

Excision of Mucocele in Children Using Diode Laser: A Case Series

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Abstract

Mucocele is a common benign oral lesion related to salivary glands. It appears as painless round circumscribed swelling with color varying from deep blue to similar to that of the mucosa. The most frequent location for it is the lower lip. Different treatment options reported in the literature are surgical removal using a scalpel, cryosurgery, micro-marsupialization, intralesion injection of corticosteroid, and laser ablation. This paper aims to report three cases of excision of mucocele utilizing a diode laser with a 3-month follow-up. Under local anesthesia, mucoceles were removed utilizing a diode laser in pulse mode set at 1.0 watts and a wavelength of 980 nm. There was minimal post-operative discomfort and scarring. No recurrence was found after a 3-month follow-up. Diode laser is considered one of the well-accepted procedures for treating mucoceles in pediatric patients since it is effective, rapid, bloodless, and well-accepted and requires less procedural timing.

Keywords: Diode laser, Marsupialization, Mucocele, Surgical excision.

INTRODUCTION

Mucocele is one of the common minor salivary gland diseases and among the most common biopsied oral lesions in pediatric patients.^[1,2] The incidence of mucocele has been reported to be ranging from 0.4% to 0.8%.^[3] It affects both genders and shows a higher predilection for males than females, with peak incidence among children and young adults. It is usually caused by the accumulation of mucus from the salivary glands and their ducts that seep into the subepithelial tissue of the oral cavity.^[1] The two main categories for mucocele are extravasation and retention kinds. Mucin builds up in the extracellular space as a result of mechanical damage to salivary ductal cells, which causes an extravasation type of mucocele. The retention type is due to mucin retention that obstructs the acini or salivary ducts.^[4] The palate, retromolar region, buccal mucosa, lingual frenum, dorsal side of the tongue, ventral surface of the upper lip, and floor of the mouth are areas where mucoceles have been reported in addition to the lower lip, which is the most prevalent site. Despite, the fact that mucoceles are mostly asymptomatic, depending on the size and location of the lesion, they can sometimes cause irritation and pain, which can impair the function of the oral cavity. Surgical excision is the conventional therapy for smaller oral mucoceles, whereas marsupialization is used for larger lesions.^[5]

Laser was newly introduced, in dentistry (Figure 1), to be used for many therapies in hard and soft tissue. It has been

utilized for the treatment of mucocele, and it has the advantage of minimal tissue damage, reduced bleeding, better wound healing without scarring, shorter treatment time, and negligible post-operative edema with reduced need for analgesics after the procedure.^[6] Indeed, pain and time reduction are crucial aspects during therapy, especially for pediatric patients. The recurrence rates are also very minimal with laser ablation of mucocele compared to surgical excision. The following are three clinical cases of management of the mucocele with diode laser and 3-month follow-ups in children.

CASE REPORT - 1

An 8-year-old, healthy, boy presented with his mother to the department of pediatric and preventive dentistry complaining of asymptomatic swelling on the labial mucosa of the lower lip. According to the mother, the swelling began 3 months ago and episodically fluctuated in size during meals. On clinical examination, a soft, fluctuant, painless, fluid-filled

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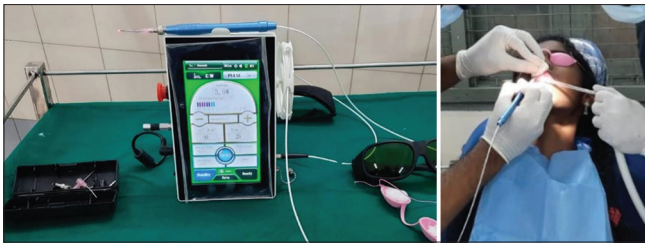


Figure 1: Diode laser unit with protective eyewear and the child patient undergoing mucocoele excision using diode laser

elevated lesion situated on the midline of the lower lip and approximately measuring 1×1 cm in size was noted (Figure 2a and b). Based on the patient's medical history and symptoms, a provisional diagnosis of mucocele was given. A differential diagnosis of traumatic fibroma, papilloma, and minor salivary gland neoplasm was considered. The parents were informed of the treatment option available, and consent was taken for the excision. Scaling and restorations of decayed teeth were performed during their first clinical visit. During the second appointment, blood investigations were performed, and the reports were within normal limits. Under local anesthesia, conventional surgical excision was done using scalpel No. 15. First, the surgical site was swabbed with 10% povidone-iodine, following which a semilunar-shaped incision was given. The mucocele was excised and a 4-0 silk suture was placed to approximate the margins (Figure 2c). Post-operative instructions were given, and sutures were removed on the 7th day and the wound healing was satisfactory.

