Mucocele Resection: A Comparison of Two Techniques

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**LEARNING OBJECTIVES:**
After reading this article, the individual will learn:

- options for treatment of a mucocele, and
- diagnosis and histopathology of mucoceles.

**ABOUT THE AUTHORS**

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**INTRODUCTION**

A mucous cyst is a benign, mucous-containing cystic lesion of the minor salivary glands. This type of lesion is more commonly referred to as a mucocele, since most lack an epithelial lining and are by definition not true cysts. The location of these lesions can vary. Superficial mucoceles are located directly under the mucosa—most commonly in the soft palate, the retromolar region, and the posterior buccal mucosa—and represent approximately 6% of all mucoceles.\(^1,2\) Classic mucoceles are located in the upper submucosa; deep mucoceles are located in the lower corium. Furthermore, 2 types of mucous cysts occur based on the histologic features of the cyst wall. The more common is a mucous extravasation cyst formed by a mucous pool surrounded by granulation tissue; this type accounts for 92% of these lesions. The other is a mucous retention cyst with an epithelial lining, which accounts for the remaining 8%.\(^3,4\)

Mucoceles of the anterior lingual salivary glands, and the glands of Blandin and Nuhn (which are mixed mucous and serous glands), are relatively uncommon, with few case reports in the literature.\(^5\) These mucous-secreting glands are located in the palate and the labial/buccal mucosa. They are also located on the dorsum of the tongue behind the circumvallate papillae.\(^6\) These mucoceles have been linked to trauma and represent an estimated 2% to 8% of all mucoceles.\(^5\) Salivary mucoceles are more common in the lower lip, but they may also occur on the floor of the mouth, the cheek, the palate, the retromolar fossa, and the dorsal surface of the tongue.\(^2\)

Mucoceles are the 15th most common oral mucosal lesion, with a prevalence of approximately 2.4 cases per 1,000 people. Although the exact prevalence in children is unknown, they are thought to occur more frequently in younger individuals than in adults. Studies have suggested that there is an association of these lesions in children with head and neck trauma.\(^4\) Frequently, the mucous cyst is found in the lateral aspect of the lower lip, supporting the role of trauma as a possible cause of a reactive lesion. Obstruction of the ducts of minor salivary glands may also be a cause of the mucous cyst. However, one study demonstrated that the ligation and cutting of the salivary gland ducts in mice and rats did not result in a mucous cyst,\(^7\) so other explanations are possible.
The clinical appearance of a mucous cyst is a distinct, fluctuant, painless swelling of the mucosa. About 75% of the lesions are smaller than 1 cm in diameter; however, the size can vary from a few millimeters to several centimeters. Although most cases can be diagnosed from the clinical history, histopathology is necessary to confirm the diagnosis.\(^8,9\) The most effective treatment of mucous cysts is complete surgical removal.

**CLINICAL TECHNIQUE**

Two patients were seen needing full-mouth rehabilitation secondary to early childhood caries. Each patient also had a mucocele. Two different methods of surgical excision were utilized to remove the mucoceles. In the first case, a standard electrocautery device was used to excise the mucocele from the lower lip. In the second case, an Er,Cr:YSGG laser was used to excise the mucocele from the lower lip. Due to their age, extent of required treatment, and level of cooperation, both patients were seen in the operating room, where all of the treatment could be completed in a single visit.

**CASE NUMBER 1**

A 3-year-old female with no significant medical history was seen in the dental clinic for an evaluation. She presented with numerous carious lesions, secondary to sleeping with a bottle. The decision was made with agreement from her parents to treat her under general anesthesia. Caries control and operative dentistry were completed. The mucocele was excised using a portable, high-temperature electrocautery unit at 2,200°F with a 5-mm fine tip. Hemostasis was achieved after placing 4-0 Vicryl sutures. The patient was seen at the one-week follow-up and reported some minor discomfort on the day of the surgery. The sutures were intact, and the healing was unremarkable. A visible zone of scar tissue around the area of the resection was tender to palpation. After one month, complete healing of the area was seen.

