

Management of Mucoceles, Sialoceles, and Ranulas



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KEYWORDS

- Mucocele • Ranula • Sialocele • Lip • Mouth floor • Marsupialization
- Surgical management

KEY POINTS

- Mucoceles are benign, mucin-filled cysts commonly found on the bottom lip, and are frequently managed with surgical excision.
- Sialoceles are a variant of mucocele that develop from the extravasation of saliva from injured parotid parenchyma. Acute salivary ductal injuries should be repaired when possible. Delayed presentations may require botulinum toxin or surgery for resolution.
- Ranulas are a type of mucocele that can vary from superficial floor-of-mouth lesions to plunging neck masses. Ranulas are extravasation pseudocysts that are most commonly managed by surgical excision of the cyst and the associated sublingual gland.

INTRODUCTION

Mucocele, sialoceles, and ranulas are extravasation pseudocysts. The collection of mucus itself does not have an epithelial lining; therefore, removing the pseudocyst generally does not solve the problem. Each of these entities is discussed in turn for their unique aspects. The most common treatment modalities are highlighted.

Mucocele

Mucoceleles are common, oral lesions that most frequently present as painless, clear or bluish cysts on the bottom lip of young adults and children. They are benign, mucus-filled growths that typically occur from damage to minor salivary glands or ducts (**Fig. 1**). Injury to the salivary glands through lip biting, sucking, or trauma can cause mucus to leak into surrounding subepithelial tissue, resulting in the most common variant of mucocele called a mucus extravasation cyst.¹ Mucoceles may also develop from mucus buildup behind blocked glandular ducts, resulting in a less common

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Fig. 1. Patient with lower lip mucocoele.

variant of mucocoele called a mucus retention cyst.² This type of mucocoele is most common in individuals between 50 and 60 years old and is typically located in the cheek or palate. On histology, retention cysts have an epithelial lining, whereas extravasation cysts do not.^{1,3}

Sixty-six percent of all mucocoeles present in patients less than 30 years old, with a peak incidence in the second decade of life and no predilection for gender. The most common location is the lower labial mucosa, with up to 80% of all mucocoeles occurring on either side of the lower lip.^{4,5} The prevalence of all oral mucocoeles is 2.5 in 1000. The size does not usually exceed 10 mm in diameter.^{6,7} Two case studies of oral mucocoeles reported that almost all included lip mucocoeles were histologically characteristic of extravasation cysts, which corroborates the hypothesis that lip mucocoeles are commonly incited by traumatic injury such as tooth impingement.^{6,8} Although frequently asymptomatic, mucocoeles may interfere with chewing, eating, and speech, and may be cosmetically unappealing.⁹ Common differential diagnoses for these lesions include oral hemangioma, fibroma, soft tissue abscess, oral lymphangioma, salivary duct cyst, epidermoid cyst, and lipoma.¹⁰ Lip mucocoeles are diagnosed clinically based on pathognomonic appearance, location, history of trauma, time to manifestation, cyst hue, and texture. Palpation for mobility and fluctuance helps narrow the differential diagnosis in many cases.⁶

Although oral mucocoeles may resolve without treatment, recurrence is common. Additional interventions may be required to remove enlarged cysts or to prevent relapse. Although lacrimal catheters can be used to recannulate a blocked glandular duct in the case of retention cysts,¹⁰ retention and extravasation mucocoele cysts are generally both best excised. Conventional surgical excision with removal of surrounding small salivary ducts remains the most common treatment of small mucocoeles because of low recurrence, with 1 case series showing a recurrence rate of 4.3% 3 years following complete surgical excision.^{5,11} Large mucocoeles may be removed surgically using marsupialization to avoid damaging surrounding structures, particularly the labial branch of the mental nerve.^{12,13} Marsupialization involves unroofing

the mucocele through a small intralesional mucosal incision to remove the mucinous material. Recurrence can be prevented by excising the minor salivary gland before performing primary closure.^{5,14} Micromarsupialization is a minimally invasive procedure that involves tying a surgical knot with silk suture at the widest diameter of the mucocele. The mucocele should recede by time of suture removal 7 to 10 days after placement. Recurrences occur 14.2% of the time; however, the series was based on a small number of patients. The procedure is fast and relatively painless, making it a popular option for pediatric patients.¹⁵