After 2 months, the patient reported to the department with the recurrence of mucocele in the same region (Figure 2d). After discussing with the parents and receiving appropriate consent, the patient was taken up for mucocele excision using a diode laser. The diode laser (Divine Lase-D [10W/980 nm]) used for the procedure; the device has pre-set parameters for different oral surgical procedures (Figure 1); for mucocele excision, the settings were as follows:

- i. Peak power: 3.0 W
- ii. Emission mode: Pulse
- iii. Average power: 1.0 W
- iv. Energy/pulse: 75 μ J
- v. Tip-to-tissue distance: in contact
- vi. Speed of movement: 1 mm/s.

During the procedure, the clinician and the patient were equipped with protective eyewear designed for laser use (Figure 1). The device's tip was positioned at a 10–15° angle against the labial surface, at the base of the lesion. Using tweezers, the mucocele was securely held in, and the base was carefully circled with movements. To prevent any overheating of the tissues, the area was consistently dabbed with a moist, sterile gauze. The device's tip was monitored throughout the process for any damage or accumulation of debris. If detected upon examination, the tip was promptly wiped clean using sterile gauze. The entire mucocele was successfully excised within 5 min (Figure 2e). The patient was given analgesics to

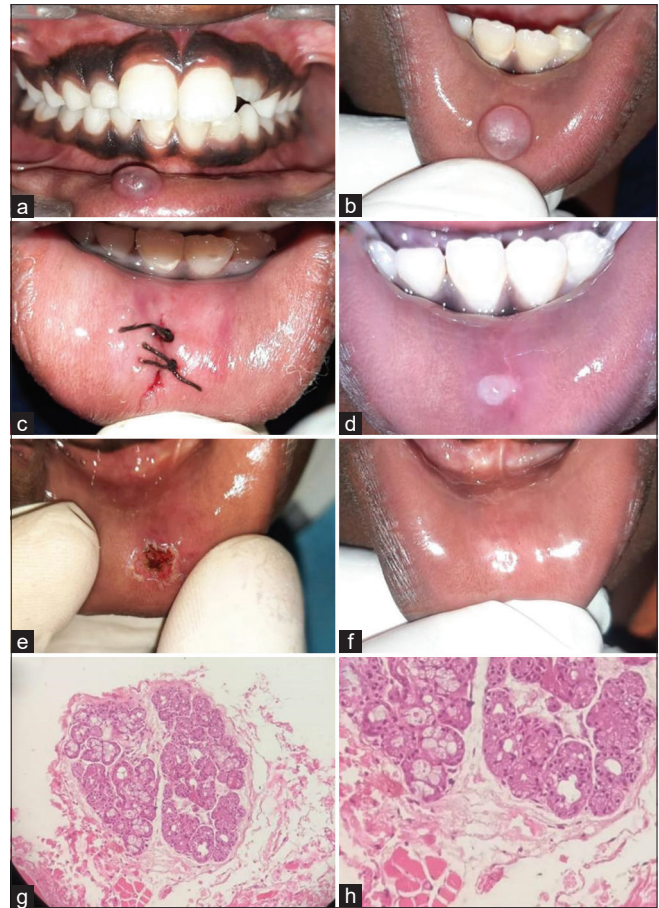


Figure 2: Case-1; Intra-oral images (a and b) Clinical presentation of mucocele on the lower lip. (c) Conventional surgical excision of mucocele. (d) Recurrence of mucocele after 1 month. (e) Excision of mucocele using diode laser, (f) 3-month follow-ups showing good healing. (g) H- and E-stained section showing minor salivary glands consisting of intralobular ducts surrounded by spilled mucin. (h) Chronic inflammatory infiltrate with macrophages present adjacent to the spilled mucin

control pain if any and 0.2% chlorhexidine mouthwash. The excised tissue was sent for histopathological examination. The patient was followed up for 3 months. The wound healing was satisfactory, and no signs of recurrence were observed (Figure 2f). Histological examination showed the presence of minor salivary glands consisting of intralobular ducts surrounded by spilled mucin. The spilled mucin was phagocytosed by macrophages (mucinophages) and was surrounded by chronic inflammatory infiltrate (Figure 2g and h).

