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ORIGINAL ARTICLE

BENIGN PARAPHARYNGEAL SPACE TUMOURS – AN ACCESS WITHOUT MANDIBULOTOMY

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Abstract

Aim: The aim of this work was to assess the accessibility of the transcervical and the transcervical-transparotid approaches per se without access mandibulotomy for removal of benign parapharyngeal space (PPS) tumours and checking the probability of occurrence of any possible postoperative ENT morbidity.

Methods: 16 patients had benign parapharyngeal tumours were subjected to surgical removal of these tumours. 13 of them were females and 3 were males. Their age ranged between 35 and 65 years old. The main diagnostic tool was CT scan. 12 (75%) of them had extraparotid origin (poststyloid) and were accessed transcervically and 4 (25%) originated from the deep parotid lobe (Prestyloid) and were accessed transcervically - transparotid.

Results: All the tumours have been successfully removed without major reported complications and without a need to do access mandibulotomy, even for large sized tumours. All the symptoms improved without ENT morbidity. No tumour recurrence observed in the follow up period that extended for a mean of one year.

Conclusion: Transcervical and transcervical - transparotid approaches were found to have a very good accessibility for removal of benign PPS tumours without the need for access mandibulotomy. .It has also a very good patient outcome regarding the occurrence of any ENT complications.

Keywords: Parapharyngeal tumours, Oropharyngeal tumours, Access mandibulotomy, Transcervical approach.

INTRODUCTION

The parapharyngeal space (PPs) has the shape of an inverted pyramid, the base is the skull base and the apex is the hyoid bone. The medial wall is formed by the buccopharyngeal fascia and the superior conistrictor muscle. The lateral wall is formed by the fascia on the medial surface of the parotid gland, the ascending ramus of the jaw and the submandibular gland. The anterior boundary is the pterygomandibular raphe and

the posterior boundary is the carotid sheath. The styloid process and the attached muscles divide the space into two compartments, the pre- styloid space that is occupied mainly by the deep lobe of the parotid gland and the post- styloid space that contains the internal carotid artery, the internal jugular vein, the cervical sympathetic chain and the last four pairs of cranial nerves.[1,2]

(PPs) tumours are not very frequent, accounting for 0.5% of neoplasms of the head and neck. Most of these tumours (70-80%) are benign. 40-50% of the total originate in the salivary glands particularly the pleomorphic adenoma.[3,4] They may originate either from the deep lobe of the parotid gland, ectopic salivary gland nests, or from minor salivary glands in the lateral pharyngeal wall. This is followed by the neurogenic tumours and paragangliomas. Rare benign tumours are lipomas, fibromas, rhabdomyomas, leiomyomas, haemangiomas, arteriovenous malformations, aneurysms[5,6] and branchial cleft cysts.[7,8]

(PPs) tumours may remain undetected for long periods of time. They may present as asymptomatic lumps medially displacing the oropharyngeal structures, or as asymptomatic mass in the neck. Unilateral eustachian tube obstruction may cause serous otitis media. Other symptoms observed include feeling of having a foreign body, sore throat, dysphagia, dyspnoea and obstructive sleep apnoea. Pain, rapid growth, trismus and or paralysis of any of the cranial nerves would suggest malignancy.[9]

CT scan is superior to MRI in demonstrating the presence of calcifications and bony involvement. With contrast infusion, the relationship of the mass to the great vessels may be appreciated. MRI is superior to CT scan in its ability to ascertain the vascular resolution and soft tissue criteria of these tumours. The information obtained from both CT and MRI is complementary and both should be obtained in extensive lesions or when there is suspicion of malignancy. Extraparotid origin of these neoplasms is indicated by preservation of the fat plane between the parotid and the mass. Angiography is reserved for enhancing lesions, and when malignancy is suspected.[10]

Fine needle aspiration cytology (FNAC) is very specific in the histological diagnosis of these tumours, however, when the result do not confirm with the clinical picture, then excisional biopsy is indicated. Incisional biopsy is now condemened by most surgeons because of the risk of bleeding and tumour contamination of the pharyngeal mucosa.[6]

