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ORIGINAL ARTICLE

A Clinical Approach to the Parapharyngeal Space

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ABSTRACT

Aim: To present the clinicopathological profile, surgical management, and the outcome of parapharyngeal space (PPS) neoplasms in 14 patients.

Materials and methods: This is a retrospective review of the clinical records of 14 patients treated for PPS tumors. The age of patients ranged from 24 to 54 years, with female to male ratio of 1.3:1. The commonest clinical presentation was a slow-growing, painless neck swelling. The preoperative protocol was based on: (1) imaging study to establish site, size, and anatomical relationships. (2) Fine-needle aspiration cytology (FNAC) was performed to determine the nature of the mass. Details of the management, morbidity, and outcome of these patients are presented.

Results: A total of 85.7% of the PPS neoplasms were benign and 14.2% were malignant. Majority of the benign tumors were of neurogenic origin. The histocytopathology confirmed 12 (85.7%) of these diagnoses (2 patients were with "nondiagnostic" result). The positive predictive value of the FNAC was 83.3% for benign tumors and 100% for malignant tumors. In 6 patients (60%), a transcervical surgery was performed. Three patients (30%) underwent transparotid–transcervical surgery for a pleomorphic adenoma of the deep lobe of the parotid gland in the prestyloid space and transcervical–transmandibular approach was taken in 1 case (10%). Postoperative complications occurred in 3 out of 10 patients (33.3%).

Conclusion: The results of our study are in agreement with other studies reported in the literature and confirm the need to follow a careful preoperative diagnostic protocol that must take advantage of imaging studies (computed tomography, magnetic resonance imaging) and of cytology FNAC, in order to plan surgical treatment with a safe approach and that reduces complications, esthetic and functional damage, and the risk of recurrence.

Keywords: Parapharyngeal space, Poststyloid, Prestyloid, Tumor.

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INTRODUCTION

Although primary tumors of the parapharyngeal space (PPS) are rare and account for only 0.5% of head and neck neoplasms, the anatomy of the PPS makes clinical examination very difficult.[1,2] The PPS is an inverted pyramid-like area that 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. This space is divided into the prestyloid and poststyloid compartment by thick layers of fascia extending from the styloid process to the tensor–vascular–styloid fascia that comprises the tensor veli palatine muscle, its fascia, the stylopharyngeal and the styloglossus muscles.[3,4] The pathologies most commonly found are primary tumors (both benign and malignant), metastatic lymph nodes, and involvement from lymphoproliferative diseases and adjacent site tumors which extend into this space.[2-5] In the prestyloid space, salivary gland neoplasms (especially parotid gland pleomorphic adenomas) are the most common, while neurogenic tumors (e.g., schwannomas and neurofibromas) are those most commonly affecting the poststyloid. Of these tumors, only 20% are malignant and 50% originate either in the deep lobe of the parotid gland or the minor salivary glands.[6] Other less common neoplasms include: neurogenic tumors (13%), vascular tumors (paragangliomas), chordomas, lipomas, lymphomas, chemodectomas, rhabdomyomas, chondrosarcomas, desmoid tumors, ameloblastomas, amyloid tumors, ectomesenchymomas, fibrosarcomas, and plasmocytomas.

Imaging studies are used to predict the origin, location, and the size of parapharyngeal tumors. Magnetic resonance imaging (MRI) with gadolinium is better than a computed tomography (CT) scan and is the examination of choice. Angiography is recommended for all enhancing lesions or vascularized masses, particularly if imaging shows a widening of the carotid bifurcation. Fine needle aspiration cytology (FNAC) is accurate in 90 to 95% of cases. It is performed transorally, transcervically, or guided

by CT or ultrasound (US) and can predict the nature of the lesion which will assist surgeon/patient planning.[7,8] The surgical removal of these tumors is the best treatment. Surgical resection techniques described in the literature[6,9-11] are classified as transoral, transcervical, transparotid–transcervical, transcervical–transmandibular, or infratemporal, and the correct choice between them depends upon the accurate information on the cytopathology, mass size and location, its relationship with the surrounding vessels and nerves, and its nature.[12]

MATERIALS AND METHODS

This study is a retrospective review of the clinical records of 14 patients treated for PPS tumors during the period of July 2005 to December 2009 at the Department of Otolaryngology, SS Institute of Medical Sciences & Research Centre, Davangere, India. The study population comprised eight females and six males with a mean age of 38.14 years (24–54) diagnosed with parapharyngeal mass tumors. The age of patients ranged from 24 to 54 years, with female to male ratio of 1.3:1 (Table 1).

The commonest clinical presentation was a slow-growing painless neck swelling. Other complaints included dysphagia, dyspnea, hoarseness of voice, impaired hearing, and pain (Table 2). Out of 14 patients, 10 underwent surgical procedure, while 2 patients refused and another 2 opted for treatment elsewhere. The preoperative protocol was based on: (1) imaging study to establish site, size, and anatomical relationships; (2) FNAC performed to determine the nature of the mass. Details of the management, morbidity, and outcome of these patients are presented.

