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Emphasizing temporomandibular joint function with clinical and home based physiotherapy after surgical resection of a parapharyngeal schwannoma: A case report

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ABSTRACT

Tumors involving the parapharyngeal space are rare. This category accounts for about 0.5 percent of all head and neck tumors. Schwannomas encircling the higher parapharyngeal space (PPS) are complicated and complex abrasions because of the bodily intricacy of this section and the repeated involvement of the neurovascular systems of the jugular foramen. Surgical eradication of parapharyngeal space malignancies is limited due to the region's anatomical complexity. Few of the tissues in parapharyngeal space can also develop benign and malignant cancers. Imaging scans are important in diagnosing and preoperative management. Head and neck magnetic resonance imaging (MRI) and computed tomography (CT) using contrast are by far the most standard techniques being used to diagnose PPS malignancies. Surgical resection is the therapeutic option for PPS cancers. Physiotherapy plays a crucial role in preventing abnormalities during PPS and after surgery, as well as assisting patients in resolving deficits and regaining normal activity.

Keywords: Parapharyngeal Schwannoma, Parapharyngeal Space, Temporomandibular Joint, Physiotherapy

1. INTRODUCTION

Approximately 0.5 percent of all neck and face malignancies have been documented, suggesting that parapharyngeal space malignancies are rare. Tumors of salivary gland, schwannoma, neurofibroma, and paraganglioma are examples of these cells having diverse histopathological bases. PPS tumors go undiagnosed and asymptomatic for a long time unless they grow large

enough to dislodge and crush adjacent organs. Even though majority of such lesions appear to be rather benign, 20% of them develop into malignant transformation. The complicated musculature of the sector, which largely includes countless neurovascular systems, makes the excision of malignancies through the parapharyngeal region a difficult surgical technique (Carroll et al., 2017). Schwannoma, also known as neurilemmoma, is a benign neoplastic growth that develops from Schwann cells. These cells acquire the myelin sheath via myelinated peripheral axons. Although there are occasional late presentations, the huge mainstream of entities appear to be symptom-free.

The majority of the complexities in the parapharyngeal region allow benign and malignant tumors to form. 70-80 percent of parapharyngeal cavity cancers are benign, while 20-30 percent is malignant. The salivary that instead of neurogenic etiology of the few parapharyngeal region metastases was common. Schwannoma is a somewhat standard neural metastatic tumor seen in the parapharynx (Jain et al., 2020). The majority of PPS tumors are benign, with just 10 to 20% of them becoming malignant (Joshi et al., 2021). Schwannomas that depict the upper parapharyngeal zone may be challenging metastases due to the anatomical complexity with this area and the widespread occurrence of neurovascular composition of the jugular foramen (Luzzi et al., 2019).

The parapharyngeal space is an interplanetary cavity at the collar with an inverted rectangular in relation extending forward the hyoid bone out of the bottom of the skull (Luna-Ortiz et al., 2018). The lateral neck, parapharyngeal region, and temporal bone are the most prevalent locations for schwannomas, and a mass in the neck with dysphagia and pain is a common clinical symptom (Mohammad et al., 2020). The tumor's and PPS's signs and symptoms are minimal. This is usually only noticed when it has fully-fledged great enough to be recognized. Due to their position, these tumors are difficult to target properly. Surgical excision is the treatment option for PPS malignancies. Transcervical, transparotid, transoral, and transmandibular surgical regimens for PPS tumors are all unique (Lien et al., 2019).

Patients' health and quality of life suffer when their mouths are restricted. Eating, dental hygiene, conversing, and other social activities have all been harmed in some way (Abboud et al., 2020). Excessive usage of normal and functioning muscles may arise to counteract muscular atrophy. Mandibular masticatory muscle atrophy can lead to fatigue in overloaded muscles, resulting in a reduction in mandibular range of motion and pain during activity (Lee et al., 2018). The utmost stereotypical form of treatment is the surgical removal of the lesion, which is based on the vicinity of the lesion to a neurovascular system and the anticipated postoperative morbidities surgical intervention. In the vast majority of situations, a simple transcervical or mixed transcervical transparotid can be used.

