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REVIEW ARTICLE

Parapharyngeal Space Tumors

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ABSTRACT

Parapharyngeal space is a potential space in the neck extending from skull base to the greater cornu of hyoid bone. It is divided in prestyloid and poststyloid compartment by the fascia joining styloid process to tensor veli palatini. Tumors of parapharyngeal space are uncommon, comprising of less than 1% of all head and neck neoplasms. CT Scanning and MRI investigations is complimentary and both studies should be performed for evaluation of lesions in this area. Complete surgical excision is the mainstay of treatment.

Keywords: Parapharyngeal space, Prestyloid, Poststyloid, CT scan, MRI.

ANATOMY

The parapharyngeal space (or lateral pharyngeal space) is a potential space in the neck shaped like an inverted pyramid.

Boundaries (Fig. 1)

- Inferior greater cornu of the hyoid bone forming the apex
- Superior—base of skull (sphenoid and temporal bones), this area includes the jugular and hypoglossal foramen and the foramen lacerum
- Medial—oro and nasopharynx
- Anterior—pterygomandibular raphe
- Posterior—cervical vertebrae and paravertebral muscles
- Lateral—ramus of the mandible, the deep lobe of the parotid gland, the medial pterygoid muscle, and below the level of the mandible, the lateral aspect is bordered by the fascia of the posterior belly of digastric muscle.

It is continuous with the retropharyngeal space and also communicates with other cervical and cranial fascial spaces as well as the mediastinum.

Divisions and Contents (Fig. 2)

The parapharyngeal space is divided into prestyloid and poststyloid compartments by the fascia joining the styloid process to the tensor veli palatini.

These lymphatics receive afferent drainage from the oral cavity, oropharynx, paranasal sinuses and thyroid.

LESIONS

Tumors of the parapharyngeal space (PPS) are uncommon, comprising less than 1% of all head and neck neoplasms.

Of parapharyngeal space (PPS) tumors, 70 to 80% are benign and 20 to 30% are malignant.

