing gingival enlargement prior to orthodontic treatment and was managed with gingivectomy to establish a healthy periodontal baseline. The second case developed gingival enlargement during active orthodontic therapy, which required surgical intervention following initial periodontal therapy. The third case reported with localized gingival overgrowth three months after completion of orthodontic treatment, which was surgically excised. Histopathological evaluation confirmed fibrous hyperplasia. All cases showed satisfactory healing with restoration of gingival contour and function. This case series highlights that reactive gingival enlargement can occur across all phases of orthodontic treatment and emphasizes the importance of timely diagnosis and phase-wise periodontal management to achieve optimal clinical outcomes.

Keywords- Reactive gingival enlargement, Orthodontic therapy, Periodontal management, Gingivectomy, Fibrous hyperplasia, Plaque-induced inflammation, Case series.

I. INTRODUCTION

Reactive gingival enlargement is a localized or generalized increase in gingival tissue volume occurring as a response to chronic irritation such as plaque accumulation, mechanical trauma, or iatrogenic factors. It represents a spectrum ranging from inflammatory enlargement to fibrotic hyperplasia depending on the chronicity of the stimulus. Orthodontic therapy is a well-recognized predisposing factor for gingival enlargement due to the presence of plaque-retentive components such as brackets, bands, and ligatures, which compromise oral hygiene and promote gingival inflammation. [1,2]

Fixed orthodontic appliances have been shown to significantly increase plaque accumulation and gingival inflammation compared to removable appliances, thereby contributing to gingival overgrowth[3.] If the inflammatory component persists, it may undergo fibrotic transformation, resulting in reactive lesions such as fibrous hyperplasia[4]. Importantly, gingival enlargement associated with orthodontic therapy is not confined to the active phase of treatment; it may also be present prior to treatment due to

pre-existing periodontal conditions or may develop or persist even after appliance removal due to unresolved inflammation and tissue remodeling. [5,6]

From a periodontal perspective, the management of gingival enlargement requires a phase-wise approach. Pre-orthodontic enlargement necessitates elimination of inflammation and establishment of periodontal health, before initiation of orthodontic therapy. During orthodontic treatment, strict plaque control and supportive periodontal therapy are essential to prevent progression. In cases where enlargement becomes fibrotic or persistent, surgical intervention such as gingivectomy may be indicated. Post-orthodontic gingival enlargement, particularly of a fibrotic nature, often requires surgical excision and histopathological evaluation for definitive diagnosis[6,7].

Therefore, understanding the periodontal considerations and appropriate management strategies across different phases of orthodontic therapy is crucial for achieving optimal functional and esthetic outcomes. The present case series highlights reactive gingival enlargement occurring before, during, and after orthodontic treatment and emphasizes the importance of timely and phase-specific periodontal intervention.

II. CASE PRESENTATION

Case 1: Pre-Orthodontic Gingival Enlargement

A 19-year-old female patient was referred from the Department of Orthodontics to the Department of Periodontics, People's College of Dental Science & Research Centre, Bhopal, for the management of gingival enlargement prior to initiation of orthodontic therapy. The patient reported difficulty in maintaining oral hygiene, with gradual enlargement of gingival tissue in the mandibular anterior region as show in {Fig.1}.

On intraoral examination, Fibrotic enlargement was observed in the mandibular anterior region, particularly involving the interdental papilla and marginal gingiva due to poor oral hygiene. The gingiva appeared firm and fibrotic with loss of normal contour. Bleeding on probing was present, and pseudo pocket depths of 4–5 mm was recorded.

Based on clinical findings, a diagnosis of fibrotic gingival enlargement was made. Phase I therapy, including scaling and polishing, was performed, and the patient was recalled after 7 days. Routine hematological investigations (hemoglobin, bleeding time, clotting time, and random blood sugar levels) were within normal limits.