In certain situations of severe and recurrent malignancies when larger operative treatment is necessary, transcervical transmandibular or transcervical transoral methods can be used (Pradhan et al., 2019). The most common postoperative oral emergencies include painful eating, poor speech difficulties (dysarthria), and neck mass formation. Limitation of activities at the surgical region, chest pain and dyspnea, edema, and restricted mouth movement is the most common postoperative oral emergencies. Individuals with oral cancer who are undergoing treatment options, such as head and neck activities, mouth opening activities using thermalite equipment, and shoulder flexibility, benefit greatly from physiotherapy. It prevents and/or addresses a variety of glitches that can ascend as a consequence of cancer therapy.

A physiotherapy treatment program primarily assists postoperative individuals in restoring functional range of motion (ROM) and so improving their quality of life. Physiotherapy is thought to be beneficial in the treatment of people who have had surgeries. Patient education placement is one of the therapeutic approaches. Activities such as shoulder flexion and abduction, shoulder shrugs, neck range of motion exercises, breathing exercises, mouth opening exercises and mouth opening with assistive devices, and bilateral upper and lower limb mobility exercises, among others.

2. PATIENT INFORMATION

A 20 years old lady notices a swelling over the left side of her neck below the ear lobe and also complains of pain over the swelling past 1 year. Reported the swelling was small in size initially which gradually progressed in size up to 5.3 x 3.0 x 2.3 cm over the left parotid gland extending inferiorly till the level of C4 behind the submandibular gland together with the anterior border of the sternocleidomastoid musculature and adjacent to the carotid sheath. Subcentimetric lymph nodes in the bilateral submandibular and submental regions were found. As reported by the patient the pain was steady at inception, advancing in nature, on and off mild to moderate in intensity, dull aching type. History of radiating pain was given downwards to the left side of the neck without any aggravating and relieving factors. She also has a history of tobacco chewing since 10 years of age and is also anemic. With these complaints, the patient visited the hospital, where the prescribed investigations were performed like MRI, CECT Neck, etc. As an outcome of the report, the patient was diagnosed with left parapharyngeal schwannoma. Later on, the patient got admitted to the ENT department on 05-01-2022 to undergo surgical intervention and was operated on for excision of left parapharyngeal tumor

(Schwannoma of the left vagus nerve) by transcervical approach on 06-01-2022. Post-surgery the patient was having complaints of difficulty in mouth opening and restricted left side shoulder ROM. The pain was dull aching with the intensity of 6/10 on NPRS and the pain was aggravating while performing shoulder activities and getting relieved at rest. With all these complaints, the patient was referred to the physiotherapy department.

3. CLINICAL FINDINGS

The subject was examined in a sitting position. On inspection, left shoulder was slightly elevated, the spine was erect, hip & knee were 90° flexed resting over the couch, and ankle was neutral. Neck drain was present at the surgical site (Figure 1). On palpation, the local temperature was slightly raised. On neurological evaluation, no loss of superficial stimulations (Temperature, pinprick, and light touch) was found. On physical examination vital signs like the rate of the pulse was 80 Beats/Min, RR was 20 breaths per minute, BP was 130/80 mmHg.



Figure 1 Depicting neck drain at surgical site

Patient's concern

Difficulty post-operative in mouth opening and restricted shoulder ROM of the left side (table 1)

Diagnosis

The diagnosis was confirmed as left parapharyngeal schwannoma, by performing necessary investigations like MRI, CECT Neck, LFT, KFT and ECG

Assessment

Range of Motion

Table 1 Pre and post physiotherapy assessment.

Joint	Pre-Physiotherapy	Post-Physiotherapy
TMJ (Mouth Opening)	1 Finger	3 Finger
Shoulder	Flexion – 100°	Flexion – 140°
	Extension – 25°	Extension – 40°

Timeline

On 5th January 2022 patient was diagnosed with left parapharyngeal schwannoma, was operated on 6th January and very next day on 7th January physiotherapy referral was given.

Intervention

Post-operative goals: The short-term goals were to reduce shoulder pain, increase shoulder movement, increase mouth opening, and have self-regulating events of everyday living. The long-term goals were to maintain the achieved shoulder range of motion and mouth opening.

