Case Report
Nasopharyngeal branchial cleft cyst
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Abstract
Second branchial cleft cysts are almost always located in the neck; thus, their presence in the nasopharynx is extremely rare. A 44-year-old man was referred to our department because a cystic mass was fortuitously found in the right lateral nasopharyngeal wall during transnasal esophagogastroscopy. He had suffered from intermittent right-sided nasal obstruction since childhood. T1- and T2-weighted magnetic resonance imaging revealed hyperintense signals. Marsupialization was performed by diode laser via an endoscopy-guided approach. No immediate postoperative complications occurred, and there was no recurrence 6 months following surgery. When a cystic lesion presents in the lateral nasopharynx, branchial cleft cyst should be considered in the differential diagnosis. In our experience, marsupialization by diode laser via an endoscopy approach is a safe and straightforward method of treating nasopharyngeal branchial cleft cyst, with no adverse effects.

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1. Introduction

Branchial cleft cysts, also known as lymphoepithelial cysts or branchiogenic cysts, usually present in late childhood or early adulthood. Most arise from the second cleft and are classically located in the neck. Congenital branchial cleft cysts of the nasopharynx are rare and usually originate from the lateral nasopharynx with inferior and medial extension. The cysts usually secrete mucus and occur unilaterally and singly. They can be differentiated from other nasopharyngeal tumors by histopathologic presentation, imaging modality, and specific localization in the nasopharynx. Conventional treatment includes aspiration of the cyst with injection of sclerosing agents, total excision via a transoral or transpalatal approach, and marsupialization with cold instruments. Here, we report a case of nasopharyngeal branchial cleft cyst (NBC) in a 44-year-old male. Endoscopic marsupialization, assisted by diode laser, was performed. The common differential diagnosis, embryologic pathogenesis, and treatment modalities are discussed.

2. Case report

A 44-year-old man presented to a gastroenterologist with epigastric pain present for 3 months. After transnasal esophagogastroscopy, a mass in the nasopharynx was accidentally discovered, and the patient was referred to the Department of Otorhinolaryngology at Tri-Service General Hospital. His medical history was unremarkable except for the intermittent right-sided stuffy nose since childhood. Nasal endoscopy showed a cystic tumor with a smooth surface at the nasopharynx, obstructing the right choana (Fig. 1). The pure tone audiogram and tympanogram were normal. Magnetic resonance imaging showed hyperintense signals without rim enhancement on T1- and T2-weighted images (Fig. 2). Under the aid of nasal endoscopic illumination, a pair of curved forceps was inserted from the opposite nostril to provide...
a traction force. The tumor was found to be attached to the right side of the nasopharynx and Rosenmuller’s fossa. A diode fiber-delivered 810-nm wavelength laser (Diomed, Andover, MA, USA) was introduced through the nose into the nasopharynx. The settings of the laser were 5 W to 10 W on continuous mode. A fiberoptic hand piece housing a 0.6-mm fiber was used. The tumor was found to be a cyst containing yellowish seromucinous fluid. Marsupialization was performed without injury to the soft or hard palate. No active bleeding occurred, and nasal packing was not needed. Histopathology revealed stratified squamous and pseudostratified columnar cell epithelium with abundant underlying lymphoid tissue (Fig. 3). The position and the pathological features were consistent with a second branchial cyst. The patient was discharged from the hospital the next day after surgery. Postoperative follow-up at 6 months revealed no recurrence.

3. Discussion

The branchial apparatus consists of six mesodermal arches separated externally by ectodermal branchial clefts and internally by endodermal pouches. It forms during the third to seventh weeks of embryonic life and contributes to many components of the head and neck. There are two theories describing the embryogenesis of branchial anomalies that are the most accepted. One is the cell rest theory, where ectopic cells trapped in the branchial apparatus can form branchial cysts. The other is the vestigial remnant theory, where the cysts are derived from the branchial apparatus failing to obliterate during embryogenesis. The majority of branchial anomalies originate from the second branchial apparatus. They can result in a sinus, fistula, or cyst. The second branchial cleft anomalies can occur anywhere along the embryologic tract,
from the neck anterior to the sternocleidomastoid muscle to the tonsillar fossa, with the majority occurring in the upper third of the neck. The second branchial cleft cysts were classified into four types by Proctor:

Type I lies superficially on the anterior border of the sternocleidomastoid muscle and beneath the cervical fascia. Type II cysts, which are the most common, lie beneath the investing layer of the deep cervical fascia and are in contact with the great vessels. Type III cysts pass between the internal and external carotid arteries and extend to the pharyngeal wall. Type IV cysts lie adjacent to the pharyngeal wall and medial to the great vessels.

