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COMPARISON OF THREE NEWER SURGICAL APPROACHES FOR THE MANAGEMENT OF RANULA

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ABSTRACT

Oral ranulas are caused by extravasation of mucus from the sublingual glands. Excision of a sublingual gland, which has the least risk of recurrence (approx. 1%) is considered to be the best treatment, though it still leads to complications such as dysesthesia of the tongue, damage to Wharton's duct, bleeding and haematoma. The conventional method of searching for the submandibular duct begins from the middle of the duct and the major problem is that the middle part may or may not be deep. This can make it difficult to find the duct, particularly after it has been displaced by extrusion of a cyst. Attempts to excise the ranula in conjunction with the sublingual gland likely places the lingual nerve and submandibular duct at even more risk due to more invasive dissection. This necessitates the consideration of newer techniques which decrease the risk of damage to these vital structures and prevents recurrence. The rationale of the present article is to review the literature and compare the results of three different approaches for the effective management of ranula.

Keywords: ranula, duct, excision

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INTRODUCTION

Mucoceles and ranulas are mucous retention phenomena, which develop from the extravasation or retention of mucous after trauma to the sublingual gland or one of the minor salivary glands[1-5] .The prevalence of ranula is about 0.2 cases per 1000 person and accounts for 6% of all oral sialocysts. Clinicians have used several methods of treatment for oral and plunging ranulas. including marsupialisation, excision, excision of the ranula and drainage of the contents, total removal of the sublingual gland and evacuation of its contents intraorally, and yttrium-scandium- gallium garnet laser [6-10]. Despite these treatments, many patients have experienced recurrence and sometimes larger lesions have occurred, e.g. conversion of a simple (superficial or oral) ranula into a plunging (cervical, burrowing, diving, or suprahyoid) ranula[11-13]. Despite high recurrence rates, marsupialisation is still suggested as the best choice in children because it is less invasive than others[14, 15]. Sclerotherapy a non-surgical treatment for oral ranulas, has also been associated with high recurrence rate of 49%[16]. However, the success of a procedure used to treat a plunging ranula depends on complete excision of the sublingual gland and drainage of its contents[10,17]. Excision of the sublingual gland is often regarded as uncomplicated, but the limited access and the

fact that the operation involves displacement of two vital structures make resection a difficult operation, often accompanied by complications[18,19]. The conventional method of searching for the submandibular duct begins from the middle of the duct , this can make it difficult to find the duct, particularly after it has been displaced by extrusion of a cyst. Attempts to excise the ranula in conjunction with the sublingual gland likely places the lingual nerve and submandibular duct at even more risk due to more invasive dissection[16]. This necessitates the consideration of newer techniques which decrease the risk of damage to these vital structures and prevent recurrence. The rationale of the present article is to review the literature and compare the results of three different approaches for the effective management of ranula.

A) The first approach studied was a two incision fistula technique[20] for the treatment of oral ranulas. It was conducted by the Independent Ethics Committee of the Ninth People's Hospital of Shanghai Jiao Tong University School of Medicine on 12 patients. Twelve patients with oral ranulas confirmed by fine needle aspiration cytology were enrolled and gave their consent to be treated by this new technique. Exclusion criteria included inflammation detected by blood tests, malignancy of the head and neck, and radiotherapy to the head and neck.

The aim of the operation was to make a fistula in the surface of the ranula to drain the retained mucus. Double incisions are made (8-15 mm long, and 2-3 mm wide) on the surface of each cyst, depending on its size (Fig. 1A1).

After the mucus had drained, the incision was sutured with the middle mucosal strip in the cyst (Fig.1A2). The patients were placed on a liquid diet with regular oral rinses for 7 days, and given prophylactic antibiotics for 3 days. No sublingual gland was excised. The clinical outcomes and complications were evaluated during a period that ranged from 8-24 months. Nine ranulas became smaller and gradually disappeared, and there were no complications or injury to Wharton's duct. Three ranulas recurred, but disappeared after a second operation. There were no cases of dysaesthesia of the tongue, or limitation of movement of the tongue as a result of the scar.

B) Second approach to treat oral ranulas is Modified L shaped surgical approach[21] for excision of the sublingual gland.

The aim of this retrospective review was to present 1131 cases of ranula recorded at from 1981 to 2013. A total of 365 patients were treated with the conventional approach, while the other 766 have been treated since 1991 using the modified approach.

