Abstract

Oral Mucocele is a common lesion seen in oral cavity which is a benign disease of minor salivary glands. It clinically presents as single, painless, soft, smooth, spherical, translucent and fluctuant nodule with pink to translucent blue observed in reflected light.

The lesion may resolve spontaneously or traumatically with the rupture of the lining, with the release of a characteristic viscous, mucoid fluid. There has been continuous research with an aim to find ways for management having least recurrence rates in various types of oral mucocele. Multiple treatment options have been trialled for eradication of the lesion, including surgical and non-surgical management techniques. The non-invasive methods also comprised of different intra-lesional injections. Many other invasive procedures with added advantages and few shortcomings have also been researched by the Clinicians.

Keywords: Oral Mucocele, Surgical excision, Cryotherapy, Intralesional Injection

Introduction

Oral Mucocele or mucous retention or extravasation phenomenon is a commonly seen oral mucosal lesion. These are benign, mucin containing, generally asymptomatic lesions affecting minor salivary glands more prevalent in children and young adult. It clinically presents as soft, single, painless nodule, with smooth and spherical appearance. It is fluctuant on palpation. The colour may vary from pink to translucent blue. It may occur anywhere along the oral mucosa where salivary glands are present but some areas have predilection for occurrence. Though lower labial mucosa is the most common site of occurrence, cases of mucocele on buccal mucosa, palate and tongue have also been reported. Oral mucoceles located on the floor of mouth are termed as ‘ranula’ has a bluish hue, which usually arises in the body of the sublingual gland and occasionally in the ducts of Rivini or in the Whartons duct. The patients diagnosed with mucocele are mostly asymptomatic. The lesion has a tendency to protrude in the oral cavity and therefore these patients report with the complaint of discomfort and interference in speech, mastication and swallowing.

Two schools of thought have been proposed over the years that lead to formation of two histological variants of mucocele i.e. mucous retention phenomenon and mucous extravasations phenomenon. Trauma or constant irritation to the ductal system, obstruction in the ducts is suggested as the most common causes (refer to schematic figure: Figure 1a) of its occurrence.

ETIOLOGY

Trauma

Leakage of Salivary Contents

Retention cyst- formed by dilatation of ducts secondary to obstruction due to sialolith or dense mucosa. Majority of retention cysts develop inducts of Major Salivary Glands

Obstruction of Salivary Tract

Leaking of saliva from surrounding salivary gland

Extravasation cyst

Occurs mostly in Minor Salivary Glands

Step 1

Spillage of mucin into connective tissue with some leucocytes and histiocytes

Step 2

Granulomas appear during resorption phase

Step 3

Connective tissue cells form pseudocapsule without epithelium

Figure 1a: Possible etiologies in occurrence of Oral Mucocele.
Differential diagnosis of mucocele includes multiple mucosal and submucosal lesions such as salivary gland tumours, fibroma, traumatic neuroma, schwannoma, hemangioma. Though clinical presentation is typical for diagnosis of oral mucocele, other methods can aid in differential diagnosis. On palpation lipomas and minor salivary gland tumors show no fluctuation while it is present in cysts, mucoceles, abscess, and hemangiomas. Obstruction due to presence of sialolith can be ruled out by radiographic examination. Other imaging techniques (CT and MRI) can be used to localise and determine origin of the lesion. The protein content and high amylase levels on chemical analysis of its contents disclose positive test for mucocele.

Recurrence of these lesions is uncommon if careful technique is employed during the biopsy procedure. The recurrence rate is significantly more common in the younger patients than in the older patients, reveals the review of literature. Mucocele may resolve spontaneously or rupture of the lining due to inadvertent trauma. This leads to leakage or release of its viscous mucoid content. Owing to this it reduces in size or may completely recede. Once a small perforation has heals, the secretions may accumulate again and the chances of recurrence persist. Various treatment modalities (Figure 1b) have been proposed and tested over the years for such lesions primarily used method is complete removal by scalpel or surgical excision. The main aim of the treatment used is to reduce or eliminate the chances of recurrence. Non-invasive methods also include intra-lesional injections of corticosteroids and various sclerosing agents. Other invasive procedures with added advantages and reduced disadvantages have also been carried out by clinicians and researchers.

