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GINGIVECTOMY AND SUPERNUMERARY TOOTH EXTRACTION ON PATIENT WITH FIXED ORTHODONTIC APPLIANCE: A CASE REPORT

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ABSTRACT

Background: Gingival enlargement is the most common characteristic of various conditions, such as inflammation, medication effects, systemic conditions like pregnancy, leukemia, and can also be caused by orthodontic treatment. There is a positive correlation between the duration of orthodontic appliance use and the incidence of gingival enlargement since it facilitates biofilm accumulation and bacterial colonization, which triggers the inflammation.
Case: A 24-year-old female patient came to RSGM UNIMUS with complaints of swollen gums in the posterior maxilla and anterior mandible, causing her teeth to appear shorter. She has experienced this issue for the past five years since using fixed orthodontic appliances. Intraoral examination revealed significant swelling in almost the entire gingival region of both the upper and lower jaws, along with a conical supernumerary tooth in the anterior region of the lower jaw. Physiological pigmentation was noted in the anterior gingiva of the mandible, which is showing a brownish color. Radiographs showed horizontal bone loss at the alveolar crest in the lower jaw. Gingivectomy with scaling and root planning, extraction of the supernumerary tooth, and depigmentation were planned for this case.
Outcome: Following a one-month post-operative evaluation, the treatment outcomes for the patient were promising with minimal pain reported. The patient was satisfied with the overall results.
Conclusion: Patients with fixed orthodontic appliances are at a higher risk for plaque accumulation, which can lead to gingival enlargement. Supernumerary teeth in the lower jaw further exacerbate the existing gingival enlargement, making it more extensive. Extraction of the supernumerary teeth, along with gingivectomy, gingivoplasty, and depigmentation were performed to improve the patient's gingival condition and achieve a more aesthetic result.

INTRODUCTION

Orthodontic treatment is becoming increasingly common in today's era due to the growing demand and awareness among the public regarding the importance of maintaining oral health.[1] Crowded teeth can lead to various dental and oral health issues, such as periodontal disease, chewing disorders, temporomandibular joint (TMJ) dysfunction, bad breath, cavities, and a decreased quality

of life related to oral health. With orthodontic care, complications arising from crowded teeth can often be addressed or at least the severity of these issues can be prevented. Nonetheless, despite these advantages, orthodontic appliances can occasionally contribute to gum disease, which may escalate into more serious issues if not adequately addressed. The most common effect during orthodontic treatment is excessive gingival growth.[2]

Excessive gingival growth during orthodontic treatment can occur due to increased plaque accumulation. On the other hand, individuals undergoing orthodontic treatment require greater skills and effort to maintain their oral hygiene, particularly on the proximal surfaces of their teeth. If plaque control is not adequately performed, it can lead to negative responses in the tissues, such as excessive gingival growth[3]. Additionally, patient cooperation in managing orthodontic care is also a factor in the occurrence of this condition. The force exerted by orthodontic appliances may become poorly controlled if patients do not visit their dentist as scheduled.[1]

Gingival enlargement is defined as a condition where the size of the gums increases beyond normal, potentially leading to aesthetic and dental hygiene issues. This condition is referred to as gingival enlargement or gingival overgrowth. It is exacerbated by the difficulty in maintaining oral hygiene, which is linked to declining periodontal health in users of fixed orthodontic appliances. Consequently, there is a possibility of transformation from the gingival sulcus to a periodontal pocket. Periodontal treatment begins with initial phase therapy, which includes dental health education (DHE), scaling and root planning, and curettage if there is inflammation or pocketing. If gingival enlargement does not reduce following these treatment steps, surgical intervention known as gingivectomy may be required.[4]

Hyperpigmentation gingival is a dark brown, purple and light brown gingival discoloration with irregular shape. Brown pigmentation in the gingiva can be caused by the presence of melanin in the gingival epithelial layer. Additionally, pigmentation in gingiva can result from the intensity of melanogenesis, the depth of epithelial cornification, and the vascularization of the gingiva.[8,9] Gingival pigmentation can be unilateral, bilateral, spotted, macular, and may only involve the interdental papilla.[9] The colors can vary irregularly, appearing purplish, dark brown, or light brown.