The lesion was sent to the oral pathology laboratory for tissue sectioning and diagnosis, and a diagnosis of a mucocele was confirmed. On the histopathology slide, charring of the tissue border secondary to the use of the high-heat electrocautery unit can be seen (Figures 1 to 5).
CASE NUMBER 2

A 4-year-old female with no significant medical history was treated in the operating room for multiple caries/abscesses and resection of a mucocele. After all restorative dentistry was completed, the mucocele was removed using an Er,Cr:YSGG laser. The settings were used in an ascending manner to minimize the zone of necrosis and postoperative discomfort and maximize postoperative healing. The first setting was 0.25 W with 10% air and no water to begin demarcating the area. The power was then increased to 0.5 W with 10% air and no water to demarcate the borders of the mucocele further. Care was taken to prevent darkening of the tissue, which is indicative of aggressive ablation. Focusing and defocusing were also used with each successive setting to prevent this from occurring. The next setting was 0.75 W with 10% air and no water to outline further the area being excised. Although these are similar to the settings that can also be used to achieve laser anesthesia, the primary rationale was to outline the borders of the lesion prior to excision. The final setting used was the tissue ablation setting of 2.0 W with 20% air and 20% water. Once again, focusing and defocusing were used to ensure that the ablation was completed without excessive charring of the tissue. Upon complete excision of the lesions, a setting of 0.5 W with 10% air and no water was used to achieve hemostasis. No sutures were used. The specimen was sent to the laboratory, and a diagnosis of a mucocele was confirmed.

The patient was seen at the one-week follow-up, and the site of excision was healing well. No scar tissue was observed, and the patient reported only generalized minor discomfort on the day of the surgery. The area of the excision was not tender to palpation, and the lesion displayed complete healing at the one-month postoperative visit (Figures 6 to 8).

The histology did not demonstrate charring at the tissue border (Figure 9). Apparently, it was the high heat from the electrocautery unit used in Case No. 1 that burned the tissue borders. This may have contributed to the lengthier postoperative healing and the formation of a zone of tissue necrosis. Neither patient demonstrated a recurrence of their respective lesions one year after removal.

DISCUSSION

Mucoceles are a fairly common oral pathological condition in children. Although not associated with significant morbidity, they can be the cause of discomfort, especially in the pediatric population. Although the recurrence rate is reported to be about 14%,10 definitive treatment often involves excision of the minor salivary
glands. In our clinical cases we opted to excise the mucocele up to the muscle layer. At the one-year follow-up, neither patient had experienced a recurrence.

In making the clinical decision as to the method of surgical excision of the mucocele, postoperative healing and postoperative discomfort are paramount, especially when treating young children. The lower lip mucocele can be treated by a number of approaches. These include excision by a scalpel, laser ablation (CO2, Er,Cr: YSGG), electrosurgery, cryosurgery, medication (gamma-linolenic acid [GLA]), micromarsupialization, and “watchful waiting” if the lesion is not problematic for the patient. This last approach can be used for superficial mucoceles. In this report, 2 of these approaches were used.

GLA is a precursor of pros-taglandin E, and its use has been associated with limited success in the treatment of mucoceles.\(^{11}\) GLA works by reducing inflammation through competitive inhibition of prostaglandins and leukotrienes. This is a possible mechanism for the anti-inflammatory, antiatherogenic, antithrombotic, and antiproliferative effects of GLA.\(^{11,12}\) Mucoceles are lined by inflammatory tissue (granulation tissue), which is secondary to the inflammation caused by the saliva in the tissues. GLA therapy is a new modality, and there is only limited information in the literature regarding success rate. However, it can be useful for multiple mucoceles if a nonsurgical approach is considered,\(^{13,14}\) but there are possible side effects and interactions with other medications and allergies to consider.

