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Case Report

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Endoscopic trans-sphenoid excision of solid petrous apex lesion: a case report

Sai Spoorthi R. Nayak[1]*, Nishit J. Shah[1], Chandrashekhar E. Deopujari[2], Prashant V. Gunawat[2]

[1]Department of ENT, [2]Department of Neurosurgery, Bombay Hospital and Medical Research Centre, Mumbai, India

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***Correspondence:**
Dr. Sai Spoorthi R. Nayak,
E-mail: dr.saispoorthinayak@gmail.com

ABSTRACT

Petrous apex lesions are highly challenging for surgical access as they lie in the most medial portion of the temporal bone, surrounded by vital structures. These lesions are traditionally tackled by labyrinthine approaches. Endoscopic endonasal approach has been described to drain cystic lesions like cholesterol granulomas. Intraosseous schwannomas of the petrous apex are a rare occurrence with only 3 cases being reported so far. We are the first to describe a transphenoidal route to completely excise a solid petrous apex lesion like a schwannoma.

Keywords: Petrous apex lesion, Schwannoma, Trans-sphenoidal approach

INTRODUCTION

Petrous apex is a complex region of the central skull base that is surrounded by a number of important vascular and neural structures. It can harbour a wide range of disease processes. Lesions arising from or spreading to the petrous apex can cause a myriad of symptoms and severe clinical sequelae which typically results from pressure effect or infiltration of the important structures.[1]

The most common petrous apex lesion is cholesterol granuloma followed by cholesteatomas.[1] Intraosseous schwannoma is a relatively rare clinical entity that typically arises in the vertebral and mandibular bone. Intraosseous schwannomas located entirely in the petrous apex is extremely rare with only 3 cases having being described so far.

We report just the 4th case and are the first to describe endoscopic endonasal excision of the petrous apex lesion.

CASE REPORT

A 43 year old male presented to our hospital with history of diplopia in the left eye with restricted eye movements since 8 months. The patient also had history of intermittent tinnitus in the left ear without any history of hearing loss. He also noticed weakness of the left side of the face, drooling of saliva from the left side and deviation of the right angle of the mouth.

Otoscopy and pure tone audiometry in both the ears was normal. There was left lateral rectus palsy and left infranuclear facial palsy (INFP) of grade IV according to House-Brackman classification.

Computed tomography (CT) of the brain revealed an expansile osteolytic lesion involving left petrous bone, left half of the clivus, left occipital condyle and projection in left sphenoid sinus. The lesion measured 4.8×2.1 cm also caused destruction of the floor of the sella and left half of dorsum sellae (Figure 1).

Magnetic resonance imaging (MRI) demonstrated isointense lesion on T1-weighted imaging (T1-WI) and high signal intensity on T2-weighted imaging (T2-WI) (Figure 2).

The patient was planned for endoscopic tumor excision under general anaesthesia. Nasoseptal rescue flaps were

raised bilaterally as CSF leak was not anticipated in this case. At the same time, it kept the option open of converting the rescue flaps into Hadad flaps in an event of CSF leak. Posterior septectomy was done so that we could use a binostril approach for better maneouvering of instruments. The anterior wall of sphenoid was removed completely to expose the lateral extent of the tumor on the left side. The tumor was found to be filling the sphenoid sinus (Figure 3). A bit of tissue was taken for biopsy and sent for frozen section.

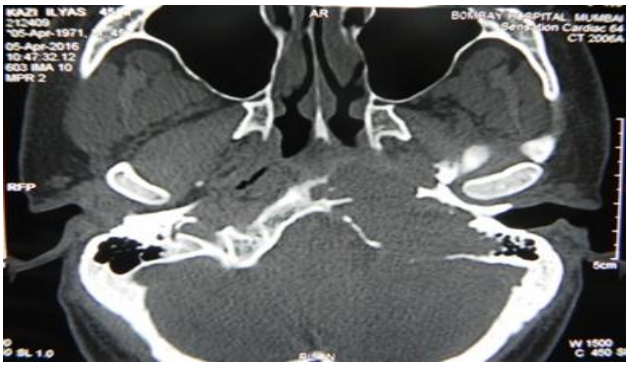

Figure 1: CT scan showing expansile osteolytic lesion involving the left petrous and left clivus and occipital bone.

