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Sculpting Soft Tissue with Diode Laser: A Prerequisite for Implant Success- A Case Report

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ABSTRACT

Introduction: Inadequate vestibular depth and insufficient attached gingiva can hinder plaque control and compromise long-term implant success. This case demonstrates the use of diode laser-assisted vestibuloplasty to optimize soft tissue conditions prior to implant placement.

Case Presentation: A 44-year-old male presented with missing mandibular anterior teeth and reported difficulty maintaining oral hygiene. Clinical examination revealed mucosal scarring and shallow vestibule due to previous faulty suturing, along with inadequate attached gingiva. Diode laser- assisted vestibuloplasty was planned to enhance soft tissue dimensions.

Management & Outcome: A horizontal laser incision at the mucogingival junction was performed without suturing. Healing was uneventful, and vestibular depth increased from 2 mm to 5 mm within 14 days. Following complete soft tissue healing, three dental implants were placed, and final prosthetic rehabilitation was completed after three months, restoring optimal function and aesthetics.

Conclusion: Diode laser-assisted vestibuloplasty is an effective, minimally invasive technique to improve soft tissue architecture, enabling successful implant placement and long-term peri-implant health.

CASE STUDY

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INTRODUCTION

Adequate vestibular depth plays a crucial role in maintaining optimal oral hygiene. A shallow vestibule may contribute to gingival recession, ineffective plaque control, and compromised aesthetics.[1] Post-extraction remodeling of the alveolar ridge often leads to hard and soft tissue resorption, including the loss of attached gingiva.[2–4] In cases with insufficient width of attached gingiva, a vestibuloplasty or apically repositioned flap,

with or without grafting, is often recommended.[5]

Vestibuloplasty is a surgical intervention that alters the mucogingival complex by repositioning muscle and frenal attachments, deepening the vestibule, and increasing the zone of keratinized tissue. This procedure is beneficial in preventing peri-implant mucosal inflammation, enhancing plaque control, improving aesthetics, and facilitating prosthesis stability.[6]

Various modalities are used such as conventional, electrosurgery, laser and cryosurgery employed to perform vestibuloplasty, the conventional i.e scalpel method remains the gold standard. However, it may be associated with intraoperative bleeding and postoperative discomfort.[7] Laser-assisted vestibuloplasty, especially with diode lasers, presents several advantages including minimal bleeding, faster healing, reduced postoperative pain, and improved patient comfort.[8]

This case report details the management of shallow vestibular depth in the mandibular anterior region using a soft tissue diode laser vestibuloplasty.

CASE REPORT

A 44-year-old male patient presented with a chief complaint of missing mandibular anterior teeth and reported difficulty maintaining oral hygiene in the affected region. The patient gave a history of trauma approximately four years prior, leading to fracture of the lower anterior teeth. There was no history of tobacco use or alcohol consumption.

Intraorally, the alveolar mucosa was found to be adherent to the edentulous ridge in the mandibular anterior region. Clinical examination revealed a shallow vestibule and inadequate width of attached gingiva, contributing to difficulty in oral hygiene maintenance.

TREATMENT PROGRESS

The primary goal was to deepen the vestibule and increase the width of keratinized attached gingiva to facilitate improved plaque control and prepare the site for future implant placement. A diode laser-assisted vestibuloplasty was planned to achieve this, considering its soft tissue precision and postoperative advantages.

SURGICAL PROCEDURE

Following Phase I therapy and oral hygiene reinforcement, informed consent was obtained. The procedure was carried out under 2% Lignocaine Hydrochloride infiltration with all the aseptic conditions using a diode laser (Lasotronix Smart 10 Watts 980 Diode Laser). A horizontal incision was made in the region spanning tooth positions 31 to 44. The lip mucosa was apically repositioned to increase vestibular depth. As laser procedure is minimally invasive, suturing was not required. A periodontal dressing (Coe-Pak) was applied to protect the surgical site. Postoperative care included 0.2% chlorhexidine mouth rinse twice daily for four weeks and Aceclofenac 100 mg + Paracetamol 325 mg BID for 5 days, Pantoprazole 40 mg OD for 5 days was recommended

POSTOPERATIVE OUTCOMES

Healing was uneventful. At 7 days, initial healing appeared satisfactory, and by 14 days, the periodontal dressing was removed. The vestibular depth had increased from 2 mm at baseline to 5 mm at surgical site over 14 days healing period. Complete healing was achieved within 21 days, with no signs of infection or complications.

