Section: Surgical Oncology

Case Series

TRANSCERVICAL RESECTION OF PARAPHARYNGEAL SPACE TUMORS WITHOUT MANDIBULOTOMY: LITERATURE REVIEW AND CASE SERIES

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ABSTRACT

Background: Parapharyngeal space (PPS) tumors are rare, comprising <1% of head and neck neoplasms. Most are benign salivary or neurogenic tumors. Surgical excision remains the mainstay of treatment, but approaches are technically challenging due to complex anatomy and proximity to vital neurovascular structures. Traditionally, mandibulotomy was used to improve exposure; however, transcervical approaches without mandibulotomy are increasingly favored to minimize morbidity.

Materials and Methods: We present a case series of three patients with large PPS tumors extending from the skull base to the hyoid, managed at SDM Medical College, Dharwad (January–August 2025). Preoperative workup included MRI/CT for anatomical delineation and selective fine-needle aspiration. All tumors were excised via a transcervical approach using key adjunctive manoeuvres: submandibular gland excision, division of stylohyoid and digastric muscles, and carotid sheath mobilization.

Results: Complete resection was achieved in all three patients: two vagal schwannomas and one pleomorphic adenoma of the deep parotid lobe. Critical neurovascular structures were preserved, with transient postoperative complications (one vagal paresis and one marginal mandibular nerve paresis), both resolving spontaneously. No permanent cranial nerve injury, vascular complications, or mandibular dysfunction occurred.

Conclusion: The transcervical approach without mandibulotomy offers reliable exposure, excellent oncologic outcomes, and reduced morbidity, making it the preferred technique for most benign and select malignant PPS tumors.

Keywords: Parapharyngeal space tumors, Transcervical approach, Mandibulotomy, Pleomorphic adenoma, Schwannoma.

INTRODUCTION

The parapharyngeal space (PPS) is a deep, paired anatomical compartment of the head and neck. It is shaped like an inverted pyramid which extends from the skull base to the greater cornu of the hyoid bone. Despite its central location, it is bordered by dense fascial planes and vital neurovascular structures, making it a region of considerable surgical complexity. Tumors arising within this space are uncommon, accounting for less than 1% of all head and neck neoplasms.[1] Their rarity, combined with the space's deep and largely inaccessible location, means that most patients present late, often with a slowly progressive, painless neck or oropharyngeal swelling, and sometimes with cranial neuropathies or dysphagia once the mass has attained significant size. Anatomically, the PPS is conventionally divided by the styloid process and its associated musculature into a prestyloid and a poststyloid (retrostyloid) compartment. This distinction has direct clinical relevance: prestyloid tumors are predominantly of salivary gland origin, most commonly arising from the deep lobe of the parotid gland, while poststyloid tumors are typically neurogenic, arising from the vagus nerve, sympathetic chain, or carotid body, or occasionally represent lymphadenopathy or vascular lesions.[2] Pleomorphic adenomas and schwannomas

together account for the majority of PPS tumors encountered in clinical practice, and both were represented in the present series.

Surgical excision remains the definitive treatment for nearly all PPS tumors, whether benign or malignant, but the approach itself has long been debated.[3] The space's proximity to the internal carotid artery, internal jugular vein, and lower cranial nerves (IX–XII), together with its relative surgical inaccessibility, makes complete tumor extirpation technically demanding. Historically, mandibulotomy—splitting the mandible to widen the surgical corridor—was advocated for large or superiorly located tumors, as it offered generous exposure of the skull base. However, this benefit comes at the cost of significant morbidity, including malocclusion, and visible scarring. This has prompted a shift toward mandible-sparing techniques wherever feasible.

Lesions confined to the superior PPS may require a skull base approach, those in the mid-compartment are often amenable to a transparotid route, while tumors occupying the inferior parapharyngeal space are generally well suited to a purely transcervical approach.[4] With adjunctive manoeuvres such as submandibular gland excision, division of the stylohyoid and posterior digastric muscles, and mobilization of the carotid sheath, the transcervical corridor can often be extended to safely deliver even large tumors reaching the skull base, without recourse to mandibulotomy.[5]

In this case series, we report three patients with large parapharyngeal space tumors extending from the skull base to the hyoid bone, all of whom were managed successfully via a transcervical approach without mandibulotomy, highlighting the feasibility and safety of this technique even for extensive disease.

