

## Case Report

# Management of Gingival Enlargement using Diode Laser in Orthodontic Patients

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### ABSTRACT

Esthetics of the anterior maxillary region of the mouth is mainly determined by the appearance of the gingival tissues surrounding the teeth. Excessive gingival display in the anterior region can have a very negative impact on the patients smile and psychology. This excessive gingival display could be due to gingival enlargement or altered passive eruption of the teeth. These defects can be corrected through periodontal surgeries. One of the most common soft tissue problems associated with fixed orthodontic appliances is gingival enlargement or hyperplasia. Maintenance of oral hygiene gets impeded when there is gingival enlargement due to orthodontic appliance. It also interferes with occlusion, mastication, phonetics and in most cases may cause aesthetic and psychological problems and has been reported to compromise orthodontic tooth movement. Diode lasers are becoming popular in periodontal surgery due to their highly absorption by pigments such as melanin and hemoglobin their weak absorption by water and hydroxyapatite makes them safe to be used around dental hard tissues. This is a case report evaluating the effectiveness of diode laser gingivectomy as an adjunct measure in orthodontic patients.

**Keywords:** Gingival enlargement, Laser, Orthodontics

### INTRODUCTION

With an ever-increasing number of adults seeking orthodontic treatment, the improvement of patients' esthetics has become one of the main goals of orthodontics.<sup>[1]</sup> The gingival esthetics plays a major role in this regard.<sup>[2]</sup> Disproportionate dentogingival relationships might negatively affect the outcome of treatment, even if the teeth are perfectly aligned.<sup>[3]</sup> Fixed orthodontic appliance therapy (FOAT) is frequently associated with pathological changes in the periodontal tissues. The presence of fixed

appliances can increase plaque stagnation, impede oral hygiene, and cause a shift in the oral microbial ecosystem to more periodontopathogenic oral biofilms. Clinical studies have frequently reported on the development of chronic periodontal inflammation, loss of clinical attachment, and gingival enlargement among orthodontic patients.<sup>[4]</sup> Gingival enlargement or sometimes called gingival overgrowth is an increase in the size of the gingiva. It is common feature of gingival inflammation. These are accurately descriptive clinical terms to avoid incorrect pathological connotation of terms used in the past like "gingival hyperplasia" or "gingival hypertrophy."<sup>[5]</sup> Gingival enlargement is multifactorial condition that causes aesthetic, functional and masticatory problems. The first line of treatment in the management of gingival enlargement is patient motivation and incorporation of Phase I therapy (Non surgical therapy) to maintain oral hygiene. Non-surgical periodontal treatment is the conventional management approach for gingival enlargement but is not always effective when gingival enlargement is extensive and self-care is

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compromised.<sup>[6]</sup> This has led to surgical approach for management of gingival enlargement. But surgical treatment is considered to be invasive and may not be effective if self-care oral hygiene practices remain poor.<sup>[7]</sup> The use of lasers in recent decades gain attention with advantages of using laser over conventional surgical lines of treatment includes: superior homeostasis; less postoperative discomfort, pain /edema etc. This is a case report evaluating the effectiveness of diode laser gingivectomy as an adjunct measure in orthodontic patients.

### CASE REPORT

A 20 years old female old patient came to the Department of Periodontology, Saraswati Dental College, Lucknow, with the chief complaint of swelling of the gums in upper and lower anterior region since 4 months. The patient was undergoing fixed orthodontic appliance treatment and persistent gingival enlargement. She received

ongoing nonsurgical periodontal treatment and instructions on oral hygiene but had persistent gingival enlargement. Patient was healthy, non-smoker who displayed gingival enlargement on the labial side of the anterior teeth in upper and lower region (Fig. 1). Patient was not medically compromised nor taking medications that may cause drug associated gingival enlargement. Patient was not currently pregnant or lactating. Initial therapy was performed consisting of full mouth scaling and root planing, by hand and ultrasonic instrumentation, and oral hygiene instructions were given (Fig. 2). Even after the initial therapy the gingival enlargement persisted. Patient was advised diode laser gingivectomy (940 nm) as an adjunct to nonsurgical periodontal treatment on sites with gingival enlargement.

The diode laser gingivectomy was performed under topical lignocaine anaesthetic gel, applied for 3 minutes prior to operation. The gingivectomy was performed with gentle, sweeping brush strokes with a power output of 1.2 W, continuous wave (CW) using the laser fibre tip (400 µm in diameter). Laser irradiation was performed using a 940 nm diode laser (Epic™ 10, BIOLASE Inc., USA), with optical fiber diameter of 400µm and at energy output of 60 mJ (average power 1.2 W), continuous wave (CW) mode with pulse duration of 20 msec. Gingivectomy and gingivoplasty of upper and lower anterior teeth was carried out. Ablation was performed using light brushing strokes and the tip was kept in continuous motion. Remnants of the ablated tissue were removed using sterile gauze dampened with saline. Gingivoplasty was done in