Although surgical removal is common, lip disfigurement, damage to adjacent ducts, numbness, and scarring are complications; thus, some investigators propose a first-line treatment alternative with CO₂ laser ablation.^{5,10,16,17} CO₂ laser ablation is a fast and simple technique limited to the superficial mucosa when set between 5 and 10 W. CO₂ laser ablation has limited postoperative bleeding, pain, complications, and damage to surrounding structures, and shorter healing time and relapse, compared with scalpel excision.^{5,16-18} Because it does not require suture, CO₂ laser ablation typically takes 3 to 5 minutes. The bloodless nature of the procedure allows excellent surgical visibility.¹⁹

Cryotherapy and intralesional steroid injection have also been introduced as first-line treatments but are associated with high rates of lesion recurrence, often requiring surgical reintervention.^{20,21} Cryotherapy uses the application of extreme cold via cryogen agents such as nitrous oxide or liquid nitrogen to destroy mucocèles during alternating freeze-thaw cycles. It is painless, quick, and simple. The drawbacks include that it can require multiple applications and has limited use for deep lesions.²¹⁻²³

The sclerosing agents OK-432 (picibanil) and polidocanol are less commonly used but have been reported to be effective in curing mucocèles by sealing the traumatized mucinous gland capsule through collapse of the cyst wall.²⁴⁻²⁶ Although OK-432 has been associated with shock, fever, and a recurrence rate of 14.3%, a recent study using polidocanol reported a cure rate of 91% with no significant side effects.^{27,28}

Although there is no unanimous consensus on the best management of mucocèles, surgical excision is low cost, highly effective, and commonly used. CO₂ laser may represent an effective alternative to surgical excision because of the benefits of minimal postoperative discomfort and good wound healing.²⁶

Sialocele

Traumatic sialoceles are common complications of iatrogenic parotid duct injury, neoplasm, infection, trauma, or stenosis of the duct with subsequent duct expansion.²⁹ These saliva-containing, subcutaneous clefts are a variation of mucocele that form through the extravasation of saliva from injured parotid tissue into the surrounding periglandular space (Fig. 2). The duct remains intact in some cases.³⁰ Superficial lesions present as soft and mobile swellings on the side of the injury, whereas deeper cysts may be difficult to palpate because of overlying tissues. Sialoceles typically present 8 to 14 days after parotid duct trauma. They are painless unless infected, in which case they may transform into external salivary fistulae.³⁰⁻³² Fine-needle aspiration shows high salivary amylase concentration, typically more than 10,000 U/L. Sialography or MRI may be useful at times for diagnosis.^{30,31,33}

Surgeons most commonly encounter sialoceles after parotidectomy. Essentially all parotid surgeries, superficial or total, leave residual parotid salivary tissue behind. In the immediate postoperative period, patients frequently leak saliva into the soft tissues. Initial conservative management of traumatic sialoceles is preferred, especially in small and superficial duct injuries. Treatment of these collections has included pressure dressings, aspiration, delayed suction drains, medications to

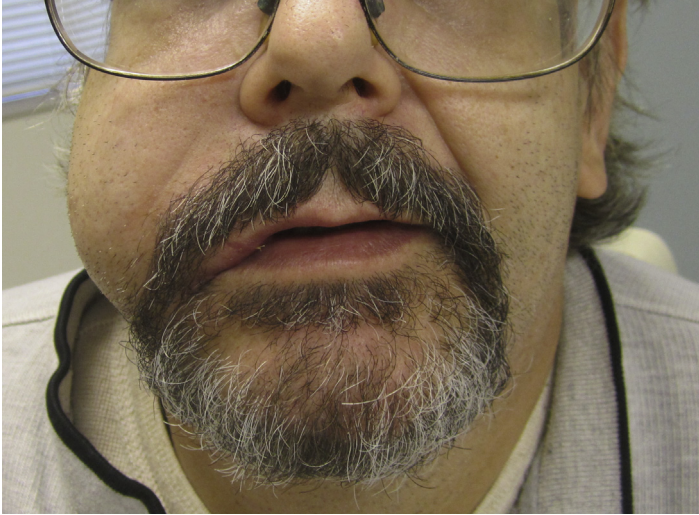


Fig. 2. Chronic right parotid sialocele after windshield laceration to the face and failure to identify and repair the ductal injury acutely. Botox injections successfully treated this lesion.

decrease saliva production, radiation, and botulinum toxin. Propantheline-bromide is an anticholinergic antisialogogue frequently used to inhibit parotid secretion through the healing phase, although unwanted anticholinergic side effects require monitoring.^{32,34,35} Although aspiration with compression is common, Witt³⁶ showed that there is no difference in the results of aspirating versus not aspirating postoperative sialoceles. Radiation therapy can result in fibrosis and gland degeneration but should be avoided if possible. Because sialoceles almost all go away while being ignored, only large and very persistent ones need to be treated with botulinum toxin. There are few articles with information on doing this. A recent review article found 47 total cases reported. There is currently no agreed-on dose for the treatment of sialoceles and, in this article, doses ranged from 45 to 200 units. The botulinum toxin is injected into the remaining salivary gland tissue after aspirating the pseudocyst. It has been described with or without ultrasonography guidance. Additional collection of saliva may occur for a short time after chemodenervation. Success rates range from 70% to 100%.³⁷ In general, time is the best treatment of most of these postsurgical problems.

