CASE REPORT

Secret Window to the Parapharyngeal Space: The Transcervical Transdigastric Approach

Nor Hafiza Qualickuz Zanan[1], Mawaddah Azman[2], Kong MH[3], Mohd Razif Mohamad Yunus[4]

Abstract

Aim: To highlight the transcervical transdigastric approach to the parapharyngeal space.

Background: The parapharyngeal space (PPS) contains important neurovascular structures and hence requires meticulous dissection when working with tumors in this space. Surgical access to this blind space is limited, and approach would depend on several factors such as location and extension of tumor, fine needle aspiration cytology (FNAC) report if available, as well as surgeon's preference and experience. There are limited publications describing the transcervical transdigastric approach to tumors in the PPS.

Case description: We present two cases of tumor in the PPS that were addressed using the transcervical transdigastric approach. One patient presented with a painless submental mass, while the other had incidental finding of a PPS tumor on computed tomography scan. Both tumors were histologically benign.

Conclusion: The transcervical transdigastric approach to the PPS gives adequate exposure to the surgical field of interest and enables complete excision of well-encapsulated PPS tumors.

Clinical significance: The transcervical transdigastric approach allows access to the PPS without aggressive dissection, therefore, avoiding the potential morbidity associated with PPS tumor resection.

Keywords: Benign tumor, Cervical, Cervicodigastric, Parapharyngeal space, Surgical approach.

International Journal of Head and Neck Surgery (2021): 10.5005/jp-journals-10001-1400

Introduction

The parapharyngeal space (PPS) has often been described as an inverted pyramid-like space, whose base is at the sphenoid bone, while the apex is at the greater cornu of the hyoid bone.[1] Medially, it is bounded by the parapharyngeal wall as well as the buccopharyngeal fascia. The medial pterygoid and ascending ramus of mandible in the anterior portion and parotid gland with its fascia in the posterior portion binds the PPS laterally. Fascia from the styloid process to the tensor veli palatine muscle divides the parapharyngeal space into prestyloid and post-styloid space. The post-styloid space contains the bifurcation of the common carotid artery, the internal and external carotid arteries, lower four cranial nerves, cervical sympathetic chain, and a few lymph nodes.[2] The portion of deep lobe of the parotid gland which is located posterior and medial to the ramus of mandible is said to be in the prestyloid space, along with some minor salivary glands and parapharyngeal fat.[3]

There are several surgical techniques practiced throughout the world for excision of PPS tumors, namely, the transcervical approach, cervicosubmaxillary approach, in which the submandibular salivary gland is removed or reflected upward to allow better access to the antero-inferior aspect of the PPS, and the transparotid approach for deep lobe parotid tumors. Transcervical approach is the most commonly used technique, especially if dealing with post styloid space tumors.[2,4] This approach provides direct access to the PPS and sufficient control of the neck neurovascular bundle. It is useful for large tumors of both benign and malignant type.[3] The transparotid approach on the other hand is used for prestyloid tumors.[2] The main disadvantage of transparotid approach is possible injury to the facial nerve during surgical handling, as the surgery involves dissection and manipulation of all branches of the facial nerve which can lead to postoperative neuropraxia or even paralysis.[3] In cases where exposure or access is difficult following the cervical or cervicoparotid approaches, a mandibulotomy can be done. It is especially necessary for extensive tumors, those that require a radical excision and for malignant tumors.[2,4,5] Several sites for osteotomy have been reported, which include mandibular body, angle of ramus, and parasymphyseal. It is important to minimize injury to the inferior alveolar nerve while providing access to the PPS. The orbitozygomatic middle fossa approach is reserved for large tumors of the PPS with considerable skull base involvement. In recent years, the intraoral approach has been shamed, as it does not give satisfactory control of the neck great vessels and cranial nerves as well as being associated with higher risk of capsule rapture and tumor seeding during surgery. The ultimate aim of surgery, regardless of technique, is maximal exposure for complete tumor removal while preserving the vital structures and minimizing postoperative morbidity.[2]

[1–4]Department of Otorhinolaryngology Head and Neck Surgery, Pusat Perubatan Universiti Kebangsaan Malaysia, Cheras, Kuala Lumpur, Malaysia

Corresponding Author: Nor Hafiza Qualickuz Zanan, Department of Otorhinolaryngology Head and Neck Surgery, Pusat Perubatan Universiti Kebangsaan Malaysia, Cheras, Kuala Lumpur, Malaysia, Phone: +60193680814, e-mail: feeza_aries@hotmail.com

How to cite this article: Zanan NHQ, Azman M, MH Kong, *et al.* Secret Window to the Parapharyngeal Space: The Transcervical Transdigastric Approach. Int J Head Neck Surg 2021;12(1):34–36.

