



## Trans Cervical and Transoral-Trans Cervical Dual Approaches to the Para Pharyngeal Benign Tumors

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### Abstract

The tumors of parapharyngeal space constitute only 0.5% of all head and neck tumors. The majority (over 80%) of the primary parapharyngeal space tumors arising from pre and poststyloid space are benign. Main structures contained in the prestyloid space are fat, deep lobe of parotid gland and minor or aberrant salivary glands of the oropharyngeal wall. Unlike the poststyloid space, this space does not have important vital neuro-vascular structures, but it is difficult to approach it. In the surgery of poststyloid tumors, the most important problem is to protect vital structures from being injured. A number of surgical approaches have been described to overcome these difficulties. Transcervical approach is the main access to the parapharyngeal space. However, additional combinations of this approach with or without mandibulotomy are mostly applied for wider exposure of the bulging oropharyngeal mass. Our experience proved that the transoral-transcervical dual approaches are the least morbid combination for a wider access. It should be emphasized that this approach is much easier and safer than the other combined approaches. Mandibulotomy must be performed only for malignant tumors that infiltrated the skull base.

**Keywords:** Parapharyngeal space; Prestyloid space; Poststyloid space; Transcervical approach; Transoral approach; Combined transoral-transcervical dual approach

### Abbreviations

PPS: Parapharyngeal Space; PSS: Prestiloid Space; PTSS: Poststyloid Space; CN: Cranial Nerves

### Introduction

Parapharyngeal space (PPS) is a potential deep area in the upper lateral neck. The tumors of the PPS constitute less than 1% of all head and neck tumors [1]. Surgery is a mainstay treatment. However, the PPS tumors are challenging problems in surgery. For this reason, the PPS is always updated in terms of more convenient approach. Anatomy of PPS is very complex, its boundaries are not clear, and participated with the regions of retropharyngeal, infra temporal and pterygoplatin fossa. For planning of surgical access, the differential diagnosis should be made between PPS primary tumors and adjacent regions tumors. Physical examination with bimanual palpation and magnetic resonance imaging are the most important diagnostic means. The anatomical lack of clear boundaries causes terminological confusion. Lateral skull base approach is frequently introduced as a PPS surgery. Tensor vascular styloid fascia divides PPS into two compartments as presteroid space (PSS) and Poststyloid Space (PTSS). The main contents of PSS are fat, deep lobe of the parotide gland, and minor salivary glands of the oropharyngeal wall. The pleomorphic adenomas are the most common tumors in this space [2]. PTSS contains internal jugular vein, internal-external carotid arteries, lower 9-12<sup>th</sup> CN, sympatethic chain, glomic corpuscules and lymphatic nodes of the cervical level 2. Surgery of PPS tumors should be cautious because there is a risk of injury of the vital structures of PTSS. On the other hand, there is a difficulty with the PSS approach. Primary PPS tumors develop hidden and symtomless, cannot be detected on physical examination until 2-3 cm in size. The most common presentation was an intraoral mass (52%) followed by a cervical mass (48%) [3]. Vertical ramus of the mandible, parotid gland, facial nerve and styloid process constitute an obstacle particularly in posterolateral access to the superior of the PPS. For this purpose, different approaches are described. In 1950, transoral approach was the first applied access [4]. However, transcervical approach is a more applied access in PPS tumors [5-8]. Transcervical approach is usually combined with trans parotid approach with or without mandibulotomy [2,9,10]. Transoral approach is controversial and accused by some surgeons with prejudice of the inadequate exposure, neurovascular risk, the wound healing problems, and the tumor spillage [1,3]. Nevertheless, this approach should never be over looked among the other accesses. Betka et al. [3], between 1997

