

Atypical parapharyngeal branchial cyst – case report

Clinical Case

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Abstract

Parapharyngeal branchial cysts are a rare entity, with approximately 40 cases reported in the literature, and surgical excision is the treatment of choice. We present a case of a 34-year-old man, with no relevant medical history, evaluated due to snoring and obstructive sleep apnea. Clinical examination revealed a submucosal swelling of the right lateral oropharyngeal wall, extending to the hypopharynx. MRI identified a cystic lesion in the parapharyngeal space, suggesting a second branchial cleft cyst. The patient underwent surgical excision via a transcervical approach, and histological analysis confirmed the diagnosis. Postoperatively, right vocal cord paralysis was identified, with satisfactory functional recovery after rehabilitation. At 12-month follow-up, no recurrence was observed on MRI. This case highlights the rarity of branchial cleft cysts in parapharyngeal space, the major role of MRI in diagnosis and surgical planning, and the need for awareness of potential complications associated with the treatment of lesions in anatomically complex regions.

Keywords: branchial cyst; parapharyngeal space; surgical excision; transcervical approach

Introduction

Branchial cysts are congenital malformations arising from developmental anomalies of the branchial arches, the embryonic precursors to the face, neck, and pharynx^{1,2}. Approximately 95% of cases arise from the second branchial arch^{1,2}. According to Bailey's classification, second branchial arch cysts are distributed into four types based on their anatomical location: type I (superficial, adjacent to the sternocleidomastoid muscle), type II (between the submandibular gland and great vessels of the neck), type III (between the internal and external carotid arteries), and type IV (in the pharyngeal mucosal space, below the palatine tonsil and medial to the great vessels of the

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Article received on September 8, 2025.

Accepted for publication on October 23, 2025.

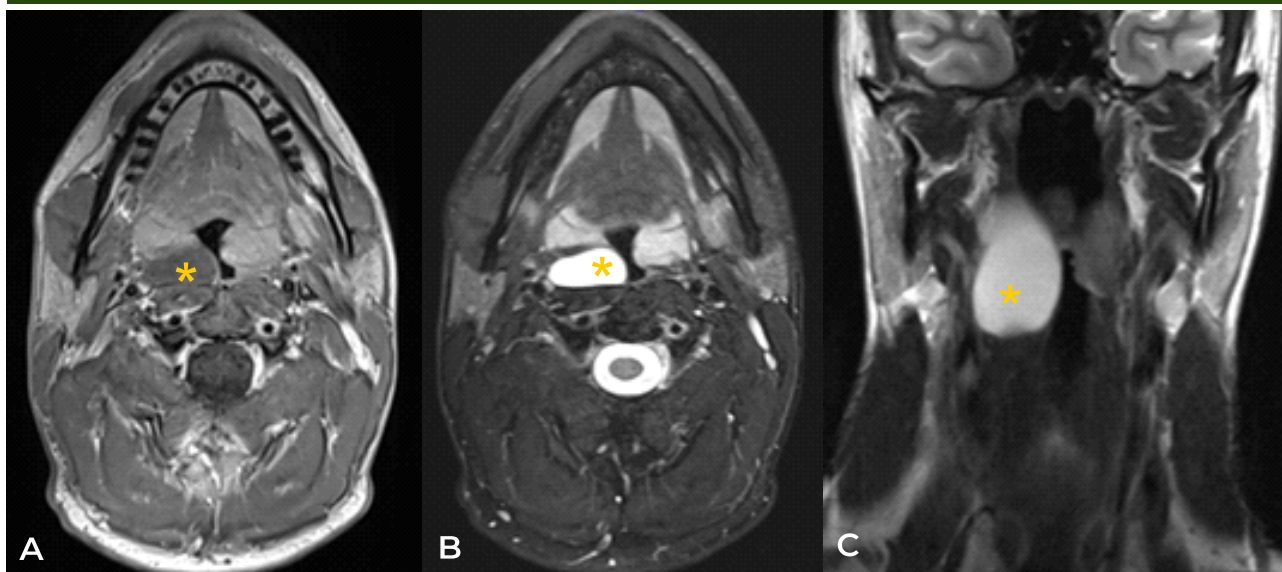
neck, with possible extension to the base of the skull)^{1,3,4}. Clinically, branchial cysts present as lateral neck masses, usually in children or young adults, with the highest incidence between 10 and 40 years of age^{1,5,6}. The most common form is type II, located near the angle of the mandible⁶. Type IV or the parapharyngeal space location is rare, with only approximately 40 cases documented in the literature^{3,6-12}. The differential diagnosis primarily includes salivary gland and neurogenic tumors, and magnetic resonance imaging (MRI) is essential for tumor characterization^{4,6,9,13}. Complete surgical excision, preferably via a transcervical approach, is the first-line treatment. Adopting approaches that minimize morbidity is essential given the close anatomical relationship of the parapharyngeal space to critical neurovascular structures^{6,7,10,11,13}. This case report highlights the rarity of parapharyngeal branchial cysts and the role of MRI in diagnosis and surgical planning, while noting the importance of identifying the potential complications associated with treating these lesions in complex anatomical locations.