**Discussion**

Review of literature reveals various methodology employed by the surgeons in order to remove mucocele in-toto thereby avoiding recurrence. Some of them have been discussed as under.

Most researchers have suggested that the optimal management of mucocele is based on avoidance of trauma. Pandit and Park have reported two pediatric cases of ranula which spontaneously resolved 4 months and 2 months, respectively. Seo et al. suggested that the intraoral ranula greater than 2cm would not reduce spontaneously if the preoperative observation period exceeded 3 months. Chinta et al. reported a case of mucocele of patient presenting with notched incisors. On detailed history taking, the patient’s parents revealed nail biting habit leading to notches along incisal edge. There was recurrence after 4 weeks of excising the lesion with diode laser and restorative procedures of incisal edge build up with composite(Figure 2 A). The constant irritation by the incisors in deep bite was thought be the reason for the recurrence. Excision of the lesion was done again followed by placement of a thermoplasticised splint (erkodur 2 mm) (Figure 2(i), (ii)) for 6 months as an adjunct to intercept the nail biting habit thereby preventing the irritation from incisors. There were no signs of recurrence over the next 6 months of follow up.

**Surgical excision:** It is the removal of lesion along with the involved minor salivary gland using a scalpel. It is a reliable method for excision of small mucocele in accessible areas. (Figure 2a)

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**Figure 1 b:** Overview of techniques in management of oral mucocele

**Figure 2:** (i): Composite build up of notched incisors.
Rupture of the membrane during surgical removal makes it difficult to define complete extent of the lesion and hence hinders the complete removal. Shira suggested a technique for such cases wherein alginate impression material (irreversible hydrocolloid) is injected in the cystic cavity and allowed to set which is followed by excision. This ensures proper delineation of the lesion and hence reducing the chances of recurrence. (Figure 2b) A complication has been reported for this technique i.e. the development of a foreign body reaction to the secondary to retention of impression material. If the original lesion has extension into several planes the material flowing along these extensions can be retained unknowingly. Therefore in such technique use of radio opaque impression material can be considered. Though surgical intervention has the least chances of recurrences it has certain limitations. Being an invasive procedure, it leaves a surgical defect. With expansile extent of lesion, the surgical removal will result in several unpleasant complications like damage to adjacent ducts and lip disfigurement. Inspite of complete excision chances of recurrence still exist owing to either incomplete removal or severance of surrounding minor salivary glands.

Micromarsupilization and its modification:
Marsupilization is a procedure wherein the cyst is cut open and the lining is sutured to the adjacent mucosa to maintain a continuum with the oral cavity and to prevent accumulation of the contents again. If the cavity is also packed with gauze, extravasation is immediately obstructed and the gauze would also induce fibrosis and help forming a permanent seal. Micromarsupilization was attempted by the surgeons, wherein a silk suture can be placed in the dome of the cyst leading to the formation of an epithelial tract between the surface and the underlying glandular tissue (i.e. a continuation with the external surface), thus preventing accumulation of fluid. (15, 16) (Figure 2c (i))

The procedure is simple to perform under topical anaesthesia, relatively atraumatic and well tolerated by the patient. The healing is uncomplicated and faster as no open wound exists. Placement of a single suture reduces chances of successful treatment if the suture opens up before 7 days and another suture has to be placed for complete epithelisation exposing the patient to another intervention. On observing these shortcomings, modified micromarsupilization was suggested by Sandrini et al, which included placement of increased number of sutures, resulting in increase in the number of epithelised drainage pathways. Addition of more number of sutures resulted in increase of operating time and delay in healing. Premature loss of one suture before 7 days does not necessitate replacement of sutures if others are intact. (17) (Figure 2c (ii))