Following initial therapy, surgical intervention was planned. The procedure was performed under local anesthesia using 2% lignocaine with adrenaline (epinephrine) 1:80, 000.and aseptic conditions, bleeding points were marked using a gingival pocket marker and external bevel gingivectomy {Fig.2}, was done using a scalpel in the mandibular anterior region (canine to canine) to re-establish physiological gingival contour {Fig.3}. A periodontal dressing (Coe-Pak) was placed postoperatively. {Fig.4}

At 1-week follow-up, satisfactory healing was observed following periodontal dressing removal {Fig.5}. At 2-month follow-up, complete resolution of inflammation, elimination of pseudo pockets, and restoration of normal gingival contour and esthetics were achieved.

Figure 1. Pre-operative view before orthodontic

Figure 2. Bleeding points were marked by using pocket marker, incision given

Figure 3. Gingivectomy and gingivoplasty was done by using conventional scalpel technique.

Figure 4. Periodontal pack is administered after the surgery.

Figure 5. Post-operative view after seven days reveals satisfactory healing, proper gingival contour and improved esthetics.

Case 2: Gingival Enlargement During Orthodontic Treatment

A 25-year-old female patient undergoing active orthodontic therapy was referred from the Department of Orthodontics to the Department of Periodontics, People's College of Dental Science & Research Centre for management of gingival enlargement in the maxillary anterior region, {Fig6}, with a clinical indication for gingival contouring and crown lengthening.

Clinical examination revealed gingival enlargement exhibiting a predominantly fibrotic consistency with superimposed inflammatory changes, loss of stippling, and altered gingival contour. Pseudo pocket depths of 4–5 mm was noted. The enlargement was attributed to plaque accumulation and mechanical irritation associated with fixed orthodontic appliances.

Following initial periodontal therapy, bleeding points were marked using a gingival pocket marker, an internal bevel incision was given and crown lengthening was done under local anesthesia using 2% lignocaine with adrenaline (1:80,000) to achieve gingival recontouring in the affected maxillary anterior region {Fig.7,8,9}. Postoperative healing was uneventful.

At 1-week follow-up {Fig.10}, satisfactory healing with significant reduction in gingival inflammation and improved gingival contour was observed.

Figure 6. Pre-operative view during orthodontic treatment, gingival enlargement

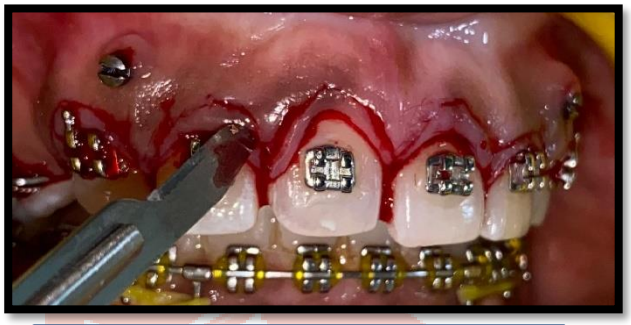

Figure 7. Bleeding points were marked by using pocket marker, and incision was given

Figure 8. Incision Line

Figure 9 Crown lengthening was done by using conventional scalpel technique.

Figure 10. Post-operative view after seven days reveals satisfactory healing, proper gingival contour and improved esthetics.

Case 3: Post-Orthodontic Reactive Gingival Enlargement (Fibrous Hyperplasia)

A 28-year-old female patient reported to the Department of Periodontics People's College of Dental Science & Research Centre with a chief complaint of painless gingival swelling in relation to mandibular anterior teeth (31, 32), {Fig.11}, three months after completion of orthodontic treatment. The swelling was gradually increasing in size, and associated with aesthetic concern.

On clinical examination, a localized gingival overgrowth was observed in relation to teeth 31 and 32. {Fig.11}. The lesion appeared enlarged dense, firm in consistency, and inflamed. Based on clinical findings, a provisional diagnosis of reactive gingival enlargement was done.

