

Laser-assisted Management for Orthodontic Treatment-induced Gingival Enlargement: A Case Series

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ABSTRACT

Different ways can be used to remove tissue during gingivectomy and generate a good gingival margin; the most common is the traditional gingivectomy, which is performed with a scalpel; however, laser technology is becoming more commonly available and can be utilized to perform procedures. Hence, this case series emphasize the importance of laser treatment in cases of gingival overgrowth seen due to ongoing orthodontic treatment. In this case series, three clinical reports are discussed in detail, comparing the efficiency of scalpel and diode laser therapy for treating gingival overgrowth and patient perception of the need of taking pain killer after the surgery and the presence of discomfort during eating and speech. Based on them, it can be concluded that diode laser gingivectomy can be a valuable tool for achieving faster and greater improvements in gingival health, implying its usefulness for orthodontic patients with gingival overgrowth, particularly when oral hygiene is insufficient to achieve normal healthy gums. For many years, scalpels were been used in performing gingivectomy and there is a dilemma whether to use scalpel or laser for gingivectomy procedures. The dilemma of the clinician was resolved confirming that laser therapy offers many more advantages for the gingivectomy procedure along with added benefits of lasers to reduce patient discomfort and accelerate healing.

Keywords: Braces, Diode lasers, Gingival overgrowth, Healing, Scalpel blade gingivectomy

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INTRODUCTION

The appearance of the gingival tissues surrounding the teeth determines the aesthetics of the anterior maxillary region of the mouth. The symmetry and form of gingival tissues also have a big impact on how well a natural or prosthetic dentition looks together. Patients' desires for better esthetic results have increased in recent years, which have impacted the therapy selection. Therefore, a treatment modality sufficient enough for the optimal anterior look is required to be provided by healthy and uninflamed periodontal tissues.

Gingival enlargement has been referred to by a variety of terms in the past, including gingival hypertrophy, gingival hyperplasia, and, more recently, gingival enlargement which are mainly caused by plaque and calculus.^[1] This deposition of plaque and calculus is due to the inability to maintain adequate oral hygiene. One of the reasons for the inadequate maintenance of oral hygiene can be the use of orthodontic wires and appliances. Gingival hypertrophy caused by orthodontic appliances makes it difficult to maintain good dental hygiene. It also affects occlusion, mastication, and phonetics and, in the majority of cases, can lead to cosmetic and psychological issues, as well as compromising orthodontic tooth movement.^[2]

Patient motivation to maintain oral hygiene, along with the use of mouth rinses, is the first line of treatment for gingival enlargement. This is dependent on patient compliance, which can be insufficient and have limited success in some individuals.^[3] Non-surgical periodontal treatment (oral hygiene instructions, scaling, root planning, and prophylaxis) is the standard treatment for gingival enlargement, although it is not always helpful when gingival enlargement is significant and self-care is compromised.^[4]

As a result, a surgical approach to gingival enlargement has been developed. Surgical treatment, on the other hand, is considered invasive and may not be effective if poor self-care oral hygiene practices continue.^[5] Recently, lasers have gained a lot of

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attention due to their advantages of superior hemostasis, less post-operative discomfort, pain, or edema, better patient tolerance, less complicated procedures, no suturing or dressing, and lower chances of post-operative bacteremia, and better visibility and accessibility.^[4]

This is a case series evaluating the effectiveness of the different types of treatment modalities used for gingivectomy.

CASE REPORT 1

A 31-year-old systemically healthy female patient reported to the Department of Periodontology with a chief complaint of swollen gums in the upper and lower front teeth region of the jaws. The patient also experienced bleeding from the gums occasionally while brushing her teeth. Her dental history revealed that she was undergoing orthodontic treatment for the past 6 months.

Intraoral examination revealed orthodontic brackets in maxillary and mandibular teeth. Diffused gingival overgrowth involving marginal, papillary, and attached gingiva in the maxillary and mandibular arches are shown in Figure 1a. Gingival overgrowth

was more prominent in the anterior sextants of the jaw, especially on the maxillary and mandibular labial aspect which was soft and edematous in consistency [Figure 1a]. Bleeding on probing was generalized through all the dentition.

