Introduction:
Tumours of the parapharyngeal space pose as a surgical challenge to every otolaryngologist. The complex anatomy and surrounding vital structures, makes the surgery of these tumours very tricky, whereas successful surgical excision provides a great satisfaction. These tumours constitute only 0.5% of all head and neck tumours, with 80% being benign in nature. The most common histological type reported is Pleomorphic Adenoma involving the deep lobe of parotid gland, although some authors have found Paraganglioma to be the most common histological finding. Delayed presentation and presence of vital structures surrounding the tumour makes its removal an intricate one.

Different authors have suggested different approaches for successful surgical removal. Here, we present our experience in the management of those tumours. A conservative Trans-cervical approach was found to be feasible and effective in most of the cases over an extensive and radical one, which may be required in malignancies and skull-base involvement.

Materials and Methods:
Fifteen patients with parapharyngeal tumours treated surgically in the Department of ENT,Nilratan Sircar Medical College in last 3 years were included in the study. 80% of the cases were benign, most common being Schwannoma. Most important investigation was found to be MRI.

Conclusion: The study gives an overview regarding the surgical approach, based upon the extent and histology of the tumour. Trans-cervical approach was found to be the most effective.

Keywords: Parapharyngeal tumours; surgical management; transcervical approach.

Results:
In our study, the most common age group of presentation was 20 - 30 years i.e. 5 patients (33.33%) [Chart1]. Female preponderance was seen i.e. 9 of the 15 cases (60%) and 6 cases were males (40%).

The most common presenting symptom in our study was neck swelling i.e. 13 cases (86.67%) (Fig-1), followed by intra-oral swelling i.e. 9 cases (60%) (Fig-2), muffled voice i.e. 7 cases (46.67%), dysphagia i.e. 7 cases (46.67%), Horner's Syndrome i.e. 2 cases (13.33%), pain i.e. 2 cases (13.33%), cranial nerve palsy i.e. 2 cases (13.33%), symptoms of Catecholamine excess i.e. 2 cases (13.33%) and trismus i.e. 1 case (6.67%) [Table 1].

The most common histologic variant in our study was Schwannoma i.e. 6 cases (40%), followed by Pleomorphic adenoma in 4 cases (26.67%), Paragangliomas 2 cases (13.33%), Carotid Body Tumour in 1 case (6.67%), Adenoid cystic carcinoma in 1 case (6.67%) and Metastatic carcinoma in 1 case (6.67%) [Table 2]. Of these cases, 10 were seen in pre-styloid compartment and 5 in post-styloid compartment in a ratio of 2:1. Of the 6 cases of schwannoma, 4 cases were pre-styloid and 2 cases were post-styloid in origin.

Depending upon the size, site, extent and histology of the tumour, the most effective and radical one or conservative Trans-cervical approach was performed.
tumours, various surgical approaches were selected. [Table 3] The most common surgical approach that we used was the Trans-cervical approach - 9 cases (60%), followed by Trans-cervical Trans-parotid - 3 cases (20%) and lastly Trans-cervical with Midline Mandibulotomy — 2 cases (13.33%). 1 case of Carotid body tumour was referred out to the Department of Cardio-Thoracic Surgery for further management.

The most common post-operative complication in our study was wound dehiscence - 4 cases (26.67%), followed by Facial nerve palsy - 2 cases (13.33%) and trismus - 2 cases (13.33%). Whereas, Vagal nerve palsy and Sympathetic chain involvement (Horner’s syndrome) were seen in 1 case each (6.67%) [Chart 2]

**Discussion:**

Tumours of the parapharyngeal space constitute only 0.5% of all head and neck tumours. 80% of them are benign in nature. Parapharyngeal space is an anatomically complex inverted pyramid shaped area where the base is formed by lateral skull-base including basisphenoid and apex is formed at the greater cornu of Hyoid bone. Superior constrictor muscle covered by Pharyngo-basilar fascia overlying Tonsillar fossa form the medial boundary; whereas ramus of Mandible, Medial pterygoid and posterior belly of Digastric muscle form the lateral boundary. Anterior boundary is formed by Pterygo-madibular raphe. Cervical vertebral bodies and para-vertebral muscles limit the space posteriorly. Styloid process, more precisely Tensor veli palati fascia covering the muscle divides the space into pre-styloidal and post-styloidal compartments. Most of the vital structures like Internal Carotid artery, Internal Jugular vein, lower 4 cranial nerves and sympathetic trunk are present in the posterior compartment; whereas deep lobe of parotid gland and some lymph nodes reside in the anterior compartment [Fig 3].

As most of the lesions are benign and tend to present late in its course, the most common age group of presentation as documented in various literatures is 4\textsuperscript{th} and 5\textsuperscript{th} decade of life. On the contrary, in our study, the most common age group of presentation was 20-30 years. This may be due to small sample size (n=15) and majority of the cases being schwannoma, which are most commonly found in 20-35 years age group.

Regarding sex distribution, we found that there was a slight female preponderance. Ratio was 5:1. This very well correlates with various literatures.

