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Trigeminal Schwannoma Presenting as Facial Neuralgia: A Case Report

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Abstract **Case Report**

Trigeminal schwannomas are rare, benign nerve sheath tumors, accounting for less than 1% of all intracranial schwannomas. Clinically, they frequently present with facial neuralgia or sensory disturbances, and magnetic resonance imaging (MRI) remains the cornerstone for diagnosis. We report the case of a 65-year-old male with a four-month history of right-sided facial pain localized to the V2 and V3 trigeminal distributions. MRI revealed a right cerebellopontine angle mass centered on the cisternal segment of the trigeminal nerve, with extension into Meckel's cave. Management strategies for trigeminal schwannomas range from conservative observation to stereotactic radiosurgery. However, microsurgical resection remains the gold standard, offering immediate local tumor control and histopathological confirmation, albeit with a potential risk of neurologic deficits. Following complete resection, functional outcomes are generally favorable. Despite their benign nature and minimal risk of malignant transformation, long-term MRI surveillance is warranted to detect recurrence.

Keywords: MRI, Schwannoma, Trigeminal Nerve, Facial neuralgia.

INTRODUCTION

Trigeminal schwannomas are exceedingly rare benign neoplasms arising from Schwann cells of the fifth cranial nerve. They represent approximately 0.2% of all intracranial tumors and 0.8–5% of intracranial schwannomas [1]. These tumors may develop along the entire course of the trigeminal nerve, including the cerebellopontine angle, the middle cranial fossa, and sometimes exhibit extradural or intradural extension [2,3]. Most originate from the Gasserian (trigeminal) ganglion.

Facial pain is the most common presenting symptom, often manifesting as trigeminal neuralgia [1]. Peak incidence is seen in middle-aged adults (38–40 years), with a female predilection [4]. MRI is the diagnostic modality of choice, vital for both characterization and preoperative planning [5].

Management options include active surveillance, symptomatic medical therapy, microsurgical resection, stereotactic radiosurgery, and fractionated conformal radiotherapy. Therapeutic decisions are guided by patient history, tumor size and location, and symptom severity [6]. Complete resection remains the definitive treatment. Frazier performed the first total resection of a trigeminal schwannoma in 1918, paving the way for modern microsurgical approaches [7].

CASE PRESENTATION

A 65-year-old male with no significant medical history presented with a four-month history of right-sided facial neuralgia in the V2 and V3 dermatomes.

MRI of the brain demonstrated a 25 × 16 × 22 mm lesion in the right cerebellopontine angle, centered on the cisternal portion of the trigeminal nerve with extending into Meckel's cave and exerting a mass effect on the pons, with medial displacement (Figure 1 and 2).

Imaging characteristics included:
T1-weighted: isointense signal relative to brain parenchyma.
T2-weighted and FLAIR: homogeneously hyperintense signal.
Diffusion-weighted imaging: moderate diffusion restriction.
Post-contrast T1: homogeneous early enhancement.

