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Case Report

Beyond the ordinary headache: MRI insights into a case of Cystic trigeminal Schwannoma

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ABSTRACT:
Trigeminal schwannomas are rare, benign and sluggishly growing tumours originating from the Schwann cells of trigeminal nerve. They are the second most common [(6)] intracranial schwannoma yet attributing to less than 0.5% of all intracranial tumours[(7)]. Often posing diagnostic challenges due to their atypical presentation. This case report underscores the crucial role of MRI in identifying these rare lesions, offering essential diagnostic clues that distinguish schwannomas from other intracranial cystic tumours. The advanced imaging capabilities of MRI are instrumental in confirming the diagnosis, supporting treatment planning, and optimizing surgical outcomes. [(1,2)]

Keywords: Trigeminal nerve, cystic, schwannoma, MR

ABBREVIATIONS:
MCF = Middle cranial fossa; PCF = Posterior cranial fossa; MRI = Magnetic resonance imaging MPRAGE = Magnetization prepared rapid gradient echo

INTRODUCTION:

Schwannomas are benign tumours originating from the schwann cells of nerve sheaths and can develop along peripheral, cranial, or autonomic nerves. Trigeminal schwannomas are rare, sluggishly growing tumours that may emerge from the cisternal segment, the trigeminal (gasserian)ganglion in Meckel's cave or one of the three branches[(2,6)]. Cystic degeneration is uncommon. They most commonly occur in people in their **4th to 6th decades of life** and with slight female preponderance. We have documented an uncommon case of **postganglionic cystic trigeminal schwannoma.**

CASE REPORT:

A 42yr old female with otherwise good pass health presented with headache and vertigo for 3 months, vomiting and occasional vague facial pain. On further examination there was decreased touch sensation on the right side of face. The patient was afebrile and the other vitals at the time of examination were BP: 130/80 mm hg; Pulse rate: 76bpm. Based on the patient's symptoms, an MRI was requested to further investigate the potential causes which revealed T1 hypo to isointense, T2W & FLAIR iso to hyperintense mixed solid cystic mass centered in the right masticator space causing widening of foramen ovale. The cystic component showed blood-fluid levels.

Intracranial extension through right foramen ovale, inferiorly into infratemporal fossa causing compression of pterygoid muscles Anteriorly up to lesser wing of sphenoid Posteromedially indenting the right tentorial fold and right prepontine cistern Medially up to the body of right sphenoid bone and right cavernous sinus.

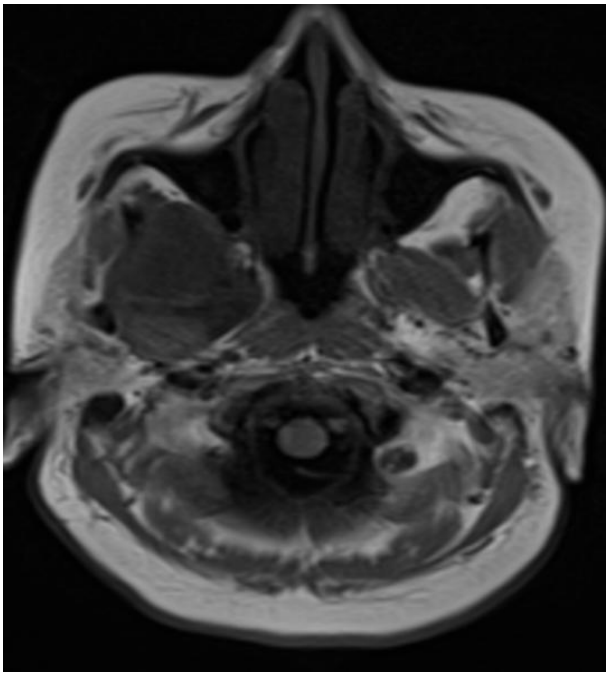
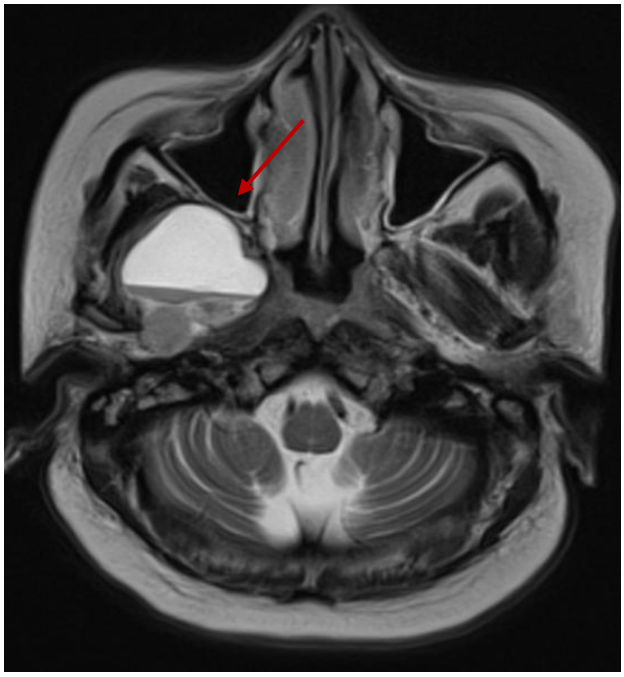