The patient was advised surgical excision of the lesion. Surgical excision {Fig.12} of the gingival overgrowth was done under local anesthesia using 2% lignocaine with adrenaline (1:80,000), {Fig.13} and the excised tissue was subjected to histopathological evaluation. {Fig.14}. A periodontal dressing (Coe-Pak) was placed postoperatively {Fig.15}. Healing at 2-week follow-up was satisfactory {Fig.16}, and at 1-month follow-up, no recurrence of enlargement was observed. The excised tissue was subjected to histopathological evaluation, which confirmed the diagnosis of fibrous hyperplasia, consistent with a reactive gingival lesion. {Fig.17} and {Fig.18}

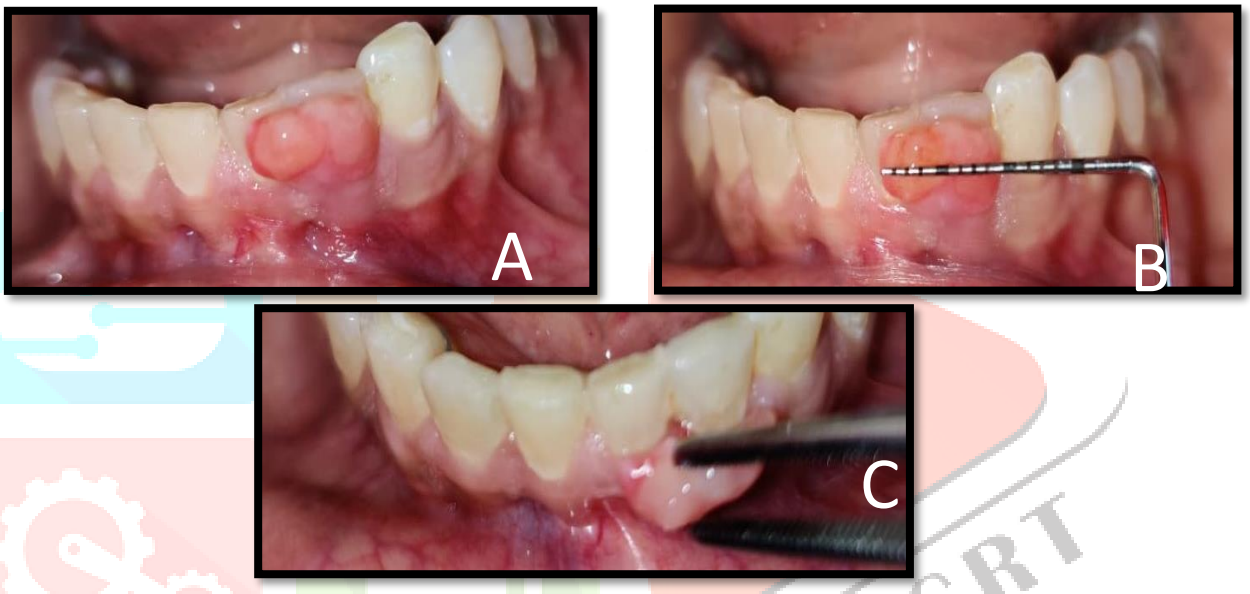

Figure 11. (A, B, C) Pre-operative view of localized gingival overgrowth three months after completion of orthodontic treatment in region teeth#31,32

Figure 12. Incision

Figure 13. Surgical Excision of enlarged tissue

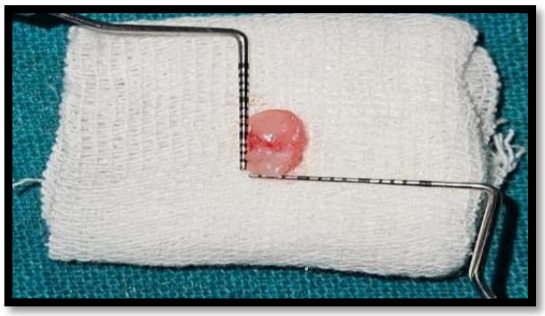

Figure 14. Excised soft tissue of size 1.0x1.0 cm

Figure 15. Periodontal pack is administered after the surgery.