The formation of dental tissue is also a complex phenomenon. Dental anomalies can occur in terms of number, size, shape, position, or structure of teeth. Among the anomalies related to tooth number, supernumerary teeth are the most common. The etiology of supernumerary teeth is heterogeneous, highly variable, and idiopathic in most cases. This condition is usually asymptomatic and can be diagnosed through routine radiographic examinations. Complications of supernumerary teeth include delayed eruption, diastema, cyst formation, ectopic eruption, root resorption of adjacent

teeth, crowding, gingival inflammation, periodontal abscesses, rotation, and pulp necrosis. These issues typically affect treatment effectiveness and generally require extraction.[11]

CASE REPORT

A 24-year-old female patient came to RSGM UNIMUS with complaints of swollen anterior gums in both the upper and lower jaws, causing her teeth to appear shorter and affecting her confidence. She first noticed this issue five years ago since she began using braces. The patient did not report any pain but mentioned occasional bleeding of the gums when brushing her teeth. The patient denied any history of systemic diseases and was not taking any specific medication.

During the initial intraoral examination, significant swelling was observed in anterior mandible and posterior region of the left maxilla. A conical supernumerary tooth was present in the anterior region of the lower jaw (Fig. 1a). The OHI score was 5.1 (moderate), the O'Leary score was 38%, and Bleeding on Probing (BOP) was positive for teeth 17, 16, 13, 23, 25, 26, 28, 37, 46, and 47. Probing depth measurements indicated pocket depths more than 4 mm for teeth 17, 16, 23, 37, 36, 35, 43, 45, 46, and 47. Physiological pigmentation was noted in the anterior gingiva of the mandible, which is presenting a brownish color.

The panoramic radiograph revealed there was horizontal bone loss on both the distal and mesial sides of teeth 33 until 37 and 43 through 47. Periodontal ligament thickening was noted around teeth 13, 12, 11, 21, 26, and 27. A radiopaque area resembling a tooth was seen between teeth 32 and 31, causing displacement of tooth 31 mesially and tooth 32 distally (Fig. 2). Based on the results of subjective assessment, objective examination, and radiograph examination, the patient was diagnosed with chronic gingivitis with enlargement gingiva due to plaque accumulation exacerbated by the presence of fixed orthodontic appliances. Gingivectomy was planned as the surgical treatment for both the upper and lower jaws.

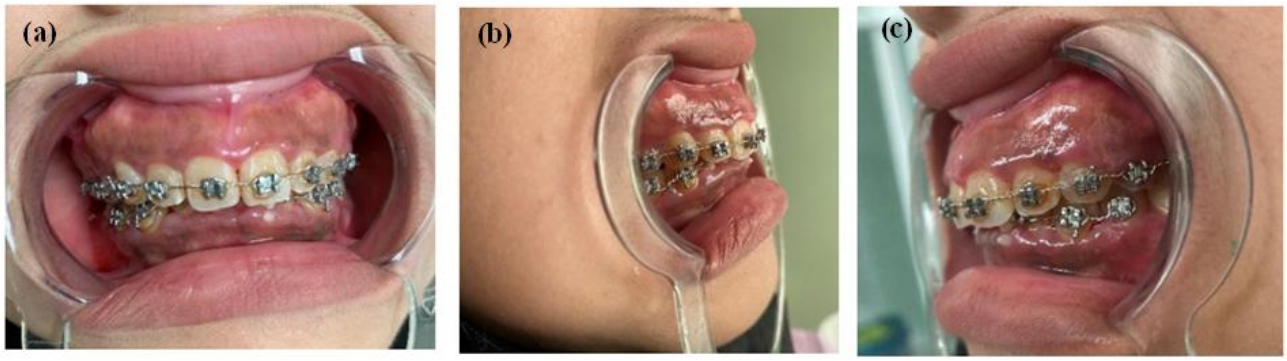


Figure 1(a). Anterior appearance on the upper and lower jaw, showing supernumerary tooth on the lower anterior region. **Figure 1(b).** and **Figure 1(c).** Appearance of gingival enlargement on the right and left buccal region.

