



DIFFERENT TREATMENT MODALITIES FOR THE MANAGEMENT OF ORAL MUCOCELE: A REVIEW

Oral Pathology

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ABSTRACT

Mucocele is a common lesion of the oral mucosa that results from an alteration of minor salivary glands due to a mucous accumulation. Mucocele involves mucin accumulation causing limited swelling. Mucoceles can appear at any site of the oral mucosa where minor salivary glands are present. Diagnosis is principally clinical; therefore, the anamnesis should be carried out correctly, looking for previous or recurrent trauma. Surgical excision is the most accepted treatment. Nevertheless micro marsupialization, cryosurgery, steroid injections and CO2 laser are widely accepted modalities.

There are different treatment modalities for management of mucocele. For this reason we felt it would be interesting to review modus operandi in order to aid decision-making about the diagnosis and treatment planning in our daily clinical practice.

KEYWORDS

INTRODUCTION:

Mucocele, exclusive of the irritational fibroma, are the most common of the benign soft tissue masses present in the oral cavity. Mucoceles (muco meaning mucus and coele meaning cavity), by definition, are cavities filled with mucus. When in the oral floor, they are called ranula (rana meaning frog and ula meaning little) because the swelling resembles the vocal or air sacs of the frog. Mucus is the exclusive secretory product of the accessory (minor) salivary glands and the more prominent product of the sublingual (major) salivary gland. The clinical features are a well-documented phenomenon involving the lip, cheek, tongue, palate, and floor of the mouth.

44% to 79% of the mucocele occurs on the lower lip. They represent the 17th most common lesion of oral cavity with an incidence of 2.5 lesions per 1000 patients, frequently in the second decade of life and rarely among children under one year of age.

The mechanisms for mucus cavity development are extravasation or retention. Extravasation (extra, outside; vasa, vessel) is the leakage of fluid from the ducts or acini into the surrounding tissue, while the much less common retention phenomenon occurs as a result of a narrowed ductal opening or obstruction of duct eg: sialolith that cannot adequately accommodate the exit of saliva produced, leading to ductal dilation and surface swelling.

Clinical Features:

On clinical presentation, the mucocele appears as an asymptomatic nodule with a pink or bluish color, and the size may vary. The lesion often arises within few days after minor trauma, reaches a certain size, or may persist unchanged for months unless treated. If the content of the cyst is drained, it usually consists of thick, mucinous material.

TREATMENT MODALITIES:

They are divided broadly into: Surgical, Thermal and Chemical

1)According to the literature Conventional treatment of the mucocele is excision with associated overlying mucosa including ductal opening and glandular tissue down to the muscle layer. After excision, there may be occasional recurrence because surgery may damage the surrounding minor salivary glands.

2)**Micromarsupialization:** Cardoso in 1974 suggested that micromarsupialization could be considered as a treatment modality for treating mucoceles especially in pediatric cases. Delbem et al (2000) popularized micromarsupialization for management of mucoceles in pediatric patients and he also reported the recurrence with this technique.

This is a minimal invasive technique carried under local anaesthesia.

Under Local anaesthesia which can be submucosally given in the tissue surrounding the lesion followed by 3.0 silk suture that can be passed through the widest diameter of the lesion from the base and a knot is tied. In large lesions, two sutures passing in different directions for effective mucous secretion. The Mucocele is then compressed to help extravasation of mucus. 0.5% chlorhexidine gel is applied postoperatively to prevent secondary infection. Sutures are removed after 15-30 days resulting in complete remission of the lesion.



Lesion On The Ventral Surface Of The Tongue



3-0 Silk Suture From Base Of The Lesion 1 year follow up

3)**Modified Micromarsupialization:** Francisco et al suggested a modified micromarsupialization technique for the management of ranulas. Sandrini et al. proposed modification to the conventional technique include an increased number of sutures to increase the quantity of new epithelialized drainage pathways, a decreased distance between the entrance and exit of the needle to facilitate epithelialization of the new pathways formed by the sutures by reducing the length of the drainage tracts, and a longer period during which the sutures are maintained for a period of 30 days permits the formation of a new permanent epithelialized tract along the path of the suture.