Subsequently, a CBCT scan was performed, and three dental implants were placed in the mandibular anterior region. The final implant prosthesis was delivered after a healing period of three months.

Fig. 1: Preoperative Photograph

Fig. 2: Preoperative measurement- Frontal view

Fig. 3: Preoperative measurement- Occlusal view

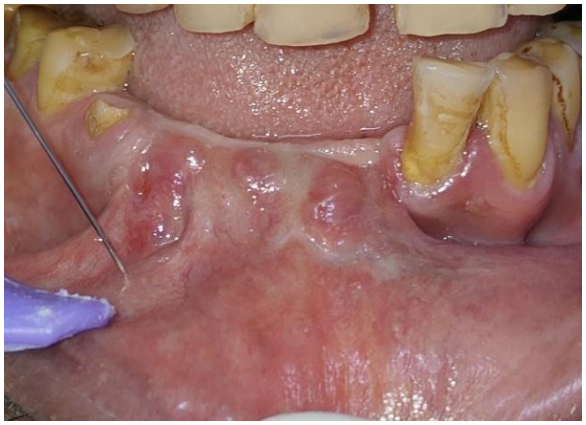

Fig. 4: Infiltration with 2% Lignocaine

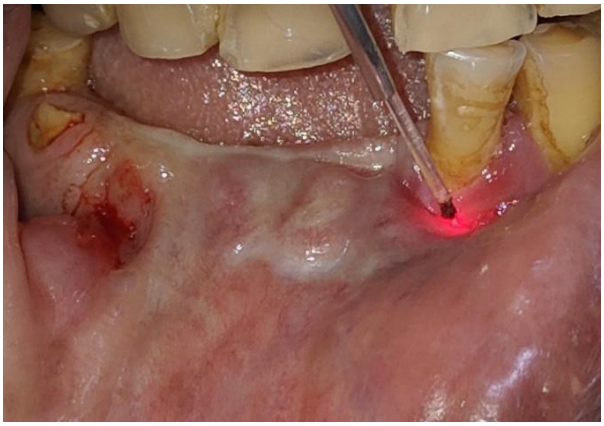

Fig.5: Horizontal incision with diode laser

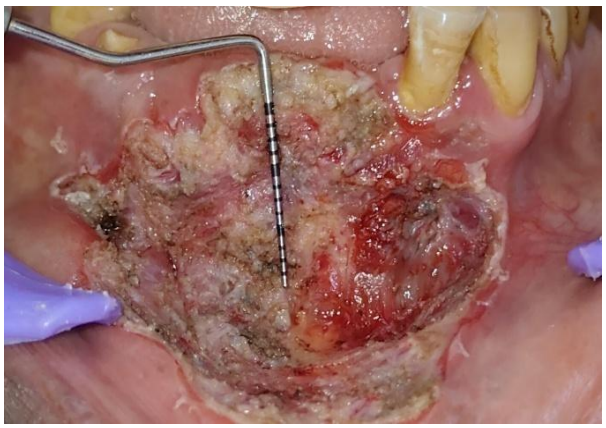

Fig. 6: Immediate postoperative

Fig. 7: Application of Coe- Pack

Fig. 8: Postoperative after 15 days- Frontal view

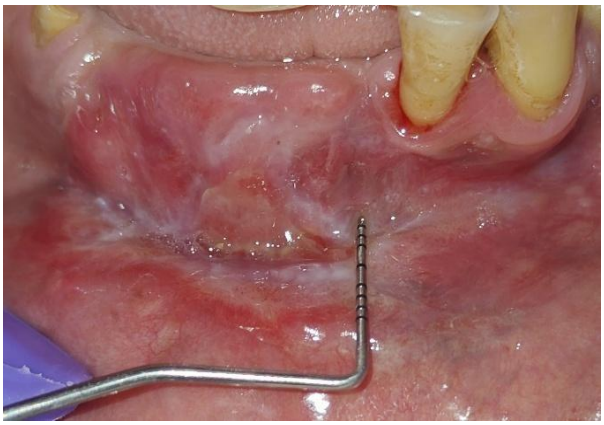

Fig. 9: Postoperative after 15 days- Occlusal view

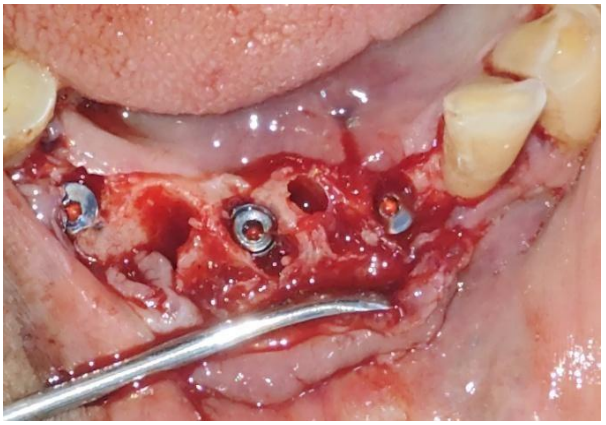

Fig. 10: Implant placement

Fig. 11: 4-0 Silk suture placed

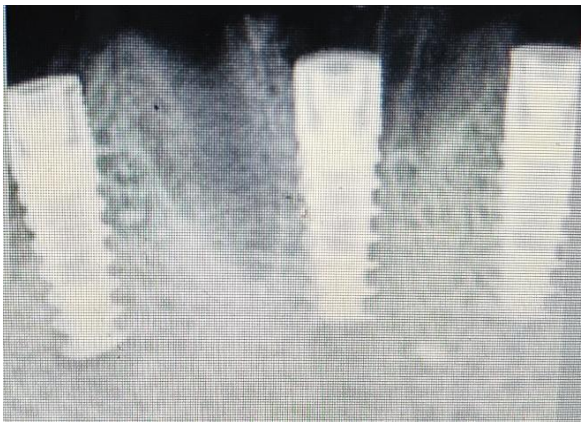

Fig. 12: RVG after Implant

Fig. 13: Final prosthesis 3 months after Implant placement

DISCUSSION

Soft tissue management is a fundamental component of periodontal and implant therapy. The presence of an adequate zone of attached gingiva and vestibular depth contributes to the long- term success of implants by minimizing mucosal inflammation, supporting oral hygiene maintenance, and enhancing prosthetic outcomes.[9–11]

An inadequate width of attached gingiva can predispose the patient to plaque accumulation, soft tissue inflammation, and aesthetic compromise. Early intervention through vestibuloplasty is essential in cases where attached gingiva is inadequate.[12,13]

