

## Surgical treatment of benign parapharyngeal space tumours. Presentation of two clinical cases and revision of the literature

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Received: 5-05-2007

Accepted: 17-06-2007

Fernández-Ferro M, Fernández-Sanromán J, Costas-López A, Sandoval-Gutierrez J, López-de Sanchez A. Surgical treatment of benign parapharyngeal space tumours. Presentation of two clinical cases and revision of the literature. Med Oral Patol Oral Cir Bucal. 2008 Jan1;13(1):E61-4.

© Medicina Oral S. L. C.I.F. B 96689336 - ISSN 1698-6946

<http://www.medicinaoral.com/medoralfree01/v13i1/medoralv13i1p61.pdf>

### Indexed in:

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-EMBASE, Excerpta Medica  
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### Abstract

Parapharyngeal space (PPS) tumours, most of them benign, account for some 0.5% of tumours of the head and neck.

The importance of these tumours lies mainly in two aspects: on the one hand, the difficulty of early diagnosis, due to the lack of symptoms in the initial stages and, on the other, the extreme complications of performing surgery in the parapharyngeal region. This article discusses two clinical cases of parapharyngeal space tumours: a 45 year old man and a 60 year old woman. We revise the scientific literature and analyse the diagnostic and therapeutic procedures used, placing special emphasis on describing the different surgical approaches to the parapharyngeal space: transcervical, transcervical-transparotid, transpalatal or transoral, transmandibular and orbitozygomatic, all of which, used alone or combined with others, allow for complete resection of these tumours with minimum morbidity.

**Key words:** Parapharyngeal space, transcervical, transoral, mandibular osteotomy.

### Introduction

Parapharyngeal space (PPS) tumours are not very frequent, accounting for some 0.5% of neoplasms of the head and neck. Most of these tumours (70-80%) are benign and 40-50% of the total originate in the saliva glands, particularly the pleomorphic adenoma (1).

The PPS is in the shape of an inverted pyramid, going from the base of the skull to the hyoid bone, up to the petrotympanic part of the temporal lobe. The back wall is delineated by the aponeurosis and the C1, C2 and C3 prevertebral muscles. It is delimited medially by the pharyngobasilar fascia and the superior pharyngeal constrictor muscle, and laterally by the ascending branch of the jaw, superficial cervical aponeurosis and the submaxillary gland. The styloid diaphragm, an aponeurotic sheath originating in the styloid apophysis is located on a plane inclined from above to below and from back to front, dividing the PPS

into two compartments: the pre-styloid compartment occupied mainly by the parotid gland deep lobe, and the retro-styloid compartment, containing the internal carotid artery, internal jugular vein, cervical sympathetic chain and the last four pairs of cranial nerves (2).

PPS tumours may remain undetected for long periods of time, and generally present anodyne symptoms, normally as asymptomatic lumps medially displacing oropharyngeal structures. Other symptoms observed include the feeling of having a foreign body, obstruction of tubes, changes in the voice and cervical mass. Pain along with lock-jaw and/or paralysis of any of the pairs of cranial nerves would suggest malignancy (3).

Because of its anatomical complexity, complementary MR and CT scanning are necessary for diagnosis, and Fine Needle Aspiration Cytology (FNAC) is very specific in the histological diagnosis of these tumours. Open biopsy

is not advised, due to the risk of bleeding, opening of the capsule and, accordingly, relapse and seeding to neighbouring tissues (4).

Because of the difficulty involved in getting into the PPS, many different approaches have been described, including transcervical, the first approach, described by Morfit in 1955 (1,5); transcervical-transparotid, the most widely used, helpful in PPS tumours originating in the parotid deep lobe; transpalatal or transoral, described by Ehrlich (6) and limited to small non-vascular tumours; transmandibular, mandibular osteotomy being described as a complement to the other approaches, in order to improve and increase access to the PPS; Ariel et al. (7) were the first to propose opening the jaw to enter the PPS, many variations being later described (8); and, lastly, the orbitozygomatic approach to the middle cranial fossa, described in detail by Fisch (9) in 1978, to give access to PPS tumours affecting the temporal bone or very large tumours reaching the base of the skull.

In order to treat these kind of tumours correctly, it is first necessary to select the right surgical approach for each case, balancing maximum exposition, for complete and safe removal of the tumour with minimum aesthetic and functional morbidity.

### Clinical case 1

Male, 45 years of age, no antecedents of interest, referred to our for study of tumour formation medially displacing the soft palate. The only symptom reported by the patient was a feeling of a foreign body on swallowing. A physical examination showed the middle line of the soft palate pushed to the left by a firm, mobile, lateral lump.

