

# Ranula-Recommended Radiology and Management

Dr Oliyath Ali, Dr Ishrit Yasin, Dr Kacho Akbar Khan

**Abstract:** The diagnosis of ranula is of clinical importance as some benign and malignant lesions may have similar clinical presentation. Ultrasonographic examination of sublingual salivary gland is usually inconclusive due to its location. But in this case we were able to clearly delineate the lesion on USG. Treatment modalities for the management of ranulas include excision of the ranula only, marsupialization with or without cauterization of the lesion lining, excision of the oral part of the ranula along with involved sublingual gland or rarely submandibular gland, incision and drainage of the lesion via intraoral approach, excision of the lesion via extraoral approach, combined with excision of sublingual gland in certain cases. Even with the above mentioned treatment modalities, many patients presented with recurrence and sometimes may have larger lesions as compared to initial one. Excision of ranula along with involved sublingual gland is the most accepted method with low recurrence rate. In our patient from the typical history and examination findings supplemented by the USG a diagnosis of sublingual ranula was made. Excision of the ranula along with the ipsilateral sublingual gland was done.

**Keywords:** Ranula, Usg, marsupialization, excision

## 1. Introduction

The name "ranula" has been derived from the Latin word "rana" which means "frog" since it resembles a frog's translucent under belly or air sacs. Ranula is defined as a mucus filled translucent cavity in relation to sublingual gland present in the floor of mouth (1) One theory states that ranulas develop as a result of mucus extravasation, whereas the second theory is in favor of mucus retention, both as a result of rupture or damage of a duct of sublingual gland [2]. Current consensus and opinion supports mucus extravasation as the developmental factor because ranulas are mostly devoid of lining epithelium. [3]. Ranulas can be of three types based on the clinical presentation. "Sublingual ranulas" are most common and presents with intraoral sublingual swelling. The ranulas that are located cervically beyond mylohyoid are termed "plungingranulas", and those having an oral and cervical component are called "sublingual plunging ranula" [4].

Many treatment modalities have been applied in the past for the management of ranulas. These include excision of the ranulaonly, marsupialization with or without cauterization of

the lesionlining, excision of the oral part of the ranula along with involved sublingual gland or rarely submandibular gland, incision and drainage of the lesion via intraoral approach, excision of the lesion via extraoral approach, combined with excision of sublingual gland in certain cases. Even with the above mentioned treatment modalities, many patients presented with recurrence and sometimes may have larger lesions as compared to initial one. Excision of ranula along with involved sublingual gland is the most accepted method with low recurrence rate [5].

## 2. Case Report

A 25 year old female patient presented with complaints of swelling in the floor of the mouth for one and half month which was gradually increasing in size. There was no other associated complaint. On examination there was a soft, fluctuant; translucent swelling 3x2cm in the sublingual floor of mouth on the left side. There was no cervical extension. High resolution USG neck was done which showed a well circumscribed transonic cyst in the floor of mouth on left side measuring 33x16x30mm with 8cc of volume.



USG picture of the lesion



Swelling in the floor of mouth

From the typical history and examination findings supplemented by the USG a diagnosis of sublingual ranula

was made. Excision of the ranula along with the ipsilateral sublingual gland was done.



Lingual Nerve and SM duct



Cyst & the ipsilateral sublingual gland post ex

### 3. Discussion

The prevalence of ranula is about 0.2 cases per 1000 persons and accounts for 6% of all oral sialocysts. Only 1% to 10% of the ranulas are true retention cysts. Ranula usually occurs in children and young adults. The peak frequency of ranula occurs in the second decade of life [6]. Our case was a 25 year old young female. Certain ethnic group like Maori and Pacific Island Polynesians have greater tendency to develop ranulas. The greater prevalence of ranula in these specific population groups is suggestive of probable congenital origin of ranula [7, 8].

The diagnosis of ranula is of clinical importance as some benign and malignant lesions may have similar clinical presentation. The differential diagnosis include various inflammatory and neoplastic lesions of the sublingual and submandibular glands, of the lymph nodes, granulomatous, adipose tissue diseases, cystic hygroma, branchial or thyroglossal duct cysts, Laryngocele, dermoid and epidermoid cysts [9].