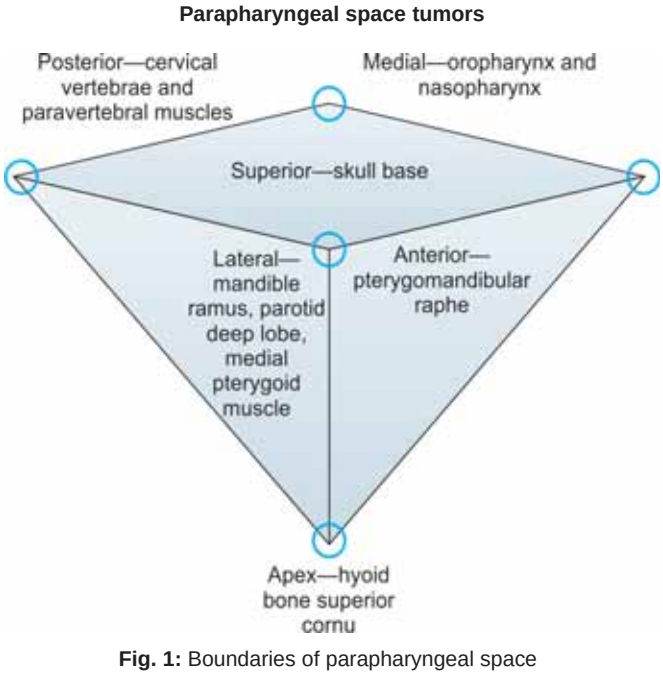

Fig. 1: Boundaries of parapharyngeal space

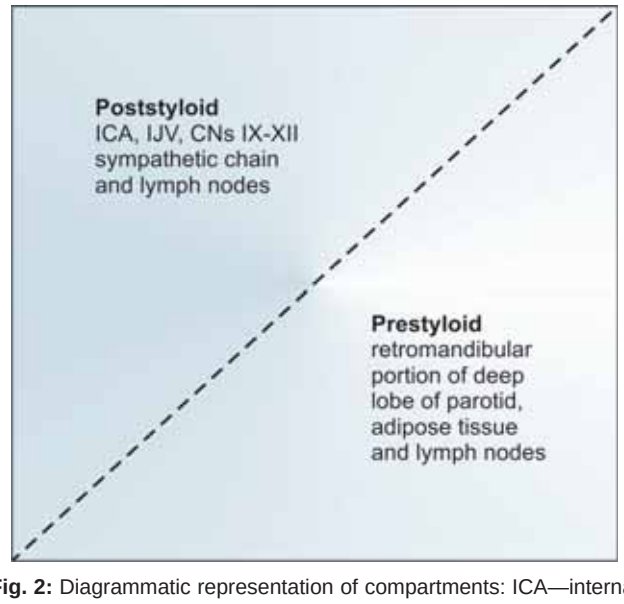

Fig. 2: Diagrammatic representation of compartments: ICA—internal carotid artery; IJV—internal jugular vein; CNs—cranial nerves

Tumors starting from the Commonest Lesions

- Metastatic[1] node from lesions in nasopharynx, lymphoma
- Neoplasms of salivary gland (45%) are located in the prestyloid parapharyngeal space. Salivary neoplasms may arise from the deep lobe of the parotid gland, ectopic salivary rests or minor salivary glands of the lateral pharyngeal wall.

The most common prestyloid parapharyngeal space lesion is pleomorphic adenoma of the parotid gland which represents 80 to 90% of salivary gland neoplasm.

Approximately 20% of all salivary lesions in the parapharyngeal space (PPS) are malignant.

- Neurogenic lesions (25%) are the most common tumors of the poststyloid parapharyngeal space. Neurilemomas are the most commonly encountered lesions, followed in frequency by paragangliomas and neurofibromas. Paragangliomas (chemodectomas) account for 15% of all neoplasms and include glomus vagale, carotid body and glomus jugulare. Malignant neurogenic lesions include malignant paragangliomas, neurofibrosarcoma, schwannosarcoma and sympathicoblastoma.

Miscellaneous Lesions

- Aneurysm
- Ameloblastoma
- Amyloid tumor
- Arteriovenous malformation
- Branchial cleft cyst
- Chondroma
- Chondrosarcoma
- Chordoma
- Choroid plexus tumor
- Dermoid
- Desmoid
- Ectomesenchymoma
- Fibrosarcoma
- Fibrous histiocytoma
- Granular cell myoblastoma
- Hemangioendothelioma
- Hibernoma
- Inflammatory pseudotumor
- Leiomyoma
- Liposarcoma
- Malignant meningioma
- Malignant teratoma
- Meningioma
- Rhabdomyoma
- Rhabdomyosarcoma
- Sarcoma
- Teratoma.

CLINICAL FEATURES

- Painless neck mass
- Sore throat
- Oropharyngeal mass
- Nasal obstruction
- Unilateral eustachian tube dysfunction
- Dysphagia
- Dysphonia
- Dyspnea
- Obstructive sleep apnea
- CN deficits
- Horner's syndrome
- Trismus
- Symptoms[2] of catecholamine excess, like headache, palpitation, excessive perspiration, hypertension, nausea, pallor, orthostatic changes in blood pressure.

INVESTIGATIONS

Laboratory Studies

- 24-hour urine collection for catecholamines
- Vanillylmandelic acid (VMA) or 4-hydroxy-3-methoxymandelic acid
- Metanephrine.

Imaging Studies

CT Scanning

Advantages

- CT[3] scanning can determine if the parapharyngeal space (PPS) mass is in the prestyloid or poststyloid space
- Fat plane between the parotid and the mass suggests an extraparotid origin
- CT scanning is superior to MRI in demonstrating the presence of calcifications and bony involvement.

