

MANAGEMENT OF ORAL MUCOCELE USING DIODE LASER: A CASE SERIES WITH BRIEF REVIEW

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DOI: 10.47750/pnr.2023.14.02.381

Abstract

Mucocele is a benign oral lesion related to salivary glands and their ducts. Most frequently seen on the lower lip, it is usually asymptomatic, unilateral; dome shaped and may vary in color based on its location. The primary causative factor is trauma to lower lip which causes injury to salivary gland and its duct. Treatment of mucocele involves its complete excision along with associated salivary gland acini. Over the past few years, use of lasers has gained popularity in dental field, especially in the treatment of various soft tissue lesions. We report a case series of four patients diagnosed with mucocele and treated for complete excision of the lesion with diode laser.

Patients were recalled after 1 week, 1 month and 3 months. In all the cases healing was uneventful, without scarring and with minimal or no postoperative discomfort. No recurrence was seen on follow up in all the cases.

Key words: mucocele, mucus extravasation phenomenon (MEP), diode laser

INTRODUCTION

Mucocele is most commonly a pseudocyst that is associated with mucus extravasation into the surrounding soft tissues. ⁽¹⁾ A less common type of mucocele, retention mucocele, is a true cyst and results from ductal obstruction due to sialolithiasis, periductal scars or invasive tumors. Extravasation mucocele may occur at any age but is most frequently seen in the second and third decades of life. ⁽²⁾ The lesion has no sex predilection and occurs more frequently in children, adolescents and young adults. This type of mucocele is believed to result from mechanical trauma to the excretory duct of the salivary glands, causing duct transection or rupture, with consequent extravasation of mucin into the connective tissue stroma (mucus extravasation phenomenon, MEP). ⁽³⁾ Clinically, mucocele appears as discrete, small, translucent, soft, painless swelling of the mucosa ranging from normal pink to deep blue in color. Blue color is caused by vascular congestion and tissue cyanosis of the tissue above and accumulation of fluid below. ⁽²⁾

The standard treatment for mucocele is complete surgical excision along with associated salivary gland acini. The excision can be done using scalpel, lasers, or electrocautery. Other treatment option includes marsupialization and cryotherapy.⁽⁴⁾

Over the years, the use of laser has evolved in the field of dentistry. Laser has many advantages over traditional scalpel surgery especially when used for the excision of soft tissue lesions. Out of the different available lasers, diode lasers can be used for a multitude of dental procedures like soft tissue surgery, periodontal pocket therapy and treatment of peri- implantitis.⁽¹⁾

The article highlights etiopathogenesis and clinical diagnosis of mucocele and presents a series of cases wherein diode laser was used to surgically excise the mucocele.

Case reports:

Case 1:

A 32-year-old female patient reported with a complaint of swelling on the lower right labial mucosa since 3-4 months (Figure 1). Difficulty in eating and unpleasant esthetics were patient's chief concerns. The swelling was asymptomatic with a gradual increase in size over the last 3-4 months. There was a history of surgical excision of the same 1 year back with conventional scalpel surgery.

Intraoral examination revealed a sessile, oval shaped nodular swelling measuring approximately 5mm × 3mm on the lower right labial mucosa, 2mm below the vermilion border of the lip (Figure 1). Color of the swelling was same as that of the adjacent mucosa, with no erythema, pus discharge or ulceration. The incisal edge of the maxillary right lateral incisor and canine was impinging on the nodule. On palpation the swelling was non-tender, non-reducible, soft in consistency and fixed to the underlying tissue.

Based on the history and clinical appearance a differential diagnosis of traumatic fibroma, mucocele, papilloma, fibroepithelial polyp was arrived at. The lesion was advised for excisional biopsy. Local infiltration (2% lidocaine with 1:100,000 epinephrine) was given and after achieving adequate anesthesia, the lesion was demarcated and excised using Diode laser (Simpler laser, Doctor Smile, Lamda Spa, Italy) (Figure 2). The laser had following specifications: wavelength - 980nm, average energy output - 2.30 watt, peak energy output - 7.00 watt, mode – pulsed and straight disposable tip of 300 micron diameter. All standard safety protocols for laser safety were followed. The excised tissue was sent to the laboratory for histopathological examination. The site was blood free during the entire procedure and there was no need of suturing at the end, which made the procedure easier and less time consuming. Patient compliance was excellent throughout the procedure. Diclofenac sodium, 50 mg was advised as anti-inflammatory agent. Figure 3 shows healing after 3 months.