There are no specific diagnostic tests for ranulas. Differential diagnosis should be based on the history of the lesion. In majority of the cases ranula present as a cystic fluctuant lesion which increases in size gradually over a period of time. Salivary amylase and protein content of the fluid in ranula is higher as compared to serum. This further suggests that ranula originate from sublingual gland which produces saliva with higher protein concentration as compared to submandibular gland [10].

Ultrasonographic examination of sublingual salivary gland is usually inconclusive due to its location. But in this case we were able to clearly delineate the lesion on USG. On computed tomography, the simple ranula present as a rough ovoid-shaped cystic lesion with a homogenous central attenuation of 10 to 20 HU. The wall of the ranula is either very thin or not seen at all. The sublingual ranula is positioned above the mylohyoid muscle and lateral to genioglossus muscle. It can extend anteriorly behind the symphysis of the mandible, above the genioglossus and geniohyoid muscles. In case of plunging ranula there is infiltration of the lesion into the adjacent tissue planes, extending dorsally and inferiorly to the submandibular

region. Although a plunging or sublingual-plunging ranula may extend into the submandibular triangle and displace the submandibular gland, it does not lead to intrinsic changes within the gland [11].

Magnetic resonance imaging (MRI) is the most sensitive method to examination the sublingual glands. On MRI, the ranula's characteristic appearance is dominated by its high water content. Therefore, it has low T1-weighted intermediate proton density and high T2-weighted signal intensity. This appearance, especially in case of plunging ranula, may be similar to that of a lateral thyroglossal duct cyst, a lymphangioma and an inflamed lymphnode. [12].

Takimoto suggested a simple radiographic technique for preoperative diagnosis of plunging ranula. This technique involves administration of a contrast medium in the sublingual space. [13] Sialographic examination of the patient with a sialocyst presents smooth displacement of the glandular ducts around the mass. Sialographic examination failed to demonstrate direct communication of the lesion with the ductal system of the gland [14].

Histopathological examination of the ranula consists of a central cystic space containing mucin and a pseudocyst wall which is composed of loose, vascularized connective tissues. There is predominance of histiocytes within the pseudocyst wall, but over a period of time, these become less prominent. An important feature in histologic diagnosis is the absence of epithelial tissues in the wall of ranula [15]. A biopsy of the cystic wall is recommended not only for histopathologic diagnosis, but also to rule out the presence of squamous cell carcinoma arising from the cyst wall and papillary cystadenocarcinoma of the sublingual gland, which may present as ranula [14].

Many treatment modalities have been applied in the past for the management of ranulas. In 1995, Morton and Bartley stated that ranula can be treated by placing silk suture in the dome of the cyst [16]. Later on Delbem et al. utilized the micromarsupialization technique for the treatment of ranula. This technique involve topical anesthesia of the lesion for 3 minutes and use of a single 4-0 black silk suture passed through the internal part of the lesion along its widest diameter. The suture was removed after 7 days [17].

Sandrini et al. performed modified micro-marsupialization for treatment of ranula. The modification include an increased number of sutures, decreased distance between the entrance and exit of the needle followed by maintenance of sutures for longer duration approximately 30 days. They stated that the simplicity of execution, low invasiveness of the procedure and the fact that no special care is required during recovery make this technique a good treatment option especially in pediatric patients [18].

Baurmash advocated that radical surgery should be reserved only for plunging ranula and recurrent cases [19]. Baurmash recommended against the sublingual gland removal as the primary treatment modality of ranulas. He advocated marsupialization followed by positive pressure gauze packing as the primary treatment modality. With this addition to the un-roofing technique for treatment of the deep ranula, the recurrence rate was reduced to 10% to 12% [20].

