Nine hundred and seventy nanometer diode laser in the management of gingival hyperplasia following fixed orthodontic treatment

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Abstract

Aim: This study aims to evaluate the efficacy of diode laser in gingivectomy procedure following fixed orthodontic treatment in terms of post-operative bleeding and pain.

Materials and Methods: A total of 15 patients undergoing fixed orthodontic appliance treatment were recruited for the study. Complete intraoral examination 1 month before the termination of their orthodontic treatment was done and patients were enrolled for the study. A 970 nm diode laser (SIROLaser, SIRONA, Germany) with a 320 μm fiber at 1.2 W power was used to perform a gingivectomy procedure. Post-operative bleeding time was assessed. Visual analog scale (VAS) was used to assess pain during the procedure. Results: The mean age of the patients was 19 ± 2.3 years. No adverse effects were reported by any of the patients. Only 1 out of the 15 patients experienced mild pain during the procedure and required injecting a local anesthetic agent.

Conclusion: The use of laser for gingivectomy after fixed orthodontic treatment was well accepted by the patient. Future studies employing a split-mouth design to compare laser gingivectomy and other conventional methods will help make laser a part of our day-to-day clinical practice.

Clinical Significance: Laser gingivectomy provides minimal bleeding, clean operative site low pain postoperatively with the added benefit of avoiding injection of local anesthetic agent.

Keywords: Gingivectomy, Laser dentistry, Orthodontic treatment

Introduction

The prevalence of malocclusion and the need for fixed orthodontic therapy among children is very high in India.[1-4] The effects of fixed orthodontics on the periodontium have been well documented.[5-8] The pathologic impact of fixed orthodontic therapy could be attributed to increased plaque accumulation around the brackets, inability to effectively maintain oral hygiene which eventually causes a shift in the oral microbial commensal to a more pathogenic ecosystem.[9] The studies evaluating oral hygiene status among Indian children in the age range of 5–18 years revealed a high prevalence of gingivitis and periodontitis.[10-14] Some of the common periodontal changes seen after initiation of fixed orthodontics therapy include the development of chronic inflammation (gingivitis), loss of clinical attachment, and inflammatory gingival enlargement and pseudopockets.[15,16] Gingival hyperplasia could promote further damage to periodontal tissues as it could hinder proper oral hygiene maintenance, causes esthetic, functional problems bleeding from the gingiva. Furthermore, improper oral hygiene and gingival hyperplasia could contribute to compromised orthodontic tooth movement.[17,18] Gingival hyperplasia will resolve by itself or will respond to nonsurgical periodontal treatment. If the gingival enlargement needs to be surgically managed if it interferes with the movement of the tooth.[19] In recent years, LASER has been used as an effective tool in the surgical management of gingival hyperplasia treatment, as they offer a less invasive surgical approach.[20-23] The present study was undertaken to evaluate the efficacy of diode laser in performing gingivectomy procedures following fixed orthodontic treatment in terms of post-operative bleeding and pain.
Materials and Methods

A total of 50 patients undergoing fixed orthodontic appliance treatment during 2017–2019 were recruited for the study. All patients underwent fixed orthodontic treatment in a private dental clinic by an orthodontist. The study was ethically conducted following the Declaration of Helsinki. Complete intraoral examination 1 month before the termination of their orthodontic treatment was done before enrolment into the study. The selected patients were given proper oral hygiene instructions. The exclusion criteria were as follows: Poor oral hygiene, patients requiring orthognathic surgeries, trismus, systemic diseases or conditions that could affect bleeding and pain perception directly or by medications, and patients requiring alveolar bone contouring along with gingivectomy.

Gingivectomy procedure

A well-trained periodontist evaluated the oral hygiene status of all 50 patients. A topical local anesthetic agent (Precaine gel containing 8% lidocaine and 0.8% dibucaine) was applied to the surgical site. Before the commencement of the procedure and for the duration of the procedure, patients were asked about the tenderness. In case, the patients complained of pain or discomfort 2% lidocaine with 1:100,000 epinephrine were administered as a local infiltration. The endpoint of soft-tissue removal/gingival contouring was collectively judged by the periodontist and the orthodontist. A 970 nm diode laser (SIROLaser, SIRONA, Germany) of 320 μm fiber at 1.2 watt power was used. The laser tip was oriented vertically over the surgical site and in a continuous laser mode; the gingival tissue was excised and contoured. Care was taken to maintain the sulcular depth at a minimum of 2 mm after the gingivectomy.[16] The surgical site was irrigated with normal saline [Figure 1a-c]. Post-operative instructions were given. Patients were instructed to take Tab. Zerodol (Aceclofenac 100 mg) B.D for 2 days postoperatively.