Surgical Approaches: Because most of these tumours are benign, the approach choosen should provide complete and safe removal of the tumour with minimum aesthetic and functional morbidity. The approach chosen depends up on the size and the site of the tumour. Many approaches have been described including transcervical (TC) approach,[11,12] transcervical-transparotid (TC-TP) approach,[13] transpalatal or transoral one.[14] Access mandibulotomy[15] have been described as a complement to these approaches for very large and vascular tumours for which maximal exposure at the skull base is required for control of bleeding and for tumour removal. Transoral approach[11,12] offers a direct route to tumors present in the oropharynx; however this is rarely used nowadays, due to its risk of hemorrhage, infection, facial nerve injury and tumor implantation. It should be used only for small lesions not extending up to the styloid process. However transoral robotic surgery has been recently evaluated for removal of benign PPs tumours utilizing a rigid endoscopy, computer and a camera and proved to be valuable.[16] Lastly, the orbitozygomatic and other skull base approaches have been described for large tumours affecting the temporal bone or tumours reaching the base of the skull.[17]

The (TC) approach has been considered as the preferred method for removal of most poststyloid tumours. This has been used ideally in patients with extraparotid lesions. The PPs is entered from below, and the lesion is dissected free and removed. Sharp and blunt dissection are often possible and allow under direct visualization the prevention of injury to the major blood vessels.[7] The (TC-TP) approach is served for large tumours arising from the deep lobe of the parotid and occupies the prestyloid compartment of the PPs. Small lesions of deep lobe of parotid with or without minimal involvement of the PPs may be removed by transparotid approach only.[11-13]

PATIENTS AND METHODS

Inclusion Criteria: Sixteen patients seen at the maxillofacial and plastic surgery unit – General Surgery Department - El Minia University were included and the research work has been approved by the local ethical committee of the University Hospital and all patients signed and gave informed consent form. All had benign PPs tumours. Their age ranged between 35 and 65 years. The mean age was 47 years. 13 were females (81%) and 3 were males (19%). All (100%) suffered from a bulge in their oropharynx and had a sense of having a foreign body in their throat. Three (19%) had a submandibular bulge (Figs. 1,2). Eight (50%) had dysphagia. One (6%) had serous otitis media. Two (13%) had dyspnoea and obstructive sleep apnoea. Patients were first seen by an otolaryngologist and had thorough clinical ENT examination then referred to the Maxillofacial Unit. Direct and indirect examination of the nasopharynx, oropharynx, and larynx were done using the fiberoptic endoscope to achieve an appropriate diagnosis regarding to the possible nature of the tumour and also to assess if there is any possibly accompanying neurological deficit, involvement or closure of the eustachean tube orifices, soft palate involvement, obstruction of the choanae of the nose or any accompanying otological manifestations.

Exclusion Criteria: Patients had malignant tumours and those having proved vascular malformations were excluded from this study as these lesions should be excised under direct vision with a good accessibility utilizing mandibulotomy. Small sized prestyloid swellings that could be excised with a transparotid approach only were also excluded from this study.

Investigations Performed: CT scan was the main diagnostic tool in all (100%) cases (Fig 3). Patients were classified according to the CT findings into Poststyloid (extraparotid) swellings and prestyloid (deep lobe parotid) swellings. Poststyloid swellings were known by preservation of the fat plane between the parotid and the mass. They were detected in 12 patients (75%). prestyloid (Deep lobe parotid) swellings were known by absence of this fat plane. They were detected in 4 patients (25%). MRI has been done in five (31%) large sized tumours to demonstrate the soft tissue criteria, the definition of the borders and to be sure of the completeness of the capsule. CT angio has been done in three
(18%) cases. (FNAC) has been done through the neck in the three cases in which the mass bulged from the neck, and transoral in the remaining 13 cases.