Pandit and Park advocated radical management of all ranulas by excision of ranula along with sublingual gland to prevent recurrence. Pandit and Park suggested that submandibular duct dissection with relocation appears to enhance exposure to the floor of the mouth [21]. Bridger et [22] and Catone et al [23] recommended sublingual gland excision as the primary treatment modality irrespective of the size of ranula. However, Crysdale et al. suggested that lesions larger than 1 cm should be treated with gland removal [24]. Patel et al. in their retrospective study also concluded that definitive treatment yielding lowest recurrence and complication rates was transoral excision of the ipsilateral sublingual gland with ranula evacuation [25]. Zhao et al. recommended insertion of a large lacrimal probe or indwelling catheter into the Wharton's duct to facilitate identification of this structure during surgical exposure and removal of the sublingual gland [26].

Additionally, Bridger et al. after reviewing plunging ranulas, found that 44% of them developed iatrogenically after single or multiple attempts at eliminating oral ranulas by either marsupialization or simple drainage. They stated that surface fibrosis after repeated failed procedures could be responsible for diversion of the saliva inferiorly leading to plunging ranula [22]. Therefore, Crysdale et al. recommended that all oral ranulas greater than 1 cm should be treated by removal of lesion along with offending sublingual gland [18]. Whereas, other authors have proposed this treatment modality irrespective of the size of the ranula [23].

The reported recurrence rates after various treatment modalities are: incision and drainage (70% to 100%), marsupialisation (36.4% to 80%), excision of ranula only (18.7% to 85%), and excision of ranula along with sublingual salivary gland (0% to 3.8%) [24, 5, 26, 27-28].

Beside surgical management, CO2 laser, Er, Cr: YSG laser has been used to vaporize ranulas. [29]. Intra cystic injection of sclerotherapy agents like OK-432 (a lyophilized mixture of low virulence group A streptococcus pyogenes with penicillin G potassium) has been reported to be highly effective in the management of intraoral ranulas [30]. A recent study found orally administered Nickel Gluconate-

Mercurius Heel-Potentised Swine Organ Preparations D10/D30/D200, a hemotoxicological agent to be an effective treatment modality for ranulas [31]. A case series involving 3 patients, reported successful treatment of ranula with administration of Botulinum Toxin Type A into the cystic swelling [32].

#### 4. Conclusion

Newer conservative methods are promising and can be used initially for treatment of ranula in selected cases. However, surgical excision of ranula along with involved sublingual salivary gland is treatment of choice so as to have least chance of recurrence

#### References

- [1] Langlois NEI, Kolhe P, Plunging ranula: a case report and a literature review. *Hum Pathol* 1992; 23(11):1306-8.
- [2] Brunner H. Pathology of ranula. *Oral Surg Oral Med Oral Pathol* 1949; 2(12):1591-8.
- [3] Mizuno A, Yamaguchi K. The plunging ranula. *Int J Oral Maxillofac Surg* 1993; 22(2):113-5.
- [4] Horiguchi H, Kakuta S, Nagumo M. Bilateral plunging ranula: A case report. *Int J Oral Maxillofac Surg* 1995; 24(2):174-5.
- [5] Yoshimura Y, Obara S, Kondoh T, Naitho SI, Scow SR. A comparison of three methods used for treatment of ranula. *J Oral Maxillofac Surg* 1995; 53(3):280-3.
- [6] Zhao YF, Jia Y, Chen XM, Zhang WF. Clinical review of 580 ranulas. *Oral Surg Oral Pathol Oral Radiol Endod* 2004; 98(3):281-7.
- [7] Davison MJ, Morton RP, McIvor NP. Plunging ranula: clinical observations. *Head Neck* 1998; 20(1):63-8.
- [8] Morton RP, Ahmad Z, Jain P. Plunging ranula: congenital or acquired? *Otolaryngol Head Neck Surg* 2010; 142(1):104-7.
- [9] Engel JD, Ham SD, Cohen DM. Mylohyoid herniation: gross and histologic evaluation with clinical correlation. *Oral Surg Oral Med Oral Pathol* 1987; 63(1):55-9.
- [10] Roediger WE, Kay S. Pathogenesis and treatment of plunging ranulas. *Surg Gynecol Obstet* 1977; 144(6):862-4.
- [11] Charnoff SK, Carter BL. Plunging ranula: CT diagnosis. *Radiology* 1986; 158(2):467-8.
- [12] Som PM, Brandwein MS. Head and neck imaging, Salivary gland: anatomy and pathology, Mosby, St Louis, Mo, USA, 2003 pp 2067-2076.
- [13] T. Takimoto. Radiographic technique for preoperative diagnosis of plunging ranula. *J Oral Maxillofac Surg* 1991; 49(6):659.
- [14] Gupta A, Karjodkar FR. Plunging ranula: a case report. *ISRNDent* 2011. Article ID 806928, doi: 10.5402/2011/806928.
- [15] Batsakis JG, McClatchey KD.: Cervical ranulas. *Ann Otol Rhinol Laryngol* 1988; 97(5 Pt 1):561-2.
- [16] Morton RP, Bartley JR. Simple sublingual ranulas: Pathogenesis and management. *J Otolaryngol* 1995; 24(4):253-4.
- [17] Delbem AC, Cunha RF, Vieira AE, Ribeiro LL. Treatment of mucus retention phenomena in children by