Parotid duct injuries otherwise causing sialoceles are penetrating lacerations most commonly from an assault weapon, knife, or glass shard.³⁸ Ideally, these are managed acutely with immediate identification of the proximal and distal ends and repairing them either primarily or with a vein interposition graft to redirect parotid secretions into the mouth. Failure to reconstitute the duct risks sialocele formation and cutaneous fistula. The presence of a foreign body should be considered if a traumatic sialocele develops (**Fig. 3**). Parotid duct reconstruction can be complicated by difficulty locating the proximal end of the duct caused by scarring, and facial nerve damage while attempting this procedure has been reported.^{39,40} There is no publication detailing the long-term patency rate of reconstituted parotid ducts. Conventional or magnetic resonance sialography or ultrasonography can help to identify a complete obstruction of the duct. Recannulation of the parotid duct using salivary endoscopy is challenging. However, proximal sialoceles have been successfully connected to normal distal ducts with salivary endoscopic assistance and stenting.⁴¹

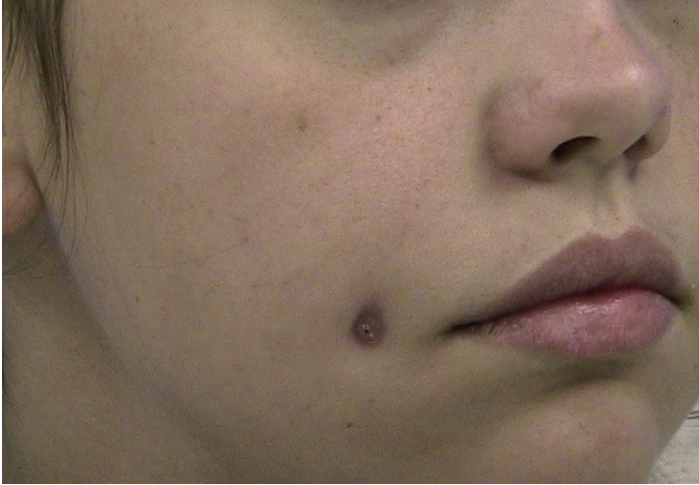


Fig. 3. Chronic right parotid sialocele and fistula that resolved with identifying and removing foreign body, which in this case was a remnant of the original penetrating stick.

Case reports describe tympanic neurectomy as a denervation alternative for salivary fistula and sialocele. Sectioning of the auriculotemporal or Jacobson nerve prevents parotid gland secretion by inhibiting parasympathetic supply to the gland; however, there is a large risk of failure or recurrence. Botulinum toxin acts by inhibiting acetylcholine release, which inhibits secretomotor parasympathetic nerve activity, causing decreased saliva production.⁴² It has been used safely and effectively in small case series.^{29,32} Some failures after initial improvement have been reported. If the duct continuity cannot be reestablished, and botulinum toxin is only successful for the 3 months following injection, then surgical glandular extirpation may be required.

Ranula

Ranulas are a subset of mucocele that present on the floor of the mouth as painless, fluctuant, blue-hued, mobile masses.⁴³ Ranulas are classified as either simple or plunging. Simple ranula pseudocysts, limited to the submucosa of the floor of mouth, typically arise from trauma to the sublingual glands (although there may be no history of such). Plunging ranulas are defined by the penetration of mucocele content through fascial planes, often posterior to or through the mylohyoid muscle (**Fig. 4**).⁴⁴ These lesions can extend superiorly, posteriorly, or inferiorly into the parapharyngeal, retropharyngeal, and supraclavicular/superior mediastinal areas respectively and may present as cervical masses.^{27,44,45} Sometimes plunging ranulas exist without a visible floor-of-mouth component.