CASE REPORT - 2

A 12-year-old, healthy, girl presented with her parents to the department of pediatric and preventive dentistry complaining of asymptomatic swelling on the ventral aspect of the tongue. The parent informed previous history of trauma to the upper front tooth region due to a self-fall 6 months back. The parent reported that the swelling started 4 months back and changed intermittently in size, especially while having food. On clinical examination, a soft, fluctuant, elevated lesion situated on

the ventral aspect of the tongue away from the midline and approximately 1×0.5 cm in size was noted (Figure 3a). Based on the patient's medical history and symptoms, a provisional diagnosis of mucocoele was given. A differential diagnosis of traumatic fibroma, papilloma, and minor salivary gland neoplasm was considered. The parents were informed of the treatment option available, and consent was taken.

On the subsequent appointment, the parent reported that the lesion had ruptured, and a new lesion appeared in the same region. On examination, this lesion was smaller in size, measuring 3×3 mm in size (Figure 3b). In this case, also mucocoele was excised using a diode laser as described in case 1. The device's tip was positioned at a $10\text{--}15^\circ$ angle against the ventral aspect of the tongue, at the lesion's base. Using tweezers, the mucocoele was securely held in, and the base was carefully circled with movements. Caution was taken not to excise deeper structures to prevent exposure of the underlying blood vessels. The entire mucocoele was successfully excised within 8 min (Figure 3c). The patient was followed up for 3 months. The wound healing was satisfactory, and no signs of recurrence were observed (Figure 3d).

CASE REPORT - 3

An 8-year-old girl reported to the department of pediatric dentistry with the chief complaint of painless swelling on the inner aspect of the lower lip for 1 month. The swelling started small and then grew gradually to its current size. There was no significant medical history. On intraoral examination, a solitary, round, fluctuant swelling was seen on the inner surface of the lower lip at the left central incisor region measuring

approximately 6×6 mm. The mucosa and the swelling were of the same color (Figure 4a). The patient gave a history of accidental lip biting 1 month back. Oral functions such as chewing and speaking were not affected.

Based on the patient's medical history and symptoms, a provisional diagnosis of mucocoele was given. A differential diagnosis of traumatic fibroma, papilloma, and minor salivary gland neoplasm was considered. The parents were informed of the treatment options available (surgical and laser), and the parent opted to undergo laser excision. Blood investigations were performed before the procedure, and the reports were within normal limits. Appropriate consent was taken from the parents, and the patient was taken for mucocoele excision (Figure 4b) using diode laser as described in case 1 and case 2. The excised tissue is shown in images (Figure 4c). The patient was given analgesics to control pain if any and 0.2% chlorhexidine mouthwash. The patient was followed up for 3 months. The wound healing was satisfactory, and no signs of recurrence were observed (Figure 4d).

DISCUSSION

This paper describes the excision of mucocoeles using a diode laser followed by 3-month follow-up in pediatric patients. A comprehensive collection of the patient's medical history and a detailed inspection are essential for the accurate diagnosis of oral mucocoeles. While the diagnosis is primarily based on clinical observation, it is important to conduct a proper anamnesis, with a focus on identifying any history of trauma. The distinctive characteristics of a mucocoele include its typical location, a history of trauma, its sudden emergence,