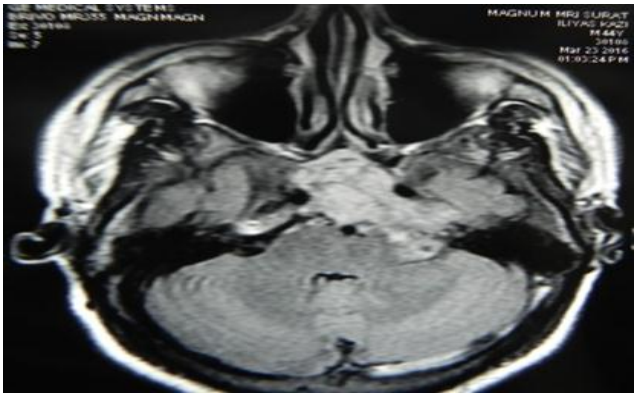

Figure 2: T1WI MRI scan showing isointense lesion occupying the left petrous lesion.

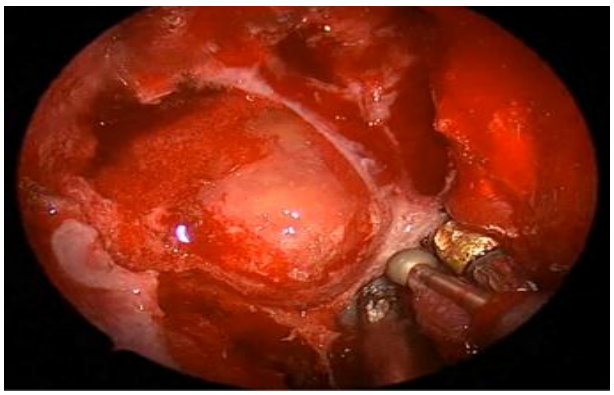

Figure 3: Intraoperative picture of schwannoma occupying the sphenoid sinus

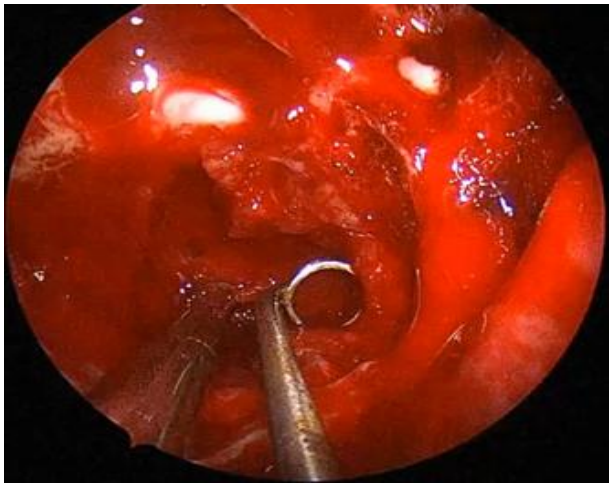

Figure 4: Intraoperative picture showing left clival carotid being skeletonised using a ring curette.

The intersphenoid septum and the sphenoid sinus floor were drilled so that the endoscope and the instruments could be easily maneouvered in the lateral extent of the tumor. The involved part of the clivus was drilled out.

In the meanwhile, the frozen section was reported to be schwannoma so the decision was made to follow the tumor till its origin and excise it completely. The clinoid process and left lateral sphenoid wall were drilled. The left clival, cavernous and paraclinoid carotid was skeletonised (Figure 4).

We used intra-op surgical neuro-imaging system to confirm the extent of the tumor and presence of surrounding vital structures. The tumor was followed into the petrous bone. It was of variegated consistency and was curetted out completely. Dura was exposed posteriorly. The borders of the tumor were confirmed on navigation system (Figure 5). The tumor was curetted out until the extents of the borders of the pre-formed tumor cavity were reached after confirming with navigation.

No CSF leak was encountered in this case. The petrous cavity was filled with absorbable hemostat (oxidized regenerated cellulose- Surgicel™) and compressed gelatin sponge (Gelfoam™). The nasoseptal rescue flaps were reposited on the left side completely. The right flap was incompletely reposited in order to keep the spheno-petrous cavity exposed for better postoperative surveillance.

The patient followed up regularly with us since his surgery. His complains of diplopia resolved completely. The left facial palsy also improved from grade IV to grade II in a span of 2 weeks (House-Brackman classification). Six months post-surgery the patient came with follow up MR scan showing recurrence in the left petro-clival region. The patient then underwent retro mastoid, navigation guided, gross total excision of the tumor.