Figure 16. Post-operative view after 15 days reveals satisfactory healing, proper gingival contour

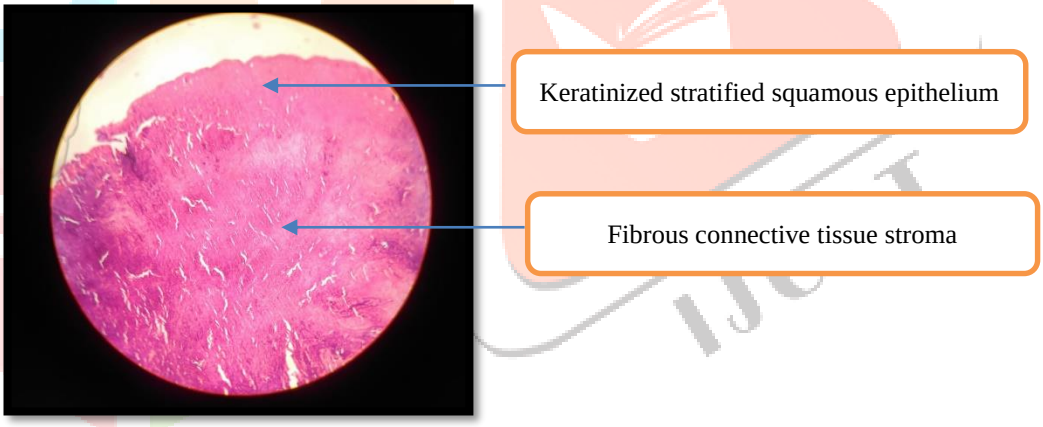

Figure 17. Photomicrograph (4x magnification) showing keratinized stratified squamous epithelium and an underlying fibrous connective tissue stroma

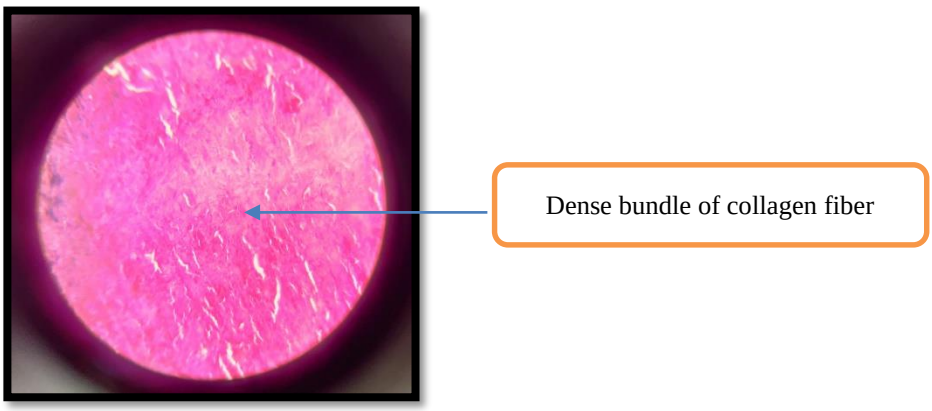

Figure 18. Photomicrograph (40x magnification) showing a hyalinized fibrous connective tissue wall with dense collagen bundles

III. DISCUSSION

Gingival enlargement (GE) is a common clinical sign of gingival pathologies and it is associated with systemic hormonal disorders and several blood dyscrasias, such as leukemia, thrombocytopenia, and thrombocytopathy, excluding the soft tissue lesions associated with fixed orthodontic treatment Depending on its extent and severity, GE may lead to functional disturbances such as altered phonetics, occlusion, and mastication, as well as aesthetic and psychological problems[9].