Image 1A (On left) Axial T1W MRI shows T1 hypo to isointense, Image 1B (On right) Axial T2W shows iso to hyperintense mixed solid cystic mass centered in the right masticator space

Laterally limited by right mandible, howbeit there is no cortical erosion
There was associated atrophy and fat deposition in temporalis, masseter and pterygoid muscles on right side, representing trigeminal(V3) nerve involvement. Marked thinning and scalloping of right lateral pterygoid plate. No intraaxial extension on the scan at that time.
On post contrast study, there is heterogeneous moderate enhancement of solid component and peripheral wall enhancement of the cystic component.

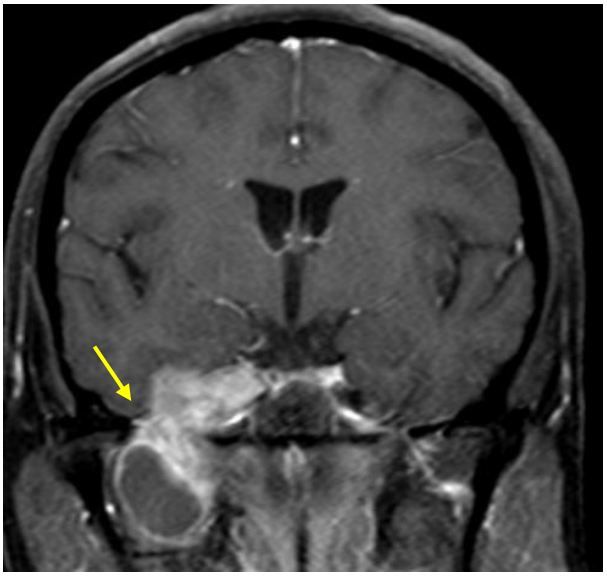
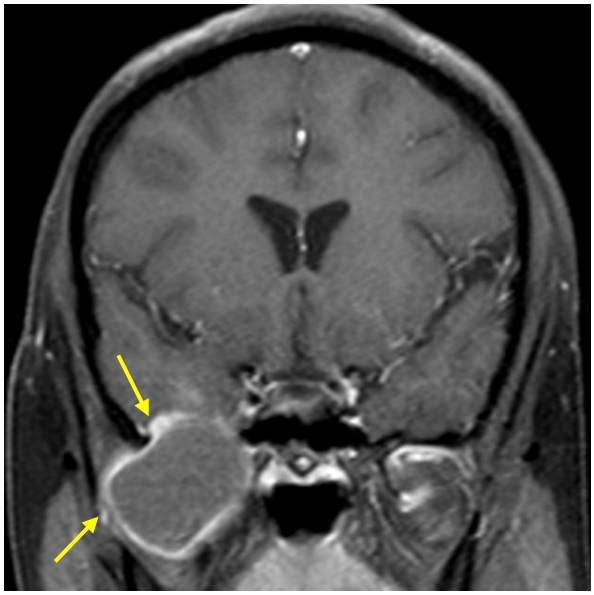

Image 2A&B: On coronal T1c, there is heterogeneous moderate enhancement of solid component and peripheral wall enhancement of the cystic component