Figure 1: Pre-operative



Figure 2: After Scaling and Root Planing



Figure 3: Gingivectomy with laser in upper anterior



**Figure 4: Post-operative after gingivectomy of upper anterior teeth**

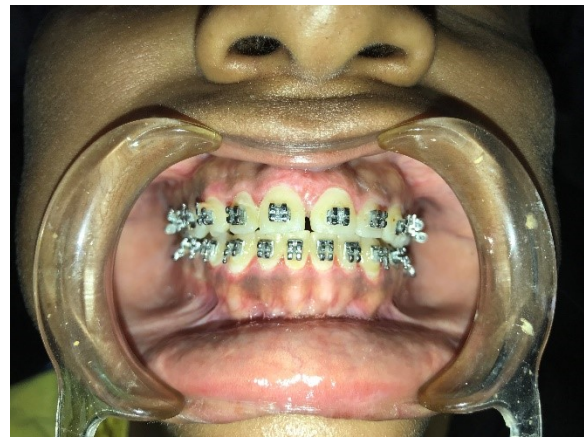
the interdental papilla and marginal gingival to create a normal physiological contour by changing the tip angulations (Fig. 3). This procedure was done until the desired architecture of marginal gingival was achieved (Fig. 4). High-volume suction was used to evacuate the laser plume and charred odour. Haemostasis was checked. Safety glasses were worn by the operator, patient and assistant. Any instrument with mirrored surface was avoided to avoid reflection of the laser beam to other tissue surfaces. Patients were given postoperative instructions. For pain control, Ketorol 10 mg (Tab. Violac) twice a day for 3 days was prescribed to patient if needed. Patient was advised to apply Evion (Vitamin E) thrice a day for 5 days capsules on the treated area. Patient was recalled after 1 and 3 weeks post operatively. It was found that there was no immediate bleeding post operatively or in the follow up period. Wound healing was slightly delayed. Patient was recalled every month for follow-up, no regrowth was noticed. Healing was satisfactory (Fig. 6).

## DISCUSSION

Laser is the acronym for “Light Amplification by Stimulated Emission of Radiation” that dates back to approximately 50 years ago. In 1960, the first functioning laser was built by the American physicist Maiman at the Hughes Research Laboratories by using a synthetic ruby crystal made of aluminum oxide and chromium oxide. In general, lasers are composed of the three principal parts: An energy source, an active



**Figure 5: Post-operative after gingivectomy of lower anterior teeth**



**Figure 6: Post-operative after 1 week**

medium and a set of two or more mirrors that form a resonator. Properties such as wavelength are determined primarily by the active medium, which can be a gas, crystal or solid-state conductor.<sup>[8]</sup> Lasers are being used in many fields and settings in dentistry due to its clinical efficacy. Orthodontic treatment primarily causes marginal gingival inflammation and secondary to that causes hypertrophic gingival margins. Laser has multiple advantages and hence is a good option for the treatment of hypertrophic gingival margins. This case report suggests that nonsurgical periodontal treatment with the adjunct use of laser therapy can be effective in the management of gingival health problems in patients with fixed orthodontic appliances. Excellent hemostasis and clear vision of the surgical field was obtained during diode laser surgery. Laser can incise accurately, has a rather deep penetration, can induce coagulation, and is highly absorbed by hemoglobin. All of these

factor might contribute to its appropriate hemostasis.<sup>[9]</sup> One of the characteristic differences between laser and the scalpel is the generation of coagulated tissue layer along the incision line.<sup>[10]</sup> Laser damage to erythrocytes enhanced aggregation of platelets which encourage intraluminal thrombosis, further decrease in the blood loss.<sup>[11,12]</sup> Diode lasers are highly absorbed by hemoglobin and melanin. Orthodontic treatment might affect gingival health. In certain cases, the gingival margin needs recontouring by means of gingivectomy. However, the costs and postsurgical pain of this treatment might discourage patients, unless in severe cases. Ideally the gingival margins of upper anterior teeth are positioned at or very near the inferior border of the upper lip in full smile. Display of gingival tissue in excess of 2mm is generally considered to be undesirable.<sup>[13]</sup> According to the standards of American national standards institute and occupational safety and health administration, lasers are classified into four different classes based on potential danger, as follows:<sup>[14]</sup>

Class I: These are low powered lasers that are safe to view.

Class IIa: These are low powered visible lasers. They do not cause damage unless one looks directly along the beam for longer than 1 second.

Class IIb: These are low powered visible lasers. They are dangerous when viewed along the beam for longer than 0.25 second.

Class IIIa: These are medium powered lasers that are not dangerous when viewed for less than 0.25 second.

Class IIIb: These are medium powered lasers that are dangerous when viewed directly along the beam for any length of time.

Wound healing after laser gingivectomy is greatly affected by laser setting parameters such as power, pulse duration, frequency and exposure time as reported by White *et al.*<sup>[15]</sup> This result could be explained by increased production of collagen fiber with less number of myofibroblast which result in less wound contraction and less scar formation along with sealing of lymphatic vessels which reduced inflammation. The decontamination ability of lasers allows the

surgeon to work in almost sterilized surgical field that reduced the possibility of postoperative infection.<sup>[16]</sup>

## CONCLUSION

Nonsurgical periodontal management with or without the adjunct use of diode laser gingivectomy can be effective over time in the management of gingival health problems. However, the adjunct use of diode laser gingivectomy can produce a greater improvement in gingival health more quickly, suggesting that the adjunct use of diode laser gingivectomy has potential benefits for orthodontic patients.

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