Three unusual parapharyngeal space masses resected via the endoscopy-assisted transoral approach: case series and literature review

Li-Fang Shen, Ya-Lian Chen and Shui-Hong Zhou

Abstract
Tumors of the parapharyngeal space (PPS) are rare, most originate from salivary and neurogenic tissues, and most are benign. However, there are some rarer masses in the PPS, with just a few published reports in the literature worldwide, and we may not consider them in the differential diagnosis of PPS neoplasms. We report three cases of rare masses in the PPS: Warthin’s tumor, branchial cleft cyst, and carcinoma ex pleomorphic adenoma. The three patients were admitted to our department with complaints of painless swelling in the lower side of the right face or a long history of snoring; diagnoses were confirmed histopathologically. An endoscopy-assisted transoral approach was used that allowed wide visibility for safe resection and resulted in a short hospitalization time and good functional and cosmetic outcomes. All patients have been followed to the current time, and there have been no recurrences. The transoral endoscopy-assisted approach appears to be safe, effective, and less invasive for excision of masses in the PPS.

Keywords
Parapharyngeal space tumors, Warthin’s tumor, branchial cleft cyst, carcinoma ex pleomorphic adenoma, endoscopy-assisted operation, transoral approach

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**Introduction**

Tumors of the parapharyngeal space (PPS) are rare, accounting for 0.5% of head and neck carcinomas. Moreover, 70% to 80% of PPS tumors are benign and most originate from salivary and neurogenic tissues. In addition to these common tumors, some rare tumors occur in the PPS. Warthin’s tumor (WT), carcinoma ex pleomorphic adenoma (CXPA), and second branchial cleft cyst are rarely encountered in the PPS. The complexity of anatomy, varied treatment approaches, and atypical presentations make these tumors worthy of study and report.

**Case reports**

We retrospectively collected three unusual PPS masses: WT, branchial cleft cyst, and CXPA, which were completely resected via an endoscopy-assisted transoral approach (EATA) under general anesthesia by Dr. Zhou and his medical team. All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (the First Affiliated Hospital, College of Medicine, Zhejiang University, China, reference number 2018-1019) and with the Declaration of Helsinki of 1975, as revised in 2008. Informed consent was obtained from all patients included in the study.

**Case 1**

A 72-year-old male patient presented with a painless swelling on the right side of his face that had been present for 1 year in January 2018. A submucosal soft mass was observed under the right lateral wall of the oropharynx. The patient had been a heavy smoker for the last 30 years and had no relevant family history. Contrast-enhanced magnetic resonance imaging (MRI) revealed a 34×29×23-mm well-defined mass arising from the deep lobe of parotid gland, with T1 hypointense contents and T2 hyperintense contents with mixed signal inside; postcontrast enhancement was significant (Figure 1a, b). The final pathological result confirmed the diagnosis of Warthin’s tumor.

**Case 2**

A 32-year-old male presented with a 3-year history of snoring and a feeling of numbness in the right laterocervical region that had been present for 6 months in November 2014. A soft painless mass under the right lateral pharyngeal wall was observed. MRI revealed a 54×34×23-mm cystic mass in the right PPS (Figure 1c, d), which was compressing the right tonsil anteriorly, causing severe narrowing of the oropharyngeal and nasopharyngeal passage. The histopathological diagnosis was a branchial cleft cyst.

**Case 3**

A 61-year-old man presented with a 6-month history of snoring in September 2015. There was no facial paralysis, nasal congestion, sore throat, or dysphagia. A mass under the left nasopharyngeal wall was observed by endoscopy. MRI revealed a 50×27×49-mm irregular mass in the right PPS, with T1 equisignal contents, T2 hyperintense contents, and asymmetrical postcontrast enhancement (Figure 1e, f), without indication of lymph node enlargement. The postoperative pathological analysis revealed CXPA and the resection margins were free of carcinoma. After surgery, the patient received local radiotherapy, DT 5000 cGy/25F. The patient underwent MRI regularly during follow-up and there was no tumor recurrence or complications.

Total excision of the masses in all three patients was performed via an EATA with or without splitting of the soft or hard palate, according to the size and location
of the tumor (Karl Storz Endoskope system with a 0 degree endoscope, 4-mm diameter, 30 cm; Karl Storz SE & Co. KG, Tuttlingen, Germany). An incision was made with an electric scalpel on the palatopharyngeal arch, and the tumor was removed using blunt resection under endoscopy. Endoscopy made the operation field clear and effectively protected important surrounding blood vessels and nerves during the operation. No neurovascular injury occurred in the process, and endoscopy helped us avoid complications (Figure 2). Table 1 summarizes the clinical and surgical characteristics of the three cases.