Figure 2. The panoramic radiograph examination

Before the surgical procedure, initial phase therapy was conducted, including scaling and root planning along with education and instructions for the patient on maintaining oral hygiene. Treatment outcomes were evaluated after the second visit, two weeks later. There was notable improvement in the patient's oral hygiene, with the improved OHI score of 2.2 (good), the O'Leary plaque index at 16.2%, and Bleeding on Probing (BOP) being positive for teeth 18, 11, 36, 35, and 41. The number of teeth with probing depths greater than 4 mm reduced to teeth 23, 37, 36, 45, 46, and 47. However, no significant changes were observed in the size of the enlarged gingiva in either the upper or lower jaws.

During the next visit, gingivectomy was performed on the maxilla. The procedure began with performing extraoral and intraoral asepsis using povidone iodine antiseptic solution, in accordance with the region of the gingiva where the surgical intervention would take place. The surgical area was anesthetized using infiltration technique with a 1:80,000 epinephrine solution to anesthetize the mucosa on tooth 24 (Fig. 3a). The tip of explorer was used to create bleeding points along the mesial, midline, and distal sides of the gingiva to be excised. These bleeding points formed an outline that served as a guide for the excision (Figs. 3b). Gingivectomy was carried out on tooth 24 using a #15 blade positioned with a 45° external bevel (Figs. 3c). Interdental contouring was then performed using an Orban knife (Figs. 3d). Following this, the granulation tissue was cleaned using scaling and root planning with a Gracey curette and manual scaler, applying the sharp edge against the tooth surface gradually until it was smooth and clean. Hemostasis was achieved using gauze and irrigation with sterile saline solution (0.9% NaCl) (Figs. 3e). To refine the excision results, gingivoplasty was performed with a #15 blade to shape the gingival margin, creating a knife-edge contour that matched

normal gingival anatomy. The surgical area was then covered with a periodontal pack to minimize the risk of infection and post-operative bleeding, facilitate healing by preventing surface trauma during chewing, and protect against pain caused by contact between the wound and food or the tongue during chewing. The patient was given post-operative instructions along with a prescription for Amoxicillin 500 mg three times a day, Ibuprofen 400 mg three times a day, and Chlorhexidine 0.2% mouthwash, with a follow-up appointment scheduled for two weeks post-surgery.

During the follow-up visit, the patient neither reported pain nor discomfort. The gingiva in the maxilla still appeared slightly red, but there was a noticeable change in the size of the maxillary gingiva, which appeared longer than before (Fig. 5).

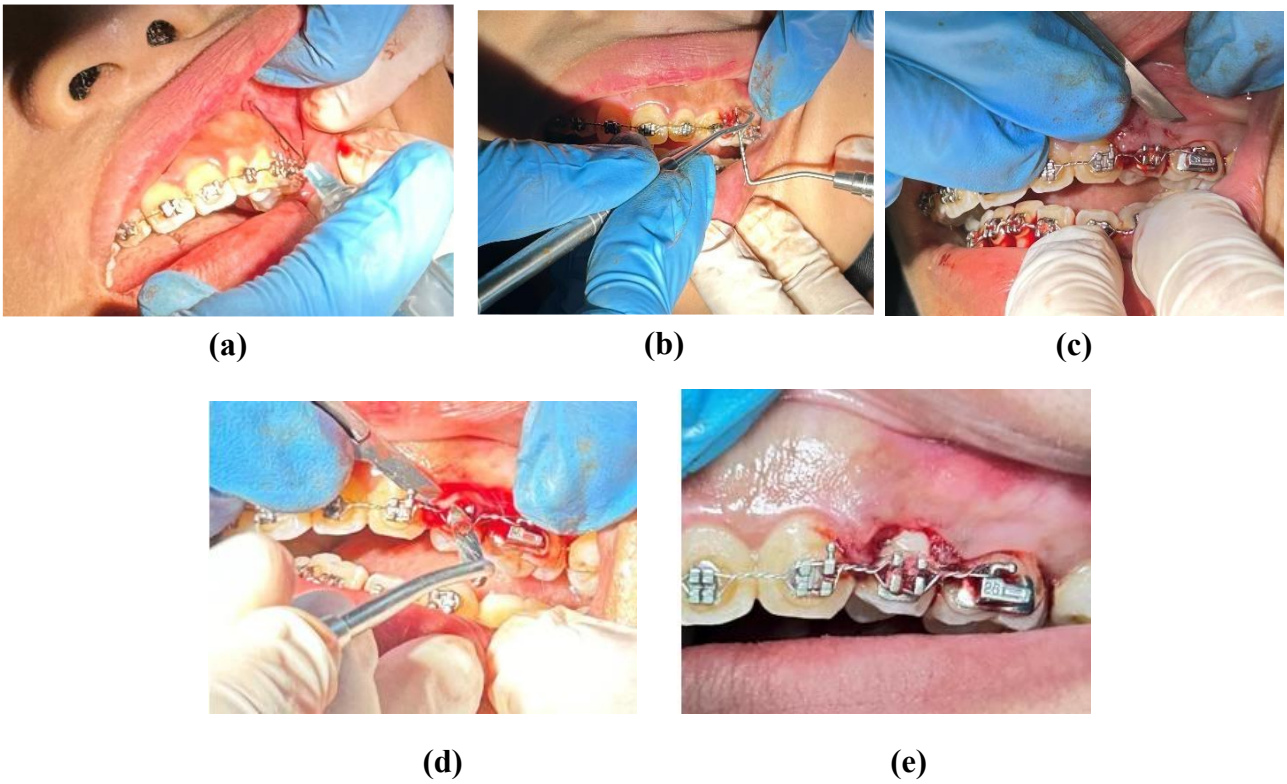
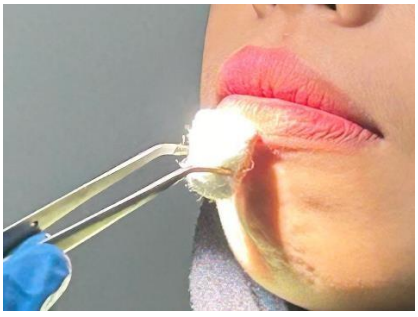