Case 2:

A female patient aged 30 years reported with chief complaint of swelling on the lower left labial mucosa measuring about 8mm x 4mm, since 1 month (Figure 4). There was history of lip biting followed by swelling at the same site. After thorough history and clinical examination, the swelling was provisionally diagnosed as mucocele. Excision of the lesion was done with diode laser and the excised tissue was sent for histopathological examination. Figure 5 shows healing after 3 months

Case 3:

A 35-year-old male patient reported with swelling in the lower left labial mucosa. The swelling was asymptomatic, present since a month and was causing difficulty in mastication (Figure 6). Excision of the swelling

was done with diode laser similar to other cases and sent for histopathological examination. Figure 7 shows post-operative healing after 3 months

Case 4:

A 45-year-old patient, reported with swelling in the mandibular left labial mucosa. The swellings were similar in color to adjacent mucosa, painless and fluctuant (Figure 8). Based on clinical examination, the swelling was provisionally diagnosed as mucocele. The swelling was excised using diode laser and sent for histopathological examination. As the swelling was deep seated, more tissue was excised, and sutures were given in this case. Figure 9 shows healed site after 3 months.

Histopathological examination of all the excised lesions, showed mucin pooled areas with numerous mucinophages surrounded by a fibrous connective tissue wall, infiltrated by chronic inflammatory cells predominantly lymphocytes and plasma cells, which suggested of extravasation type of mucocele (Figure 10).

The patients were recalled at one week, one month and three months. The postoperative period in all the treated cases was without any discomfort and healing was without any scarring. No recurrence was reported in any of the treated cases.

DISCUSSION:

Mucocele is a benign pseudocyst or a true cyst, ranked as the seventeenth most common salivary gland lesion seen in the oral cavity. It is also the second most common benign soft tissue tumor occurring in the oral cavity. It usually occurs as an isolated lesion, although more than one may be present at a time as in case of superficial mucocele.⁽⁵⁾

Etiology and clinical presentation:

Mucocele is a painless, slow growing, fluctuant, fluid filled vesicle or blister in the superficial mucosa or a fluctuant nodule deep within the connective tissue.⁽²⁾ There are two types of mucoceles: extravasation type due to traumatism and retention type due to obstruction of the salivary gland duct.⁽⁶⁾

Extravasation mucocele results from a broken salivary gland duct and with consequent spillage of mucin in surrounding tissue.⁽¹⁾ Bagan et al. proposed that extravasation mucoceles undergo three evolutionary phases. In the first phase, mucous spills diffusely from the excretory duct into adjacent tissues where some leucocytes and histiocytes are found. Granulomas appear during the resorption phase due to histocytes, macrophages and giant multinucleated cells associated with a foreign body reaction. In the final phase connective tissue cells form a pseudo capsule without epithelium around the mucosa.⁽⁷⁾ Retention type is due to the blockage of salivary gland duct which is commonly seen in major salivary gland ducts. When mucocele is present in the floor of mouth it is called as ranula. It is named so as it appears as the underbelly of a frog.⁽⁸⁾

Mucocele is most commonly seen in the lower labial mucosa as the site is most prone to trauma, especially at premolar level.⁽⁶⁾ Other locations include buccal mucosa, floor of mouth, tongue, upper lip, hard palate and retromolar area. They may vary in color from deep blue to similar to adjacent tissue. Bluish color is mainly due to vascular congestion and cyanosis of the tissue above and the fluid accumulation below. They are usually unilateral dome shaped swellings with intact epithelium over it and size may vary from few millimeters to centimeters. Sometimes mucocele can also occur bilaterally.⁽⁸⁾

According to Harrison et al., the lesion develops over a period of one week to five years, though the most common duration is three weeks to three months⁽⁹⁾. The lesion size reportedly varies between 0.2 mm to 2 cm in diameter

⁽¹⁰⁾. Mucoceles rarely cause significant problems, however at times they may cause discomfort, interference with speech, mastication, swallowing and external swelling depending on the size and location. ⁽¹¹⁾

Diagnosis: ^{(8)(11)(6) (12)}

Diagnosis of mucocele can be achieved by:

- History – related to trauma, lip biting habit,
- Clinical examination- lesion location, rapid appearance, variation in size, color and consistency,
- Fluctuation test- palpation can be help in correct differential diagnosis. Lipomas and tumors of minor salivary gland present no fluctuation while cysts, hemangiomas, mucoceles do show positive fluctuation test.
- Fine Needle Aspiration Cytology which demonstrates mucus retention, inflammatory cells and histiocytes.
- Chemical analysis showing high amylase and protein content
- Histology
- Radiographs like computed tomography and magnetic resonance imaging helps in localization of these lesions, if sialoliths are considered as a contributing factor in the formation of oral and cervical ranulas.

