

## Stylohyoid Window: An Approach in the Management of Parapharyngeal Space Tumours

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**Abstract:** Parapharyngeal space (PPS) is one of the potential confined fascial planes of head and neck that may be involved by various pathological processes. Parapharyngeal tumours are groups of rare tumours in a relatively complex anatomical area and account for 0.5% of head and neck tumors. Proper surgical management of tumour is based on preoperative symptoms, clinical signs and radiological investigations. The aim of the study is to describe our experience with parapharyngeal space tumours resected via stylohyoid windowing approach. In present study 5 cases of parapharyngeal tumours are operated by trans-cervical approach via stylohyoid windowing.

**Keywords:** parapharyngeal space tumor, stylohyoid window, trans-cervical

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### I. Introduction

The PPS is an inverted pyramid-like area which starts at the base of the skull with the apex reaching the greater cornu of the hyoid bone. The boundaries of the space are: the temporal bone above, the vertebrae and prevertebral muscles behind, the buccopharyngeal fascia (which covers the pharyngobasilar plane and the superior pharyngeal constrictor muscle) medially and laterally both the condyle of the mandible and the medial pterygoid muscle. The fascia stretching from the styloid process to the tensor veli palatini muscle divides the PPS into prestyloid and poststyloid compartments. The prestyloid space contains the retromandibular portion of deep lobe of parotid, minor or ectopic salivary gland, 5th cranial nerve supplying the tensor veli palatini, ascending pharyngeal artery along with venous plexus and fat. The poststyloid space is potential because of its major neurovascular contents like carotid sheath and cranial nerves 9th to 12th. PPS tumour are rare and accounts for only 0.5% of head and neck tumours[1-3]. Because of the location of this space, the clinical examination and surgical approach is challenging. Computed tomography (CT) and magnetic resonance imaging (MRI) scans are crucial for the assessment of PPS tumors. MRI is particularly useful for determining the tumor localization and distinguishing the tumor origin. The surgical approaches to access parapharyngeal space tumours are traditionally transcervical, transparotid, transoral and transmandibular[4]. The experience of parapharyngeal space tumour in our institute by transcervical approach via stylohyoid windowing is highlighted in this study.

### II. Materials And Method

From June 2010 to October 2017, a total of 5 patients of parapharyngeal tumours were admitted in the Department of Otorhinolaryngology, Gauhati Medical College & Hospital. A detailed history and clinical examination was done. All patients were subjected to routine test, contrast enhanced CT scan in all cases and was used as an important diagnostic tool and MRI in selected cases only because of larger size of tumour and suspected retrostyloid positioning. The patients were reviewed on basis of clinical details, presenting symptoms, imaging characteristics, fine needle aspiration cytology, surgical approach, postoperative complications, and histological confirmation.

### III. Transcervical Stylohyoid Windowing Approach

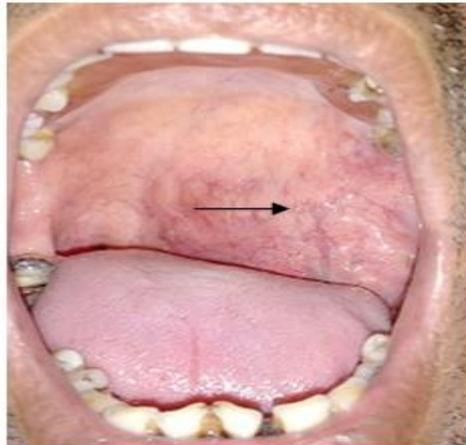
In our study a curvilinear skin incision was given 2.5 cm below the inferior border of mandible 4-6 cm length extending from hyoid bone to the mastoid tip on the same side. Subplatysmal skin flaps were elevated. Cervical fascia was incised and sternocleidomastoid muscle identified. Marginal mandibular nerve was identified and preserved in all cases. Submandibular gland was identified without sacrificing facial vessels and retracted anteriorly. Great vessels of neck were identified. Glossopharyngeal nerve was identified first, following this stylopharyngeus muscle was identified just beneath it. Digastric tendon was identified and retracted posteriorly, this gives an adequate space for tumour removal. Stylohyoid muscle was identified then. The