Disadvantages

Limited soft tissue details.

Magnetic Resonance Imaging (MRI)

- MRI[4] is superior to CT scanning in its ability to ascertain the soft tissue characteristics and vascular details of parapharyngeal space tumors
- MRI can be used to differentiate between tumor and muscle and it has greater resolution in defining the great vessels and their relationship to tumor. Intracranial extension is better delineated on MRI
- T1-weighted images with and without contrast displaying highly vascular nature of tumor matrix
- Paragangliomas have been described as having a "salt-and-pepper" appearance on MRI because of numerous flow voids within the lesion (Figs 3 and 4)
- Schwannomas show greater enhancement on T2-weighted images, enhance with gadolinium, and lack flow voids (Figs 3 and 4).

MRI Scan of the Patient of Paraganglioma

The information obtained from both CT scanning and MRI is complementary, and both studies should be performed in

Fig. 3: Coronal view of parapharyngeal mass

Fig. 4: Axial view of parapharyngeal mass

the evaluation of extensive lesions or when malignancy is suspected.

Angiography

- Angiography is recommended in the work-up of all vascular lesions
- Angiography is also used if malignancy is suspected and if carotid sacrifice is anticipated during resection. If carotid artery resection is considered, angiography is combined with balloon occlusion testing to measure cerebral blood flow
- CT angiography and magnetic resonance (MR) angiography are emerging as alternatives to conventional arteriography.

Balloon occlusion test: The balloon occlusion test measures the effect of internal carotid artery occlusion on cerebral blood flow (CBF) and the adequacy of the contralateral circulation. It is indicated when findings on imaging studies suggest carotid involvement or when resection of the lesion carries a high risk of intraoperative carotid artery injury.

MIBG scanning: If screening for a functional paragangliomas by urinary VMA and metanephrine levels is positive, obtain an MIBG scan. This radioisotope has a similar molecular structure to norepinephrine and is used to trace catecholamine uptake and storage.

Metastatic work-up: If a metastatic lesion is suspected, the primary tumor should be sought by performing a full clinical evaluation, panendoscopy, and a full metastatic work-up as directed by the clinical examination findings.

Diagnostic Procedures

Biopsy: FNAB may be a useful adjunct when the mass is readily accessible, either transcervically or transorally, and may provide useful information if a diagnosis of malignancy is suspected. Under no circumstances should biopsy of a parapharyngeal space mass be performed prior to obtaining results from the radiologic studies.

MANAGEMENT

Complete surgical excision is the mainstay of treatment and is recommended for both diagnostic and therapeutic purposes.

The choice of surgical approach depends on:

- Tumor size
- Location
- Relationship to the great vessels
- Suspicion of malignancy.

SURGICAL APPROACHES

Transoral Approach

Indications

Removal[5] of small, benign salivary tumors arising from minor salivary glands limited to the prestyloid parapharyngeal space.

Disadvantages

- Limited exposure
- Inability to visualize the great vessels
- Increased risk of facial nerve injury
- Tumor rupture.

Transcervical Approach

Indications

Removal of most poststyloid parapharyngeal space tumors.

Steps of Surgery

- A transverse incision at the level of the hyoid bone, two fingerbreadths below the mandible
- Identify carotid artery and internal jugular vein
- Retraction of the digastric and stylohyoid muscles
- The submandibular gland either retracted anteriorly or removed, if necessary.

Transcervical-transparotid Approach

Indications

Removal[6] of tumors arising from the deep lobe of the parotid.

Advantages

Can be combined with a transparotid approach by extending the incision superiorly as for parotidectomy.

The cervical incision allows access to the parapharyngeal space component of the tumor.

Transcervical-transmandibular Approach

Indications

Removal of very large tumors, vascular tumors with superior parapharyngeal space (PPS) extension.

Advantages

- Better exposure facilitates oncologic resection
- Distal control of the carotid at the skull base possible.