Management

On postoperative day 6 the patient was referred for physiotherapy. Where the evaluation of the patient was done by the physical therapist and the evaluatory findings were shoulder pain and restricted shoulder range of motion and restricted mouth opening. Physiotherapy was initiated by a skilled and experienced therapist for 6 weeks routinely in physiotherapy OPD.

Week 1

Shoulder and TMJ range of motion exercises were initiated within the pain limit, along with neck and shoulder ROM exercises, Mouth opening and closing exercises. Breathing techniques such as pursed lip breathing, segmental breathing, and diaphragmatic breathing was taught. This was continued for 1 week.

Week 2-4

For increasing ROM of Temporomandibular Joint exercises such as Goldfish Exercises for partial and full opening of mouth were given, air gulping, gulping of air with tongue touching palate, wooden clip clinch exercises, air blow exercises, chin tucks were initiated. In addition, cervical & temporal muscles were released & a referral to speech therapist was given for patients benefit.

Week 4-6

Isometric exercises for strengthening the shoulder and cervical region were given including static cervical and static shoulder exercises which were performed within the pain limit. Shoulder shrugs, neck isometrics, opening and closing exercises of mouth with the help of ice-cream sticks to increase mouth opening with 10 seconds hold were given. Breathing exercises which include pursed-lip breathing, diaphragmatic breathing, and glossopharyngeal breathing were given. Goldfish Partial opening exercises are performed with the tongue above the top of the mouth, a single finger at the TMJ, and the index finger over the chin. Then, with the backside of the index finger, enable the underneath jaw to slip downward and upward sparingly. The above is accomplished by observing the jaw's marginal exposure in presence of a mirror to assure consistent disclosure. Placing the tongue on the upper jaw for the period of opening, as well as positioning additional fingers above both TMJ, helps the lower jaw to fully slide down and back, allowing the chin to reach the throat for the entire opening. All TMJ & mouth opening activities were accomplished in front of mirror for determining the entire jaw opening is accurate and not uneven.

Home programme

The patient was referred to continue physiotherapy after discharge and explicit directives were given to do all the activities and other tasks at home with prescribed repetitions and weights. The patient demonstrated an increase in shoulder ranges, mouth opening (Fig. 2) and pain after the physiotherapy treatment was greatly reduced. As compared to POD 2, numerical pain scoring on NPRS was also substantially reduced.



Figure 2 (A) 1 Finger mouth opening at POD 2, (B) 2 Finger mouth opening at 3rd week

Follow-up and outcome

The patient was effective in enduring all everyday life activities and had no shoulder pain. As well as the degree of mouth opening rose. The patient was keen to do physiotherapy and was well-motivated. The patient has also been briefed on home fitness plans and postural correction was advised. NPRS score on POD 2 was 6/10. After initiation of physiotherapy treatment after surgery and post 6 weeks with physiotherapy, improvements in NPRS were seen as 2/10. Improvements were observed in the patient by increased shoulder and mouth opening ranges. The improvements are observed gradually as the patient progressed with the exercise or physiotherapy treatment.

4. DISCUSSION

Schwannomas, commonly known as neurilemmomas, are benign, slow-growing tumors that arise from replicating Schwann cells in the peripheral, cranial, or autonomic nerves (Carroll et al., 2017). The parapharyngeal cavity must be divided into two divisions in clinical practice: the pre-styloid compartment and the post-styloid compartment. Parapharyngeal space is separated in two groups by fascia that runs through the styloid process toward the tensor veli palatine muscle. They've being identified with in face, scalp, intracranial cavity, orbit, nasal and oral cavities, mastoid, parapharyngeal region, larynx, and lateral and medial sections of neck (Jain et al., 2020). Because clinical assessment of the parapharyngeal region is challenging, imaging tests are essential for PPST examination.