tumour once identified was dissected extracapsularly and freed from its surrounding attachments. In case of larger tumour digastric tendon, stylohyoid muscle and stylomandibular ligament were transected if required for wider exposure. Transection of stylomandibular ligament and anterior dislocation of mandible increases the exposure by about 50%. Sometimes stylopharyngeus muscle were also cut. This gives an adequate exposure to parapharyngeal space tumours. Lower cranial nerves were identified. Hemostasis was achieved and a drain was given.

#### IV. Results And Observations

Most common presenting complaint was a unilateral neck mass. The mean age at presentation was 42.4 years (Range: 28-67 years). The study group had 3 males and 2 females. FNAC was done in 3 cases. CT scan was done in all cases, CT and MRI both done in only 2 cases. All patients had tumour size more than 4 cm on imaging studies. All patients underwent tumour excision via transcervical approach through stylohyoid windowing. Submandibular gland retracted in all cases, extracapsular dissection done in all cases. Complete tumour excision was done in all cases. Intraoperative blood transfusion required in only one cases. Post-operative complications included hypoglossal nerve weakness in one case only which resolves within one month. None of the patients developed wound infection or hematoma. Histopathological diagnosis confirmed pleomorphic adenoma in 4 cases and schwannoma in 1 case. None of the patients have tumour recurrences till present.

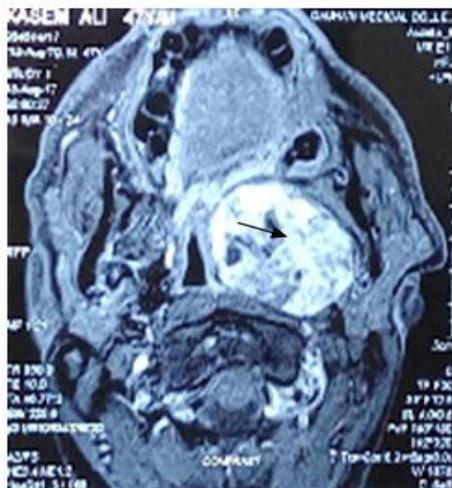
#### V. Images



**Figure1-clinical photograph showing a parapharyngeal mass presenting as intra oral swelling**



**Figure2-Contrast enhanced MRI of neck (sagittal section) showing parapharyngeal mass**



**Figure3-contrast enhanced MRI neck (axial section) showing parapharyngeal mass {5.2x4.2x5.4 cm}**



**Figure4-preoperative photograph showing incision line transcervical approach**



Figure5-intraoperative photograph showing submandibular gland (upper arrow) and common facial vein (lower arrow)



Figure6- intraoperative photo showing stylohyoid ligament (upper arrow) and 9<sup>th</sup> nerve (lower arrow)



Figure7- intraoperative photo showing stylomandibular ligament (arrow)



Figure8-intraoperative photo showing cut margin of stylohyoid ligament (upper arrow) and tumour mass (lower arrow)



Figure 9-intraoperative photograph (upper arrow) after removal of tumour by transcervical approach via stylohyoid windowing, facial nerve (lower arrow)



Figure10-postoperative specimen

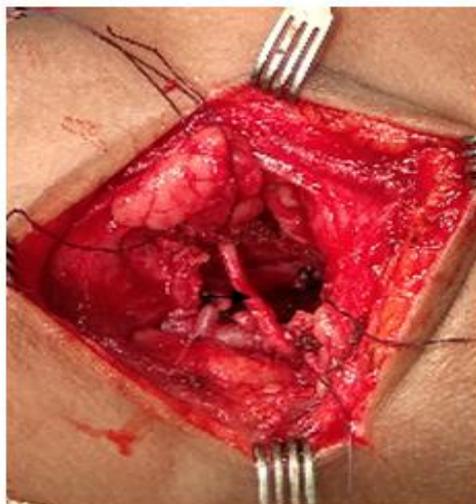


Figure 11-intraoperative photo showing Hypoglossal nerve(arrow)