The incidence of ranulas is 0.2 in 1000, arising from the sublingual gland more than 90% of the time.¹⁴ Like lip mucoceles, the diagnosis is typically based on history and clinical picture, although imaging modalities and biopsy can be used. Fine-needle aspiration cytology findings of a high amylase content, histiocytes, and no epithelial cells is helpful in differentiating ranulas from other oral or neck masses such as thyroglossal duct cyst, branchial cleft cyst, cystic hygroma/lymphatic malformation, intramuscular hemangioma, lymphangioma, abscess, or dermoid.⁴⁵

Ranulas are surgically removed an estimated 80% of the time. The management is similar to that of lip mucoceles with some variation. Superficial and plunging ranulas should be treated with surgical removal of the ranula and implicated sublingual gland

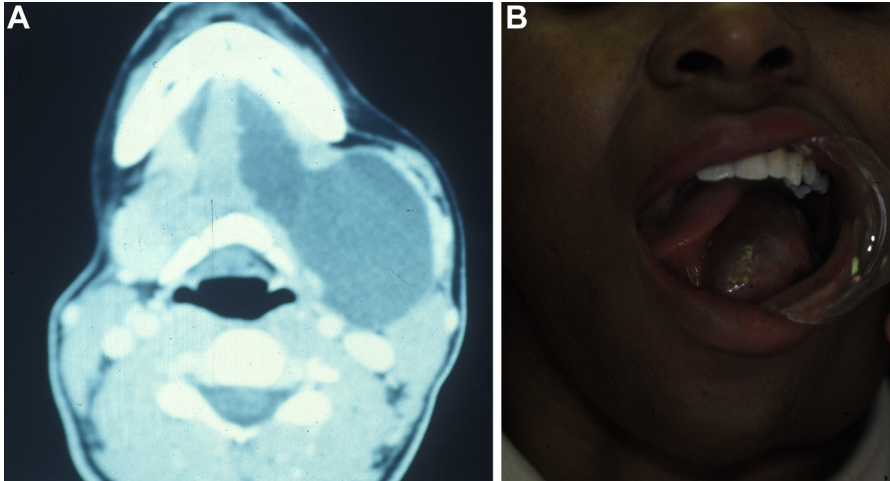


Fig. 4. (A) Computed tomography scan of left-sided plunging ranula. (B) Clinical view of large left ranula. Plunging neck mass can be seen in left submandibular triangle.

via a transoral approach. Sublingual gland excision is preferred to marsupialization because of much lower rates of ranula recurrence.^{14,46–50} A transcervical approach with neck exploration for plunging ranulas is not necessary. Plunging ranulas can be effectively treated by removing the sublingual gland transorally and evacuating the extravasated mucus through the transoral approach.^{51,52} Ranulas almost never recur when the sublingual gland is excised; however, avoiding injury to the adjacent submandibular duct or lingual nerve during excision is important.^{27,53–56} Recurrence rates of superficial ranulas removed with excision without the associated gland is reported to be between 25% and 56.69%. Ranulas treated by marsupialization recur at rates between 36.4% and 66.7%.⁵⁴

Kono and colleagues⁵⁷ conducted a retrospective chart review including 23 patients with intraoral ranulas treated with OK-432 (picibanil) injection sclerosing therapy. The overall efficacy rate was 91.2% without complications. Complete regression of intraoral ranulas occurred in 78.2% of patients. More than 1 injection is required in most patients for complete cure. The drug is more effective in small lesions.⁵⁷

SUMMARY

Mucoceles are benign extravasation pseudocysts. Lip mucoceles, sialoceles, and ranulas are variations of mucoceles that can be managed medically or surgically depending on the type. Lip mucoceles are generally treated with surgery, whereas sialoceles should be managed conservatively or with botulinum toxin or surgery in delayed presentations. Ranulas are managed with surgical removal of the cyst wall and associated sublingual gland and evacuation of the pseudocyst.

CLINICS CARE POINTS

- (1) Ideal treatment of salivary collections is determined by the presence or absence of a true epithelial lining.
- (2) The presence of a true cyst lining makes marsupialization possible.
- (3) Both true cysts and pseudocysts can recur if the source generator persists.

AUTHOR CONTRIBUTIONS

Concept and design: E.M.R. Bowers, B. Schaitkin.
 Analysis and interpretation: E.M.R. Bowers, B. Schaitkin.
 Data collection: E.M.R. Bowers, B. Schaitkin.
 Writing the article: E.M.R. Bowers, B. Schaitkin.
 Critical revision of the article: E.M.R. Bowers, B. Schaitkin.
 Final approval of the article: B. Schaitkin.
 Statistical analysis: not relevant.
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