Source of support: Nil

Conflict of interest: None

Case Description

Case 1

An 18-year-old gentleman with no known medical problem who presented to us with a painless but rapidly enlarging submental mass, associated with a mass in the floor of mouth for 2 weeks duration. On examination of the neck, there was a 5 × 4 cm firm and nontender swelling at level I. The swelling was mobile, and there was no overlying skin changes. Intraorally, the floor of mouth was raised, pushing the tongue to the left side. The overlying mucosa was healthy. Magnetic resonance imaging showed a left parapharyngeal enhancing mass arising from the jugular fossa, extending down to the parotid space, sparing the hypoglossal canal (Fig. 1). An excision of the mass through the transcervical transdigastric approach was performed, and histopathological examination was reported to be a neurofibroma. His surgery was complicated by a left vocal cord paralysis for which injection thyroplasty was done successfully.

Case 2

A 41-year-old lady who was asymptomatic but found to have a right parapharyngeal tumor on a computed tomography (CT) scan done for breakthrough seizure. The CT scan showed a non-enhancing mass measuring 3.0 × 2.5 × 3.0 cm with well-defined margin in the prestyloid region of the right PPS at the level of the oropharynx. It appears to be abutting the deep lobe of parotid gland (Fig. 2). There was no abnormalities noted on clinical examination. This patient was also subjected to a transcervical transdigastric excision of tumor which was later reported to be a pleomorphic adenoma. We chose this approach instead of transparotid, as the latter carries higher risk of morbidity in relation to facial nerve function. This patient was completely well post-surgery.

In both cases, the surgical steps taken involves a transcervical skin incision, raising the subplatysmal flap as well as identifying and preserving important neurovascular structures within the PPS. The anterior border of sternocleidomastoid muscle was delineated and retracted posteriorly. The digastric muscle was identified and cut at the tendon. This gave us adequate access to the PPS tumor. In the first case, tumor was excised in piece meal through digital manipulation while in the second case it was removed in toto.

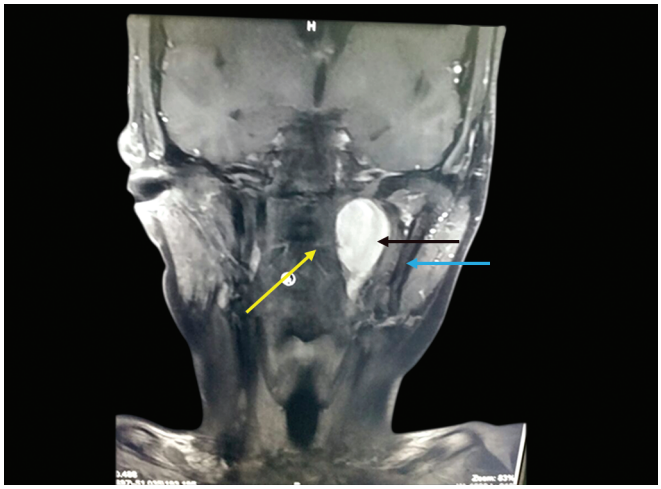

Fig. 1: Coronal cut section of MRI (T1 fat saturated) postgadolinium image of a left parapharyngeal enhancing mass (⟵). This mass is medial to the mandible (⟵) and masticator space. It causes medialization of the ipsilateral pharyngeal wall (⟋)

Discussion

Tumor in the PPS represents less than 1% of all tumors in the head and neck.[5,6] Of these, the most common pathology is benign salivary gland tumor, followed by benign neurogenic neoplasm, and hemangioma. Very rarely, a tumor in the PPS is of malignant type.[5] They may be primary, metastatic, or extension from the adjacent neck spaces.

The main presenting symptoms of a tumor in the PPS are painless neck, parotid or intraoral swelling, dysphagia, foreign body sensation in the throat, nasal obstruction, and facial nerve paralysis.[5,6] Some may present with hoarseness, slurring of speech, or weakness of shoulder.[2] A retrospective study done by Dimitrijevic et al. in 2010 revealed that 17% of patients were asymptomatic and was found to have PPS tumor on imaging done for another reason. Common clinical manifestations include palpable neck mass posterior to the mandibular angle, intraoral/pharyngeal mass causing displacement of the lateral pharyngeal wall, soft palate or tonsil, and cranial nerves IX, X, and XII palsy.[3]

Radiological examination is essential in making a diagnosis of PPS tumor and for deciding on the best surgical approach. Computed tomography with contrast, magnetic resonance imaging (MRI) as well as angiography will provide us with the necessary information before embarking on surgery. The most important information that we look for is the localization of the tumor whether it is in the pre- or post-styloid space, its relation to the parotid gland and major blood vessels, and the tissue characteristic of the tumor. Magnetic resonance imaging is superior to CT, as it can differentiate tumors of the deep lobe of parotid from neurogenic lesions or carotid body tumors as well as delineate the relation between the tumor and important neurovascular structures.[6] In cases of prestyloid tumors, if MRI shows a fatty plane between the tumor and the parotid deep lobe, this indicates that the tumor is separate from the lobe, while absence of this plane indicates that the tumor originates from or has invaded the parotid gland.[3] Angiography is recommended if there is suspicion of carotid artery involvement or a paraganglioma is suspected.[6]