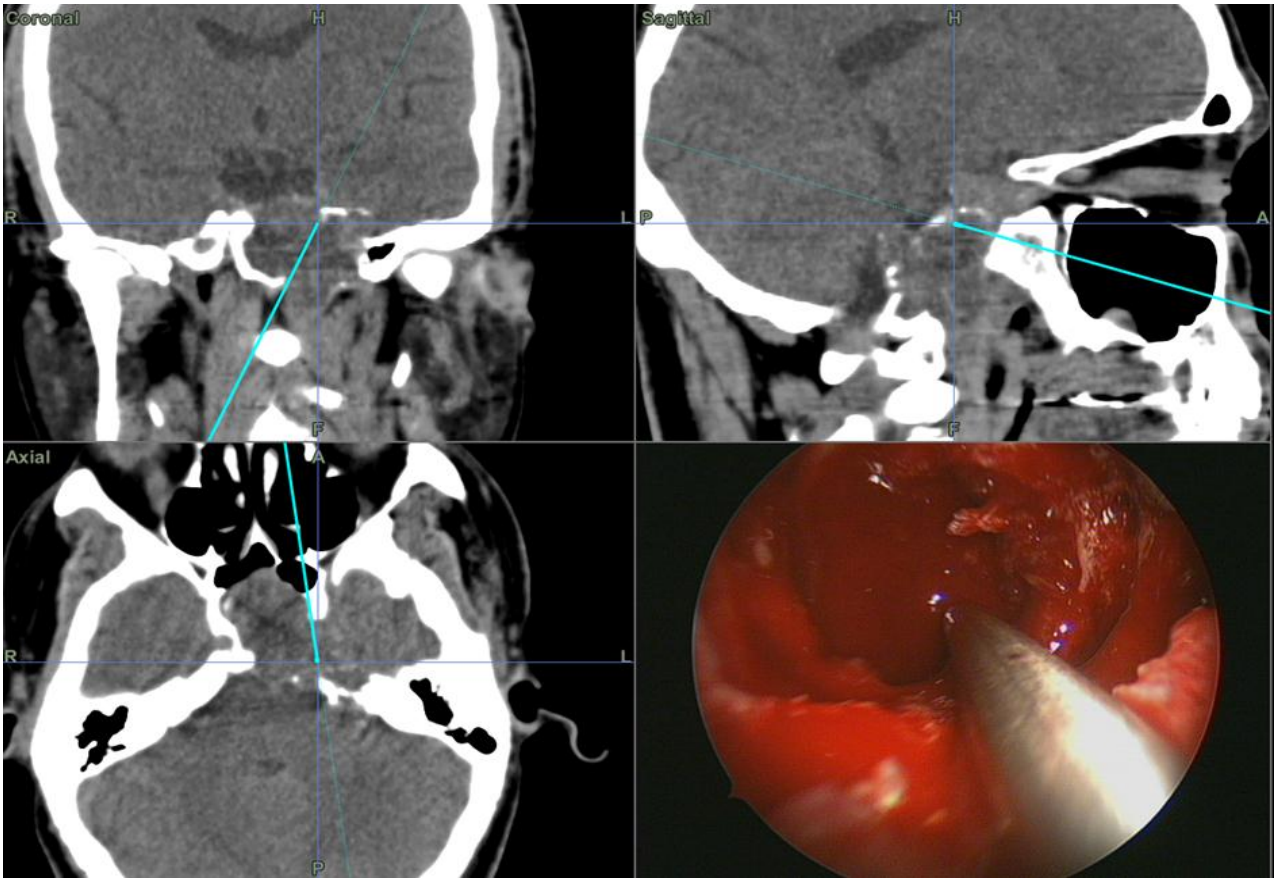

Figure 5: Intraoperative neuroimaging picture showing the navigation pointer at the posterior and superior limit of the tumor, marking near total excision of the tumor.

DISCUSSION

A variety of petrous apex lesions have been described. They can be categorized as those arising from the bone and those arising from adjacent structures. Lesions arising from the bone include the following:

- Cholesterol granuloma
- Cholesteatoma
- Mucocoele
- Petrous apicitis[1]

Primary neoplasms of the petrous apex are rare and include the following

- Eosinophilic granuloma
- Chondroma
- Chondrosarcoma
- Chordoma
- Schwannoma[1]

Alternatively petrous apex lesions can be classified on the basis of their origin.