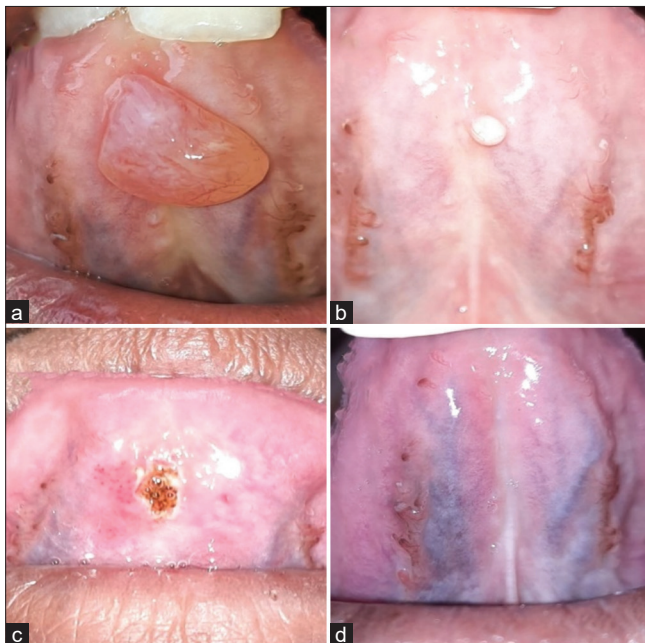


Figure 3: Case-2 Intra-oral images (a) Clinical presentation of mucocoele on the ventral aspect of the tongue. (b) Regression in size of mucocoele on the subsequent visit. (c) Excision of mucocoele using diode laser. (d) 3-month follow-up image showing good healing



Figure 4: Case-3 Intra-oral images, (a) Clinical presentation of mucocoele on the lower lip. (b) Excision of mucocoele using diode laser. (c) Excised mucocoele lesion. (d) 3-month follow-up image showing good healing

size changes during meals, a bluish hue, and its texture.^[7] Mucoceles are movable growths that feel soft and stretchy, with the degree of softness varying based on the amount of overlying tissue. While mucoceles are generally fluctuant, one that has been drained will not show such variability, and one that has become chronic with established fibrosis will exhibit reduced fluctuation.^[7]

Etiological factors of mucocele include accidental trauma, calculi in the minor salivary gland, trauma due to dental brushing,^[8] and rubbing or sucking habits.^[9] Currently, there are various treatment options available for the management of mucocele: scalpel incision, marsupialization, complete surgical excision, intralesional injections with corticosteroids, cryosurgery, micro-marsupialization, laser ablation, sclerosing substance, and electrocautery methods.^[10] Key considerations for achieving a successful operation without recurrence involve removing the cyst, surrounding minor salivary glands, and extending the excised area to the muscle layer. In case 1, recurrence of mucocele was observed after conventional surgical excision. This could be due to remnants minor salivary glands or the procedure itself causing trauma to the tissue, leading to recurrence.^[11]

The last few decades have increased the popularity of lasers due to their wide range of applicability in dentistry. A study conducted by Romeo *et al.* evaluated the ability of three distinct lasers, i.e. Er-Cr: YSGG 2780 nm, diode 808 nm, and KTP 532 nm, to excise labial mucocele using mucosal preservation technique and circumferential incision technique. Regardless of wavelength, these tested lasers provided good results along with advantages such as a bloodless surgical field, relative speed, no post-operative pain, and easy execution with no recurrence.^[12] Melanin pigments on the skin and hemoglobin readily absorb diode laser irradiation with greater thermal effects in contrast to dental hard tissue where their irradiation is poorly absorbed.^[13] According to Goharkhay *et al.*, absorption of diode laser wavelength by hemoglobin leads to better incision performance and also excellent coagulation of tissue. The literature reported that diode laser stimulates clotting factor VII which results in enhanced hemostasis and a significant reduction of bacteria on the wound bed reducing the risk of bacteremia.^[14] The diode laser was used by Paglia *et al.*, in a 3-month-old infant to remove mucocele. The wound healed perfectly after the follow-up period of 2 weeks.^[15] In our cases, outcomes coincide with those of Paglia *et al.*, where post-operative complications and recurrence were minimal following ablation of lower lip mucoceles with the diode laser.

New learning points

- Conventional surgical excision causes injury to the adjacent minor salivary glands which in turn can cause recurrence of mucoceles. However, this does not occur with laser excision
- Laser excision has improved the child patients' and parents' acceptance as it decreased operating time and a relatively bloodless field

- The equipment used in laser excision is less fearful for children compared to the scalpel used in conventional procedures. Hence, laser excision has become a boon for pediatric patients.

CONCLUSION

The present case series discloses knowledge about diode lasers for mucocele excision with various benefits such as good visualization of the surgical site, less procedural timings, minimum post-operative discomfort, hemostasis, minimal scarring, and recurrence. Laser application reduces fear and anxiety in pediatric patients and this technique spurs dental practitioners to use it in their routine practice.

SOURCE OF SUPPORT

None.

CONFLICTS OF INTEREST

None.

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