The biomolecular mechanisms of GE are not yet completely understood; however, it is usually considered to be the result of inflammation developed as a reaction to the accumulation of biofilm and possible overproduction of glycosaminoglycan-rich amorphous ground substances by fibroblasts[9]. In addition, recent studies have shown the association between gingival enlargement and the presence of matrix metalloproteins (MMP-8 and MMP-9)[10,11]

Reactive gingival enlargement represents a common periodontal condition characterized by an increase in gingival tissue volume in response to chronic local irritants such as dental plaque, calculus, and mechanical factors. It is widely recognized that the pathogenesis involves an initial inflammatory response which, if persistent, may progress to a fibrotic state resulting in lesions such as fibrous hyperplasia. The present case series demonstrates the occurrence of reactive gingival enlargement across different phases of orthodontic therapy, highlighting the importance of phase-specific periodontal considerations and management.

Orthodontic treatment is a well-documented predisposing factor for gingival enlargement due to the presence of plaque-retentive components, including brackets, bands, and ligatures, which compromise effective oral hygiene maintenance. Miethke RR[4] and Vogt[4] reported significantly increased gingival inflammation in patients undergoing fixed orthodontic therapy compared to those treated with removable appliances, emphasizing the role of plaque accumulation in the development of gingival changes. Furthermore, studies have shown that persistent inflammation may stimulate fibroblast proliferation and extracellular matrix deposition, contributing to fibrotic gingival enlargement.

Although the precise process underlying the development of GE is unknown, it most likely involves enhanced fibroblast production of an amorphous ground substance containing a high concentration of glycosaminoglycans. Excessive epithelial cell proliferation and the development of GE may be significantly influenced by increases in type I collagen mRNA expression and up-regulation of keratinocyte growth factor receptors.[8]

Due to the prolonged nature of the treatment, gingival enlargement is frequently caused by the patient's orthodontic care. Careful instruction regarding oral hygiene and surgical technique is part of the treatment strategy for gingival overgrowth.[8]

In the pre-orthodontic phase, as observed in Case 1, the presence of gingival enlargement can interfere with effective plaque control and may adversely affect orthodontic outcomes if left untreated. Establishing periodontal health prior to initiation of orthodontic therapy is therefore essential. Phase I therapy followed by surgical intervention, when indicated, helps in eliminating pseudo pockets, restoring gingival contour, and providing a favorable environment for subsequent orthodontic treatment.

During active orthodontic therapy, gingival enlargement may develop or worsen due to increased plaque retention and mechanical irritation. Case 2 in the present series demonstrated enlargement during treatment, necessitating surgical correction. While non-surgical periodontal therapy remains the first line of management, persistent or fibrotic enlargements often require gingivectomy and crown lengthening. These procedures not only improve gingival architecture but also facilitate better oral hygiene and enhance esthetic outcomes.

Post-orthodontic gingival enlargement, as seen in Case 3, is an important yet often under-recognized clinical scenario. Even after removal of orthodontic appliances, residual inflammation and tissue remodeling may lead to localized overgrowth. In such cases, the lesion may present as a reactive fibrotic enlargement. Histopathological confirmation plays a crucial role in establishing the definitive diagnosis. In the present case, the diagnosis of fibrous hyperplasia supports the concept that chronic irritation can lead to irreversible fibrotic changes requiring surgical excision.

The findings of this case series reinforce that reactive gingival enlargement is not confined to a single phase of orthodontic therapy but represents a continuum influenced by local factors and host response. Effective management requires a comprehensive periodontal approach tailored to the specific phase of orthodontic treatment. Early diagnosis, meticulous plaque control, and timely surgical intervention when indicated are key to achieving optimal functional and esthetic outcomes.

IV. CONCLUSION

Reactive gingival enlargement associated with orthodontic therapy can present at various stages, including before, during, and after treatment. The present case series highlights that such enlargement represents a continuum from inflammatory changes to fibrotic overgrowth, influenced by local irritants and oral hygiene status. A phase-wise periodontal approach, including timely non-surgical and surgical interventions, is essential to restore gingival health, improve esthetics, and ensure long-term stability.

Surgical intervention plays a crucial role by eliminating pseudo pockets, thereby reducing plaque accumulation and preventing further disease progression. Early recognition and appropriate management are key to preventing progression and achieving optimal functional and esthetic outcomes.

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