Micromarsupialization is a treatment technique that involves placing a 4.0 silk suture through the widest diameter of the lesion without including the underlying tissue. It is indicated for lesions less than 1 cm in size. The suture is then tied off and is left in place for 7 days. As a result, reepithelization of the duct occurs, creating a new epithelial-lined duct. This allows the saliva to be released from the duct. The recurrence rate with this approach has been reported to be about 14% in pediatric patients. This technique may be very challenging to perform on a pediatric patient in the outpatient setting.\(^{15}\)

Cryosurgery is a method of lesion destruction by rapid freezing. The lesion is frozen, and the resulting necrotic tissue is allowed to slough spontaneously. The 2 ways of performing this type of procedure are via open and closed cryosurgical systems. Open systems involve the direct placement of a freezing agent (ie, liquid nitrogen) onto the lesion via a cotton swab.\(^{16}\) The advantages of this technique are that there is no intraoperative or postoperative bleed-ing, there are minimal surgical defects, and there is minimal scarring. Therefore it is considered in areas of aesthetic concern, such as the vermilion border. In addition, no local anesthesia is required in most cases, so it is considered for use with the pediatric population.\(^{17}\) The closed cryosurgical system technique requires sophisticated equipment. It can be a challenge to obtain/store liquid nitrogen and/or closed system equipment if one is not in a hospital environment. Finally, for the inexperienced clinician it can be difficult to gauge depth of freezing, and therefore damage to deeper structures may result.

The scalpel is one of the most-often used methods of excising a mucocele. It does not require extensive equipment, has negligible cost, and can be performed by most trained dentists. It does require great precision, however, and de-tailed knowledge of the mucocele and the surrounding anatomy. It also requires great control of the instrument, with accurate tactile awareness. Local anesthesia is also required, and this may be more challenging in children, especially those with behavior management issues. The potential for postoperative bleeding is also greater than with certain other treatment modalities such as the laser, as is the possibility of a more ulcerative appearance and possibly a longer healing period.\(^{18,19}\)

The laser is a very precise ablation instrument that offers certain advantages when compared to the electrocautery device. The laser causes minimal damage to the adjacent tissues, especially the underlying muscle layers. Postoperative bleeding in the case reported was minimal due to the ability of the laser to coagulate. Due to minimal trauma to the adjacent tissues, postoperative healing was favorable, with very little scar formation. No sutures were placed after the excision, as the denatured proteins serve as a natural wound dressing. In this case there was little contraction and scarring.
Use of the high-heat cautery system resulted in a more ulcerative appearance after the initial procedure, and at the follow-up appointments. The surgical site was tender to palpation at the postoperative visits, and the parent reported some postoperative discomfort following surgery that was not reported with use of the laser. During that excision, a zone of blanched mucosa was evident around the borders of the lesion. This was not seen during the excision with the laser. This thermal damage, along with burning of the adjacent tissues, was likely a contributing factor to the discomfort experienced by the patient. Therefore, although both methods had acceptable results, the laser resection displayed less postoperative discomfort and more favorable clinical healing.

REFERENCES

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1. The reason a benign, mucous containing lesion is called a mucocele and not a true cyst is ___.
   a. it is of minor salivary gland origin
   b. it is a mixture of mucous and serous fluid
   c. it lacks an epithelial lining
   d. it is commonly located on the lower lip

2. Superficial mucoceles are located in the _____.
   a. soft palate
   b. posterior buccal mucosa
   c. retromolar region
   d. all of the above

3. The classic mucocele is located in the _____.
   a. lower corion
   b. superficial epithelial layer
   c. upper submucosa
   d. all of the above

4. The most common of all mucous cysts is _____.
   a. the mucous retention cyst
   b. the mucous extravasation cyst
   c. both (same meaning)
   d. none of the above

5. Salivary mucoceles most often occur in the _____.
   a. lower lip
   b. ventral surface of the tongue
   c. buccal mucosa
   d. all of the above

6. The recurrence rate for mucoceles is reported to be approximately ____%.
   a. 8
   b. 14
   c. 22
   d. 25

7. The lower lip mucocele can be treated by _____.
   a. laser ablation/excision
   b. electrocautery
   c. cryosurgery
   d. all of the above

8. The benefit of the laser excision of a mucocele is _____.
   a. minimal trauma to the surrounding tissues
   b. less postoperative bleeding
   c. little scar formation
   d. all of the above
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