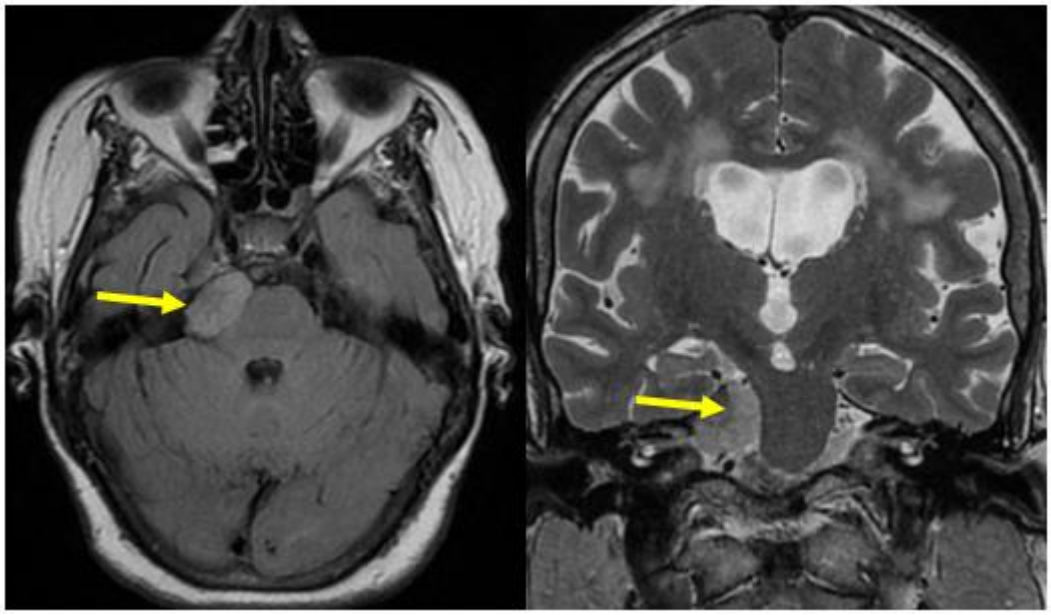

Figure 1: Axial T1-weighted and coronal T2-weighted brain MRI demonstrating the lesion (yellow arrow) within the right cerebellopontine angle, centered on the cisternal segment of the right trigeminal nerve, with infiltration of the right Meckel's cave and a mass effect on the pons causing medial displacement

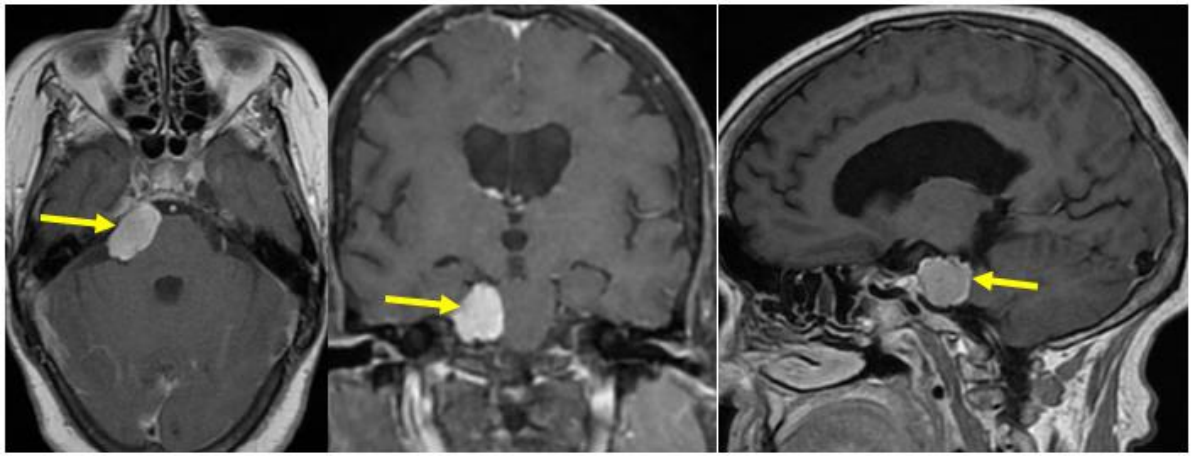

Figure 2: Three-dimensional post-contrast brain MRI sequence depicting early and homogeneous enhancement of the lesion (yellow arrow) following Gadolinium administration

These imaging findings were consistent with a trigeminal schwannoma, correlating with the clinical picture of trigeminal neuralgia.

DISCUSSION

Epidemiology and Clinical Presentation

Trigeminal schwannomas are benign neoplasms originating from Schwann cells and can occur along any portion of the trigeminal nerve or its branches. They comprise roughly 0.2% of intracranial tumors and 0.8–5% of intracranial schwannomas [1].

While typically diagnosed around 40 years of age, reported cases span ages 7 to 63, with a notable female predominance [8,9]. Our case is atypical, involving a 65-year-old male, exceeding the usual age range.

Clinical manifestations are highly dependent on tumor location and extent. Presentations range from classic paroxysmal trigeminal neuralgia (V1–V3 distribution) to continuous pain, sensory loss, or dysesthesia. In cases of posterior fossa extension, motor or cerebellar signs may emerge. Differential diagnosis can be challenging due to overlap with other perineural pathologies, underscoring the critical role of MRI in accurate diagnosis [10-13].

In our patient, symptoms were limited to sensory disturbances in the V2 and V3 dermatomes. MRI confirmed a 25 × 16 × 22 mm lesion with Meckel's cave involvement.