WHO bleeding criteria[27]

Post-operative bleeding assessment was done using the World Health Organization bleeding criteria:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Nil Bleeding</td>
</tr>
<tr>
<td>1</td>
<td>Bleeding under the skin and petechial class</td>
</tr>
<tr>
<td>2</td>
<td>Mild bleed</td>
</tr>
<tr>
<td>3</td>
<td>Gross bleed</td>
</tr>
<tr>
<td>4</td>
<td>Mortal bleed</td>
</tr>
</tbody>
</table>

Pain assessment

A visual analog scale (VAS) was used to assess pain felt by patients. It is an 11-point scale ranging from 0: No pain to 10: Intolerable pain.

Results

A total of 60 fixed orthodontic patients were initially examined to be enrolled in the study. Ten patients were excluded as per the criteria mentioned earlier. The age range of selected patients was 18–23 years. Out of the 50 patients, 25 were male and 25 were female. The mean age of the patients was 19 ± 2.3 years. No adverse effects were reported by any of the patients. Only 1 out of the 50 patients experienced mild pain during the laser procedure and required injecting a local anesthetic agent.

Post-operative bleeding and pain

Bleeding from the gingiva was very minimal during the procedure and after the procedure. Forty-eight out of the 50 patients had Grade 0 or no bleeding and 2 patients had Grade 2 bleeding. About post-surgical pain, VAS = 0 was reported by all 50 patients. None of the patients required immediate postoperative analgesia. Only one patient required analgesic 6 h post the procedure.

Discussion

The observational study was undertaken to assess the efficacy of performing gingivectomy procedures following fixed orthodontic treatment in terms of post-operative bleeding time and pain. Various methods have been employed to perform gingivectomy such as scalps, electrosurgery, chemosurgery, and laser.[19] Laser has several advantages over conventional treatment methods. The incision could be given much accurately and the laser has good penetration capacity in the gingival soft.

Laser can induce coagulation of small capillary endings present in the gingiva which could, in turn, aid in achieving adequate hemostasis.[21,28,29] The added benefit is laser it gives a clear operating field and a dry and isolated surgical site which, in turn, helps to get more control and reduction the chance of surgical site infection. This could also contribute to lesser pain perceived postoperatively.[30,31] Various factors influence the outcome following laser therapy including time of exposure, wavelength, and the type of irradiation.[32] Forty-eight out of the total 50 patients were treated only with topical application of the local anesthetic agent. Procaine gel contains 8% lidocaine as an effective fast-acting anesthetic and 0.8% dibucaine as an effective long-lasting anesthetic. The dual-action formula provides fast onset of 30–45 s and a prolonged duration of 30–40 min. This formulation does not contain benzocaine, thereby eliminating the possibility of allergic sensitivity reactions. This observation is similar to other studies that have reported minimal pain perceived by patients undergoing laser soft-tissue procedures.[20,21,33] Furthermore, the minimally invasive laser procedure could have contributed to minimal pain perception.[32,34] VAS was used as a tool to evaluate pain. It is easy to understand and easily represents pain perception.[35,36]
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Conclusion

The use of laser for gingivectomy after fixed orthodontic treatment was well accepted by the patient. Future studies employing a split-mouth design to compare laser gingivectomy and other conventional methods will help make laser a part of our day-to-day clinical practice.

Clinical Significance

Laser gingivectomy provides minimal bleeding, clean operative site low pain postoperatively with the added benefit of avoiding injection of local anesthetic agent.

Funding

None.

Conflicts of Interest

None.

Informed Consent

The patients consented to the investigation and publication of the study.

References


Figure 1: (a) Pre-operative palatal view of gingival hyperplasia, (b) immediate post-operative view, (c) 1-month post-operative view