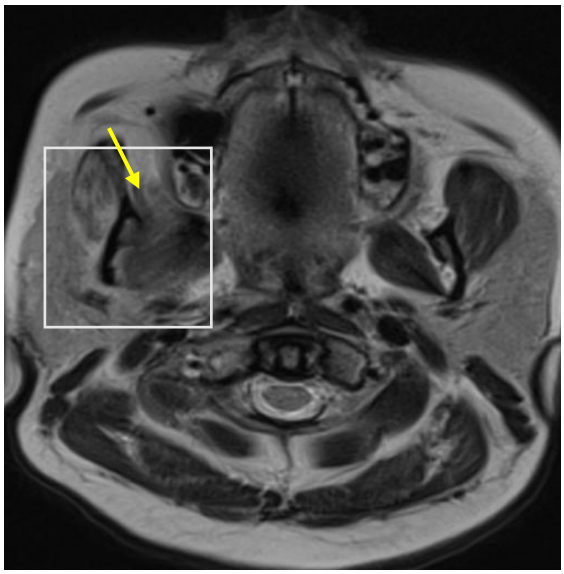

Image 3A: Axial T2W showing associated atrophy and fat deposition in temporalis, masseter and pterygoid muscles on right side, representing trigeminal (V3) nerve involvement.

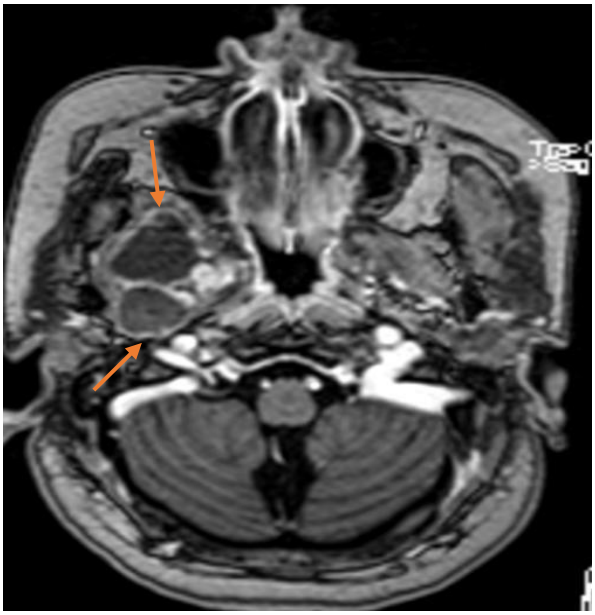

Image 4A: On T1MPRAGE the tumour is seen extending anteriorly up to lesser wing of sphenoid and inferiorly into infratemporal fossa.

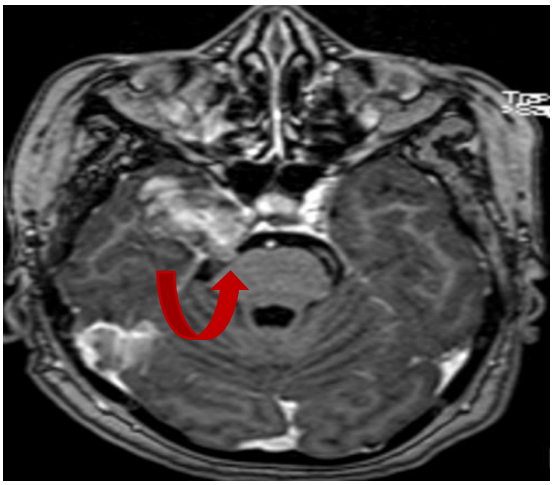

Image 4B: On T1MPRAGE the tumour is seen indenting the right tentorial fold and prepontine cistern Posteromedially