4) Introducing Impression Material Into The Lesion Followed By Surgical Excision

In 1962 Robert J. Strader used alginate impression for the first time on the lower lip to aid in complete mucocele excision.

The treatment of choice is usually excision. Those mucoceles

measuring just a few millimeters in size are carefully wedged without difficulty. The larger ones, however, present more of a problem while dissecting them. The membrane around the cyst is easily mutilated, allowing the mucous content to escape, thus making a clear, more exact dissection impossible. The following is a simple, effective way to remove the larger cyst: An 18-gauge needle is inserted into the cyst, and the contents are aspirated. A 5 cc. syringe with an 18 gauge needle is filled with a very watery mixture of alginate impression material. This material is introduced into cystic area and allowed to set. After the material sets, the mass is easily removed.

Ramesh Kumaresan et al in 2013, did the same technique for the management of Blandin-Nuhn mucocele.

Surgical removal of the lesion is planned under local anesthesia. A vertical incision is made on the ventrum of the tongue and excision of the lesion is attempted. In course of dissecting the lesion from the underlying tissues, the cystic lining ruptured leading to an immediate extravasation of mucus. This made the lesion to collapse causing difficulty in further surgical exploration.

To improve the visual access of the lesion, alginate impression material was injected into the lesion through the ruptured wall using a 19 gauge needle. This technique helped in clearly demarcating the boundaries of the lesion. The lesion is excised in toto together with the associated minor salivary glands to avoid recurrence. The wound is approximated and sutured.

No foreign-body reaction is reported postoperatively. The use of alginate impression material to define the boundaries of the lesion is an effective, safe and economical way of treating an anterior lingual salivary gland mucocele, whilst ensuring complete removal and minimal chance of a recurrence. If performed correctly, this technique will undoubtedly prove to improve the surgical compliance thereby curtailing the recurrence of mucocele in the oral cavity.

Mucoceles In The Floor Of The Mouth Called Ranulas.

Ranula is an extravasation cyst and may develop from extravasation of mucus after trauma to the sublingual gland and rarely submandibular gland or obstruction of salivary ducts. Many theories for the origin and pathogenesis of these cysts have been postulated by Hippocrates, who described that ranulas are the effect of local inflammation of sublingual salivary gland. The lesion forms due to extravasation of mucus and subsequent formation of a pseudocyst. Another theory for this anatomical lesion is inflammation causing atrophy and mucous degeneration of the sublingual gland. Pathogenesis of ranula is associated with sublingual and rarely the submandibular gland and mainly appears in the floor of one side of the oral cavity or rarely bilaterally.

Treatment For Ranula: Surgical and chemical

SURGICAL:

Jia T, et al in 2014 introduced a minimally invasive treatment of oral ranula with mucosal tunnel technique.

Technique: By making 2 parallel incisions across the top of the protruding ranula 2–3 mm apart, and dissected the soft tissue along the incisions to its wall. The fluid was removed and the cavity irrigated with normal saline. The wall of the ranula was not treated. The first mucosal tunnel is made by suturing the base of the mucosal strip to the deepest part of the wall of the ranula. The mucosal base of the tunnel and the deepest part of the base of the ranula were fixed with absorbable sutures. The two external edges of the incisions were sutured together to form the second mucosal tunnel, and apposing sutures were inserted between the two parallel incisions to form two natural mucosal tunnels. The duration of follow-up ranged from 1 to 5 years.

Advantages: Outcomes for this procedure is satisfactory without relapse during the follow-up period and the patients were satisfied. The mucosal tunnel is a safe, effective, simple, and minimally-invasive treatment for oral ranula.

Disadvantages: Longer time follow up, and fistula formation after 1-2 years.

Plunging Ranula arises from simple ranula extending beyond the

floor of the mouth into the neck, usually sublingual; sometimes submandibular gland.

