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Minimally Invasive Management of Oral Mucocele with Diode Laser

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Case Study

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ABSTRACT

Oral Mucocele is the result of the accumulation of mucous due to an alteration in the minor salivary gland. Clinically, they present as well-defined, dome-shaped, transparent swellings that are soft, fluctuant, and typically asymptomatic, with intact overlying epithelium. Management of mucocele can be achieved through several treatment approaches, including conventional surgical excision with a scalpel, laser excision, laser ablation, sclerotherapy, cryosurgery, micro-marsupialization, and intralesional steroid injections. We are presenting a case of mucocele managed with laser excision.

Keywords: Diode Laser, Excision, Mucocele, Laser, Salivary Gland.

Introduction

Oral Mucocele is the result of accumulation of mucous due to the alteration in the minor salivary gland.1 Mucocele occurs mainly due to obstruction or trauma to salivary glands The lower lip is the most frequently affected site (about 90%), followed by the floor of the mouth (6%) and the ventral surface of the tongue (4%).[1] Mucocele can be classified a) Based on involvement it can be superficial or deep mucocele b) Based on pathogenesis it can be extravasation and retention type.[1,2] Superficial mucoceles often appear bluish in color, whereas deep mucoceles usually have a normal mucosal appearance. An extravasation mucocele develops when a salivary gland duct is injured, leading to leakage of saliva into the surrounding soft tissues. In contrast, a retention mucocele occurs due to obstruction of the salivary gland duct, which reduces or completely prevents the normal flow of glandular secretions. Clinically, they present as well-defined, dome-shaped, transparent swellings that are soft, fluctuant, and typically asymptomatic, with intact overlying epithelium.[1,2] Management of mucocele can be achieved through several treatment approaches, including conventional surgical excision with a scalpel, laser excision, laser ablation, sclerotherapy, cryosurgery, micro-marsupialization, and intralesional steroid injections.[1-5] Among these, the most widely preferred method is complete surgical removal of the lesion along with the associated minor salivary glands to reduce the risk of recurrence.[1] We are

presenting a case of mucocele managed with laser excision.

Case Presentation

A 21-year-old male patient reported to the Department of Oral Medicine and Radiology with a chief complaint of swelling on the inner aspect of the lower lip for the past 4 weeks. The patient gave a positive history of traumatic biting at the same site a few months earlier. He also reported that the swelling frequently ruptured with the discharge of thick, watery fluid, after which it subsided but subsequently reappeared. On clinical examination, a dome-shaped swelling was observed on the lower labial mucosa, measuring approximately 1 × 1 cm (Figure 1a). The lesion was normal in color, soft, fluctuant, non-tender, and non-pulsatile. No other abnormalities were detected. Based on the patient's history and clinical presentation, a provisional diagnosis of mucocele was made. The patient was informed about the available treatment modalities, and laser excision was planned according to the patient's preference using a 980-nm diode laser. Standard safety protocols were strictly followed, including the use of protective eyewear for the patient, assistant, and operator. Excision was performed using a 980-nm diode laser (Ga-Al-As) with the parameters listed in Table 1. Local anaesthesia was administered using 2% lignocaine with 1:80,000 adrenaline. Laser parameters were set, and the tip was initiated using a cork. The lesion was outlined with a dotted marking around its base using the initiated tip. The dotted outline was then joined to form a continuous circumferential incision line (Figure 1b). The tip was moved along this incision line, and the depth was gradually increased (Figure 1c, 1d). Once adequate depth was achieved, the entire mucocele, along with the adjacent minor salivary glands, was excised without rupture (Figure 2a). The excision site was irrigated with Betadine. Photobiomodulation was performed immediately after surgery to promote healing. The excision site was left open without suturing to allow healing by secondary intention (Figure 2b, 2c). The patient was instructed to rinse twice daily with 0.2% chlorhexidine mouthwash for two weeks postoperatively. Analgesics were prescribed for three days, to be taken only if pain occurred. The patient was recalled for regular monthly follow-up visits (Figure 2d).

For Main cutting	▪ **Wavelength**-810–980 nm ▪ **Fiber diameter**- 400 micrometer ▪ **Mode-** Continuous, contact mode with Initiated tip ▪ **Power**-2.0 watt ▪ **Energy density –** 1592 Jule/cm^2
For post treatment PBM	▪ **Wavelength**- 630- 660, 810–980 nm ▪ **Fiber** diameter– PBM tip, 8mm ▪ **Mode-** Continuous, noncontact mode of 1-2 mm ▪ **Power**-0.1-0.3 watt (100-300mW) ▪ **Energy density**- 2-4 Jule/ cm^2

Table1- Laser parameter for the excision of Mucocele.