MATERIALS AND METHODS

We present a series of three patients who underwent excision of parapharyngeal masses at SDM Medical College, Dharwad, between January and August 2025. As part of the initial diagnostic work-up and to optimize surgical planning, CT and MRI scans were performed to assess tumor location and relationships with adjacent structures. In two patients, transoral fine-needle aspiration was attempted, whereas in one patient, preoperative biopsy was deferred due to extensive vascularity. Written informed consent for publication of clinical details and images was obtained from all patients included in this study. All procedures were conducted in accordance with the principles of the Declaration of Helsinki.

Surgical approach

Key steps in our transcervical approach to maximize exposure and safely deliver the tumor were as follows:

Cervical Incision and Submandibular Gland Removal: A transverse cervical incision along a skin crease in the upper neck was employed. The ipsilateral submandibular gland was excised, with careful preservation of the marginal mandibular nerve, hypoglossal nerve, and lingual nerve. Submandibular gland removal was performed to improve access. For the patient with a deep lobe parotid tumor, the neck incision was extended towards the parotid region to identify and secure the facial nerve trunk and branches before mobilizing the mass transcervically.

Division of the Digastric and Stylohyoid Muscles: The posterior belly of the digastric muscle and the stylohyoid muscle were divided to provide additional access to the parapharyngeal space. During this procedure, the hypoglossal nerve was carefully identified and preserved.

Carotid Sheath Mobilization: The carotid artery and internal jugular vein were carefully identified and mobilized laterally. The mass was then dissected, and both proximal and distal vascular control were established. In one case, the tumor mass had a direct blood supply from the external carotid artery. Each of the arterial branches was identified, carefully ligated, and divided, allowing the tumor mass to be freed from the external carotid artery.

Tumor Mobilization: Once adequate exposure was achieved and the vessels were freed up to the skull base, the tumor capsule was carefully dissected from the surrounding tissues—medially from the pharyngeal constrictors, posteriorly from the prevertebral fascia, and superiorly from the skull base. A combination of sharp and blunt dissection was employed. All three tumors were well encapsulated. No mandibular split or oral incision was required in any case; access and visualization were adequately maintained through the cervical incision alone.

Reconstruction and Closure: Since no bony cuts were made, reconstruction was straightforward. After achieving hemostasis, the wound was closed in layers over a drain. The mandible remained intact, and occlusion was unchanged postoperatively. The patients had only the external neck incision, which healed well.

CASE SERIES

Case 1: An adult patient in the mid-40s presented with a slowly enlarging right oropharyngeal mass and mild dysphagia. MRI revealed a 5 × 4 cm right carotid space lesion displacing the carotids anteriorly and the internal jugular vein posterolaterally, extending from the skull base to the hyoid bone. Fine-needle aspiration was attempted transorally twice, but both samples yielded only hemorrhagic aspirate. Based on its location in the poststyloid compartment, a presumptive diagnosis of schwannoma (vagal nerve schwannoma) was made. A transcervical approach was performed as described above. Intraoperatively, the tumor was found to originate from the vagus nerve; careful intracapsular enucleation was performed, preserving vagal continuity. The mass was delivered intact. The patient experienced

transient postoperative vocal cord paresis and difficulty swallowing, both of which resolved within three months. No other complications were observed. Final histopathology confirmed a benign schwannoma. The extent of the parapharyngeal tumor and intraoperative findings are illustrated in [Figure 1].

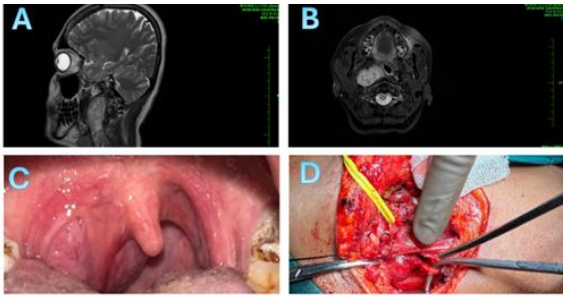

Figure 1: (A, B) MRI showing extent of parapharyngeal tumor. (C) Preoperative intraoral bulge. (D) Intraoperative view showing tumor arising from vagus nerve.

Case 2: An adult patient in the early 40s presented with a slowly growing right parapharyngeal mass and no other symptoms. MRI and CT angiography revealed a lesion measuring 5.5 × 4 cm in the right parapharyngeal space, extending from the C1 to C4 vertebrae and displacing the carotid artery and internal jugular vein posterolaterally, with direct feeders from the external carotid artery. With a clinical suspicion of schwannoma, the patient was taken for surgery. A transcervical submandibular approach was used, and the lesion was carefully separated from the external carotid artery, with direct feeders meticulously ligated. The lesion was otherwise well encapsulated and was enucleated. Histopathological examination confirmed it as schwannoma. The postoperative course was uneventful, and no complications were observed. The imaging and operative findings are illustrated in [Figure 2].