The modified L shaped incision is both viable and safe, and simplifies excision of the sublingual gland while protecting the submandibular duct. Modified L shaped incision makes dissection of the submandibular duct easier. It is an angular incision that starts from the lingual frenum, crosses the sublingual caruncle, and bypasses the external side of the ipsilateral fold, until it reaches the distal end of the first molar instead of making a conventional arc.

The modified incision simplifies orientation for repair containing the submandibular duct orifice (the sublingual caruncle). A thin mucosal flap is raised including the submandibular duct, the position of which is fixed and superficial, and it is easy to find. The most difficult step is separation of the flap just underneath the sublingual fold, where multiple minor sublingual ducts tether the gland to the mucosa. The submandibular duct is raised with the angular flap, because the integrity of its attachment to the caruncle is maintained. In this approach, two key structures at risk in the procedure have been identified at an early stage in the dissection .After the superficial and medial surfaces have been exposed, dissection of the deep and lateral surfaces of the gland from their bed is relatively straightforward, and identification of the sublingual vessels is simplified. Careful separation and ligation is required for the 1-2 large branches of the sublingual artery and vein before their entrance into the gland. The flap is repositioned with a few sutures. A drain is tied to the teeth, and removed on postoperative day 2.

They used the chi square test, the chi square test with a correction for continuity, and Fisher's exact test, as applicable. Probabilities of less than 0.05 were accepted as significant.

Results:

There were significant differences in postoperative bleeding ($p = 0.01$), incidence of injury to the submandibular duct ($p = 0.03$), incidence of ranula on the opposite side ($p = 0.02$), duration of operation ($p = 0.000$), sex ($p = 0.03$), and volume of intraoperative bleeding ($p = 0.000$). There were no other significant differences.

c) Third approach studied was Anterograde excision of a sublingual gland[22].

Author prospectively studied 50 consecutive patients with ranula who were treated by anterograde excision of the sublingual gland between May 2012 and January 2015 at Sanming First Hospital, Sanming, Fujian, China. Patients with bilateral ranulas and those who had previously been treated for ranula were excluded. With the patient under general anaesthesia and nasotracheal intubation, a linear incision is made 1 cm medial and parallel to, the ipsilateral mandible, and extended from the orifice of Wharton's duct to the

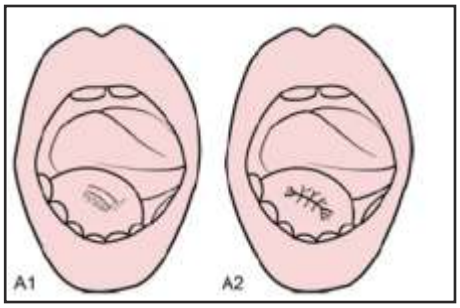

Fig.1[20]. Diagram of two incision fistula technique

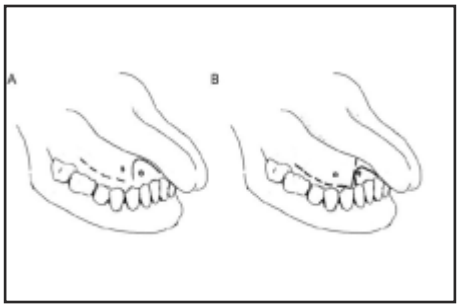

Fig. 2[21]. The conventional and modified approaches. (A) conventional incision; (B) modified L shaped incision

Fig.3[22]. Before anterograde excision of the sublingual gland the important anatomical structures and the first crossing point of Wharton's duct (WD) and the lingual nerve (LN) were identified in the space behind the sublingual gland (G). B=branches of the sublingual artery and vein, SLG=sublingual ganglion, and R=ranulas

Fig. 4[22]. After the glandular tissue lateral to the tunnel has been incised completely without loss of blood, Wharton's duct (WD) is exposed and the gland cut into two parts: superior (SP) and inferior (IP). LN=lingual nerve and R=ranulas

lingual side of the retromolar region. To control bleeding the site was infiltrated with a solution of lignocaine and epinephrine. The mucosa was then incised, and blunt dissection and mosquito haemostats used to expose the lateral aspect of the sublingual gland. The posterior part of the gland was gripped with an Allis clamp and constant traction exerted in an anterior, superior, and medial direction by the assistant, which exposes the loose areolar tissue behind the gland. Smooth, blunt dissection was used in the loose areolar tissue to identify Wharton's duct, the main trunk of the lingual nerve, the branches of the sublingual artery and vein, the relations of the lingual nerve and Wharton's duct, and the sublingual ganglion split from the main trunk of the lingual nerve (Figs. 3).