Parapharyngeal mass can give rise to a host of various symptoms depending on the different types of adjacent structures affected. In our study, the most common presentation was neck swelling mainly behind the angle of mandible (86.67%), which is in accordance with various published literatures. This may be explained by the fact that the only resilient wall of parapharyngeal space is the medial wall. Rest of the walls is too rigid due to its bony contents to cause any significant distortion by the tumour. Although most of the cases that we came across were schwannomas which generally present with cervical swellings, their moderate size in most cases initially leads to intra-oral bulging rather than cervical swelling. Trismus indicates infiltration of Pterygoid muscles in malignancies or mechanical obstruction to coronoid process. It was seen in only 1 case (6.67%) of adenoid cystic carcinoma in our study.

The next most common symptoms were dysphagia (46.67%) and muffled voice (46.67%). Cranial nerve palsies were seen in 2 cases (13.33%). These occur due to the involvement of the lower 4 cranial nerves in the post-styloidal compartment. Involvement of the 9\textsuperscript{th} (Glossopharyngeal) and 10\textsuperscript{th} (Vagus) cranial nerves are more common which gives rise to nasal regurgitation, nasal intonation, hoarseness, flattening of palatal arch and dysphonia. It may be due to mass compression effect and their presence usually signifies malignancy or Paraganglioma as seen in 2 of our cases.

Gadolinium enhanced MRI is the most important investigation (Fig-4). It is done to find out the site of origin, size, extent and involvement of the surrounding vital structures especially the Carotid sheath and its contents; lower 4 Cranial nerves and cervical sympathetic chain. Due to its superior soft tissue contrast, MRI is better than Contrast Enhanced CT Scan (CECT) (Fig. 5); the only drawback being its poor bony detail, for which CT is better. So in extensive tumours, extending up to the lateral skull-base, CT Scan is an useful adjunct to figure out Jugular foramen, Hypoglossal foramen and Foramen lacerum areas. A non-parotid pre-styloid parapharyngeal mass can be easily differentiated from a deep lobe parotid mass radiologically by a thin radiolucent line between the parotid capsule and the mass, which is absent in non-parotid lesions.

MR Angiography (Fig-6) was done in 4 of our cases clinically suspected of having vascular tumour or encroachment of carotid seath by the tumour. It is usually done in suspected case of paraganglioma including carotid body tumour.

Fine Needle Aspiration Cytology (FNAC) was done in all cases externally or intra-orally, depending upon the clinical presentation for pre-operative tissue diagnosis. FNAC bears overall Sensitivity of 96% and Specificity of 99% with Accuracy being 98.8%. However, FNAC suffers the drawback of yielding false positive or false negative results, especially in cases of paraganglioma. Incisional
biopsy is usually avoided. After thorough pre-operative work up, the patients underwent surgical excision of the mass through various approaches depending upon the site, size, extent and histology of the tumours, as mentioned earlier. Trans-cervical approach (Fig-7) was most commonly used i.e. in 9 cases (60%). As per existing literature, exposure in this approach is limited superiorly by the angle of mandible. It is suitable for only small and moderate sized tumours. Tumours extending up to the skull-base cannot be managed by this approach due to insufficient exposure superiorly. However, in our experience, we found out this to be the most practical approach, since not only small and moderate tumours but even large tumours, especially well encapsulated ones, can be approached trans-cervically with little difficulty and can be dissected out bluntly without causing significant injury to great vessels and nerves. Second most commonly used approach was Trans-cervical Trans-parotid (Fig-8). Lateral mandibulotomy can be combined with this, if deemed necessary. This is particularly suitable for salivary gland tumours arising from the deep lobe of parotid gland. Facial nerve poses a certain difficulty and injury is quite common even in experienced hands. Out of 3 patients approached by this method, 2 patients developed Facial nerve palsy, out of which, 1 patient recovered by administration of steroids postoperatively. Third type of approach used was Trans-cervical Midline Mandibulotomy (Fig-9). It provides excellent exposure for extensive tumours involving the lateral skull-base. This approach is also known as Mandibular swing. Extensive resection and ligation of major vessels is very well feasible. Repositioning and wire or plate and screw fixation of the mandible gives satisfactory cosmetic outcome. Our experience says that this approach is an excellent one in cases of skull-base involvement as it gives enough exposure for complete removal of the tumour. However, it is more time consuming and chances of complications like wound dehiscence, marginal mandibular nerve injury, palate and dental complications are more, adding to the morbidity of the patient. 

The post-operative complications were very less. Most common complication was wound dehiscence -4 cases (26.67%). 2 cases of voice paralysis were seen in cases of Vagal paraganglioma (Chart - 2). One out these 2 cases opted for Medialisation (Type -1) Thyroplasty later on.

**Conclusion:**

From our study, we conclude that not only small to moderate sized parapharyngeal tumours but also large tumours, specially benign and well encapsulated ones, are quite well managed by an adequate Transcervical approach. Only Malignancies or Skull-base involvement entails a more radical approach like Trans-cervical Midline Mandibulotomy. Hence, a conservative and conventional Trans-cervical approach is feasible in most of the cases over an extensive and radical one.

**Reference:**

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