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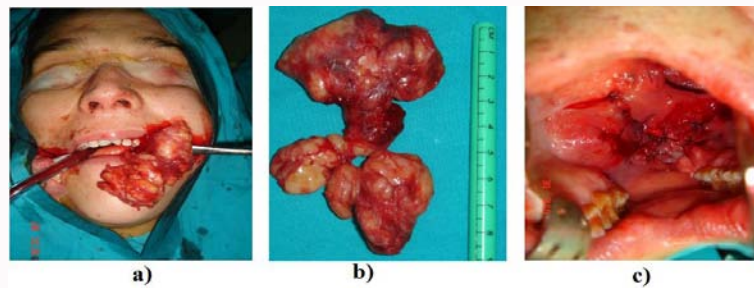
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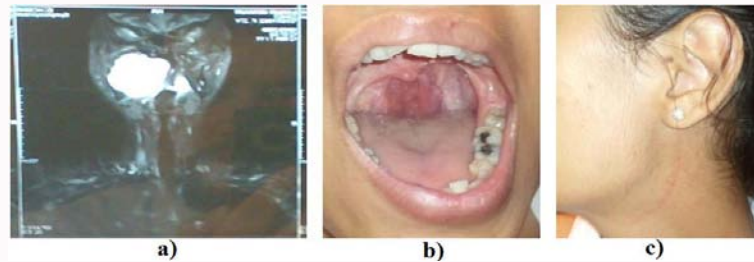
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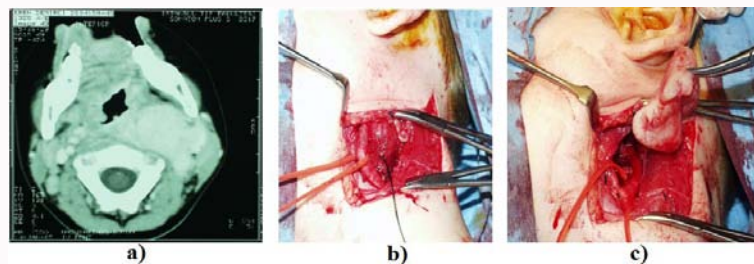
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**Figure 1:** Transoral-transpalatal excision of the pterygopalatine fossa schwannoma, **a)** after excision of tumor, **b)** tumor specimen, **c)** transpalatal incisions.



**Figure 2:** Tranoral-transcervical dual approach of the recurrent of the insufficient pleomorphic adenoma of the PSS tumor removal, **a)** MRI, **b)** intraoral large tonsillectomy incision, **c)** transcervical incision.



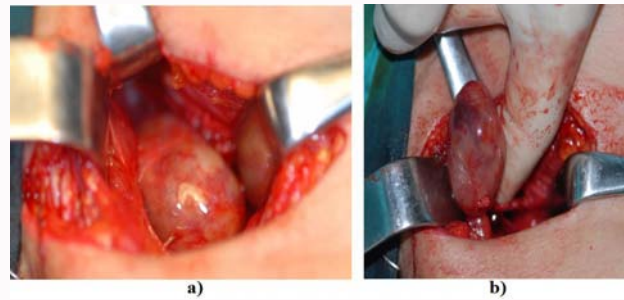
**Figure 3:** Tranoral-transcervical approach of malignant neurofibroma in a 5-years old child, **a)** MRI, **b)** tumor extending between external and internal carotid arteries, **c)** tumor extirpation with blunt dissection.

and 2007, applied transoral or combined transoral-transcervical dual approach in 26 cases of PSS tumors. They stated that they did not encounter any major complications or wound healing problems in the operated cases. The transoral approach should be considered as a safe option in appropriate cases.