Poststyloid (extraparotid) swellings were approached transcervically (Figs. 4-6). An incision was made as a transverse curvilinear one in the skin fold at the level of the hyoid bone. Subplatysmal flaps were elevated with preservation of the marginal mandibular nerve which was reflected superiorly. The digastric tendon was followed posteriorly up to styloglossus and stylohyoid ligament. The Para pharyngeal space was entered by dividing these structures. Removal of the submandibular salivary gland, and / or division of the digastric tendon improved the accessibility to the PPS. Because of the limited exposure superiorly, medially, and posteriorly, blunt dissection was necessary for tumour removal.[18]

Prestyloid swellings were removed through the usual parotidectomy incision that was extended transcervically. Superficial parotidectomy was done after identification and preservation of the facial nerve utilizing a nerve stimulator. The facial nerve was then dissected free of the underlying deep lobe, and the tumour exposed. The submandibular gland was displaced. The tumour was then mobilized in a three dimentional manner from the parotidectomy wound, as well as the submandibular space, and removed.[19]

All the patients were thoroughly reevaluated postoperatively and resubjected to ENT evaluation and followed up for a mean of one year.

RESULTS

The benign (PPs) tumours were found to be four times more common in females than males. They were common in middle and old ages. . The most common physical finding was a painless oropharyngeal mass that extended and became palpable in the neck in three (19%) cases. These swellings were found to be solitary and of different sizes. They had smooth surface and a well-defined edge. Also they were firm, mobile and not tender. The overlying mucosa was intact and normal looking. There was no regional lymphadenopathy. The laboratory data was within normal limits. The eustachian tube was found to be closed in one case. Cranial nerve affection was not encountered in any case.

CT scan revealed that all these swellings were well defined and 88% of them approached the skull base. They varied in size from 3x5 to 7x13 cms. MRI showed an enhancing lesions in three cases from the five cases that have been examined. These three cases were subjected later on to further examination by CT angio that ruled out vascular malformation. FNAC excluded malignancy in all cases.

All these swellings have been successfully enucleated. Significant bleeding was not encountered. Access mandibulotomy was not required in any of these tumours, even in the largest swellings. Removal of the submandibular gland, and /or division of the digastric tendon improved the accessibility in these cases. The only reported intraoperative complication was iatrogenic opening of the lateral pharyngeal mucosa that occurred in one case. The mucosa has been closed primarily without harmful outcome. Temporary facial nerve weakness was clinically identified in two patients out of the four who had undergone (TC-TP) approach. These two patients improved within two months after being treated with medical treatment and physiotherapy. All the symptoms improved in the immediate postoperative period, and the patients had uneventful recovery. No tumour recurrence detected in the follow up period that extended for a mean of one year.

Histopathologic Examination: Histopathologic examination of the resected masses revealed pleomorphic adenoma in eight (50%) cases, ganglion neuroma in three (19%) cases, Schwannoma in two (13%) cases, Leiomyoma in one (6%) case, fibroma in one (6%) case and lipoma in one (6%) case. The exact origin of the neurogenic tumours could not be determined and no neurologic deficit detected in these patients. Table 1.

Table 1. Patients' demographic data, approach used histopathology and outcome. F (female) - M (Male)-PA (Pleomorphic adenoma).

No	Sex	Age in years	Size in cm	Location	Approach	Histopathology	Complications
1	F	48	4x6	Poststyloid	Transcervical	Ganglion neuroma	
2	F	52	5.5X7.5	Poststyloid	Transcervical	PA	
3	F	35	3x5	Poststyloid	Transcervical	Leiomyoma	
4	M	42	5X8	Poststyloid	Transcervical	PA	
5	F	65	5X11	Poststyloid	Transcervical	Ganglion neuroma	Iatrogenic opening of the lateral pharyngeal wall without harmful outcome
6	F	51	7x12	Prestyloid	Transcervical transparotid	PA	Temporary facial nerve weakness
7	F	37	3,5X5	Poststyloid	Transcervical	Fibroma	----------
8	F	47	7X13	Prestyloid	Transcervical transparotid	PA	Temporary facial nerve weakness
9	F	48	4x5	Poststyloid	Transcervical	Ganglion neuroma	
10	M	52	5x6	Poststyloid	Transcervical	PA	
11	F	48	3x5	Poststyloid	Transcervical	Lipoma	
12	F	37	6x12	Poststyloid	Transcervical	Schwanoma	
13	F	50	7X10	Poststyloid	Transcervical	PA-	
14	F	51	7x13	Poststyloid	Transcervical	Schwanoma	
15	M	35	7x12	Prestyloid	Transcervical transparotid	PA	
16	F	56	6x13	Prestyloid	Transcervical transparotid	PA	