The surgical approach, in these 10 patients, was: transparotid–transcervical in 3 cases with benign tumors (all pleomorphic adenoma) of the prestyloid space and <4 cm in size; transmandibular–transcervical in 1 case of adenoid cystic carcinoma of >4 cm in size. Transcervical approach was utilized in 5 cases of benign lesions <4 cm in size and 1 case of secondaries in PPS, <4 cm in size and without cranial extension. All patients were observed at annual follow-up for at least 3 years, with a physical examination and imaging evaluation (US, CT, or MRI).

RESULTS

Of these PPS tumors, 12 were benign (85.7%) and 2 malignant (14.2%). The histological diagnosis was 4 cases with neurilemmoma, pleomorphic adenoma of the deep lobe of the parotid gland in 3 cases, 2 cases of paraganglioma and ganglioneuroma each, and 1 case of benign spindle cell tumor. One case of adenoid cystic carcinoma and one secondaries in neck with unknown primary were the two malignant cases. The histocytopathology confirmed 12 out of 14 cases (85.7%) of these diagnoses (2 patients with benign lesions had a "nondiagnostic" result). The positive predictive value of the FNACs was 83.3% for benign tumors and 100% for malignant tumors (Table 3).

The surgical approach, in these 10 patients, was: transparotid–transcervical in 3 cases with benign tumors of the prestyloid space and <4 cm in size; transmandibular–transcervical in 1 case; adenoid cystic carcinoma of >4 cm in size. In 5 cases of benign lesions <4 cm in size and 1 case of secondaries in PPS with unknown primary, 4 cm in size, a transcervical approach was performed (Table 4). Postoperative complications

Table 1: Age and sex distribution (n = 14)

Age (years)	*Male*	*Female*	*Total number*	*Percentage*
21–30	1	1	2	14.2
31–40	2	4	6	42.8
41–50	2	2	4	28.5
51–60	1	1	2	14.2
Total	6	8	14	100

The lowest age of the presentation was 24 years and highest was 54 years. The mean ± SD was 38.14 ± 9.21 years

Table 2: Presenting clinical features

Symptoms	*Number*
Neck swelling	6
Dysphagia	4
Heaviness in ear	3
Pain in swelling	2
Change of voice	2
Breathing difficulty	1

Table 3: Histopathological type of neoplasm

Neoplasm	*Number (n = 14)*
Neurilemmoma	4
Pleomorphic adenoma	3
Paraganglioma	2
Ganglioneuroma	2
Benign spindle tumor	1
Adenoid cystic carcinoma	1
Secondaries	1

Table 4: Surgical approach

Approach	*Total cases (n = 10)*	*Neoplasm type*
Transparotid–transcervical	3	Pleomorphic adenoma
Transcervical	6	Neurilemmoma 2
		Paraganglioma 1
		Ganglioneuroma 1
		Benign spindle cell tumor 1
		Secondaries 1
Transmandibular–transcervical	1	Adenoid cystic carcinoma 1

Table 5: Complications of surgery

Complication	*Surgical approach*	*Neoplasm*	*No*	*%*
Horner's syndrome	Transcervical	Neurilemmoma	1	10
Marginal mandibular N palsy	Transmandibular–transcervical	Pleomorphic adenoma	1	10
Hypoglossal nerve palsy	Transcervical	Secondaries	1	10
Total			3	33.3

occurred in 3 out of 10 patients (33.3%). One patient developed Horner's syndrome due to sympathetic chain damage during resection. One patient had a temporary marginal mandibular of the facial nerve dysfunction, which healed spontaneously 6 months later. One patient with metastatic adenocarcinoma had hypoglossal nerve injury, which did not recover completely at 6 months follow-up (Table 5). Postoperative radiotherapy was carried out in 2 patients with malignancies. Disease status was evaluated in all patients in order to determine the best therapeutic approach. Eleven patients (91.6%) were still disease-free after a 3-year follow-up. Postoperative radiotherapy was carried out in 2 patients with malignancies. Disease status was evaluated in all patients in order to determine the best therapeutic approach. Eleven patients (91.6%) were still disease-free after a 3-year follow-up.