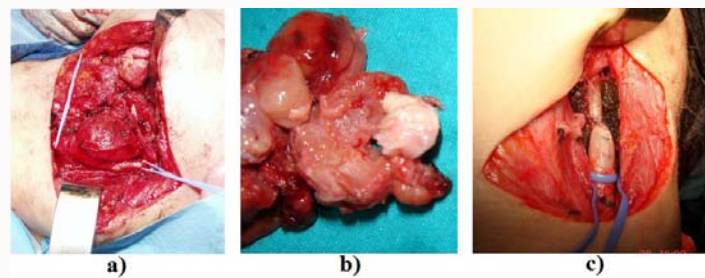
### Approaches to the PSS Benign Tumors

Small or moderate size tumors such as schwannomas and minor salivary gland adenomas can be easily removed with careful blunt finger dissection without oncologic recurrence problem (Figure 1a-1c). In this case, the pterygopalatine schwannoma was easily removed completely by the intraoral-transpalatal approach. In the necessity of combination with transcervical approach, transoral-transcervical dual approach is a very convenient and simple application. This approach is used to prevent mandibulotomy for large tumors where transcervical approach is insufficient. It allowed en bloc and safe resection of the tumor by providing its control in the upper and lower sides. The procedures are initiated intra orally with a large tonsillectomy incision including the mucosa, submucosa and upper constrictor muscle. The upper side of the tumor is easily freed from the surrounding fatty tissue by blunt finger dissection. Transoral approach is followed by cervical external approach. A horizontal curved incision is made in the lateral of the hyoid bone. Sub-capsular sub-mandibular gland dissection is performed with identification and preservation of

marginal mandibular branch of facial nerve, 12<sup>th</sup> CN, and facial artery. Anteromedial traction or removing the submandibular gland permits access into the PSS, and in this way to the below of PSS tumor. The lower side of the tumor is mobilized under direct vision after releasing its upper side intra orally, and en bloc safe resection is achieved (Figures 2a-2c and 3a-3c). Combined approach with mandibular osteotomy is a very morbid approach although it is recommended for the most favorable exposure with different mandibulotomy techniques. We have always used mandibulotomy for only malignant tumors infiltrating the skull base [8]. The transparotid-transcervical approach is one of the most frequently mentioned pathways for PPS. In our practice, the transparotid-transcervical approach was applied for the deep lobe tumor of the parotid gland [8]. The most common PTSS tumors are respectively schwannomas, carotid body paragangliomas, vagal paragangliomas, and neurofibromas. In all PPS benign tumors surgery, careful blunt dissection is usually sufficient except for paragangliomas. Because of this advantage of easily blunt dissection, wide incision, and particularly facial nerve dissection at every cases are not required for more exposure. If PTSS tumor extends toward superior PSS, anteromedial retraction of the mandible and division of posterior belly of digastrics and styloid muscles permits adequate access. En bloc resection of schwannomas, neurofibromas and other benign tumors do not present a problem in their removal (Figure 4). The paragangliomas, especially carotid body paraganglioma surgery



**Figure 4:** Truncervical approach of the PTSS schwannoma, a) easy blunt dissection, b) en bloc resection.



**Figure 5:** Truncervical approach for the extirpation carotid paraganglioma. a) subadventitial dissection and extirpation of the moderate size carotid paraganglioma, b) Schamblin Type 3 carotid body paraganglioma, external-internal carotid arteries resection with adenopathies, c) reconstruction of the carotid continuity with saphana vein bypass technique.

carry a vital risk of carotid rupture in the sub adventitial dissection of the tumor even in its earliest stage. Furthermore, the possibility of the necessity of carotid artery resection with the tumor and obligation of reconstruction should be kept in mind. If there is no adequate tissue in the upper part of the internal carotid artery, even if the balloon occlusion test is positive, in the arterial ligation and the surgical resection should be cautious against the risk of stroke. In this case, radiotherapy is the least risky option to prevent progression of the glomus tumor. Collaboration with vascular surgeon must be ensured as a rule (Figure 5). This region is also the site of lymphatic metastasis of larynx, pharynx and thyroid malignant tumors. Tumors may also extend from surrounding structures and spread to the PPS. These tumors are excluded from this article because they are not primary PPS tumors.