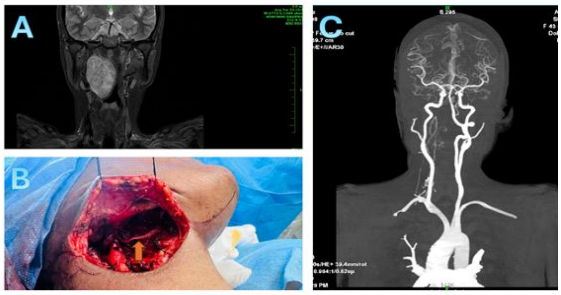

Figure 2: (A) MRI demonstrating a well-defined parapharyngeal space tumor. (B) Intraoperative photograph showing the surgical field with preservation of the hypoglossal nerve (arrow). (C) CT angiography highlighting the vascularity of the lesion.

Case 3: An adult patient in the late 50s was evaluated for a left parapharyngeal swelling. MRI revealed a large 8 × 6 cm prestyloid parapharyngeal space tumor arising from the deep lobe of the left parotid gland, with posterolateral displacement of the common carotid artery and internal jugular vein. Fine-needle aspiration cytology was consistent with pleomorphic adenoma. A transcervical approach was planned, with a cervical incision extending into the parotid region to facilitate identification of the facial nerve. The facial nerve trunk was identified at the standard surgical landmark and preserved. Following excision of the submandibular gland, the parapharyngeal mass was carefully dissected free from the carotid sheath, pharyngeal constrictors, and skull base using a combination of sharp and blunt dissection. The lesion was delivered from the parapharyngeal space, with part of the tumor being attached to the deep lobe of the parotid. The mass was excised along with a thin rim of parotid tissue, while preserving the facial nerve and superficial lobe. The postoperative course was uneventful except for mild marginal mandibular nerve paresis, which completely resolved within one month. Final histopathological examination confirmed the diagnosis of benign pleomorphic adenoma. The preoperative imaging and intraoperative findings are demonstrated in Figure 3.

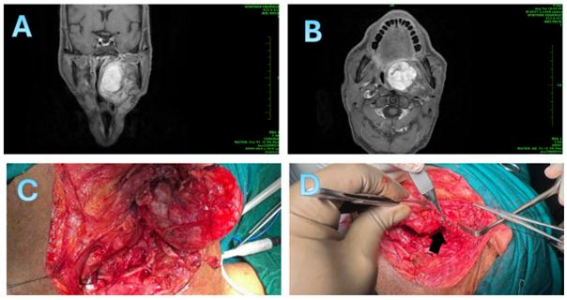

Figure 3: (A) Coronal MRI showing tumor extent. (B) Axial MRI showing origin from deep lobe of parotid. (C) Tumor reflected out of parapharyngeal space and lateral to mandible. (D) Preserved lower branches of facial nerve.

All three parapharyngeal tumors were successfully excised via a transcervical approach without the need for mandibulotomy. The tumors were sizable (approximately 5–8 cm) and extended from the skull base to the hyoid, yet adequate exposure was achieved through a cervical incision combined with submandibular gland removal and division of the digastric and stylohyoid muscles. Complete en-bloc removal was accomplished in each case – two vagal schwannomas (post-styloid carotid space lesions) and one pleomorphic adenoma of the deep parotid lobe – while preserving critical neurovascular structures. Postoperative recovery was favorable: one patient had transient vocal cord paresis (vagal nerve weakness) that resolved within three months, and another experienced a mild marginal mandibular nerve palsy that fully recovered within one month. No permanent cranial nerve deficits, vascular injuries, or other major complications occurred.

DISCUSSION

The transcervical approach offers reliable exposure, minimizes morbidity, and avoids the functional and cosmetic complications of mandibulotomy. Current evidence supports it as the first-choice approach for most benign PPS tumors, reserving mandibulotomy or skull base extensions only for selected malignant, recurrent, or very high-situated lesions.