Fig 1. 52 years old female patient presented with right upper cervical swelling. Red arrow points to the bulge.

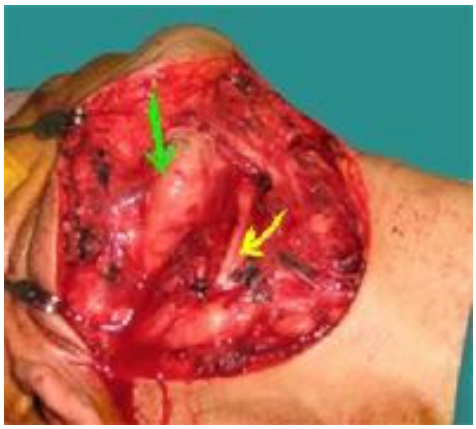

Fig 4. Raised cervical flap for the same previous patient and upward displacement of the submandibular salivary gland which is pointed to by the green arrow. The digastric tendon which will be cut is pointed to by the yellow arrow.

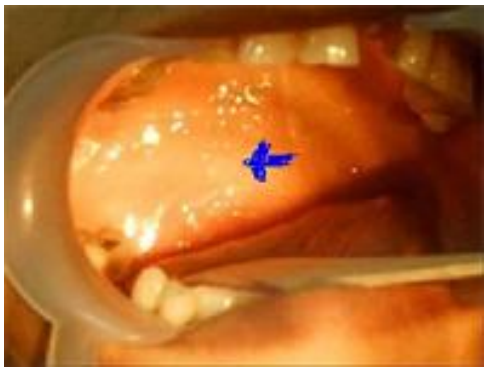

Fig 2. An intraoral view for the same previous patient showing an oro-faucial bulge as pointed to by the blue arrow.

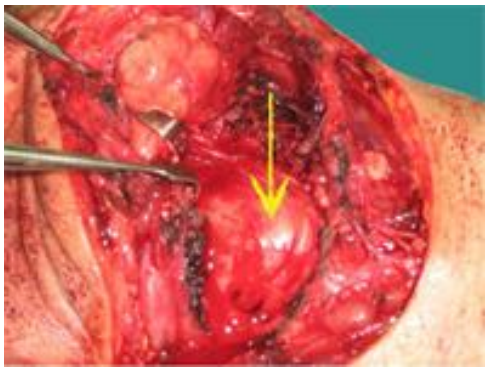

Fig 5. Further dissection over the lower pole of the mass that becomes more evident as pointed to by the yellow arrow.

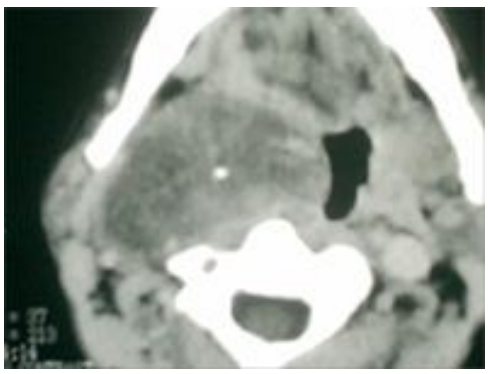

Fig 3. Axial CT scan of the same patient showing right poststyloid hypodense mass with homogenous enhancement and central calcific dot. The fat plane is preserved between the mass and the parotid. The masss encroaches on the the oropharyngeal airway.