## Discussion

Different approaches have been described to ensure complete removal of PPS tumors and prevention of injury of neurovascular structures. Among them, transoral and truncervical approaches are the first described access techniques [4]. However, transoral approach is not commonly recommended, and has been implicated in the risk of tumor rupture and spillage [1,3]. On the other hand, there is an increase in publications related to transoral approach. It is stated that the transoral approach to PSS tumors is an uncomplicated and safe approach [11,12]. Ducic et al. [13]. Recently described a new transoral approach to superomedial benign PPS tumors with protection and control of internal carotid artery. For the resection of small-moderate size benign tumors of PSS, transoral approach must be taken into consideration [2,11-13]. Contrary to posterolateral transparotid approach, anterolateral transoral approach provides a direct access to the PSS tumor. This access is the most convenient and uncomplicated way. Truncervical approach is mainstay pathway in PPS surgery [5-7]. The retrospective review of 44 patients who underwent benign primary PPS tumors surgery during the years 2000-2010 in our Ear

Nose Throat Department of Medical Faculty of İstanbul, focused on the adequacy of the truncervical approach without mandibulotomy [8]. However, the truncervical approach is often combined for the increased exposure of PPS tumors. Truncervical-transparotid approach with or without mandibulotomy. Truncervical-transparotid approach is a postrotatel pathway for the upper part of the PPS. In this access, the facial nerve identification and protection is essential. However, this postero-lateral approach is more suitable for lateral skull base lesions. It should be the rule to apply the least morbid and oncologically safe combined approach in the surgery of PPS. In our practice, we prefer intraoral and external cervical dual approach as an alternative to mandibulotomy in PSS tumor that manifests as a large oropharyngeal mass. This procedure also provides a safe method for the patients who have previously attempted unsuccessful intraoral excision. Transoral-truncervical approach permits superomedial and inferolateral access of PPS tumors. Betka et al. [2] have the same opinion as us, emphasizing the efficacy of transoral approach and combined truncervical-transoral approach in the resection of selected PPS tumors. We believe that these two approaches should be used in appropriate tumors in PPS surgery. The recommendations of the different mandibulotomy and mandibulectomy for the larger field of view still persist [14-17]. In our practice, mandibulotomy is only indicated in malignant tumors involving the skull base [8]. Paragangliomas surgery, particularly resection of carotid paraganglioma, is of vital importance among PTSS tumors. Risk of carotid rupture, even in earlier stage, and eventuality of its resection should always be considered in sub adventitial dissection of the tumor. For this reason, the possibility of collaboration with a vascular surgeon must be ensured.

## Conclusion

Experience in PPS tumors surgery is difficult to obtain due to its rare occurrence. Surgery is the mainstay treatment option. The difficulty of surgical approach to PSS, and the possibility of injury of vital neuro

vascular structures of PTSS are challenging to surgery. It is necessary to choose the least morbid one among surgical approaches, because the majority of PPS primary tumors are benign. Primary benign PPS tumors have the advantage of safe and easy resection by blunt finger dissection from the adjacent fatty tissue despite its limited approach. Therefore, we believe that transoral approach is mostly suitable for small, moderate, extra parotid and nonvascular PSS tumors. They can be removed easily and oncologically secured via direct trasoral approach. The PTSS benign tumors have same advantages of blunt dissection except paragangliomas. The transcervical approach is very useful and suitable for complete excision of PTSS tumors. This approach permits direct control for protection of the vital neurovascular structures. Transparotid-transcervical approach should be indicated for the parotid deep lobe tumor. Trasoral and transcervical dual approaches are easy to apply, and uncomplicated access to PSS. This is used instead of mandibulotomy in prestyloid recurrent or large benign tumors manifesting as oropharyngeal bulging mass. Mandibulotomy should be performed only for malignant tumors that infiltrated the skull base. In the surgery of carotid paragangliomas collaboration with vascular surgeon must always be provided.

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