Initial treatment included full mouth scaling and root planning using hand and ultrasonic instruments (Gracey Curettes, Hu-Friedys®, Hu-Friedy Inc., Leimen, Germany), as well as oral hygiene instructions. The gingival enlargement persisted even after the initial treatment. In areas with gingival enlargement, the patient was recommended diode laser gingivectomy (810 nm) as an adjuvant to non-surgical periodontal treatment. The diode laser gingivectomy was conducted after a 3-min application of topical lignocaine anesthetic gel. It was performed using a laser fiber tip (400 µm in diameter) and moderate, sweeping brush strokes with a power output of 1.2 W, continuous wave. The upper and lower anterior teeth region was treated with the mentioned treatment modality, along with gingivoplasty. Light brushing strokes were used to ablate the tip, which was kept moving continuously. Using sterile gauze dampened with saline, remnants of the ablated tissue were removed. By modifying the tip angulations, gingivoplasty was performed in the interdental papilla and marginal gingiva to create a normal physiological contour. This treatment was repeated until the desired marginal gingival morphology was achieved [Figure 1b]. The laser plume and burnt odor were removed using high-volume suction. The state of hemostasis was examined. The operator, patient, and helper all wore safety eyewear. To avoid the laser beam being reflected onto adjacent tissue surfaces, any equipment with a mirrored surface was avoided.

Post-operative instructions were given to the patients. If needed, the patient was prescribed Zerodol SP (325-mg tablet) for pain relief. After one and 3 weeks post-operative, the patient was re-evaluated. There was no bleeding either immediately after surgery or during the follow-up period. However, wound healing took 2 weeks. Every month, the patient was recalled for a check-up, and no recurrence was observed. The healing process was uneventful [Figure 1c].

CASE REPORT 2

A 21-year-old male patient was referred to the Department of Periodontology following orthodontic treatment. In terms of clinical presentation, the patient had gingival overgrowth in the maxillary anterior region, which had been produced by orthodontic therapy [Figure 2a]. During the examination, it was discovered that the patient had no relevant medical history, had poor oral hygiene due to gingival overgrowth, and had pseudo pockets.

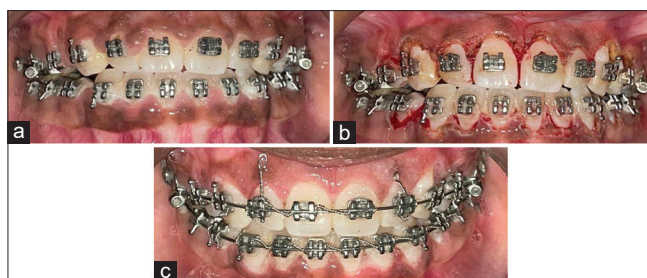


Figure 1: (a) Pre-operative photograph of the patient undergoing orthodontic treatment showing pseudopockets, (b) photograph showing gingivectomy being performed by diode laser (810 nm), and (c) 2 week follow-up taken.

After completing phase one therapy and reinforcing oral hygiene guidelines, the gingivectomy procedure was performed after 1 week. The procedure was initiated with the administration of local anesthetic and the labeling of bleeding points using a pocket marker. After noting bleeding spots, a 45° angle incision was made and forming a bevel that began apically and directed coronally to the mucogingival junction. The pocket wall was removed [Figure 2b] after the external bevel incision, and the periodontal dressing was applied [Figure 2c]. There were no suprabony pockets evident after a week of follow-up [Figure 2d], and the recovery was uncomplicated.

CASE REPORT 3

A 30-year-old male patient undergoing orthodontic treatment was referred to the Department of Periodontology with the chief complaint of bleeding and swollen gums in the lower region of the mouth.

Intraoral examination revealed diffuse gingival overgrowth including the marginal gingiva and extending up to the interdental papilla in the mandibular arch, as shown in Figure 3a.

After completing phase 1 therapy and reinforcing oral hygiene guidelines, the gingivectomy procedure using a scalpel was performed after 1 week of phase 1 therapy on the left side of the arch [Figure 3b]. Following the healing of the left arch [Figure 3c], a gingivectomy procedure using a diode laser (810 nm) was performed on the right side [Figure 3d] and the healing was noted [Figure 3e]. After 1 and 3 weeks post-operative, the patient was re-evaluated.

DISCUSSION

Gingival enlargement is an abnormal overgrowth of gingival tissues. It is an unusual condition that affects an individual's esthetic, functional, and psychological well-being. Gingival overgrowth is one of the most common consequences following chronic inflammation, can be drug-induced, or due to systemic diseases and conditions. This overgrowth might be unpleasant for the patient since it interferes with regular parafunctional activities such as mastication and speech. It also has a negative aesthetic effect, as it causes the gingiva to swell, covering up to one-third to two-thirds of the tooth. This gingival overgrowth also makes it difficult for the patient to maintain adequate dental hygiene, causing plaque, and calculus to build up, resulting in pseudopockets or suprabony pockets.