A contrast CT, and even an MRI and, in some situations, angiography, are essential for diagnosing and treatment (Luna-Ortiz et al., 2018). Three individuals developed malignant PPS tumors, comprising carcinoma ex-pleomorphic adenoma, malignant carotid body paraganglioma, and acinic cell carcinoma, according to our data. Following the operation, the patients with malignant carotid body paraganglioma underwent radiation, while another two patients receive CCRT. Following prophylactic treatment was accomplished, all patients were evaluated on a constant schedule, and no resurgence was observed. The operative method was chosen based on the tumor's site and dimensions. The transcervical technique affords appropriate access to the carotid artery division and has the fewest clinical complications. Surgical excision in the highest and deepest part of tumors with a high superior border and under the inner side of the jaw is challenging. The transparotid method analyses all of the facial nerve's branching and gives the best nerve preservation. In this method, scarring is generally not visible (Lien et al., 2019). As a result, trigeminal nerve injury could be linked to masticatory muscle inactivity shortening, lowering the patient's quality of life.

Schwannoma is a Schwann cell-derived benign tumor of the nerve sheath. Schwannomas in the vagus and cervical sympathetic systems are prevalent, while trigeminal schwannomas are uncommon (Lee et al., 2018). Because PPS tumors are so close to neurovascular structures, they frequently cause dangerous neurological problems that can be noticed in the preoperative or

postoperative phase. Presurgical nerve palsies appear to be less symptomatic than postoperative nerve palsies, which is more likely related to the gradual initiation and activating of rehabilitative processes (Joshi et al., 2021). The two main prevalent tumors in the brachial plexus region are schwannomas and neurofibromas, which either grow through nerve sheath or are benign. Almost all of the time, initially on in the duration, there would be just a minor neurological deficiency, if any at all.

Paraesthesias or "shocks" in the circulation of the afflicted nerve might be produced by manipulating the tissue, and this might help diagnose the problem. In benign lesions, side-to-side motion is relatively more frequent than longitudinal movement, but malignancy is linked to hardness and inactivity (Ansari et al., 2018). Most of the tumors in the PPS are found in post-styloid compartment, with most of those coming through the vagus nerve, one from the spinal accessory, and the remaining through the cervical sympathetic chain (Pradhan et al., 2019). The extent of tumor at intradural, intracanal, and extracanal areas influences the treatment protocol. Condylectomy is required for intracanal and extracanal lesions (Fachniadin et al., 2021). The paragangliomas have a hard-to-leathery substance and appear as sharply defined polypoid lumps. They are venous tumors that can be dark red (Mittal et al., 2020). After TMD management with a stabilizing splint, the individual in this research had substantially better symptoms. It proved to be highly efficacious than earlier therapies. Biofeedback, visual feedback, relaxing of the masticatory muscle, and repair of the neuromuscular instability are a few of the causes of the effects of stabilizing splint therapy.

In the research, quite a handful of occurrences of TMD following surgical trigeminal nerve damage have recorded. In this particular instance, the patient was referred to physiotherapy because of his discontentment with his restricted mouth opening and shoulder range of motion. A course of action was devised for patient assessment, which included TMJ activities such as mouth opening and closing exercises, as well as static neck and shoulder activities. Diaphragmatic breathing and glossopharyngeal breathing are examples of breathing exercises. TMJ exercises are used to increase the client's restricted mouth opening, while neck and shoulder static exercises are used to relieve muscle tension and relax the body. To boost the endurance of certain muscles, strengthening exercises are given. As per the scientific papers, there is neither such predominance for any single-gender or age group, so schwannoma must be considered a condition that can affect anyone of any age or gender. As a result, in the incidence of parapharyngeal Schwannoma, rehabilitation following surgery is advantageous.

5. CONCLUSION

In oral surgery patients, a definite surgical strategy and physiotherapy treatment have been demonstrated to be beneficial in reaching intended outcomes. Throughout the management time, the patient showed incredible cooperation, and she is now competent to perform an entire range of movements. A collaborative work with speech therapist benefitted the patient. The objective variables of physiotherapy treatment helped her to improve her quality of life and range of motion.

Author's contribution

All writers offered their quality effort for the idea, evaluation, assessment, and processing of data

Informed consent

The consent was obtained from the patient to prepare the case report.