Most NBCs are small and asymptomatic, whereas some cause nasal obstruction, postnasal drip, occipital headache, or Eustachian tube dysfunction. The diagnosis of a cyst of branchial origin is mainly based on the anatomic location and histopathologic features. On MRI, branchial cysts usually show low signal on T1-weighted images and high signal on T2-weighted images without rim enhancement. However, cysts with high protein contents may demonstrate hyperintensity on T1-weighted images. Branchial cleft cysts are usually lined by stratified squamous epithelium, pseudostratified ciliated columnar epithelium, or epithelium of both types, with a subepithelium containing varying amounts of lymphoid tissue. These objective findings indicated the nasopharyngeal cyst in our case was derived from Type IV second branchial cleft.

The mucosa of the nasopharynx is composed of epithelium, lymphoid tissue, and accessory salivary glands. The differential diagnosis of nasopharyngeal tumors includes Rathke’s pouch, pharyngeal bursa of Luschka, Tornwaldt’s cyst, intra-adenoid cyst, branchial cyst, retention cyst of the seromucinous gland, abscess, dermoid cyst, meningiocele, meningoencephalocele, antrochoanal polyp, turatoma, mucocele of sphenoid sinus, juvenile angiofibroma, pleomorphic adenoma, lymphoma, minor salivary gland malignancy, and nasopharyngeal carcinoma. As it is one of the most common cancers among Chinese males, nasopharyngeal carcinoma is always included in the differential diagnosis. It commonly presents as an ulcerative mass in Rosenmuller’s fossa in an adult male with concomitant enlarged neck nodes, Eustachian tube dysfunction, or blood in postnasal drip. The differential diagnosis between a Tornwaldt’s cyst and a branchial cleft cyst is initially based upon the anatomic location. A branchial cleft cyst is usually located laterally close to the Eustachian tube orifice, while a Tornwaldt’s cyst lies along the midline. Histopathologically, a Tornwaldt’s cyst is lined by epithelium without surrounding lymphoid tissue.

Complete surgical extirpation and marsupialization are the main treatment for NBCs. There are several approaches to treat NBCs: transoral, transpalatal, transmandibular, transcervical, and endonasal. Those approaches, except the endonasal method, may be associated with complications of hemorrhage, velopharyngeal insufficiency, cosmetic deformity, and extreme scarring, respectively. The endonasal approach for NBCs is less discussed in the literature. Verma et al reviewed 22 cases of NBCs from 1927 to 2000. Most patients underwent surgical excision through transoral and transpalatal methods. Aspiration of the cyst with/without injection of sclerosing agents was reported in four cases; only one patient was treated by endonasal removal. The endonasal approach has several benefits, including reduced tissue damage, improved cosmetic appearance, and fewer wound-related complications. Surgical instruments can be introduced via both nostrils for cooperation. The diode laser’s flexible fiber delivery system is compatible with hollow instruments and ideally suited for intranasal use. The diode laser’s tissue cutting effect is comparable to that of the CO2 laser, the coagulation effect is comparable to that of the argon laser, and the tissue absorption rate is slightly higher than the Nd:YAG laser. These advantages make it a potential option compared to conventional surgical instruments. Postoperative nasal packing is not necessary, and the hospital stay is short. However, the minimally invasive endoscopic laser surgery has anatomical limitations, such as parapharyngeal extension. If the extent of the tumor is far beyond the nasopharynx, conventional approaches should be used.

When a patient presents with a nasopharyngeal tumor, we should consider NBC, although it is an extremely rare anomaly. The anatomical location and histopathological features are the basis for accurate diagnosis. Marsupialization, assisted by diode laser via an endoscopy-guided approach, is a safe and straightforward method with no adverse effects in our experience. In the future, this technique needs to be evaluated in more cases to examine its reliability and effectiveness.

References