Original Article

Integration of Diode Laser in Periodontal Management of Oral Mucoceles: Case Series and Clinical Outcomes

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Abstract

Background: Oral mucoceles are benign lesions of minor salivary glands caused by mucus accumulation due to trauma or ductal obstruction. Traditional surgical excision is effective but can be associated with post-operative discomfort and recurrence. The diode laser offers a minimally invasive alternative with advantages in soft tissue management, especially in periodontal practice. **Objective:** The objective of the study is to evaluate the clinical effectiveness and healing outcomes of diode laser-assisted excision of oral mucoceles within a periodontal treatment setting. **Materials and Methods:** This case series included 3 patients diagnosed with oral mucoceles. All lesions were excised using a Biolase diode laser (wavelength: [960 nm], power: [10 W], continuous/pulsed mode). Parameters such as operative time, post-operative pain, healing response, and recurrence were recorded over a follow-up period of 1 year. **Results:** All patients showed excellent healing with minimal post-operative discomfort. No recurrence was observed during the follow-up period. Diode laser excision provided good hemostasis, reduced intraoperative bleeding, and eliminated the need for sutures. **Conclusion:** Diode laser-assisted excision is a safe, effective, and patient-friendly alternative to conventional surgery for managing mucoceles in periodontal practice. It offers advantages in terms of healing, pain control, and clinical handling.

Keywords: Diode laser, Minimally invasive surgery, Mucocele, Oral soft tissue lesions, Periodontics.

Introduction

Mucoceles are common non-neoplastic lesions of the oral cavity, often resulting from mechanical trauma or obstruction of minor salivary gland ducts.[1] Clinically, they present as painless, bluish, translucent swellings – most frequently found on the lower lip, floor of the mouth, or buccal mucosa.[2]

Conventional surgical excision has long been the standard treatment but may be accompanied by intraoperative bleeding, the need for sutures, patient discomfort, and potential recurrence.[3] With advancements in laser technology, diode lasers have emerged as a viable alternative for excising soft tissue lesions in the oral cavity. Their advantages – such as precision, minimal bleeding, bactericidal properties, and improved patient comfort – make them particularly suitable for procedures within periodontal practice, where soft tissue management is critical.[4-5]

This case series aims to present the clinical outcomes of diode laser-assisted excision of oral mucoceles in a periodontal setup, assessing its effectiveness, healing response, and recurrence rate.

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Materials and Methods

Study design and setting

This case series was conducted in the Department of Periodontology at SMBT Institute of Dental Sciences and Research, Nashik, Maharashtra, involving patients who presented with clinical signs and symptoms of oral mucoceles.

- Patients aged 15–60 years with clinically diagnosed oral mucoceles
- Lesions located on the lower lip, buccal mucosa, or ventral tongue
- No history of systemic illness or contraindications to laser therapy
- Patients who consented to diode laser treatment and follow-up.

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Procedure

After obtaining informed consent, a diode laser (BIOLASE) was used for the excision of the mucoceles under local anesthesia (2% lignocaine with 1:80,000 epinephrine).

- A protective barrier (gauze soaked in saline) was placed behind the lesion to prevent thermal damage to surrounding tissues.
- The lesion was circumscribed and excised with minimal tissue trauma using sweeping motions.
- Hemostasis was achieved without the need for sutures.
- Post-operative instructions were given, including avoidance of spicy food, no brushing over the surgical site, and analgesics as needed.
- Patients were recalled after 3, 7, 14 days, and 1 month for follow-up and healing evaluation (Figure 1).

Case 1

A 17-year-old boy reported with the chief complaint of painless swelling on the inner aspect of the lower lip for 12 weeks. Swelling was small initially and then increased gradually to attain the present size. There was no significant medical history.

History of present illness: Patient was apparently alright 3–4 months back until he noticed painless swelling on the inner aspect of the lower lip for 12 weeks. Swelling was small initially and then increased gradually to attain the present size.

Histopathology

Hematoxylin and eosin section (×4 magnification) showing mucin-pooled regions in the central luminal area surrounded by granulation tissue. The periphery of the lesion shows salivary gland acini and granulation tissue encapsulated by dense fibrous connective tissue (Figure 2).

Case 2

A 20-year-old boy reported with a complaint of swelling on the lower lip for 1 month. The child had a history of trauma 5 years back and there was a fracture in the upper left central incisor (Ellis class II fracture). Swelling was soft, oval, sessile, and painless which was fluctuating in size.

History of present illness: Patient was apparently alright 5 years back until he noticed painless swelling on the inner aspect of the lower lip for 5 years. Swelling was small initially and then increased gradually to attain the present size.

Case 3

A 59-year-old male reported with the chief complaint of painless swelling on the inner aspect of the lower lip for 10 years. Swelling was small initially and then increased gradually to attain the present size. There was a medical history of hypertension for 6 years.

History of present illness: Patient was apparently alright 10 years back until he noticed painless swelling on the inner aspect of the lower lip for 10 years. Swelling was small initially and then increased gradually to attain the present size.

- On intraoral examination, a round, solitary, fluctuant swelling was seen on the inner aspect of the lower lip at the right central incisor region. Swelling was 2–3 mm below the vermilion border of the lower lip and extending inferiorly toward the lingual vestibule, measuring approximately 6–8 mm. Color of the swelling was the same as that of the adjacent mucosa. No other oral anomalies were detected. The patient had a positive history of lip biting habit. There was no difficulty in speaking or chewing.