Figure 2: (a) Pre-operative photograph of the orthodontic patient showing gingival enlargement and pseudopockets, (b) gingivectomy being performed by scalpel, (c) coe pak placed after the surgery, and (d) follow-up after a week

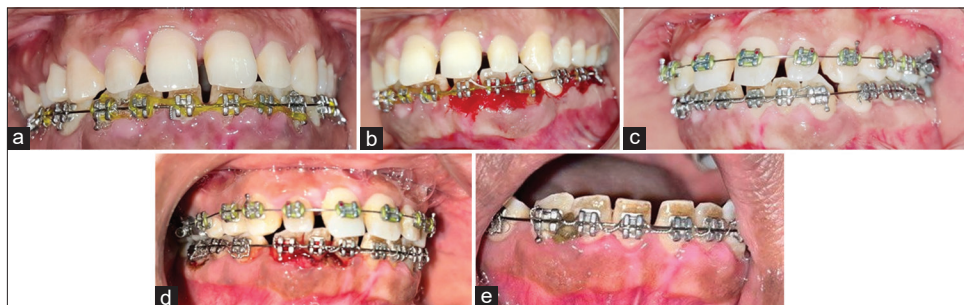


Figure 3: (a) Pre-operative photograph of the patient undergoing orthodontic treatment showing presence of pseudo pockets, (b) left arch gingivectomy by scalpel, (c) follow-up at 1 week for scalpel gingivectomy, (d) right arch gingivectomy by laser, and (e) follow-up at 1 week for laser gingivectomy

One of the causes of gingival overgrowth or enlargement found in patients is orthodontic therapy. Many studies have shown that patients undergoing orthodontic treatment notice changes in the gingival tissue or gingival overgrowth as a result of the nickel ions present in orthodontic brackets. Among the many interactions of nickel ions present in orthodontic bands, one of the interactions between nickel ions and gingival tissues is fibroblast proliferation, resulting in gingival overgrowth.^[6]

The cases presented in this case series had pseudo pockets and no clinical attachment loss; hence, gingivectomy procedure was indicated.

Different methods can be used to perform gingivectomy; the most common are scalpel and laser. For many years, the scalpel has been used in performing gingivectomy and offers advantages like ease of use, precise incision with well-defined margins, faster healing, and there is no lateral tissue damage. While the disadvantages of scalpel are the need of giving anesthesia, bleeding that results in inadequate visibility, and the incision cut is not sterilized.

Due to their clinical efficacy, lasers are employed in a variety of sectors and circumstances in dentistry. The orthodontic treatment produces gingival inflammation at the margins, which leads to hypertrophy of the gingival margins. Laser has a number of advantages, making it a viable alternative for treating hypertrophic gingival margins.

The majority of the time, gingival hypertrophy in orthodontic patients is iatrogenic, due to the lengthy treatment period. The treatment for gingival overgrowth is a combination of diligent dental hygiene training and surgical procedure. When used properly, a soft-tissue laser can increase the quality of outcomes, shorten treatment time, and reduce appointments for orthodontic patients. The laser treatment is quick, painless, and infection-free, with few adverse effects for the patients.

The advantages of employing laser in surgery include greater laser control, reduced post-operative inflammation and pain, and enhanced surgical site healing.^[7] Soft-tissue laser surgery has some drawbacks, such as the high expense of purchasing a laser device compared to a scalpel,^[8] and the risk of retinal eye injury to the surgeon, dental assistant, and patient if special protective goggles are not worn. According to certain studies, a laser is linked to poorer wound healing and more tissue desiccation than scalpel.^[9]

In our case series, Case 1 is performed by laser, Case 2 by scalpel, and Case 3 by both scalpel and laser. First and foremost, laser gingivectomy was easier and faster than traditional gingivectomy. Traditional gingivectomy resulted in bleeding,

whereas laser gingivectomy resulted in comparatively less bleeding. Laser gingivectomy requires less anesthetic. We discovered that pain after laser gingivectomy was lower than pain after conventional gingivectomy. This could be due to the heat created by the laser, which inhibits pain receptors, and the coagulation, which provided a dry and isolated environment with less infection to the incision.

CLINICAL SIGNIFICANCE

Patient desire to maintain oral hygiene, together with the use of mouth rinses, is the first line of treatment for gingival enlargement. This is dependent on patient compliance, which can be insufficient and results in limited success in some patients. Non-surgical periodontal treatment (oral hygiene recommendations, scaling, root planning, and prophylaxis) is the most common treatment for gingival enlargement, although it is not always helpful when gingival enlargement is severe and self-care is hindered.

As a result, a surgical approach to gingival expansion has been developed. Surgical treatment, on the other hand, is regarded as invasive and may not be beneficial if poor self-care oral hygiene practices continue. For many years, scalpels were used in performing gingivectomy and there is a dilemma whether to use scalpel or laser for gingivectomy procedures.

This case series demonstrates that non-surgical periodontal therapy combined with laser therapy can be useful in treating gingival health issues in patients wearing fixed orthodontic appliances as it offers many more advantages than the scalpel along with added benefits of lasers to reduce patient discomfort and accelerate healing.

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