- the micro-marsupialization technique: Case reports. *Pediatr Dent* 2000 ;22(2):155-8.
- [18] Sandrini FA, Sant'ana-Filho M, Rados PV. Ranula management: Suggested modifications in the Micro-marsupialization technique. *J Oral Maxillofac Surg* 2007;65(7):1436-8.
- [19] Baurmash HD. Mucoceles and ranulas. *J Oral Maxillofac Surg* 2003;61(3):369-78.
- [20] Baurmash HD. Marsupialization for the treatment of oral ranulas: A second look at the procedure. *J Oral Maxillofac Surg* 1992 ;50(12):1274-9.
- [21] Pandit RT, Park AH. Management of pediatric ranula. *Otolaryngol Head Neck Surg* 2002;127(1):115-8.
- [22] Bridger AG, Carter P, Bridger GP. Plunging ranula: literature review and report of three cases. *Aust N Z J Surg* 1989; 59(12):945-8.
- [23] Catone GA, Merrill RG, Henny FA. Sublingual gland mucous escape phenomenon: Treatment by excision of sublingual gland. *J Oral Surg* 1969;27(10):774-86.
- [24] Crysdale WS, Mendelsohn JD, Conley S. Ranulas-mucocele of the oral cavity: Experience in 26 children. *Laryngoscope* 1988; 98(3):296-8.
- [25] Patel MR, Deal AM, Shockley WW. Oral and plunging ranulas: What is the most effective treatment? *Laryngoscope* 2009; 119(8):1501-9.
- [26] Zhao YF, Jia J, Jia Y. Complications associated with surgical management of ranulas. *J Oral Maxillofac Surg* 2005; 63(1):51-4.
- [27] Dhaif G, Ahmed Y, Ramaraj R. Ranula and the sublingual salivary glands: Review of 32 cases. *Bahrain Med Bull* 1998;20(1):3-4.
- [28] Parekh D, Stewart M, Joseph C, Lawson HH. Plunging ranula: a report of 3 cases and a review of literature. *Br J Surg* 1987;74(4):307-9.
- [29] Lai JB, Poon CY. Treatment of ranula using carbon dioxide laser- case series report. *Int. J Oral Maxillofac Surg* 2009;38(10):1107-11.
- [30] Fukase S, Ohta N, Inamura K, Aoyagi M. Treatment of ranula with intracystic injection of the streptococcal preparation OK-432. *Ann Otol Rhinol Laryngol* 2003;112(3):214-20.
- [31] Garofalo S, Briganti V, Cavallaro S, Pepe E, Prete M, Suteu L, et al. Nickel Gluconate- Mercurius Heel Potentiated Swine Organ Preparations: a new therapeutic approach for the primary treatment of pediatric ranula and intraoral mucocele. *Int. J Pediatric Otorhinolaryngol* 2007;71(2):247-55.
- [32] Chow TL, Chan SW, Lam SH. Ranula successfully treated by botulinum toxin type A: report of 3 cases. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2008;105(1):41-2.