Case Presentation

A 34-year-old male with no known comorbidities was referred to an otolaryngology clinic for a 2-year history of snoring and sleep apnea. Oropharyngeal examination identified a submucosal bulge of the right lateral pharyngeal wall, with protrusion of the palatine tonsil and soft palate. Flexible nasendoscopy showed submucosal extension to the hypopharynx, without laryngeal involvement. Neck examination revealed no cervical lymphadenopathy or other palpable masses. The patient had no neurological deficits or constitutional symptoms. MRI identified an encapsulated cystic lesion in the right prestyloid parapharyngeal space, extending medially with submucosal extension from the oropharynx to the hypopharynx, causing posterolateral displacement of the internal carotid artery, measuring approximately 44 × 29 × 11 mm (Figure 1). Based on the imaging characteristics, a type IV second branchial arch cyst was considered the most likely diagnosis. Surgical excision using a transcervical approach under general anesthesia was recommended. The surgical approach consisted of a right lateral neck incision at the level of the hyoid

Figure 1

– Preoperative cervical MRI demonstrating a cystic lesion in the right parapharyngeal space (*). A) T1-weighted axial section – well-defined lesion with homogeneous low signal. B) Post-contrast axial section – showing a regular-contoured capsule and high central signal consistent with fluid content. C) Coronal reconstruction – highlighting the location of the lesion in the parapharyngeal space and its compression of the pharyngeal lumen.



bone, with ligation of the external jugular vein, retraction of the sternocleidomastoid muscle, and identification of the major vessels of the neck. The mass was located deep to the major vessels, adjacent to the pharynx, bounded inferiorly by the greater cornu of the hyoid bone and superiorly by the base of the skull (Figure 2A). Cautious soft tissue dissection was conducted, with identification of the vagus, phrenic, and spinal accessory nerves. Dissection continued superiorly to reach the superior pole of the mass, which extended approximately 4-5 cm above the level of the posterior belly of the digastric muscle. The mass was completely excised (Figure 2B). Histopathological analysis confirmed the diagnosis of a branchial cyst. Postoperatively, the patient developed right vocal cord paralysis despite intraoperative identification and preservation of the vagus nerve; contralateral glottic compensation was achieved following speech therapy, resulting in satisfactory functional voice recovery. During the first few months after surgery, the patient experienced acute ipsilateral facial pain triggered by the onset of chewing (first bite syndrome) and whose symptoms were difficult to control. A