Magnetic resonance showed a well-defined pre-styloid tumour, 5 cm x 4 cm x 5 cm in size, linked to the parotid deep lobe, occupying the right parapharyngeal space as far as the submandibular space. After Fine Needle Aspiration Cytology it was diagnosed as a pleomorphic adenoma.

**Surgical technique:**

We began by making a standard preauricular parotidectomy incision extending forwards towards the submandibular region. We performed parotidectomy of the deep lobe and part of the superficial lobe, preserving the branches of the facial nerve. The external carotid was exposed to the level of the lowest and deepest part of the parotid. The submandibular flap was dissected towards the hyoid and up towards the symphysis, taking great care to preserve the marginal branch of the facial nerve. The periosteum was opened along the lower edge of the jaw and a sub-periostic dissection was performed up to the interproximal space between the canine and the first molar, where we performed osteotomy, at all times respecting the inferior dental nerve and without having to split the lip or open the bottom of the mouth. The masseter muscle is reflected upwards to give access to the sigmoid notch. Before performing the parasymphysis osteotomy, we

modelled and placed titanium mini-plates with bicortical screws, used to fix the jaw at the end of the operation. Once the osteotomy had been performed, the mandibular segment could be rotated and disjoined forward, giving access to the PPS.

We then performed the intraoral exposition, using a Digman retractor and an incision in the lateral part of the soft palate, taking care not to harm the palatine artery. After blunt dissection, the deepest part of the tumour was seen and freed, allowing for its complete liberation and transmandibular removal. By combining both approaches, the tumour was mobilised and completely resected. After the tumour was removed, we placed the titanium mini-plates in the osteotomy line, maintaining complete occlusion by intermaxillar fixation, and the walls of the pharynx were repaired by planes.

The post-operative period passed without incident and the patient was revised two weeks, one month, three months and six months later, observing correct oral opening with no effects on the facial nerve or other complications. (Fig. 1-4).

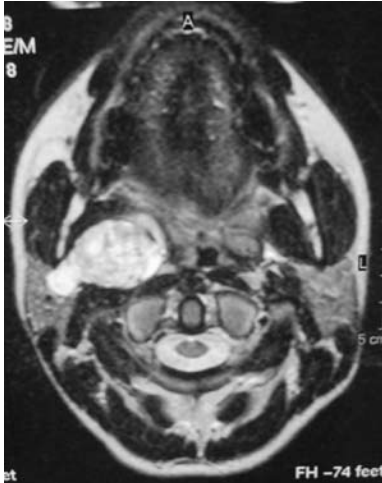
### Clinical case 2

Woman, 60 years old, no antecedents of interest, referred to our department for evaluation of an intraoral tumour. The initial physical examination showed tumour formation in the pharyngeal wall, with medial displacement of the soft palate and uvula to the left. The clinical appearance was that of a right parapharyngeal lump, without lock-jaw and not affecting the cranial nerve pairs. The patient reported discomfort on swallowing. The study was completed by Fine Needle Aspiration Cytology and MR, giving an anatomopathological diagnosis of a pleomorphic adenoma.

The MR showed a right bilobal parapharyngeal lump 2 cm x 5 cm x 2 cm in size. It was hyperintense in T2 and took up the contrast markedly, though heterogeneously. The displacement of the parapharyngeal fat towards the back indicated that the lump was separate from the parotid deep lobe.

**Surgical procedure:**

The oral cavity was exposed using a Digman retractor. An incision was made in the upper part of the soft palate as far as the uvula, giving access to the lateral wall of the PPS. We avoided making a lateral incision to the soft palate in order not to damage the palatine artery and neurovascular package. Once the muscular plane had been bisected, an encapsulated tumour could be seen. The tumour was separated from the other structures without breaking the capsule. After enucleation, the lateral wall of the pharynx was repaired by planes, using absorbable suture. The post-operative period passed without incident and the patient was checked two weeks, two months and six months afterwards, with no complications being observed. (Fig. 5).



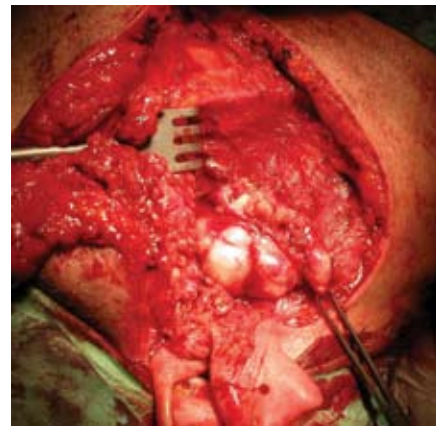
**Fig. 1.** Case 1. MR image of tumour in T2 showing increased uptake, attached to the parotid deep lobe.