Abbreviations

PPS - Parapharyngeal Space, TMJ - Temporomandibular Joint, POD - Post Operative Day, NPRS - Numerical Pain Rating Scale, MRI - Magnetic Resonance Imaging, ROM - Range of Motion.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Abboud WA, Hassin-Baer S, Alon EE, Gluck I, Dobriyan A, Amit U, Ran Y, Yarom N. Restricted Mouth Opening in Head and Neck Cancer: Etiology, Prevention, and Treatment. *JCO Oncol Pract* 2020; 16:643–53. doi: 10.1200/OP.20.00266.
2. Ansari I, Ansari A, Graison AA, Patil AJ, Joshi H. Head and Neck Schwannomas: A Surgical Challenge—A Series of 5 Cases. *Case Rep Otolaryngol* 2018; 2018:e4074905. doi: 10.1155/2018/4074905.
3. Carroll C, Jagatiya M, Kamel D, Siddiqi J. A parapharyngeal space schwannoma arising from the vagus nerve: A case report. *Int J Surg Case Rep* 2017; 41:22–5. doi: 10.1016/j.ijscr.2017.09.025.
4. Fachniadin A, Nugroho SW, Aman RA, Ichwan S, Tandian D, Susanto E, Watanabe K, Nonaka Y. A Dumbbell-shaped hypoglossal schwannoma managed by a combination of open surgery and endoscopic assistance. *Interdisciplinary Neurosurg* 2021; 25:101102. doi: 10.1016/j.inat.2021.101102.
5. Jain N, Jatav G, Patel A. A complete removal of parapharyngeal space schwannoma: A rare case report with review of literature. *Interdisciplinary Neurosurg* 2020; 21:100540. doi: 10.1016/j.inat.2019.100540.
6. Joshi P, Joshi KD, Nair S, Bhati M, Nair D, Bal M, Joshi A, Mummudi N, Tuljapurkar V, Chaukar DA, Chaturvedi P. Surgical Management of Parapharyngeal Tumors: Our Experience. *South Asian J Cancer* 2021; 10:167–71. doi: 10.1055/s-0041-1731580.
7. Lee YH, Park HJ, Hwang MJ, Auh QS. Temporomandibular Disorder and Disuse Atrophy of the Masticatory Muscles after Surgical Resection of a Schwannoma: A Case Report. *J Oral Med Pain* 2018; 43:147–51. doi: 10.14476/jomp.2018.43.4.147.
8. Lien KH, Young CK, Chin SC, Liao CT, Huang SF. Parapharyngeal space tumors: a serial case study. *J Int Med Res* 2019; 47:4004–13. doi: 10.1177/0300060519862659.
9. Luna-Ortiz K, Villa-Zepeda O, Carrillo JF, Molina-Frias E, Gómez-Pedraza A. Parapharyngeal Space Tumor: Submandibular Approach Without Mandibulotomy. *J Maxillofac Oral Surg* 2018; 17:616–24. doi: 10.1007/s12663-018-1133-0.
10. Luzzi S, Lucifero AG, Maestro MD, Marfia G, Navone SE, Baldoncini M, Nuñez M, Campero A, Elbabaa SK, Galzio R. Anterolateral Approach for Retrostyloid Superior Parapharyngeal Space Schwannomas Involving the Jugular Foramen Area: A 20-Year Experience. *World Neurosurg* 2019; 132:e40–52. doi: 10.1016/j.wneu.2019.09.006.
11. Mittal GS, Sundriyal D, Agrawal M. Paraganglioma of superior laryngeal nerve mimicking as carotid body tumor: A rare case report. *IP J Surg Allied Sci* 2020; 1:77–81.
12. Mohammad A, Iqbal MA, Wadhwanian A. Schwannomas of the head and neck region: A report of two cases with a narrative review of the literature. *Cancer Res Statist Treat* 2020; 3:517. doi: 10.4103/CRST.CRST_149_20.
13. Pradhan P, Preetam C, Samal S, Samal DK, Parida PK. Surgical management of extracranial nerve sheath tumours in a tertiary care center. *World J Otorhinolaryngol Head Neck Surg* 2019; 5:76–81. doi: 10.1016/j.wjorl.2019.01.001.