The sublingual ganglion and the branches of the sublingual artery and vein were ligated and divided as close as possible to the posterior surface of the gland. To prevent damage to the lingual nerve, therefore, anterograde dissection of Wharton's duct was started between the posterior surface of the gland and the first crossing point of Wharton's duct and the lingual nerve. It then continues anteriorly to create a tunnel lateral to Wharton's duct. After the glandular tissue lateral to the tunnel had been incised completely without bleeding, Wharton's duct was exposed and the gland cut into two parts: superior and inferior. The two parts were then opened laterally with Allis clampsor mosquito haemostats to expose the medial aspect of the gland, and give a wider surgical field to visualise and protect Wharton's duct and the lingual nerve (fig.4.)

The inferior part of the gland is then removed anteriorly and the superior part of the gland is removed posteriorly. Bartholin's duct is identified, ligated, and divided. The ranula is ruptured without excision and mucus drained naturally and suctioned. Finally, the surgical field is irrigated and inspected, followed by meticulous haemostasis. The incised mucosa is loosely sutured back, and a drain inserted through the incision. Patients were recommended to take a liquid diet for 1 week. The drain was removed after 1–2 days.

DISCUSSION

Sclerotherapy and marsupialisation are less invasive than excision, inspite the rate of recurrence is high but is still used perhaps because of fear of potential surgical injury to adjacent structures when removing the sublingual gland or because of preservation of the function of the gland. Excision of a sublingual gland, which has the least risk of recurrence, is considered to be the best treatment. But Excision of the sublingual gland or ranula may carry the potential risk of severe hemorrhage from the lingual and sublingual vasculature, lingual nerve damage, and duct severance. A recent report has shown that a tunnel of mucosa was an effective approach for oral ranulas[23], but this method still risks damaging Wharton's duct and nerve, and might even lead to new ranulas. Keeping in mind potential risk involved with these techniques ,consideration towards newer techniques in the management of ranula has been given.

The two incision technique is simple and safe, but particular attention should be paid to avoiding injury to Wharton's duct and the lingual nerve. The width of the middle mucosal strip should depend on the thickness of the cyst's wall, and care should be taken when inserting sutures to prevent tearing the mucosa.

The modified approach takes full advantage of 2 distinct anatomical characteristics that make it superior to the conventional approach. First, the submandibular duct that connects to its orifice –

the sublingual caruncle can be found easily because of its constant anatomical position. In addition, the front of the submandibular duct, which is superficial and constant, can also be found easily. The modified L shaped incision which contains the sublingual caruncle in the angular mucosal flap, is a guide to finding the duct methodically from the front. Because of these anatomical characteristics, the key step of dissecting submandibular duct turns out to be easy, leading to an appreciable reduction in injuries to the submandibular duct, the volume of operative bleeding, and the duration of the operation. The modified surgical approach has therefore made an important contribution to speeding up the progress of the operation and improving safety. There were no long term complications involving the lingual or hypoglossal nerves, and a low rate of recurrence, which might result from the favourable exposure. When compared the modified angular incision containing the orifice of the submandibular duct with a square incision and square flap[24] it was found that it was less invasive, probably as a result of a combination of mylohyoid dehiscence, racial predisposition, and previous trauma to the mouth or face or previous oral surgery[25].

During Anterograde excision of the sublingual gland it is noted that the space behind the gland itself contained important anatomical structures, including Wharton's duct, the main trunk of the lingual nerve, the branches of the sub-lingual artery and vein, and the sublingual ganglion, together with the first crossing point of Wharton's duct and the lingual nerve, which was large. There is no risk of injury to the lingual nerve during anterograde dissection of Wharton's duct, because at this point the lingual nerve is inferior or medial to the duct, not lateral. The medial aspect of the gland, Wharton's duct, and the lingual nerve are therefore exposed directly, a wider surgical field is provided, and a cleaner plane of dissection is achievable without bleeding. The medial aspect of the gland can be dissected under direct vision, and further dissection of the lingual nerve is not necessary, so the risk of injury will be reduced.

CONCLUSION

Excision of a cyst, or a sublingual gland, or both, should not be the first choice of treatment. For the management of ranula, first treatment of choice should be two incision operation. Since newer techniques (Both modified L shaped and anterograde approach) have lesser chances of injury to Wharton's duct and lingual nerve in comparison to conventional approach. These should be considered when excision of cyst or sublingual gland is to be done or management of recurrent ranula. However, Further studies are still needed to evaluate its long term outcome of newer techniques.

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