In a large case series of 44 patients with mean tumor diameter of 5.5 cm size, authors reported that a transcervical route (with transparotid extension in select deep-lobe cases) achieved complete resection, emphasizing its advantages of direct tumor access, excellent neurovascular control, preservation of mandibular continuity, reduced morbidity, and shorter hospitalization.[5] Similarly in a series of 18 patients with benign parapharyngeal masses with mean tumor size of ~5.5 cm, tumors could be removed transcervically or via a transcervical-transparotid approach without mandibulotomy, which they reserved only for malignant or rare poorly exposed cases—significantly reducing morbidity and hospital stay.[6] Horowitz et al confirmed in 29 pleomorphic adenomas that 28/29 could be excised without mandibulotomy, concluding that a simple transcervical route suffices for most deep-lobe or de novo PPS salivary tumors. Only lesions with broad parotid deep lobe involvement or other complicating features necessitated adding a parotid or mandible component.[3] In our study we performed surgery via transcervical approach, even in a patient with tumor arising from deep lobe of parotid with a narrow attachment to deep lobe, avoiding the parotid and mandible component.

Successful transcervical excision of PPS tumors requires precise anatomical knowledge and careful technique. The space is divided into prestyloid (mostly salivary) and poststyloid (neurogenic, paragangliomas) compartments, each with distinct relationships to critical structures. The transcervical approach creates a safe corridor between the mandible and great vessels, allowing tumor access while avoiding morbidity of mandibulotomy. Several surgical manoeuvres help gaining a wide access to this space.

Submandibular gland excision or displacement provides direct lateral access to the PPS. Sacrificing the gland, as done in our series and others, offers significantly improved exposure with minimal morbidity.[7] Division of the stylohyoid, posterior digastric and stylomandibular ligament enhances PPS exposure and Sometimes Partial styloid removal increases the operative space and improves access to the tumour's superior pole.[1,8]

It is important to highlight that one of the strongest advantages of the transcervical approach lies in its ability to ensure secure neurovascular control. Through a cervical incision, the surgeon gains reliable access to the external and internal carotid arteries, allowing both proximal and distal vascular control—an essential safety measure for vascular tumors such as paragangliomas or whenever major bleeding is anticipated. Similarly, the internal jugular vein, which may be compressed or displaced by the mass, can be safely exposed and controlled via this route. Equally significant, the transcervical corridor permits identification and intraoperative monitoring of the lower cranial nerves (IX–XII) and the sympathetic chain, thereby reducing the risk of inadvertent nerve injury. By contrast, a transoral approach lacks this capability, offering no means of vascular control or safe visualization of cranial nerves, thus posing unacceptable risks for all but the smallest, well-encapsulated, avascular lesions. This comparison underscores why the transcervical approach remains the preferred strategy for most parapharyngeal tumors: it combines adequate exposure with critical safety in managing the region's dense neurovascular anatomy.[8]

After securing neurovascular structures, tumors can be safely removed through a transcervical approach using blunt dissection and enucleation along natural planes with nerve preservation. Even tumors near the skull base can be delivered through the neck, often with mandibular displacement, while mandibulotomy is reserved for cases with inadequate exposure.

In our study we experienced transient vocal cord paresis and mild dysphagia in first patient which improved overtime and transient marginal mandibular nerve injury in third patient.[3] Many studies have shown that Cranial nerve deficits remain the main morbidity, usually due to tumor involvement (vagus or sympathetic chain), while first bite syndrome occurs in up to 30–46% but often improves. Other cranial neuropathies are usually transient. Avoiding mandibulotomy prevents complications like malocclusion, TMJ dysfunction, or visible scarring, with neck incisions being cosmetically acceptable.[9]

While the transcervical approach without mandibulotomy is effective in most PPS tumors, limitations include inadequate exposure for very large skull base lesions, malignant tumors requiring wider margins, recurrent or irradiated cases with fibrosis, and highly vascular tumors needing proximal control. Some anterior prestyloid tumors with intraoral extension may require a transoral component. Mandibulotomy is thus reserved for selected cases (~18% in large series), with modern practice favoring mandible-sparing techniques supported by advanced imaging, embolization, and endoscopic assistance. Oncologically, complete resection with negative margins remains the goal, and with careful selection, transcervical resection achieves excellent outcomes in benign and select malignant tumors.[10]

CONCLUSION

The transcervical approach, with or without transparotid extension, achieves complete resection in most parapharyngeal space tumors while avoiding the morbidity of mandibulotomy. Our series and literature review confirm its safety, efficacy, and favorable functional outcomes, with adjunctive manoeuvrers enabling access even to high tumors. Careful patient selection remains vital, as very large, malignant, or recurrent tumors may still require extended approaches. Overall, the transcervical route offers an optimal balance between oncologic control and reduced morbidity, and should be considered the preferred technique for the majority of benign and select malignant PPS tumors.

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