Anatomical Classifications

Classification systems aid in surgical planning by delineating tumor location:

1. Jefferson (1955) (20):

- Type I: posterior fossa (trigeminal root)
- Type II: dumbbell-shaped, spanning middle and posterior fossae
- Type III: middle fossa (Gasserian ganglion)
- Type IV: peripheral trigeminal branches

2. Samii *et al*. (1995) (19):

- Type A: middle fossa predominant
- Type B: posterior fossa predominant
- Type C: dumbbell-shaped
- Type D: extracranial with intracranial extension

3. Ramina *et al*. (2006) (16) :

- A: extracranial dominant, minimal intracranial extension
- B: middle fossa with extracranial extension
- C: confined to middle fossa
- D: confined to posterior fossa
- E: middle and posterior fossa involvement
- F: extensive intracranial and extracranial components

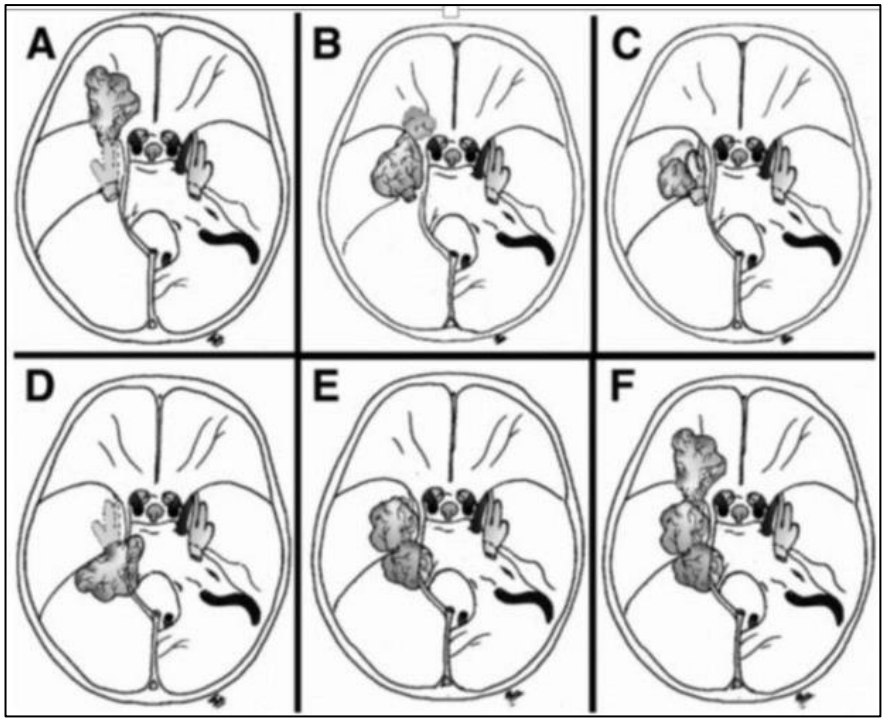

Figure 3: Classification of trigeminal schwannomas - Ramina *et al*

Surgical complexity increases from type A to F. Based on this system; our patient's lesion corresponds to **type C** (purely intracranial, middle fossa).

Therapeutic Strategies

1. Medical Management

- Neuropathic pain: analgesics, NSAIDs, anticonvulsants (gabapentin, pregabalin)
- Corticosteroids: transient use for compressive edema

2. Surveillance

- Indications: asymptomatic tumors <2 cm
- Monitoring: MRI every 6–12 months
- Surgical threshold: growth >0.5 cm/year or symptom onset (15)

3. Microsurgical Resection:

Indications: large or symptomatic tumors [18]

- Approaches:
- Temporal (pterional/orbitozygomatic) for middle fossa
- Subtemporal trans-transtentorial for Gasserian ganglion
- Retrosigmoid for posterior fossa components [17]
- Benefits: definitive histology, immediate mass reduction
- Risks: persistent trigeminal deficits, surgical complications [17]

4. Stereotactic Radiosurgery (SRS):

- Non-invasive (Gamma Knife, CyberKnife)
- Indications: tumors <3.5 cm, high-risk surgical candidates, residual disease [18]
- Goals: tumor control, symptom stabilization

5. Fractionated Conformal Radiotherapy (13):

- Used post-partial resection
- Benefit: sparing of adjacent critical structures

In our case, surgery was preferred due to the lesion's size (25 × 16 × 22 mm), painful symptomatology, and cisternal extension.

PROGNOSIS

Following complete resection, functional outcomes are typically favorable. In Aftahy *et al*. (2021), no perioperative mortality was reported; neurological deficits were generally mild and transient. Sensory and motor recovery was variable, depending on preoperative nerve compromise. Though rare, malignant transformation and recurrence remain possible, warranting long-term follow-up. Annual MRI for five years, then biennially, is recommended [14].

CONCLUSION

Trigeminal schwannomas, though rare, should be considered in cases of atypical facial neuralgia. MRI remains pivotal in diagnosis and surgical planning. Complete microsurgical excision offers optimal tumor control and favorable neurological outcomes. Given the potential for recurrence, even in benign lesions, long-term imaging follow-up is essential.

Conflict of Interest: The authors declare no conflicts of interest.

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