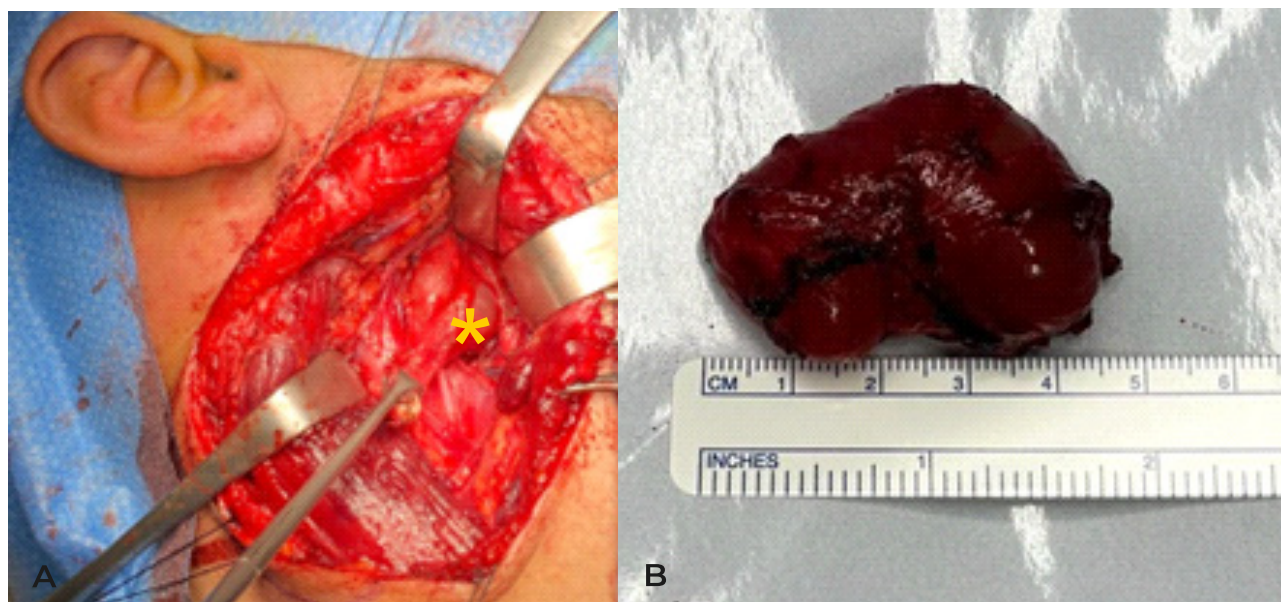
neurology consult was required to optimize therapy with carbamazepine and pregabalin. The symptom resolved approximately 1 year after surgery. The 12-month follow-up MRI showed no recurrence or residual lesions.

Discussion

The parapharyngeal space is a complex anatomical region in the suprahyoid neck, shaped as an inverted pyramid and bounded superiorly by the skull base and inferiorly by the greater cornu of the hyoid bone¹⁴. Anatomically, it is situated lateral to the pharynx and medial to the mandible, and is subdivided into two compartments—prestyloid and retrostyloid—based on its relationship to the styloid process¹⁴. The prestyloid compartment contains adipose tissue, lymph nodes, and the deep lobe of the parotid gland, while the retrostyloid compartment houses the internal carotid artery, the internal jugular vein, cranial nerves IX-XII, and the cervical sympathetic chain^{9,12,14}. Parapharyngeal space masses are rare, representing approximately 0.5% of all head and neck tumors, and are mostly benign (80%)^{5,10,12,14}. Approximately half of these lesions develop in the prestyloid

Figure 2

Intraoperative images of the excision of a right parapharyngeal lesion via a transcervical approach. A) Surgical exposure showing a cystic lesion (*) located deep to the great vessels of the neck, which are retracted by retractors. B) Surgical specimen after complete excision, measuring 48 mm in its largest dimension.