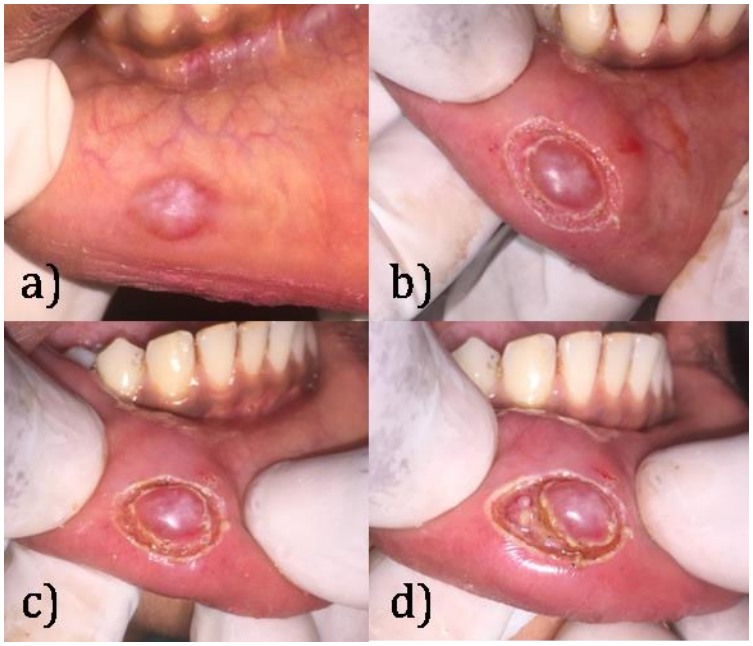

Figure1: Case of diode laser excision of mucocele affecting lower labial mucosa a) Mucocele affecting lower labial mucosa b) Initially, The lesion was outlined with a dotted marking around its base using the initiated tip. The dotted outline was then joined to form a continuous circumferential incision line. c, d) The tip was moved along this incision line, and the depth was gradually increased.

Figure 2- a) Once adequate depth was achieved, the entire mucocele, along with the adjacent minor salivary glands, was excised without rupture. b) The excision site was left open without suturing to allow healing by secondary intention. c) Excised specimen d) Final view after complete healing.

Discussion

LASER is an acronym for Light Amplification by Stimulated Emission of Radiation. A laser device emits electromagnetic radiation through a process called optical amplification. Unlike ordinary light, which is produced by spontaneous emission, laser light is generated through stimulated emission, resulting in a highly focused and coherent beam.6 Laser therapy is among the mainstay in the management of oral lesions.[7,8] Various laser systems have been used clinically for the management of mucocele, including the carbon dioxide (CO_2) laser and the diode laser.[9] Laser therapy offers several clinical advantages, including a dry surgical field and improved visibility during procedures. It is associated with minimal postoperative swelling and pain, a lower risk of mechanical trauma, and consequently reduced scarring. Additional benefits include improved infection control through a reduction in circulating bacteria, greater patient acceptance due to minimal postoperative discomfort, and a decreased need for local anesthesia in soft-tissue procedures. Furthermore, laser use requires minimal decontamination and provides effective bactericidal action.[6-10]

A study involving 68 patients with mucocele was conducted to compare the outcomes of oral mucocele resection performed using a scalpel versus a CO_2 laser, with evaluation based on postoperative complications and recurrence rates. The study concluded that laser resection provided more predictable outcomes and was associated with fewer complications and recurrences compared to conventional scalpel excision.[9]

A study reported that diode laser excision of mucocele results in minimal patient discomfort, reduced postoperative pain and edema, and an absence of bleeding or recurrence even after long-term follow-up. It concluded that diode laser therapy can be an effective treatment option, particularly for uncooperative patients.[11] Our findings were consistent with previous studies, as we observed no intraoperative bleeding, reduced postoperative pain, absence of edema, and no recurrence.

A systematic review was conducted to evaluate the effectiveness of laser irradiation in the treatment of pediatric mucocele. The findings indicated that laser therapy is an effective treatment modality for mucocele in pediatric patients, offering several advantages, including reduced or absent pain and bleeding, improved hemostasis, shorter operating time, minimal analgesic requirement, and antibacterial effects.[12]

Conclusion

Diode laser excision represents a safe, effective, and minimally invasive treatment modality for the management of oral mucocele. Its advantages—including excellent hemostasis, a clear surgical field, reduced intraoperative discomfort, minimal postoperative pain and swelling, and faster healing—make it a highly favorable alternative to conventional surgical techniques. The bactericidal properties of the laser and the reduced need for sutures further contribute to improved patient comfort and clinical outcomes.

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