Soft tissue and tongue appear normal.

- The patient's oral hygiene technique was reviewed.

Data collection

Clinical parameters recorded included:

- Lesion size
- Operative time
- Intraoperative bleeding (graded as none, mild, and moderate)
- Post-operative pain (using a Visual Analog Scale)
- Healing outcome (based on clinical evaluation)
- Recurrence at 1-year follow-up.

A total of 3 patients were included in this case series. All patients presented with clinically diagnosed oral mucoceles located in the lower lip.

Clinical characteristics

- Number of lesions: 3
- Average lesion size: 5–6 mm in diameter
- Duration of lesion before treatment: 12 weeks to 10 years
- Etiologic factor: History of lip biting was noted in 1 of the patients.

Laser procedure outcomes

- Average operative time: 6–10 min
- Intraoperative bleeding:
  - None in 2 of cases
  - Mild in 1 of cases.
- Need for sutures: None in all cases
- Post-operative pain (Visual Analog Scale score):
  - Day 1: Mean score of 2.0 ± 0.8
  - Day 3: Decreased to 0.5 ± 0.6
  - No pain reported beyond day 7.

Healing and follow-up

- Healing at day 7: All patients showed satisfactory epithelialization with no signs of infection or inflammation.
- Healing at day 14: Complete mucosal healing was observed in 100% of patients [Figure 3].
- Recurrence: No recurrence was observed during the 1-year follow-up in any of the cases.

Patient satisfaction

Patients reported high satisfaction with the procedure due to:

- Minimal discomfort
- No sutures required
- Rapid healing
- Aesthetic results with no scarring.

Figure 1: Case 1 - (a) Pre-operative. (b) Taking measurement of lesion 5 mm–4 m. (c) Excised lesion send it for biopsy. (d) Post-operative. (e) One-year follow-up

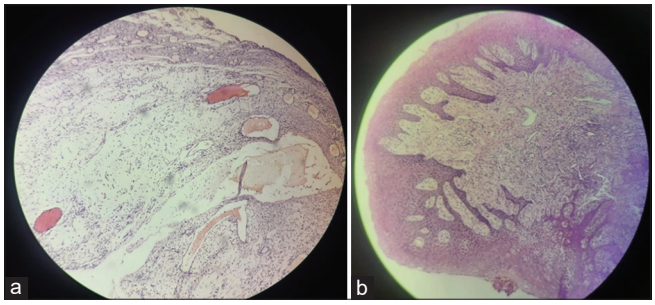

Figure 2: Case 2 - Histopathology showing mucous extravasation cyst

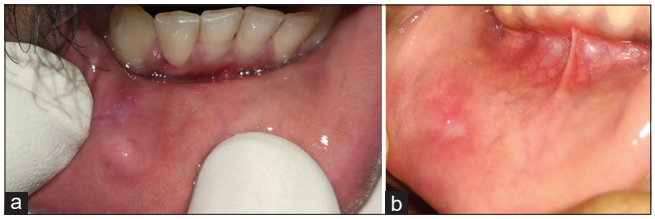

Figure 3: Case 3 - (a) Pre-operative. (b) One-year follow-up

Discussion

Oral mucoceles are common benign lesions caused by the extravasation or retention of mucus from minor salivary glands, typically following trauma such as lip biting.[6] Although benign, they can cause discomfort, interfere with function, or raise cosmetic concerns, necessitating surgical intervention.[7]

In conventional management, mucoceles are treated through surgical excision using scalpel techniques. However, this approach may be associated with intraoperative bleeding, post-operative pain, suturing, and risk of recurrence. The use of diode lasers in periodontal practice offers a minimally invasive, precise alternative, particularly suited for soft tissue procedures like mucocele excision.[8-9]

In this case series, diode laser-assisted excision was associated with excellent clinical outcomes. The procedure was bloodless in most cases, required no sutures, and resulted in minimal post-operative discomfort.[10] Healing was rapid and uneventful, with no recurrences noted during the 1-year follow-up period. These findings are consistent with earlier studies reporting similar benefits of diode laser in oral soft tissue surgery, such as those by Gontiya and Bhatnagar[1] and Suter *et al.*[2]

The laser's ability to coagulate tissue intraoperatively eliminates the need for sutures and improves patient comfort, while its bactericidal effect may contribute to improve healing and reduced infection risk. In addition, the diode laser causes less thermal damage to surrounding tissues compared to other laser types, making it suitable for delicate intraoral regions often managed in periodontics.[11-12]

This study supports the integration of laser technology into periodontal therapy for soft tissue lesions, expanding the scope of practice and improving patient-centered outcomes.

Limitations

- Small sample size and short follow-up period limit the generalizability of results.
- Lack of a comparative control group (e.g., scalpel excision) prevents direct comparison of healing outcomes.
- Long-term follow-up is needed to conclusively rule out recurrence.

Conclusion

Diode laser-assisted excision of oral mucoceles is a safe, effective, and minimally invasive approach, especially suitable in a periodontal clinical setting. It offers excellent hemostasis, minimal post-operative discomfort, faster healing, and high patient satisfaction. Incorporating laser technology in periodontal practice can enhance both functional and esthetic outcomes in managing minor oral lesions.

Conflict of Interest

None.

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