

Robotic-Assisted Removal of Parapharyngeal Space Tumor via a Retro-auricular Approach: A Case Report

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ABSTRACT

Parapharyngeal space (PPS) tumors are rare and excised most commonly via the transcervical approach. A female patient presented with a left side neck swelling of size 5cm x 4cm, progressively increasing in size. Radiologically a well-defined soft tissue intensity mass lesion in left parapharyngeal space (PPS) was noted suggesting paraganglioma (Schwannoma). Resection of the tumor with robotic assistance via the retro-auricular approach was planned and resected. The robotic assistance resection of PPS mass via retro-auricular tunnel has the advantages of lessening the extent of dissection and better instrument access eliminating blind dissection.

Keywords: Parapharyngeal space tumor; Robotic-assisted; Retro-auricular approach; Schwannoma.

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INTRODUCTION

Parapharyngeal space (PPS) is a potential space in the neck that resembles an inverted pyramid extending from the skull base and apex pointing to the greater cornu of the hyoid bone which is further divided by fascia of the tensor veli palatine into a pre-styloid and a post-styloid part.

Parapharyngeal space (PPS) tumors are rare and represent approximately 0.5% of head and neck tumors out of which 74 to 87% are benign and 12-26% are malignant [1]. Depending upon the characteristics of the tumor numerous approaches are mentioned in literature for targeting PPS masses like trans-parotid, transoral, transcervical, infratemporal with or without mandibulectomy [2]. The transcervical approach is the most common approach which is used for the excision of masses and tumors like thyroid swelling, cervical lymphadenopathy, parapharyngeal tumors, etc.

Many case series have been published, demonstrating transoral resection of PPS masses using da Vinci surgical system [1]. The surgical robot allows the removal of PPS mass pre-

cisely from the narrow space with the help of freely movable endowristed arms.

In this article, we are reporting our experience of robotic-assisted resection of a post-styloid PPS mass via a retro-auricular approach.

CASE PRESENTATION

A 41 years old female patient presented to us (Indraprastha Apollo Hospitals, New Delhi, India) with a left side neck swelling (middle one-third) for the last two and a half months. It was progressively increasing in size. There was no history of pain, dysphagia, dyspnea, or any cranial neuropathies. On examination, a single, firm, non-tender swelling of size approximately 5cm×4cm was palpable over the left lateral neck. On oropharyngeal examination, no bulge was seen. Contrast-enhanced computed tomography (CECT) and contrast-enhanced magnetic resonance imaging (CEMRI) of the neck was performed. CECT shows a well-defined soft tissue density mass in the left parapharyngeal region with patchy and branching enhancement and CEMRI shows a well-defined soft tissue mass lesion in the left parapharyngeal region, postero-lateral to left common carotid with heterogeneous enhancement and multiple internal flow voids- likely paraganglioma (Figure 1). Ultrasound-guided Fine needle aspiration cytology (FNAC) was tried carefully keeping in mind

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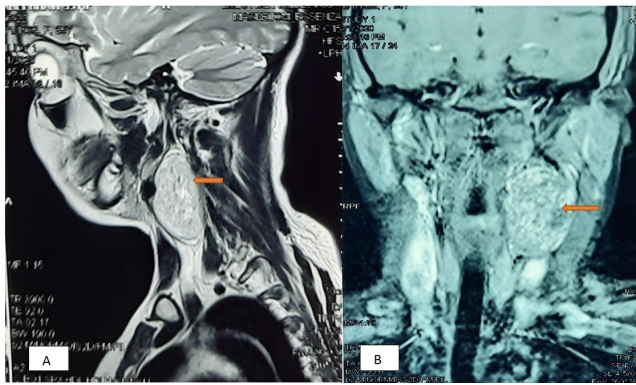


Figure 1. Sagittal (A) and coronal (B) CEMRI cuts showing a well-defined soft tissue mass lesion (arrow) in the left parapharyngeal region with heterogeneous enhancement and multiple internal flow void.

the possibility of paraganglioma but was inconclusive showing only blood components.

After a careful preoperative assessment, resection of the tumor with robotic assistance via a retro-auricular approach was planned. The patient and family were counseled about the advantages of using the robotic technique and informed consent was obtained before surgery.