DISCUSSION

The neoplasms of PPS may originate from either prestyloid space that contains retromandibular portion of the parotid gland and its lymph nodes and adipose tissue or from the poststyloid compartment which contains the internal carotid artery, the internal jugular vein, the IX, X, XI and XII cranial nerves, the sympathetic chain, and the lymph nodes. They present with very few symptoms and may include dyspnea, obstructive sleep apnea syndrome, dysphagia, Horner's syndrome, pain, hoarseness of voice, cranial nerve deficits, dysarthria, hearing impairment, pressure in the ears, and trismus. Sometimes, a neck mass may be discovered incidentally during a routine physical examination. Intraorally, the tumor may appear as a smooth submucosal swelling pushing the tonsil, lateral pharyngeal wall, and soft palate anteromedially and is often misdiagnosed as an infection or tumor of tonsil. In addition, the space itself is clinically inaccessible as it is surrounded by the muscles of mastication, the mandible and parotid glands which makes physical examination of the tumor difficult. In these cases, a bimanual evaluation is the most effective clinical examination, although tumors of <2.5 cm are undetectable.[13]

The mean age of presentation for PPS neoplasm was 40 years by Stanley,[14] Maran et al,[15] and Pang et al,[1] and they reported no sex predominance in their studies. In our study, the mean age was 38.14 years with slight female predominance. Salivary gland tumors comprise the majority of PPS tumors followed by neurogenic tumors and paragangliomas.[14] In our study, neurilemmoma was the commonest tumor, compatible with findings of Cai et al.[16]

Ultrasonography or CT-guided FNAC is desirable to know the nature of the tumor. According to the data in the literature, FNAC is accurate in 90 to 95% of cases. It is performed transorally, transcervically, or guided by CT or US and can predict the nature of the lesion which will assist in management planning.[17] In our study, all patients underwent FNAC, and cytohistopathological findings confirmed 12 out of 14 cases (85.7%) of the diagnosis (2 patients had a "nondiagnostic" result). The positive predictive value of FNAC was 83.33% for benign tumors and 100% for malignant tumors. Therefore, FNAC has proved to be a valid tool in our presurgery protocol, since accurate diagnosis is paramount for planning the best management plan and to safely and radically remove PPS tumors.

Tumors that involve the PPS are primary neoplasms, metastatic cancer, or lesions which originate from the neighboring areas. Neoplasms of PPS reported in the literature are 80% benign and 20% malignant.[6] In our study, 85.7% were benign and 14.3% malignant. A transcervical–transparotid approach provides a good field of visualization and helps to identify the branches of the facial nerve, external and internal carotid arteries, the internal jugular vein, the cranial nerves IX, X, XI, XII, and the paravertebral sympathetic chain. Most deep lobe tumors can be removed with this approach and it is particularly effective for small tumors. A superficial parotidectomy must be performed and the facial nerve carefully dissected and preserved. A retractor will expose the PPS and create sufficient space to perform the digital dissection of deep lobe tumors by gently dividing the soft tissue and fibrous adhesions. However, extreme caution must be used during dissection, since rough handling may cause the tumor to rupture and spill into the surgical field, resulting in a high risk of local recurrence. This approach cannot be used when the mass is >4 cm, where tumor adhesion is dense or in patients who have previously undergone attempts to biopsy or remove it or when an infiltrating malignancy is suspected.[18] In our study, this approach was used in the removal of 3 cases of pleomorphic adenomas. The mean tumor size was 3.5 cm, facial nerve function was preserved in all cases, and no other complications occurred. The transcervical approach is usually used for lesions of <4 cm, not originating in the parotid gland, and without cranial extension. In our study, this approach was used in 6 cases: 5 of the benign neurogenic neoplasms and 1 case of secondaries with unknown.

Surgically, the mandible becomes an obstacle to the successful surgery of PPS and many approaches have been proposed to overcome this problem. These can be divided into two distinct groups: (1) retraction of the mandible into a protruded position and (2) mandibulotomy techniques.[6,8,9] A midline mandibulotomy or a parasymphysis osteotomy, anterior to the mental nerve, with a labiotomy and an intraoral incision along the floor of the mouth, could be combined with a transcervical or transcervical–transparotid approach, since it would enlarge PPS exposure. However, this procedure would also require a tracheotomy and a nasogastric feeding tube. In the mandibular "swing" approach, the mandible is retracted laterally to expose the PPS as much as possible, and to preserve the mental nerve.[9] The disadvantages of this approach are cutting of the lower lip and the subdislocation of the temporal–mandibular articulation. The "swing" approach must be used for malignant or invasive tumors with mucosal involvement of the pharyngeal wall or invasion of the skull base or the pterygomaxillary fossa. In our experience, 4 cm is the limit for radical tumor excision with the transcervical approach without mandibulotomy. For a safe and radical resection of tumors >4 cm, the "swing" approach or the transmandibular with a double osteotomy is required.

CONCLUSION

Our protocol to the diagnosis and surgery are in agreement with other studies reported in the literature,[1-14] where PPS tumors have been treated with the use of one of the various surgical approaches described in relation to the histopathological diagnosis (benign or malignant), to the side (prestyloid or poststyloid), and to the size (±4 cm) of the neoplasia and, moreover, with a long-term follow-up. The FNAC, CT scan, and US imaging are very useful to assess the location, size, vascularity, tissue origin, and the relationship of PPS tumors to surrounding anatomical structures, which is very crucial in planning surgical approach and predicting the prognosis.

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