The differential diagnosis should include lesions known to cause swelling of the lips. The lip comprises of adipose tissue, blood vessels, nerves, connective tissue and salivary glands, so pathosis of any of these tissues, like Blandin and Nuhn mucocele, ranula, benign or malignant salivary gland neoplasms, oral hemangioma, oral lymphangioma, venous varix or venous lake, lipoma, soft irritation fibroma, oral lymphoepithelial cyst, gingival cyst in adults, soft tissue abscess, cysticercosis (parasitic infection) should be included in the differential diagnosis. Superficial mucoceles may be confused with cicatricial pemphigoid, bullous lichen planus and minor aphthous ulcers.

Treatment:

Various treatment modalities like excision (using scalpel, lasers, electrocautery), intralesional corticosteroid injection, cryotherapy, or marsupialization are available for the treatment of mucocele.⁽¹⁾⁽¹⁰⁾ However, the most common treatment of mucocele involves complete excision of the swelling along with the involved salivary gland duct.

Over the past few decades lasers have gained popularity in dentistry due to their many advantages over conventional scalpel surgery like:

- Decreased treatment time
- Increased patient comfort
- No need of suturing
- Clean surgical field
- Less post-operative discomfort.⁽¹⁾

In 2014, Qafmolla et al., in a study concluded that excision of mucocele with laser required 3-5 minutes, which was less than that done with scalpel and listed following advantages in comparison to scalpel:

- Minimal damage to the neighboring tissues,
- Bloodless and highly decontaminated surgical bed,
- Minimal pain and discomfort during the postoperative period.⁽¹³⁾

As with argon and Nd:YAG lasers, diode laser (wavelength 800- 810 nm), is intensely absorbed by hemoglobin, elevating the temperature and promoting coagulation and carbonization of soft tissues, such as the oral mucosa. Moreover, the small size of the diode laser system is of great benefit as it takes up very little office space and assures great portability.⁽¹⁾ Thus considering the advantages of lasers, and ease of using diode laser, excision of mucocele in all the four cases presented here was carried out with diode lasers. The excisions were achieved with minimal bleeding, the surgical field was clean and there was no need of suturing except in one case where the lesion was deeply placed. All the four patients reported minimal to no post operative discomfort and healing was uneventful without any scarring.

Regardless of the treatment approach, total excision of lesions and follow-up is necessary due to the high recurrence rate of mucoceles.⁽¹⁾ While excising the mucocele it is important to remove the surrounding glandular acini. Also, the lesion should be removed down to the muscle layer and damage to the adjacent gland and duct should be avoided to reduce the chances of recurrence of mucocele.⁽⁸⁾ None of the cases presented here reported any recurrence on follow- up till the end 3 months.

CONCLUSION:

Mucocele is a benign self-limiting condition of the oral mucosa with several treatment options. Amongst these the diode lasers appear to be the most rapid and efficient method of excision of mucocele. Use of this laser not only reduces the operation time and causes less bleeding but also results in less post-operative discomfort, making it a much better alternative to conventional scalpel surgery.

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Figures with legends

Figure 1: Case 1 - Swelling on the lower right labial mucosa



Figure 2: Case 1 - Immediate post-operative after mucocele excision with diode laser



Figure 3: Case 1 - Post-operative healing after 3 months



Figure 4: Case 2 - Swelling on the lower left labial mucosa



Figure 5: Case 2 - Post-operative healing after 3 months



Figure 6: Case 3 - Swelling on the lower left labial mucosa



Figure 7: Case 3 - Post-operative healing after 3 months



Figure 8: Case 4 - Swelling on the lower left labial mucosa



Figure 9: Case 4 - Post-operative healing after 3 months



Figure 10: Histopathological Examination

