Management of the pediatric plunging ranula: results of 15 years’ clinical experience

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Objective. This study was designed to evaluate the diagnosis and surgical treatment of the plunging ranula in children.

Study design. A retrospective study of 129 pediatric patients with a clinical diagnosis of plunging ranula was conducted. All children underwent clinical assessment and fine needle aspiration cytology. Cytologic diagnosis was considered to be definitive, and radiologic investigations were not conducted. Intraoral excision of the ipsilateral sublingual gland and partial pseudocyst was performed for all patients.

Results. The preoperative diagnosis was consistent with postoperative and histopathologic analyses in all cases. There were no recurrences at 36 months' follow-up. There were no long-term complications as of writing this report.

Conclusions. Fine needle aspiration cytology can be used as the routine method to reach a diagnosis for plunging ranula, especially in the absence of floor of mouth involvement. Intraoral excision of the ipsilateral sublingual gland and partial pseudocyst is an effective and safe method for the treatment of the plunging ranula in the pediatric population, with absence of recurrence and low morbidity. (Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:499-502)

Ranulas are large retention phenomena that occur in the floor of the mouth in relation to the sublingual gland. They may be large enough to elevate the tongue and interfere with speech and swallowing. The term “ranula” is derived from the Latin word “rana,” which is described as the blue translucent swelling in the floor of mouth resembling the throat/underbelly of a bullfrog. It is now well accepted that a ranula is a mucus extravasation pseudocyst arising from the sublingual glands. The precipitating factor may be trauma to the sublingual gland, originating from either previous surgery or minor trauma to the floor of mouth.1-3

Ranulas can be classified into 2 groups: simple and plunging ranula. The simple (intraoral) ranula is much more common than the plunging (cervical) type. The plunging ranula develops when mucus herniates through or behind the mylohyoid muscle along the fascial planes into the cervical, submandibular, or submental space with or without an associated intraoral collection (Fig. 1).

Several methods of treatment for plunging ranulas have been reported, including marsupialization, excision of the pseudocyst, and excision of the sublingual and/or submandibular gland.2,4 Surgical treatment for plunging ranulas has been refined as the pathophysiology of this condition has become better understood. Marsupialization and excision of the pseudocyst with or without removal of the submandibular gland almost always leads to recurrence of plunging ranula.5 Consequently, the definitive treatment is now considered to be surgical excision of the ipsilateral sublingual gland,6 which is supported by recent findings from large case series.7 The present report summarizes our experience with the management of pediatric plunging ranulas.

PATIENTS AND METHODS

A total of 129 patients referred to the stomatologic hospital of Xi’an Jiaotong University and Sichuan University between 1990 and 2005 were assessed and treated for plunging ranula. These patients were new referrals from other comprehensive hospitals with a provisional diagnosis of plunging ranula.

All patients underwent clinical assessment followed by fine needle aspiration cytology (FNAC). The aspirate was light yellow mucus. The FNAC was completed via extraoral approach. Biochemical analysis of the saliva revealed high protein and amylase concentrations consistent with secretions from the mucinous acini in
the sublingual gland. The diagnostic protocol for plunging ranula generally consisted of patient history and examination followed by FNAC for definitive diagnosis. Radiologic investigations, such as ultrasonography, computerized tomography (CT), or magnetic resonance imaging (MRI), were not performed for every case according to the cost/benefit analysis.

In all cases, the surgical technique was performed to remove the ipsilateral sublingual gland via intraoral approach (Fig. 2). It was common that the plunging ranula developed behind the mylohyoid muscle to cervical. So the pseudocyst was drained in the floor of the mouth and its contents were aspirated. It was unnecessary to remove the whole pseudocyst. It was very important to completely remove the ipsilateral sublingual gland via an intraoral approach. The submandibular region was placed under continuous pressure by Barton bandage for a week to prevent a collection of blood or saliva. A small rubber strip drain was placed in a retrograde fashion to allow drainage blood and saliva from the floor of the mouth. After intraoral excision of ipsilateral the sublingual gland, the mucosa of the floor of the mouth was loosely closed to protect the lingual nerve and submandibular duct (Fig. 2).

After surgery, the patient was placed on a normal diet, with regular oral rinsing and 5 days of antibiotic therapy. The drain was removed after 48 h and suture was removed after 5 days. The patient was discharged when a normal diet was tolerated.

RESULTS

The mean age of patients at presentation was 12 years (range 3-16 years). Of the 129 patients, 82 (63.57%) were male and 47 (36.43%) female. The characteristics of the plunging ranulas present in these patients are described in Table I. Only 10 children had a history of trauma to the neck. Forty-five patients had undergone previous surgery, which had comprised incision and drainage for submental abscesses (n = 10), surgery for presumed dermoid cysts (n = 8), submandibular gland excision (n = 9), submandibular region abscess incision and drainage (n = 12), and incomplete excision of the sublingual gland (n = 6).