**Discussion**

Tumors that originate in the PPS are rare and their histopathology is varied; about 70 histopathologic types in PPS are reported. WT was first described by Hildebrand in 1895; Warthin described similar cases and the tumor was named after him in 1929. WT almost always originates in the parotid...
gland, and extra-parotid presentations are very rare. The main histologic characteristic of this tumor is its abundant lymphoid stroma, the origin of which is the subject of debate. It is unclear whether the lymphoid tissue is a reactive or neoplastic response. Patients with WT are more likely to be heavy smokers than patients with other salivary tumors. The probability of transformation of WT into carcinoma or malignant lymphoma is 0.3% to 1.1% thus, rapid growth of a long-standing WT may indicate a malignant transformation.

The second branchial cleft cyst may arise anywhere from the tonsillar fossa to the supraclavicular area. It is extremely uncommon in PPS. Diverse approaches have been implemented to treat parapharyngeal cysts, including drainage and incision, injection of sclerosant substances, and marsupialization. Nevertheless, these methods do not always guarantee long-term efficacy, and surgical excision remains the only definitive solution.

CXPA is an uncommon malignancy of the salivary gland, and it comprises approximately 5% to 15% of all salivary tumors. CXPA can be composed of diverse histologic subtypes, including adenocarcinoma not otherwise specified, high-grade salivary duct carcinoma, sarcomatoid carcinoma, and myoepithelial carcinoma. Precise preoperative diagnosis of CXPA is almost impossible. The 5-year survival rate of CXPA ranges from 25% to 75%, and CXPA is considered to have one of the worst prognoses of all parotid tumors.

The major goals of PPS tumor surgery are to completely remove the tumor and reduce the main postoperative complications. Classic methods of approach for PPS tumors include transparotid, transcervical, transmandibular, and combinations thereof. The choice of approach is mainly based on the site, vascularity, size, and histology of the tumor, especially the relationship between the carotid sheath and the tumor. It should provide wide visibility for safe resection during the operation with minimal functional or cosmetic sequela. In our cases, the transoral approach provided

![Figure 2. Excision of the mass via an endoscopy-assisted transoral approach.](https://example.com/figure2)

| Case No | Sex | Age (years) | Surgery time (minutes) | Tumor size (mm) | Pathologic diagnosis | Bleeding (mL) | Hospitalization time (days) | Recurrence or complication | Follow-up time (months) |
|---------|-----|-------------|------------------------|----------------|---------------------|--------------|-----------------------------|--------------------------|------------------------|
| 1       | Male | 72          | 60                     | 35 × 30 × 20    | Warthin’s tumor     | 50           | 5                           | No                       | 23                     |
| 2       | Male | 32          | 80                     | 54 × 34 × 23    | Branchial cleft cyst| 50           | 5                           | No                       | 61                     |
| 3       | Male | 61          | 89                     | 60 × 45 × 30    | CXPA                | 50           | 7                           | No                       | 51                     |

Table 1. Clinical and surgical information data from the three cases.

CXPA, carcinoma ex pleomorphic adenoma.
a safe and wide visible approach to the PPS; this results in a lower rate of postoperative complications and has some advantages.\textsuperscript{7} Betka et al.\textsuperscript{1} recommended this approach because of its superior visual control of dissection over the upper and middle parts of the tumor, good cosmetic and functional outcomes, and short surgical and hospitalization times. The main limitation of the transoral approach is the narrowed access, which may hamper complete tumor resection and increase the risk of neurovascular injury; however, these limitations can be overcome by the endoscopy-assisted approach.

The EATA can provide a sufficient surgical window for tumor removal from the PPS, and the important anatomical structures near the tumor, including the carotid sheath and IX-XII cranial nerves, can be clearly exposed and protected via the endoscopy-assisted approach. This approach reduces the risk of inferior alveolar nerve and facial nerve injury and salivary fistulae, eliminates parotid dissection and obvious facial scars, and achieves excellent functional and aesthetic results.\textsuperscript{8} Wang et al.\textsuperscript{9} found that there was no significant difference in complication rate, operation time, total removal rate, or recurrence rate between EATA and external approaches. However, EATA has advantages of less postoperative pain level, reduced blood loss, preservation of facial appearance and function, and shortened hospitalized time.\textsuperscript{9} However, because of the rigid bars of the harmonic scalpel, some inferior anatomic fields cannot be reached with harmonic scalpels during EATA. Therefore, external approaches or robotic technologies should be considered in these cases. In our study, all of the tumors were removed completely by EATA, and blood vessels and nerves were carefully preserved during the separation process.

In conclusion, WT, CXPA, and second branchial cleft cyst in the PPS are rarely encountered. Although surgical approach remains a challenge, EATA provides better functional and aesthetic results than external approaches in selected cases.

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**Declaration of conflicting interest**

The authors declare that they have no conflict of interest.

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