Figure 3(a). Infiltration anesthesia to anesthetize the mucosa from tooth 24, **(b)** Marking bleeding points along the mesial, midline, and distal sides of the gingiva, **(c)** The gingiva was incised by using a #15 blade positioned with a 45° external bevel, **(d)** Removing the incised gingiva and interdental contouring with an Orban knife, **(e)** Bleeding control and irrigation with sterile saline solution.

During the next visit, surgical procedures including the extraction of the supernumerary tooth, gingivectomy, and gingival depigmentation were performed on the mandible. The procedure commenced with extraoral and intraoral asepsis using povidone iodine antiseptic solution, targeted to the specific gingiva region where the surgery would be performed (Fig. 4a and b). The surgery began with infiltration anesthesia using a 1:80,000 epinephrine solution to anesthetize teeth 33 to 43 (Fig. 4c), followed by the extraction of the supernumerary teeth using excavator due to the small size of the tooth (Fig. 4d). After successful extraction, the open socket was irrigated with saline solution (0.9%

NaCl) and bleeding was controlled using sterile gauze. Bleeding points were marked with sonde's tip along the mesial, midline, and distal gingiva to guide the excision for teeth 33, 32, 31, 41, 42, and 43. The excision of the gingiva was performed using a #15 blade positioned with a 45° external bevel and interdental contouring was then completed using an Orban knife (Fig. 4f). Granulation tissue was cleaned through scaling and root planning with a Gracey curette and manual scaler. Hemostasis in the working area was achieved with gauze and irrigation using sterile saline solution (0.9% NaCl). To refine the excision results, a gingivoplasty procedure was performed to shape the gingival margin into a knife-edge. As a final step, gingival depigmentation of the mandible was also carried out to remove the hyperpigmentation with a scraping method using a scalpel and blade no.15 (Fig. 4g).

After the surgical procedure was completed, the surgical area was covered with a periodontal pack for 3-14 days (Fig. 4h). The patient was given post-operative instructions along with a prescription for Amoxicillin 500 mg three times a day, Ibuprofen 400 mg three times a day, and Chlorhexidine 0.2% mouthwash, with instructions for follow-up. One month after the procedure the site of the supernumerary tooth extraction had healed well, and the patient reported no pain, stating that she felt much more confident about her appearance now (Fig. 5a and 5b). Then the patient was educated on how to maintain oral hygiene after the treatment to prevent recurrence.