## VI. Discussion

Parapharyngeal space tumour comprise 0.5% of all head and neck tumours. Anatomically and histologically the most common tumour of parapharyngeal space is parotid pleomorphic adenoma[5,6]. The commonest pre-styloid tumour being of salivary origin and commonest post-styloid tumour being of neurogenic origin[7]. The consideration of the histopathological entity is of prime importance for surgical planning[8]. Schwannomas in PPS arise from lower cranial nerves or from the sympathetic plexus. Paragangliomas, however, are rare and slow growing tumours of neural crest origin. The other tumors in PPS are neurofibroma, meningioma and lymphoma. Both CT and MRI are highly useful for diagnosis and planning surgical intervention in parapharyngeal space tumours. The imaging modality of choice is MRI as it better delineates origin (prestyloid/poststyloid compartment), character (benign/malignant), vascularity, and also shows relation with the deep lobe of parotid and the great vessels. Meyers et al. opined about “Radiological biopsy” for preoperative diagnosis of parapharyngeal tumours as most of the tumours of this area are of benign in origin[9]. Meyers et al.[10] highlighted about the dependency on CT scan and showed that it can give more than 96% accuracy on site, vascularity and histological assumption of salivary or neurogenic origin. It is also to be noted that more than 80% of the tumours are benign in origin. If there is any bone erosion on CT scan possibility of malignancy is there.

The commonest presentation of tumour is swelling in the neck followed by pharyngeal swelling[11,12]. Vagal schwannomas have a tendency to splay carotids while cervical sympathetic schwannoma will cause anterior displacement of carotids. In present study all 5 cases were operated by transcervical approach using stylohyoid windowing. Transcervical approach via stylohyoid windowing not only gives excellent exposure to both prestyloid and poststyloid, but also prevents any undue injury to vessels and nerves. Cohen S. M [13] suggested that removing stylohyoid ligament gives an adequate exposure. Occasionally we can transect the tendon of the digastric muscle along with the stylohyoid muscle and the stylomandibular ligament in order to gain wider exposure of the operative field in cases of larger or high positioned tumours. Meyers [9] commented on sectioning of stylomandibular ligament and anterior dislocation of mandible to increase exposure by about 50%.

The most serious complication of PPS tumor resection is CN paralysis and associated CNs are VII, IX, X, XI and XII [14]. The original nerve of the tumor tends to be injured following the resection of neurogenic tumors, including schwannomas and paragangliomas. CN X palsy is the most common form [15], and may be severe following PPS surgery. A previous study [16] revealed that neurogenic tumors, particularly vagal paragangliomas, are particularly at risk for developing postoperative sequelae. Horner syndrome may also be presented postoperatively in cases of sympathetic PPS schwannomas [16]. The key to prevent any complications during surgery is to perform blunt dissection along the tumour capsule(extracapsular dissection) and avoid its rupture. In present study only one patient present with hypoglossal nerve paresis which recovered with in one month. Meyers et al and Attia [17] found the percentage of common cranial nerve palsies i.e. palsies of IX, X, XI and XII nerves ranges from 11% to 57%.

## VII. Conclusion

Tumours of parapharyngeal space are challenging and have important surgical considerations due to their close relationship with neurovascular structures. A proper planning of surgical procedure is based on clinical and radiological evaluation guided by strong anatomical knowledge and experience helps in management of parapharyngeal tumour. The transcervical approach via stylohyoid windowing is a versatile approach for complete removal of tumour with excellent exposure and minimum morbidity. It can also be combined with excision of submandibular gland in order to improve exposure.

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