Various techniques have been described for vestibular deepening. Laser-assisted vestibuloplasty using diode lasers has emerged as a favorable alternative to traditional methods.[14] Diode lasers offer precision, minimal tissue trauma, hemostasis, reduced postoperative discomfort, and enhanced healing.[15],[16] Lasers also aid in wound healing by creating a denatured protein coagulum called "eschar" or "biological bandage." The protein coagulum matrix protects the wound from masticatory pressures and microbes.[17, 18]

In this case, the use of a diode laser not only achieved the desired vestibular depth but also facilitated a pain-free, uneventful recovery with minimal postoperative complications. Studies by Kalakonda et al. and Moritz et al. support the clinical efficacy of lasers in soft tissue surgeries, highlighting their bactericidal properties and minimal scarring.[14],[19] Furthermore, Zeinoun et al. demonstrated reduced myofibroblast activity in laser-treated wounds, minimizing wound contraction and relapse.[20],[21]

CONCLUSION

Mucosal scarring from faulty suturing compromised vestibular depth and plaque control, creating an unfavorable environment for implant placement. Diode laser-assisted vestibuloplasty successfully restored vestibular depth and the width of attached gingiva with minimal discomfort and rapid healing. This soft tissue correction laid the foundation for ideal implant positioning and long-term prosthetic success, both functionally and aesthetically.

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