Surgical procedure

The patient was given general anesthesia and orotracheal intubation was done. The patient was positioned in a supine position and the head of the patient rotated toward the contralateral side with a shoulder roll to extend the head and neck. A 5cm long incision starting from the retro-auricular region and extending to the hairline over the lateral neck, along the posterior border of the sternocleidomastoid (SCM) was made. The skin flap was elevated along the subplatysmal plane. SCM and greater auricular nerve were identified. Anterior border of SCM was retracted posteriorly, dissection proceeded medially exposing the tumor. A self-retaining Chung's retractor was applied to maintain working space and a final surgical tunnel was prepared.

We used da Vinci Si surgical system (Intuitive Surgical Inc, Sunnyvale, CA), a 30-degree endoscope, a 5mm harmonic curved shear, and a 5mm Maryland dissector for removal of PPS tumor after creating the surgical tunnel. The endoscope and two instrument arms were inserted through the tunnel (Figure 2).

Both the edges of the tumor were identified and exposed. All-important neurovascular structures were identified and preserved. The intracapsular dissection of the tumor was done with the utmost care from the surrounding tissue using the robotic arms. The carotid artery was identified behind the tumor. Finally, the tumor was delivered through the tunnel without fragmentation or disruption of the capsule. A single closed drain was inserted and an incision was closed in two layers. The patient was extubated in the operating room only and intravenous steroid and antibiotics were given for 24 hours. The time taken for creating the surgical tunnel was 41 minutes and another 19 minutes for robotic resection of the tumor. The patient was discharged after 36 hours and the drain was removed after 72 hours of surgery in the outpatient department. Postoperative cranial nerves examina-

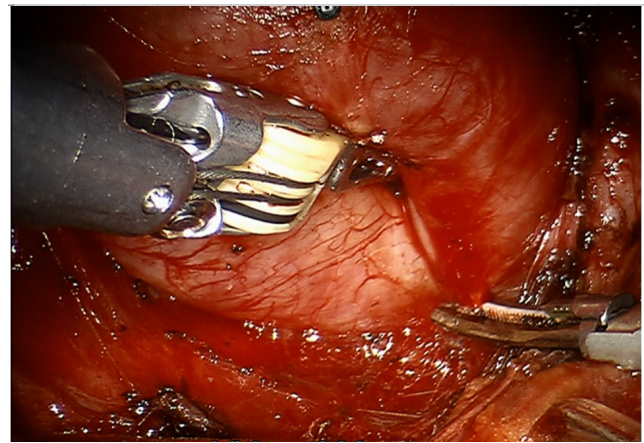


Figure 2. Robotic excision of parapharyngeal mass via retro-auricular approach.

tion was normal and the patient reported no first bite syndrome. Post-surgical histopathology confirmed the diagnosis as Schwannoma (Figure 3).

DISCUSSION

The parapharyngeal space (PPS) is a complex anatomical region, adjacent to which multiple vital neurovascular structures are present which are at risk while performing any surgery in that region making their management challenging. Significant bleeding or cranial nerve injury can occur while resecting or removing a PPS mass. The post-styloid part of PPS contains critical structures like the internal carotid artery (ICA), internal jugular vein (IJV), cranial nerves IX to XII, and sympathetic chain.

The best way to approach post-styloid PPS mass depends on many factors like tumor size, location, and extent, histopathology of mass, preference, and experience of the operating surgeon. The most common approach applied for resecting post-styloid PPS mass is the transcervical approach with or without adjunctive maneuvers like mandibulectomy, submandibular gland removal, and division of posterior belly of digastric [1, 3, 4]. However, via these conventional approaches, complete tumor visualization is impossible and a blind maneuver around the tumor in a narrow space can result in injury to vital neurovascular structures or tumor spillage and significant morbidity [5].

The da Vinci robotic system was applied in 2007 for resection of PPS mass [6]. Among PPS masses, TORS (transoral robotic surgery) is predominantly applied for masses located in the superomedial or pre-styloid compartment [7, 8]. TORS provides limited exposure to laterally and posteriorly located tumors [9]. It can also be combined with a transcervical/retro-auricular approach if the tumor is extending laterally. Whereas tumors that are located predominantly at the apex of PPS could be resected via a retro-auricular (RA) approach [8]. But when the tumor is located more laterally and superiorly the dissection may be difficult via the RA approach. In this case, the trans-cervical approach is the least morbid approach providing better axis and dissection of the lower and posterior aspects of the tumor by robotic arms [9, 10].