Steps of Surgery

Mandibulotomy may be lateral or anterior (midline).

A lip-splitting incision is vertically through midline or curved around ipsilateral mental crease.

Infratemporal Fossa Approach

Indications

Removal[7] of malignant tumors involving the skull base or jugular foramen.

Steps of Surgery

A parotidectomy incision with cervical extension is extended superiorly into a hemicoronal scalp incision.

The temporalis muscle is elevated to expose the glenoid fossa, which is removed laterally.

The temporomandibular joint can be displaced inferiorly or the mandible condyle can be transected for improved exposure.

Orbitozygomatic osteotomies are performed, and the infratemporal skull base and distal carotid are exposed.

The facial nerve and vascular structures in the neck are identified through the cervical and preauricular approaches.

Can be combined with frontotemporal craniotomy for removal of tumors with significant intracranial extension.

Postoperative Details

Always perform tracheostomy in conjunction with a transmandibular approach because significant upper airway edema may result from surgical manipulation of the oral cavity and oropharynx, causing obstruction.

COMPLICATIONS OF SURGERY

- Bleeding
- Seroma formation
- Injury to the facial nerve (temporary or permanent)
- Cerebrospinal fluid leaks
- Meningitis
- Injury to the lingual and hypoglossal nerves
- Injury to CN IX, X, XI, XII and the cervical sympathetic chain
- Isolated injury to the hypoglossal nerve does not usually significantly impair swallowing or speech function
- Horner's syndrome may result from injury to the cervical sympathetic chain
- Vascular complications are more common with removal of neurogenic or vascular lesions
- Complications of mandibulotomy include infection, temporomandibular joint dysfunction, nonunion, plate extrusion and tooth loss
- Malocclusion may occur following mandibulectomy in dentate patients
- Complications of radiation therapy (xerostomia, tissue fibrosis, acceleration of dental caries and osteoradionecrosis).

Nonsurgical Management is indicated

- Poor surgical candidates because of comorbid disease
- Those who are elderly
- Those in whom balloon occlusion fails
- Those who have unresectable lesions
- Those who have benign, slow-growing tumors that would carry a significant risk of sacrifice of multiple cranial nerves, if resected.

CHALLENGES

The transoral[8] robotic surgery TORS approaches provided excellent three-dimensional visualization and instrument access that allowed successful parapharyngeal space and infratemporal fossa surgical resections from cadaver models to the first known human patient application. Robotic surgery for the skull base holds potential as a minimally invasive approach to skull base neoplasms; however, continued development and investigation is warranted in a prospective human clinical trial before final conclusions can

be drawn as to the full advantages and limitations of this approach.

REFERENCES

1. Watkinson JC, Gaze MN, Wilson JA. Stell and Maran's head and neck surgery, Benign neck disease (4th ed): 81-195.
2. Friedman Rick A, Brackmann Derald E. Paul J Donald surgery of skull base chapter 24 approaches to jugulotympanic paragangliomas 473-87.
3. Som PM, Biller HF, Lawson W. Tumours of parapharyngeal space evaluation, diagnosis and surgical approaches. Annals of Otology Rhinology Laryngology 1981;90(suppl 8014):3-15.
4. Som PM, Curtin HD. Lesions of parapharyngeal space, role of MR imaging. Otolaryngologic clinics of North America 1959;286:515-42.
5. Shaheen OH. Tumours of infratemporal fossa and parapharyngeal space (5/22/1- 5/22/19).
6. Work WP, Gates GA. Tumours of parotid gland and parapharyngeal space. Otolaryngologic clinics of North America 1969;2:497-514.
7. Fisch U, Pillsburry HC. Infratemporal fossa approach to lesions in temporal bone and base of skull. Archives of Otolarngology 1979;105:99-107.
8. Bert WO'Malley Jr, Weinstein Gregory S. Arch Otolaryngol Head and Neck Surg 2007;133(12):1215-19.