(a)

(b)

(c)

(d)

(e)

(f)

(g) (h)

Figure 4(a). and **4(b)** Extraoral and intraoral asepsis using povidone iodine antiseptic solution, **4(c)** Infiltration anesthesia to anesthetize the mucosa from teeth 33 to 43, **4(d)** Extraction of the supernumerary tooth, **4(e)** The supernumerary teeth were successfully extracted, **4(f)** Gingivectomy by using a #15 blade positioned with a 45° external bevel, **4(g)** gingival depigmentation, **4(h)** Surgical area was covered with periodontal dressing for 3-14 days.

(a) (b)

Figure 5. Evaluation one month after the procedures of gingivectomy, extraction of supernumerary teeth, and depigmentation, **(a)** Maxilla and **(b)** Mandible

DISCUSSION

In this case, the gingival enlargement was caused by the accumulation of plaque and calculus. Another contributing factor was trauma from the use of fixed orthodontic appliances. Patients with fixed orthodontics must have a high level of awareness regarding oral hygiene. The force applied to the fixed appliance must be monitored to ensure it is not too strong, as this can cause trauma to the periodontal tissue.[5]

The use of orthodontic appliances is also a local factor contributing to gingival enlargement. There is a positive correlation between the duration of orthodontic appliance use and the incidence of gingival enlargement. The placement of fixed orthodontic appliances facilitates the accumulation of biofilm and bacterial colonization, which triggers inflammation[6]. With gingival enlargement, access to tooth surfaces becomes more difficult, leading to increased plaque accumulation. This condition can be managed with initial treatments such as scaling and root planning. However, despite the reduced probing depths and improved oral hygiene, unfortunately the gingiva did not show a decrease in size,

suggesting the persistence of fibrous tissue in the gingiva. Therefore, surgical procedures like gingivectomy and gingivoplasty are necessary.[7]

Periodontal surgical treatments, including gingivectomy, flap methods with lasers, and electrocautery, are used when gingival enlargement persists beyond conventional care. In this case, gingivectomy was performed using conventional surgical techniques. The advantages of the conventional method include low cost and ease of execution. In conventional gingivectomy techniques, epithelial regeneration is more easily achieved. In contrast, gingivectomy with lasers, electrocautery, or acid materials can cause necrosis, which is not seen with the conventional method.[2]

The formation of dental tissue is also a complex phenomenon. Dental anomalies can occur in terms of number, size, shape, position, or structure of teeth. Among the anomalies related to tooth number, supernumerary teeth are the most common. The etiology of supernumerary teeth is heterogeneous, highly variable, and idiopathic in most cases. This condition is usually asymptomatic and can be diagnosed through routine radiographic examinations. Complications of supernumerary teeth cause increased accumulation of debris and plaque, thereby increasing the risk of gingivitis. These issues typically affect treatment effectiveness and generally require extraction.[10] The extraction of supernumerary teeth is recommended when they cause eruption disturbances, pathology, or when they affect during gingivectomy treatment, as in this case, extraction was necessary to necessary to facilitate the surgical procedure and to achieve a better esthetic outcome. By extracting the supernumerary tooth, not only does it improve the appearance of the patient, but it also improves the at-home plaque removal by the patient. Supernumerary teeth could also pose a threat during orthodontic treatment as it may interfere with the desired changes necessary to achieve the ideal occlusion of the patient.

In addition to gingival enlargement and supernumerary teeth, there is also brownish discoloration on gingiva, known as gingival hyperpigmentation, caused by accumulation of melanin granules produce by melanoblasts located between the epithelial cells in basal layer. The procedure for remove gingival hyperpigmentation is depigmentation using #15 blade and scraping technique on the same day with gingivectomy

In this case report, a 24-year-old female patient undergoing orthodontic treatment experienced gingival enlargement in both the upper and lower jaws due to her inability to maintain proper oral hygiene. As a result, a gingivectomy was performed to reduce the pseudo pockets in the gingiva. One month after the procedure, the gingiva was in good condition, and the patient reported minimal pain following the gingivectomy.

CONCLUSION

Patients with fixed orthodontic appliances are at a higher risk for plaque accumulation, which can lead to gingival enlargement. Supernumerary teeth in the lower jaw further exacerbate the existing gingival enlargement, making it more extensive. Extraction of the supernumerary teeth, along with gingivectomy, gingivoplasty, and depigmentation were performed to improve the patient's gingival condition and achieve a more aesthetic result.

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