Fig 6. The operative field after enucleation of the mass. The yellow arrow points to the Intact pharyngeal mucosa.

DISCUSSION

Parapharyngeal space tumours present a great challenge to the surgeon with respect to preoperative evaluation as well as surgical approach. The majority of these tumours are benign, so the aim of surgery is to totally excise the tumour with least morbidity. There are various approaches been described which are transcervical,[11,12] transparotid,[19] transcervical-transparotid,[13] different transoral approaches [14] , and skull base approaches.[17] Access mandibulotomy may be associated with any of these.[20]

Despite providing adequate exposure, access mandibulotomy may be associated with several complications. Poor dental hygiene adjacent to the mandibulotomy may predispose to osteotomy sepsis with a possibility of malunion or ununion that is potentially associated with malocclusion and potentially requires removal of the hardware and refixation.[21] Access osteotomy at the mandibular angle area is associated with inferior alveolar nerve injury, While paramedian osteotomy may be associated with mental nerve injury.[22-24]

It has been found that (TC) and (TC-TP) approaches per se without access mandibulotomy are enough for resection of benign PPS tumours, This is in accordance with that mentioned by many authors.[11,13,18] In their retrospective study up on 33 patients who underwent resection of PPS neoplasms, Malone et al, 2001[11] demonstrated that (TC) approach with submandibular gland excision provides excellent local disease control with minimal risk of facial nerve injury or need for mandibulotomy and/or tracheostomy. Khan et al 2002,[18] presented four cases of PPs masses that have been removed without mandible split through (TC)approach even with their enormous size. Also, Hughes et al, 1995,[13] published a series of 172 cases using the transcervical and transparotid approaches using mandibular osteotomy in only 2% of resections without major reported complications.

It has been mentioned that the (TC) approach is associated with risks of permanent lower cranial nerve and cervical sympathetic neuropathies as seen in 17% of the cases in Carrau series[25] and 1/13 of the cases in the Pang series.[26] These neurologic deficits were not encountered in this study. The other fatal complications are mainly related to paraganglioma excision namely neurovascular accident and mortality. These complications were not encountered in this series. Also the (TC) approach was proved to have limited exposure medially, superiorly and posteriorly that makes complete control of vascular structures particularly at the skull base is not possible.[6] This limited exposure was overcomed by excision of the sbmandibular gland, division of the digastrics tendon and by using blunt dissection in large sized masses. Naresh et al, 2005[6] mentioned that the transparotid approach can lead to temporary facial weakness and Frey's syndrome.

The (TC) approach was found to be suitable for any benign (PPs) tumours either presenting in the neck or extending high in the (PPs), and is suitable even for masses of enormous size. In contrast to this Prasad et al, 2004[20] mentioned that (TC) approach is suitable for tumours presenting in the neck but not extending into the upper (PPs) or very large tumours which needs access mandibulotomy.

In order to determine the best surgical approach for 22 benign (PPs) tumours, Kanazaki and Nameki, 2008[19] found that large tumours present in the superior portion of the (PPs) could be completely removed through a skull base approach. To remove a large tumour in the middle and inferior portion of the (PPs), a transparotid approach was the most suitable. Finally a tumour in the inferior portion was best accessed through a (TC) approach.

Access mandibulotomy is still mandatory in malignant cases with a possibility of mandibular invasion and in vascular malformations. So, Patients had malignant tumours and those having proved vascular malformations were excluded from this study as these lesions should be excised under direct vision with a good accessibility utilizing mandibulotomy. Recent advances in mandibular access osteotomies included double mandibular osteotomies (condylar neck osteotomy and osteotomy anterior to the mental foramen) and coronoidectomy gave excellent access to the (PPs).[17] Other modification was a modified notch mandibulotomy in a trapezoidal shape to stabilize the symphysis with only a four-hole miniplate. This shape of the osteotomy reduces the time to return to an unrestricted diet and permits more accurate occlusion.[27] Subcutaneous mandibulotomy without lip splitting or floor of the mouth incisions has also been recorded.[22-24]

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