Treatment: Plunging ranula is excised through extraoral approach along with the gland (sublingual and submandibular approach). However, surgery remains the main treatment modality of ranula and is usually achieved with the following methods:

- Surgical removal of the lesion and extra-oral also excision of the involved salivary gland with or without biopsy of cystic wall.
- Removal only of the cyst with an extra-oral approach and ligating the branch of sublingual or submandibular gland duct.
- Endoscopic excision of the involved salivary gland only.
- Transoral approach with excision of sublingual gland alone could be the least invasive approach with minor complications, because there is no risk of damage to the marginal mandibular branch of the facial nerve, no cutaneous scarring and the submandibular gland is not injuring.
- Marsupialization with or without intra- or extra-oral excision of the involved salivary gland (mainly used for superficial ranulas) marsupialization with packing of the cyst cavity may reduce the recurrence.
- Drainage and marsupialization of the lesion without excision of the involved salivary gland.

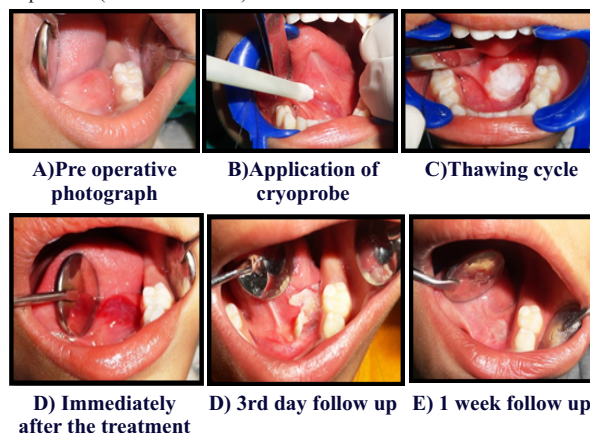
Advantages: It provides a high success rate with minimal complications and indicated when ranula has diameter lower than 2 cm and the transoral approach is the treatment of choice.

- Ranula have also been managed by cryosurgery and electrosurgery.
- Simple ranula have also been excised by laser (CO₂ and ER-YAG).
- For pseudocyst of plunging ranula the treatment is OK-432 and sclerotherapy, have also been tried.
- Radiation therapy may be used in rare cases of deeply plunging ranula.

THERMAL:

1) **Cryosurgery** is the one of the advanced therapeutical modality of dealing with lesions. It involves usage of frozen method. Oral cavity is a moistened area with adequate humidity and smoothness which offers an congenial field of operation used for cryosurgery.

Liquid nitrogen (-196°C) and nitrous oxide (-81°C) are most commonly used agents in cryosurgery, and the former is more effective for eradicating oral lesions. The available apparatus is classified into "open" and "closed" systems. Open system involves the direct application to superficial lesions of either carbon dioxide snow (-76°C) or liquid nitrogen (-196°C) by cotton swab or open spray. Closed system are of three main types: thermoelectric, evaporative, and gas expansion (Joule-Thomson).



Closed system uses principle of expansion that allows lesions to undergo drop in temperature when moved from higher pressure gradient to relatively lower levels. This drop in pressure gradient allows freezing of tissue.

All the living tissue when subjected to a temperature of <-20°C has the ability to necrose or undergo cryogenic changes.

The most easy way to strike oral lesion is by constantly touching the lesion with a cryoprobe. Tissue approximation with the probe freeze

quickly, ice being an thermal insulator delays spread of freezing thereby it also presents accidental damage to nearby vessels and nerves. As there is a gradient loss of heat/ cold the tissues are unharmed.

Mechanism Of Action: During the freeze cycle as the temperature drops, it is believed that extracellular water undergoes crystallisation. In addition, membrane lipids harden at low temperatures decreasing cell resistance to shrinkage. As extracellular stores of water diminish, the electrolyte concentration increases. In order to counteract this concentration gradient, intracellular water moves out of the cell, and this water becomes involved in the crystallisation process. Also, intracellular ice formed remains trapped within the cellular membrane. As a result of these processes, intracellular electrolytes reach toxic levels, which become lethal to the cell. During a slow thaw cycle, cells at the periphery of the cryolesion will take up excess electrolytes. To equalise this gradient, water enters the cell and can lead to swelling and lysis.

Cryotherapy is well received by the patients due to a relative lack of discomfort, the absence of bleeding and minimal to no scarring. It is an effective, simple, predictable, relatively self-limiting and safe method for almost all types of oral lesions.