One hundred twenty-three patients underwent intraoral excision of the ipsilateral sublingual gland, and 6 had intraoral excision of the bilateral sublingual gland. No surgery was performed through a neck incision. No patients had removal of the pseudocyst in the submandibular region. The submandibular region was placed under con-

Table I. Characteristics of ranula

<table>
<thead>
<tr>
<th>Number</th>
<th>Percentage</th>
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<tbody>
<tr>
<td><strong>Location</strong></td>
<td></td>
</tr>
<tr>
<td>Left</td>
<td>72</td>
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<tr>
<td>Right</td>
<td>51</td>
</tr>
<tr>
<td>Bilateral</td>
<td>6</td>
</tr>
<tr>
<td><strong>Etiology</strong></td>
<td></td>
</tr>
<tr>
<td>Trauma</td>
<td>10</td>
</tr>
<tr>
<td>Previous surgery</td>
<td>45</td>
</tr>
<tr>
<td>Unknown</td>
<td>74</td>
</tr>
<tr>
<td><strong>Type of ranula</strong></td>
<td></td>
</tr>
<tr>
<td>Simple ranula</td>
<td>0</td>
</tr>
<tr>
<td>Plunging ranula alone</td>
<td>96</td>
</tr>
<tr>
<td>Plunging ranula with intraoral component</td>
<td>33</td>
</tr>
<tr>
<td><strong>Duration in months</strong></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>12.37</td>
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<tr>
<td>Minimum</td>
<td>2</td>
</tr>
<tr>
<td>Maximum</td>
<td>26</td>
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tinuous pressure by Barton bandage for a week to prevent a collection of blood or saliva. Three patients had a postoperative hematoma because the artery in floor of the mouth was not ligated tightly. The follow-up period for all patients ranged from 30 to 48 months, with a mean of 36 months. No long-term complications have been reported as of this writing. There were been no recurrences of plunging ranula at follow-up.

DISCUSSION

It is now well accepted that the plunging ranula is a mucus extravasation pseudocyst arising from the sublingual glands. The important factors may be trauma to the sublingual gland, originating from either previous surgery or minor trauma to the floor of mouth. The plunging ranula may arise from defect of the mylohyoid muscle, along the fascial planes into the cervical, submandibular, or submental space with or without an associated intraoral collection. An earlier study found that trauma to the floor of the mouth or neck region may rupture the sublingual gland acini or cause obstruction of the sublingual gland ducts, which results in mucus extravasation. In the present study, only 10 patients (7.76%) had a history of blunt trauma to the head and neck. We think the cause of plunging ranula may be correlated to the congenital partial dehiscence or fragility of the mylohyoid muscle, as described in our previous study. The incidence of dehiscence has been reported as between 36% and 45% in earlier studies. In the present study, 72 patients (55.8%) exhibited left-sided plunging ranula. Other studies have also noted a bias for left-sided plunging ranula. The cause for this is unknown.

In the present study, all of the patients had only FNAC for diagnosis. Aspiration contents were a light yellow mucus, which was confirmed by cytology for the absence of keratin, absence of epithelial/glandular elements/cholesterol crystals, and positive staining for mucin. It is common routine protocol for rapid and definitive diagnosis of the plunging ranula in China. FNAC can be performed under local anesthetic for all child patients. In all cases in the present study, the preoperative diagnosis obtained by FNAC correlated with the final histology, which is consistent with plunging ranula with chronic inflammation of the sublingual gland and the biopsy of the pseudocyst wall without epithelial lining. The hypothesis that salivary tissue is implanted in the neck through trauma is not supported, because no salivary tissue was found in the lining of the excised pseudocyst. From our experience with CT and MRI, we have found that, although these techniques were useful, they did not enable definitive diagnosis of the presenting tissue abnormality and thus did not permit precise preoperative planning.

Although many techniques to manage plunging ranula are described in the literature, the optimal treatment of plunging ranula is still controversial. In our previous study, we suggested that spontaneous resolution may be another option for the pediatric population. If the lesion does not resolve after 6 months of observation for spontaneous resolution or recurs repeatedly, surgical treatment is recommended. Plunging ranula rarely resolves spontaneously and tends to recur with marsupialization, according to our experience. In our 2 hospitals after almost 20 years, we recommend the surgical treatment for plunging ranulas. We prefer intraoral excision of the ipsilateral sublingual gland, although another method described is management via a submandibular incision with plunging ranula excision along with the sublingual gland. The submandibular incision carries the potential risk of injury to the marginal mandibular, lingual, and hypoglossal nerve and the risk of cervical fistula formation, as well as cervical scar. On the other hand, the sublingual gland is the source of the problem, so it is unnecessary to remove the pseudocyst via a neck incision. However, when a cervical pseudocyst is large, we suggest using continuous pressure in the submandibular region by Barton bandage to prevent a collection of blood or saliva. It is not required to close partial dehiscence of the mylohyoid if the entire ipsilateral sublingual gland is removed. Leaving the mylohyoid dehiscence open helps improve the drainage of saliva or blood from the pseudocyst of the neck in the postoperative period. The follow-up period for the patients ranged from 30 to 48 months, with a mean of 36 months. There was no recurrence in the follow-up.

CONCLUSION

The pediatric plunging ranula is rare and seldom has spontaneous resolution. FNAC can be used as the routine protocol to diagnosis, especially in the absence of floor of the mouth involvement. Intraoral excision of ipsilateral sublingual glands is a straightforward surgical technique that is associated with low morbidity and the absence of recurrence.

REFERENCES

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