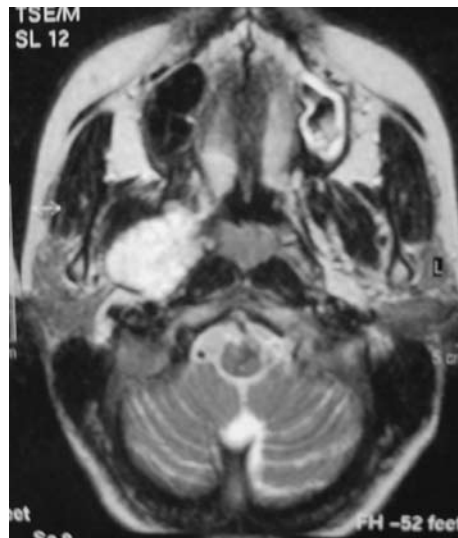
**Fig. 2.** Case 1. Bulging of the tumour in the soft palate.



**Fig. 3.** Case 1. Close up of mandibular parasymphysis mandibular osteotomy.



**Fig. 4.** Case 1. Close up of the removal of the tumour through a transparotid-cervical incision.



**Fig. 5.** Case 2. MR image of a tumour in the PPS with a fatty plane separating it from the parotid deep lobe.

## Discussion

PPS tumours are infrequent, mostly benign and present few symptoms, making them very difficult to diagnose early on.

CT scans and MR are necessary for topographical diagnosis. In the case of pre-styloid tumours, if MR shows a fatty plane between the tumour and the parotid deep lobe, this would indicate that the tumour had separated from the lobe. To the contrary, absence of this plane would indicate that the tumour originated in the parotid deep lobe or, less frequently, was invading it (1, 10).

Once imaging tests have shown that it is not a vascular tumour, histological diagnosis is normally performed using Fine Needle Aspiration Cytology (over 93% specific). Open biopsy is not advised, as it increases the risk of bleeding, breakage of the capsule and, accordingly, the seeding of the lesion (4).

Traditional PPS surgery mainly uses the transcervical and transparotid approaches. Malone et al. and Hamza et al. (11, 12) describe the resection of PPS tumours using the transcervical approach alone in 90-100% of cases. Hughes et al. (13) published a series of 172 cases using the transcervical and transparotid approaches in 94%, using mandibular osteotomy in only 2% of resections.

The transoral approach described by Ehrlich (6) in 1950 is indicated for small, non-vascular tumours, as it offers poor exposition and does not give adequate control in the event of haemorrhage. Works published by McElroth et al. (14) in 1963 describe the use of this approach along with ligation of the external carotid artery to remove PPS tumours in a study on 112 patients. More recently, in 1989, Goodwin and Chandler (15) considered this approach to give adequate access to the PPS, as it gives direct access to the PPS. It is very useful combined with other techniques, as it allows the deepest part of the tumour to be exposed, allowing for the removal of larger tumours. Compared with transcervical excision of tumours, it gives a rate of post-operative complications of less than 31% (Carrau et al. (16) 1990). We consider that this approach is helpful for small, extra-parotid and non-vascular tumours of the PPS, but is also useful combined with other approaches for the complete resection of larger tumours of the PPS (17).

The several kinds of mandibular osteotomy described in the literature give excellent access to the PPS, being very useful for the complete excision of tumours and allowing better control of the vascular structures. Since the first osteotomies were described by Ariel et al. (7), several variants (18) have been described. We favour that used by Seward (19) in 1989, consisting of a parasymphysis mandibulotomy anterior to the mental foramen, with no cheilotomy or opening of the floor of the mouth, and preserving the dental nerve. Another possible variant is osteotomy at the level of the condyle or, more recently, vertical osteotomy of the mandibular branch (20) to facilitate greater mobilisation of the corresponding segment of the mandible.

In short, the success of PPS surgery depends on two conditions: correct identification and exposition of the lesion, allowing for complete removal; and minimum functional and aesthetic morbidity as a consequence of the surgery. Most patients may benefit from a simple transcervical or transparotid approach, but a group of patients with larger tumours require the use of techniques which, while simple, in combination may widen the surgical field without necessarily increasing morbidity. It is, accordingly, necessary to use all available surgical resources, adapting the chosen approach to the characteristics of the lesion.

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