Advantages:

- 1) Neither expensive nor sophisticated equipment is necessary.
- 2) Infants and nervous patients are less afraid of cotton swabs than of complex cryosurgical equipment.
- 3) An adequate size of cryoprobe can be obtained easily, depending on the size of the lesion.

Disadvantages: The main disadvantage of this technique is the

1. Lack of a specimen to be examined microscopically to confirm the diagnosis.
2. Include unpredictable degree of swelling
3. Lack of precision with depth and area of freezing.

LASERS

One of the magnificent creations of physics are the Lasers. These Lasers are proven to be hit model than conventional surgical blades in various fields of medicine and dentistry.

CO2 has the ability to provide continuous power in focused and non focused Laser handpieces; thus can be called as most versatile and precision guided gas for surgical procedure.

Advantages: CO2 laser energy has a very high water absorption coefficient, is independent of tissue color, and is well absorbed by all soft tissues that are high in water content, with minimal effects on adjacent non target tissue. The CO2 Lasers generates a lot of heat, which readily carbonizes tissue. Owing to its highly ideal coagulated tissue obtained, it makes the CO2 Lasers a ubiquitous tool in maxillofacial surgery.



Mucocoele on the right lower lip

Performing incisional biopsy

Vaporization with CO2 LASERS



After vaporization

Exposing the base of the lesion

Topical application of steroid ointment

METHOD:

Mandatory clean incisional biopsy is performed. The CO2 Laser probe of 5-8 watts is set in a cutting mode. Central areas of the lesion are first vapourized, thus moving centripetally, after achieving the desired vapourised surgical area, the tissue bed and walls of the site are treated with defocused beam to obtain tissue hemostasis and shrinkage. Open wound with steroid ointment provides good surgical healing.

Mechanism Of Action: Absorption of Laser energy into the target tissue release heat by photothermal process which causes intra and extracellular vapourization of the cells which further leads to cellular explosion and tissue ablation.

Advantages: Minimal damage to adjacent tissue, especially the muscle layer. Coagulation of small vessels is excellent, and postoperative bleeding is thus decreased. Operation site is effectively done and the acute inflammatory reaction is delayed and minimal. Trauma to the tissue is diminished, and there is little scar formation.

Disadvantages:

1. The equipment is expensive,
2. Adequate protection must be provided for the patient and operator.

CHEMICAL:

CHEMICALS USED FOR RANULA: Sclerosing agents like 2% iodine, BLM (Benadryl, lidocaine and Maalox), BLM + dexamethasone, promethazine hydrochloride solution, anhydrous ethanol, hypertonic saline, 5% cod liver oil, tetracycline hydrochloride (T Jia 2015), and picibanil (OK -432) (MHRHO in 2006) are used.

CHEMICAL USED FOR MUCOCELE:

Intralesional Injection: It is a method used to treat diverse skin and oral lesions. It is minimally invasive technique without any systemic effect of steroid. Providing best local concentration with maximum therapeutics achieved. Intralesional injection is considered one of the effective treatment options for oral lesions.

There are various intralesional injections used. According to the literature luiz et al (2008) used high potency 00.5% clobetasol propionate, Baharvand et al (2014) used combination therapy, OK-432 (NOBUO OHTA in 2011), pingyangmycin (Y CAI in 2014), absolute ethanol injection (AEI) and polidocanol (JIAN-LIN LIU in 2018)

Corticosteroids act as the most potent anti-inflammatory agent inhibiting the expression of multiple inflammatory genes (encoding cytokines, chemokines, adhesion molecules, inflammatory enzymes, receptors, and proteins) and may also increase the transcription of genes coding for anti inflammatory proteins including lipocortin-1, interleukin-1, and interleukin-10 receptor antagonist. They also act like a sclerosing agent causing shrinkage of the dilated salivary ducts.

Intralesional corticosteroid therapy is a good alternative nonsurgical procedure which can be performed in a short span of time, economical, esthetically more beneficial than surgery, cryotherapy, or laser ablation, and performed effortlessly. It is a relatively simple, repeatable, cost effective, and potentially curative method easily acceptable by the patient.

CONCLUSION:

Each technique and therapies have various advantages and disadvantages that their clinical application, a novel alternative treatment should be developed. Some procedures are decided based on the size of the lesions and also on surgeons experiences.

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