Fine needle aspiration cytology (FNAC) can be extremely helpful for the preoperative evaluation of a PPS tumor. It should be done once the diagnosis of vascular lesions is ruled out by the imaging studies.[7,8] CT- or ultrasound-guided FNAC is advocated

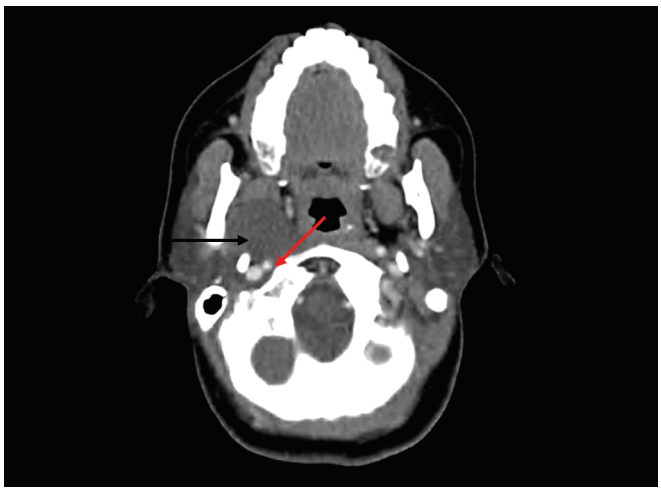

Fig. 2: Axial cut section of CECT of the neck showing a well-defined mass at the right PPS (⟶). This mass displaces the carotid vessel posterolaterally, indicating a prestyloid origin (⟋)

for deep seated PPS tumors. It has less risks of tumor spillage and seeding than open biopsy hence can be used safely. Open biopsy through intraoral approach is reserved for cases, where the PPS tumor is small and projects sufficiently into the oropharynx, usually causing a soft palate displacement. The advantage of an open biopsy is that it always confirms the diagnosis, but it may be associated with residual tumor or recurrence if not excised adequately.[3]

Postoperative complications associated with excision of PPS tumor includes hoarseness, Horner's syndrome, facial nerve paralysis, and first bite syndrome.[5] The incidence of cranial nerve deficit is related to the nature of tumor, whereby surgery involving malignant or neurogenic tumors are at higher risk of postoperative cranial nerve dysfunction.[5,9] Where mandibulotomy is performed, there is risk of temporomandibular joint dysfunction, nonunion, plate extrusion, and tooth loss.[9]

As mentioned earlier, there are many methods practiced by surgeons worldwide in accessing the PPS. The transcervical transdigastric approach that we would like to highlight in this report begins with a curvilinear skin incision made approximately 2 finger breadths below the lower border of the mandible, followed by raising the subplatysmal flap up to the level of the mandible. The marginal mandibular branch of facial nerve is identified and preserved. The sternocleidomastoid muscle is then retracted posteriorly, and the carotid artery, internal jugular vein (IJV), and hypoglossal nerve are identified and preserved. Later, the posterior belly of the digastric muscle is identified and divided to improve the access to the PPS. If necessary, the facial artery is ligated. The tumor is then dissected from the surrounding tissues. Hemostasis is secured by means of ligation and diathermy. Surgical field is then irrigated with copious amount of warm saline. A surgical drain is inserted before closing the wound in two layers. The major advantage of the transcervical transdigastric technique which we would like to emphasize is that it allows access to the PPS without dissection and manipulation of facial nerve, hence reducing the risk of postoperative cosmetic morbidity. Operating time is also less when using the transcervical transdigastric method because it does not require parotidectomy and identification of facial nerve. The carotid artery, IJV, hypoglossal, and vagus nerves are also identified earlier when using this approach. The transcervical transdigastric technique gives good control of the major blood vessels and cranial nerves in the neck. Furthermore, reconstructive procedures are not required when adopting this method. This approach also does not require mandibulotomy. The limitation of the transcervical transdigastric approach would be in cases of large PPS tumors with significant skull base involvement as well as tumors which encase the carotid or internal jugular vessels and with features suggestive of malignancy.

Shahab et al. in 2005 demonstrated that the 5-year and 10-year survival rate for benign PPS tumor is 100%. For malignancies, the 5-year survival was 93% but fall to 57% at 10 years. This study showed that a patient is highly unlikely to die of a benign PPS tumor; therefore, it is imperative to discuss the surgical treatment with the patient and provide an option with the least morbidity.

Conclusion

The transcervical transdigastric technique by means of dividing the posterior belly of the digastric muscle gives adequate exposure to the PPS for complete tumor removal while preserving the vital structures and obviates the need for mandibulotomy or any major reconstructive procedures.

Clinical Significance

The transcervical transdigastric approach minimizes postoperative functional and cosmetic morbidity. It is a good option when dealing with small, well-encapsulated PPS tumor of benign nature.

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