Lasers:
Laser ablation by CO2 seems to be a simple, effective and rapid mode of treating oral mucocele (Figure 2d). Lasers can also be indicated for treatment of paediatric and geriatric patients as these groups of patients are less likely to tolerate long procedures. Diode laser technology has more patient acceptance and a dental surgeon prefers it due to the following reasons:
minimal tissue damage
- reduced bleeding
- better wound healing without scarring
- negligible post-operative edema
- reduced intake of analgesics

Major drawback is that it is an expensive equipment to be owned by the dental surgeon and need of adequate protection in the form of eyewear to the patient and operator becomes mandatory. There may be chances of delayed healing and a larger wound site may result if the laser application time is more.

**Cryotherapy:**

Another part of non-pharmacological modality includes cryotherapy. Commonly used cryogens: Liquid nitrogen (−191°C), Nitrous oxide (−81°C) and Carbon dioxide (−79°C). Liquid nitrogen is most commonly used and is more effective in treatment of soft tissue lesions. Most tissues freeze at −2.2°C, tissue death occurs at a temperature of −20°C, the effectiveness of cryosurgical treatment stems from the formation of extracellular and intracellular ice crystals. The alteration in pH, rapid production of toxic electrolytes, protein denaturation and all of this subsequently leads to cell membrane destruction.

A cryoscar shows comparatively lesser amounts of mature collagen than in scars produced by other methods. An important drawback is that the extent or depth to which the laser will effect vary. This lack of precision leads to difficulty in assessing amount of tissue necrosis. On the other hand inadequate destruction can lead to recurrence and hence mandating another surgery.

**Intralesional Corticosteroids:** Steroids act as the potent anti-inflammatory agent, have action like a sclerosing agent causing shrinkage of the dilated salivary ducts. Moderately potent corticosteroids (e.g. triamcinolone) have been associated with relapse. High potency steroids like dexamethasone (Figure 3) and betamethasone have been used as intra-lesional agents. topical application of a clobetasol propionate in a mucosal adhesive base causes high potency vasoconstriction and anti-inflammatory effect.

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**Intralesional sclerosing agent:**

Sclerosing agents have been in use in multiple oral diseases. Their mechanism is a combination of cytotoxic damage induced by denaturation and extraction of surface proteins, dehydration of cells and coagulation and thrombosis when blood is present. A sclerosing agent, Picinabil (OK-432), was made by penicillin treatment of the strain of A-group Streptococcus. A 27-gauge needle was used for intra-lesional injection therapy. These cytotoxic damage causing products induce a strong local inflammatory reaction at the site of mucocele by activation of neutrophils and monocytes, leading to cytokine production. All these changes lead to fibrinoid necrosis in the vicinity. The effectiveness of OK-432 is affected by the initial size of the lesion and the number and interval of injections. Roh believed that the number of injections was one to five in intraoral ranula, one to three in plunging ranula. He suggested that the sclerotherapy interval in ranulas should be shorter than 2 weeks because of the higher viscosity of saliva.

**Combination of Intralesional Components:**

Literature shows the use of a combination of Nickel Gluconate—Mercurius Heel—Potentised Swine Organ Preparations in management of oral mucocele. These three homo-toxicological drugs, were used as primary intervention of paediatric oral mucoceles and ranula act synergistically on foreign body inflammation, triggered by extravasated mucus. These drugs act by activating infiltration of inflammatory cells and production of various cytokines, increasing the endothelial permeability, and resulting in accelerated drainage and fluid flow induce shrinkage of the cystic lesions i.e. pseudo cyst re-absorption, and repairing gland physiology and function.
Conclusion

Through this article we have attempted to give a brief overview of the various treatment options for oral mucocele. The article puts light on the various methods, their mechanism of actions and each of their advantages and disadvantages.

Summary

The main aim of finding effective treatment option is to reduce or eliminate the chances of recurrence. Though we have summarized the treatment options in this article, various other modifications to these existing methods have been tried and reported.

Figure 4: Summary of Clinical features, etiology and management techniques of Oral Mucocele

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