compartment, predominantly originating in the salivary glands, with pleomorphic adenoma being the most frequent histological type. Retrostyloid masses, in turn, are frequently of neurogenic origin, such as schwannomas and paragangliomas, accounting for approximately 40% of cases. Other types of lesions, such as congenital cysts and vascular tumors, represent approximately 10% of parapharyngeal space masses^{5,14}. Type IV second branchial arch cysts, located in the parapharyngeal space, are particularly rare. Despite their congenital origin, most become symptomatic in young adults, generally between the second and third decades of life. Branchial cyst growth is often triggered or accelerated following upper respiratory infections and can mimic a peritonsillar abscess, although clinical presentation may also include dysphagia, odynophagia, foreign body sensation, or more rarely, snoring^{3,7,11,14}. This case is notable because the patient's primary complaint was snoring, an unusual presentation previously reported in only one other clinical case¹¹. Similar to other parapharyngeal space masses, branchial cysts tend to grow slowly, displacing the adjacent structures—usually medially and inferiorly. This clinically presents as an intraoral submucosal swelling or a cervical mass near the mandibular angle¹⁴. MRI is the preferred imaging modality for evaluating parapharyngeal space masses, allowing for a detailed characterization of their origin, anatomical boundaries, and relationship with neighboring neurovascular structures. Branchial cysts mostly have a cystic morphology with well-defined contours, thin walls, and variable signal on T1-weighted images, generally showing high signal intensity on T2^{1,3}. Definitive diagnosis is histological, making complete surgical excision essential, not only for therapeutic purposes, but also for histopathological confirmation⁸. The classic surgical approach for parapharyngeal space lesions is the transcervical approach, which provides wide exposure of the inferior region and adequate neurovascular control^{3,13,14}. However, it is limited by restricted access to

superior lesions near the base of the skull, which can increase the risk of nerve injury⁶. For small lesions (<2 cm) in the prestyloid compartment, a transoral approach can be used, although it is associated with greater difficulty in controlling potential hemorrhages and a higher risk of incomplete excision^{8, 5,13,14}. The primary complication of surgical excision of parapharyngeal space masses is cranial nerve injury, particularly to the vagus nerve, which leads to ipsilateral vocal cord paralysis¹⁴. In this case, despite identifying and preserving the major nerves during surgery, the patient developed right vocal cord paralysis, possibly due to intraoperative traction. The patient also exhibited symptoms consistent with first bite syndrome, a complication following upper cervical surgery caused by the sympathetic denervation of the parotid gland, which triggers reflex parasympathetic hyperactivity at the onset of mastication. This condition is typically self-limiting, resolving spontaneously within weeks or months^{14,16}. This case reinforces the need to include branchial cysts in the differential diagnosis of parapharyngeal cystic masses, especially in young adults, even in the absence of a history of infection⁷. Although they are benign lesions, their growth can cause compressive symptoms, such as upper airway obstruction, justifying surgical excision. MRI plays a central role in the preoperative characterization of these lesions and in surgical planning, and is essential for differentiating them from other more common tumors of the parapharyngeal space. Finally, it is essential to recognize that, given the anatomical complexity of the region, complete excision of these lesions may be associated with morbidity; therefore, thorough knowledge of the regional anatomy and potential complications is crucial for optimizing the surgical outcomes.

Conclusion

Branchial cysts in a parapharyngeal location are rare lesions, with the clinical presentations ranging from asymptomatic cases to symptoms of airway obstruction, and surgical

excision is the treatment of choice. MRI plays a crucial role in diagnosis and preoperative planning, and surgeons must be aware of the potential complications arising from the manipulation of this complex anatomical area.

Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

Data Confidentiality

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

Protection of humans and animals

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the 2013 Helsinki Declaration of the World Medical Association.

Privacy policy, informed consent and Ethics Committee Authorization

The authors declare that they have written consent for the use of photographs of patients in this article.

Funding Sources

This work did not receive any contribution, funding or scholarship.

Availability of scientific data

There are no datasets available, publicly related to this work.

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