- Developmental
- Inflammatory
- Tumor (benign/malignant)
- Vascular
- Osseous dysplasia

Most neoplasms of petrous apex arise from direct extension of nearby primary tumor such as cranial nerve schwannoma or as metastatic spread from breast, lung or prostrate.[1,2]

The histopathological diagnosis of our case was schwannoma with diffuse expression of S-100 protein (Figure 6). Schwannomas are tumors of the nerve sheath. They typically develop from the Schwann cells. They are usually benign and involve the substance of the bone.[5] Intraosseous schwannomas contribute to 0.2% of bone tumors. They arise exclusively from sensory nerves.[3,5] They are isointense on T1 and hyperintense on T2.

In this particular case, abducens nerve was strongly suspected as the area of origin however the lateral rectus palsy completely resolved in 2 weeks of postoperative period. The facial nerve palsy also improved from HB grade IV to HB grade II. In addition, ultrastructure & review of literature suggest that schwannomas arise exclusively from sensory nerves.[3,5] Hence abducens nerve and facial nerve as the origin were ruled out. Patient did not show any evidence of trigeminal nerve deficit pre-

operatively. Hence in this case, schwannoma was considered to be intraosseous.

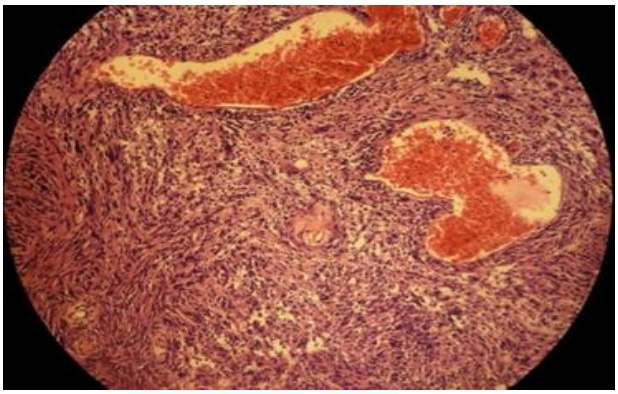

Figure 6: Showing spindle cell Antoni A cells on the left and round cells Antoni B cells on the right.

Such a tumor could arise possibly from Schwann cells of sensory nerves distributed in the dura, pial cells, Schwann cells of subarachnoid, pial or parenchymal nerve plexus around the vessels or from embryologic migration of Schwann cells.[4] Intraosseous schwannomas are mostly considered to originate according to the last theory.[5]

In the history of petrous apex lesions, schwannomas are a rare occurrence. Only 3 cases of petrous apex schwannomas have been described till date. Out of which 2 patients were reported to be operated by temporal craniotomy with subtemporal extradural approach.[4] So far there has been no case report having described an endonasal approach for solid petrous apex lesions. We are the first to describe an endoscopic, endonasal trans-sphenoidal approach for excision of a solid petrous apex.

Traditional approaches to petrous apex include surgery through and around the labyrinth such as translabyrinthine, infralabyrinthine, retrocochlear, retrolabyrinthine or approaching it from the middle cranial fossa. All these approaches are technically demanding and the view and access are often narrow and restricted. Also there is always a potential risk of audiovestibular loss. Middle cranial fossa approach entails retraction of the brain and this may cause potential neurological sequelae. There is no natural drainage pathway postoperatively.

On the other hand trans-sphenoidal approach to petrous apex is useful for biopsy and drainage purposes. It is particularly useful for lesions which bulge into the medial sphenoid sinus. This approach usually avoids injury to the audiovestibular system and provides drainage pathway into the sphenoid sinus.

The trans-sphenoidal approach is appropriate for lesions that create a definite impression or "mass effect" on the posterolateral wall of the sphenoid sinus. If the optic nerve and the carotid artery can be identified and kept in view, then the trans-sphenoidal approach is relatively straightforward. The difficulty comes when the lesion is not so obvious in the sphenoid, or the sphenoid is poorly pneumatised or the lesion does not bulge into the sinus or the lesion is situated posterolateral to the clival carotid artery.

So far trans-sphenoidal approach has been described for cystic petrous apex lesions like cholesterol granulomas. No case reports have described an endonasal route for excising a solid petrous apex lesion till date. We are the first to take a trans-sphenoidal route for a solid lesion and also completely excise it.

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