The da Vinci robot provides an excellent three-dimensional,

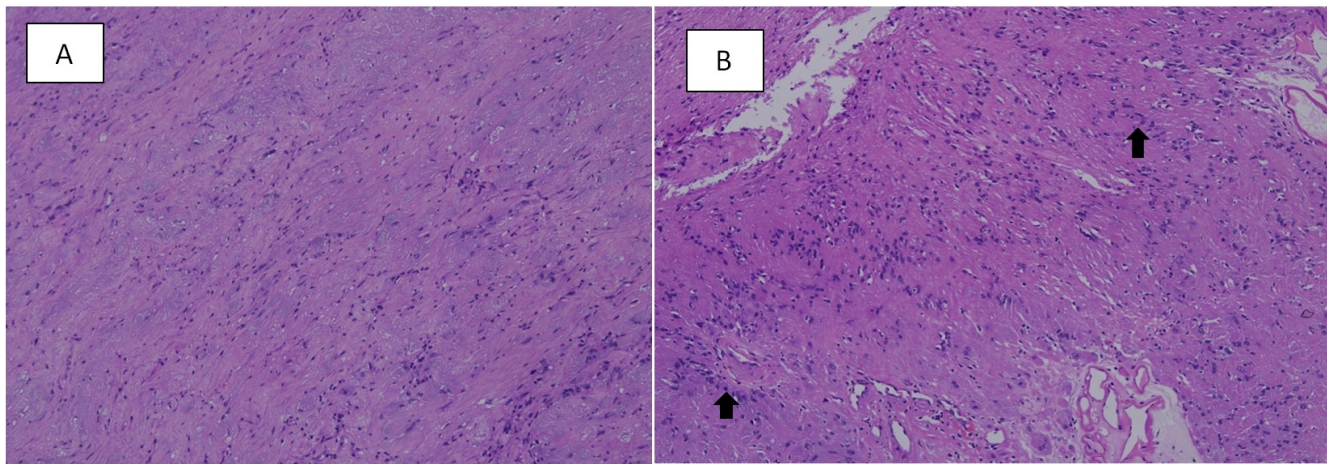


Figure 3. H&E, 10X (A) showing spindle cell, mildly cellular area with thin, wavy nuclei. H&E, 20X (B) showing cellular area, with cells in palisades (arrow) suggestive of schwannoma.

magnified view of the surgical field and tremor filtration allowing the surgeon to perform the surgery precisely with minimal injury to critical neurovascular structures. The combination of this excellent vision and endowristed instruments helps in the identification of vital neurovascular structures like the vagus nerve, carotid artery, and internal jugular vein and their preservation without injury, removing the tumor safely [11]. The surgeon can easily prevent bleeding from tiny vessels that would be difficult to identify with a naked eye through a narrow working space.

The robotic-assisted resection of post-styloid PPS mass via retro-auricular tunnel has the advantages of lessening the extent of dissection and better instrument access, hence faster wound healing and lesser postoperative pain. It eases the identification of the tumor capsule and allows meticulous dissection in this tenuous space avoiding unintentional complications.

The benign masses of the upper neck can be successfully resected by robotic assistance via a retro-auricular approach [PPS-1]. But for middle and lower one-third neck mass the incision needs to be extended more caudally over the lateral neck. As compared to the open transcervical approach, RA

robotic approach provides a superior cosmetic result. The limitations of performing robotic excision are the higher cost of surgery and a little longer procedure time as compared to conventional approaches.

CONCLUSION

The exposure of PPS tumors poses a challenge to otolaryngologists because of its complex anatomy. The robotic-assisted resection of parapharyngeal mass via retro-auricular tunnel is feasible and safe with an efficacious hemostatic outcome. It eliminates the need for blind dissection, hence minimal iatrogenic injury to adjacent neurovascular structures and minimizes morbidity. Though the careful patient selection is the key to success in robotic surgery for PPS masses.

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CONFLICT OF INTEREST

The authors declares that there is no conflict of interest.

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