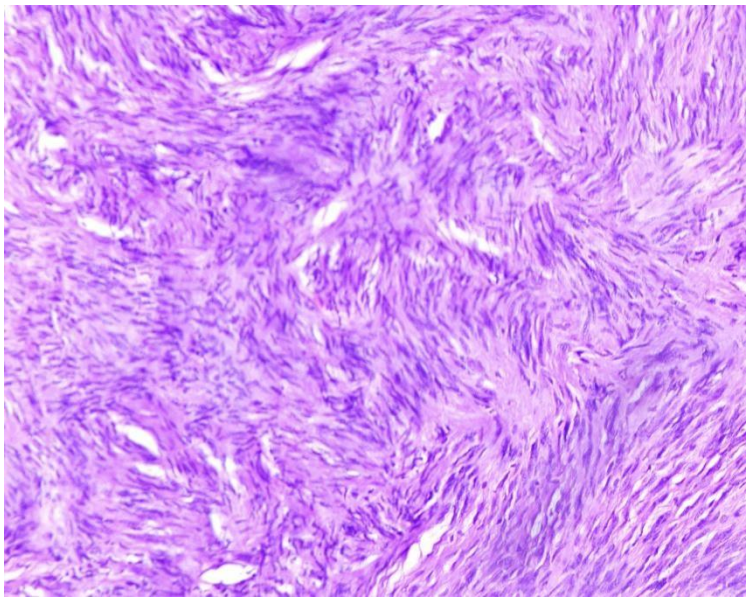

Image 5: shows Spindle cells with elongated wavy nuclei exhibiting focal nuclear palisading around fibrillary process (Verocay bodies), Haematoxylin and Eosin stain, 40x magnification.

DISCUSSION:

Cystic trigeminal schwannoma is a rare variant of an already uncommon disease Unlike their typical solid counterparts, these present with heterogeneous imaging features due to the mixture of Antoni A (dense, cellular) and Antoni B (loose, cystic) area. The symptoms in this case are nonspecific making the clinical diagnosis difficult. The interpretation of a radiologist is therefore **crucial** in **localizing** the tumour, **mapping** its extent and identifying any **compression of nearby structures** or **mass effects** After establishing the diagnosis, understanding **surgical classifications** is important for gaining insight into the **surgeon's perspective**. Trigeminal schwannomas can be classified based on their anatomical origin[(2)] into three major types:

1. ***Preganglionic Segment*** **(Posterior Fossa Mass)**

originate before the gasserian ganglion, typically in the cisternal segment of the trigeminal nerve, and present as a dumbbell-shaped posterior fossa mass.

2. ***Gasserian Ganglion*** **(Meckel Cave Mass)**

Arise at the level of the gasserian ganglion and appear as **dumbbell-shaped masses** confined within the Meckel's cave.

3. ***Postganglionic Branches*** **(Infratemporal Mass)**

Originating from the postganglionic branches, these tumours typically present as **infratemporal masses**. [(2)]

Classification of Trigeminal Schwannomas Based on Tumour Extent

Yoshida and Kawase [(3)]	Samii et al [(4)]	Radiological tumour extent
M	Type A	Intracranial tumour confined to MCF
P	Type B	Intracranial tumour confined to PCF
MP E ME	Type C	Intracranial dumbbell shaped tumour in MCF & PCF Extracranial extension MCF & Extracranial extension
MPE	Type D	Extracranial tumours with intracranial extensions

Trigeminal schwannomas are benign, well-defined tumours that rarely invade surrounding tissue, so **complete surgical removal** is the primary treatment. The choice of surgical approach depends on the tumour's location.

Radiotherapy is used if any tumour remains after surgery. If the tumour is not fully removed, it may **recur** after surgery.

Based on the clinical presentation and imaging findings, a provisional diagnosis of cystic trigeminal schwannoma was established, and the tumour was subsequently removed via a right fronto-parieto-temporal approach. The histopathology revealed Spindle cells with elongated wavy nuclei exhibiting focal nuclear palisading around fibrillary process (Verocay bodies-A component of Antoni A), which was consistent with the diagnosis of schwannoma. Immediate postoperative imaging showed no evidence of residual disease, and follow-up imaging was advised

CONCLUSION:

Preoperative imaging with **MRI** (and, when necessary, **CT**) plays an essential role in improving the outcomes of surgery for **trigeminal schwannomas**. It provides **accurate tumour localization**, evaluates **adjacent structure involvement**[1,2], helps assess **tumour composition**, and identifies potential **secondary effects** or **complications**, all of which guide surgical planning and minimize risks during resection. Thus, preoperative imaging significantly enhances **surgical precision**[5] and **patient safety**.

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