Case Report

Intraoral Endoscopic Approach to Excision of an Infratemporal Fossa Tumour

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ABSTRACT

Introduction

The infratemporal fossa is an inverted pyramid shaped structure that lies at the skull base, posterior to the maxillary sinus. It has a complex anatomy due to its relationship to various important vascular and neural channels. Surgical approaches to this region, via the lateral skull base and access mandibulotomies, have high morbidity. By our minimally invasive intra-oral endoscopic technique, an external incision, bony osteotomies and cranial nerve palsies were avoided with an expedited road to recovery and shorter hospital stay.

Case Report

A middle aged lady who presented with left sided facial swelling and numbness was evaluated for the same with a diagnostic nasal endoscopy and imaging. MRI of the maxilla with contrast revealed a well-defined left infra-temporal fossa soft tissue signal intensity mass, which was subsequently planned for intra-oral endoscopic removal. The surgery was performed via a transvestibular-paramandibular incision through which the endoscope was passed, structures delineated and tumour removed piece meal. Immunohistochemical analysis confirmed that it was a Spindle cell Rhabdomyosarcoma. Hence, she was given post operative chemoradiotherapy and is currently one year post surgery, with good outcomes.

Discussion

The infratemporal fossa has a varied and complex anatomy, due to its interior location and multiple important neurovascular structures within it. This intra-oral endoscopic approach, although challenging for the novice surgeon, avoided an external scar, providing better cosmesis and also had lesser patient morbidity related to wound gaping and dehiscence. It also allowed a direct and magnified visualization of the neuro-vascular structures in that region, aiding in tumour removal.

Keywords

Infratemporal fossa; Endoscopy; Neoplasm; Rhabdomyosarcoma

The infratemporal fossa is an inverted pyramid shaped structure at the skull base, posterior to the maxillary sinus.[1] Surgical approaches to this region are challenging owing to its location and its relationship to various important vascular and neural channels.[2] They have been described classically via a lateral or anterior route employing a post auricular and sublabial incision respectively;[3] which have now evolved to minimally invasive techniques such as the endoscopic endonasal approach.[4,5] This provides benefit of reducing morbidity and complications associated with open approaches.

Case Report

A middle-aged lady in her 40s with no known comorbidities presented to the outpatient clinic with a history of swelling and pain on the left side of her face for last 3 months, which had increased in the last 2 weeks, along with a sensation of numbness over the left side of her face for last 1 month.

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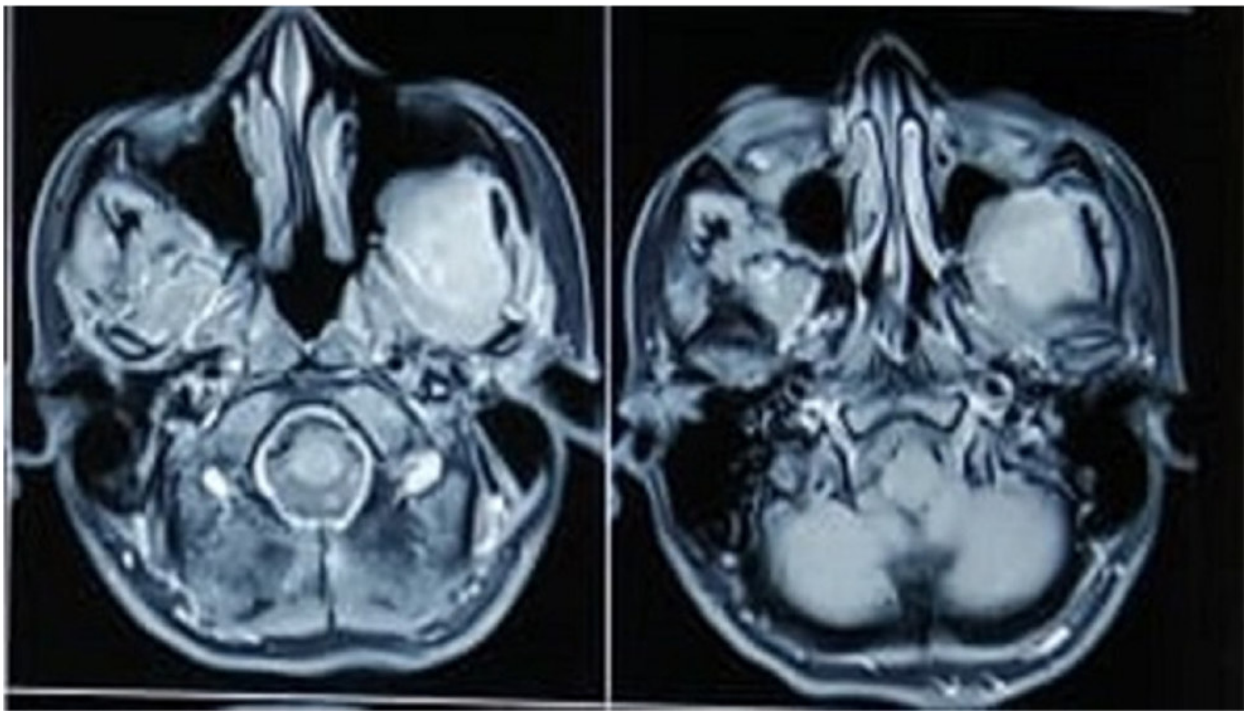


Fig. 1. Axial MRI image showing T1 hypointense, T2 intermediate hyperintense, well defined left infra temporal fossa soft tissue mass

On examination, left sided facial fullness was noticed on inspection of the face. On palpation, a firm, non-tender swelling measuring 4 x 4 cm with an irregular surface was felt extending from two finger breadths lateral to the left ala of the nose, superiorly till the zygoma to posteriorly, two finger breadths in front of the tragus.

Examination of the nasal cavities by anterior rhinoscopy was unremarkable. Oral cavity examination revealed an irregular 3 x 2 cm bulge in the left buccal mucosa adjacent to the left upper 2nd and 3rd molars till the Retro-molar trigone. It was indurated and hard in consistency. The remaining ENT examination was unremarkable. There were no palpable cervical lymph nodes. Diagnostic nasal endoscopy also did not reveal any nasal mass.

On Magnetic Resonance Imaging of the maxilla with contrast, a well-defined left infra-temporal fossa soft tissue signal intensity mass (T1 hypointense, T2 intermediate hyperintense), measuring 42 x 21 x 41mm (AP x ML x CC), showing moderately heterogeneous enhancement on post contrast study and causing remodelling and indentation over posterolateral wall of left maxillary sinus and left lateral pterygoid plate, was reported. (Fig. 1) The most probable differential diagnosis that was considered at this time was a left infratemporal fossa schwannoma. She was hence advised tumour removal by surgery.

Nasal intubation was done to provide good access for intra-oral tumour manipulation. After application of the Doyen's mouth gag, a smooth bulge was visualized 1 cm anterior to the retromolar trigone on the left, where a 2 cm mucosal incision was made and submucosa incised, separated and retracted. An extension of the soft tissue tumour, was visualized deep to the submucosal layer and removed with an elevator (Fig. 2). A 4 mm zero-degree nasal endoscope (Karl Storz, Tuttlingen, Germany) was then passed via the incision (Fig. 3) and the soft tissue tumor was then exenterated from the antero-lateral and postero-lateral walls of the left maxillary sinus (Fig. 4a).

The postero-lateral wall of the maxilla was found to be eroded and the soft tissue mass was seen extending into the left infra-temporal fossa. On dissection, the pterygoid plexus of veins (Fig. 4b), mandibular nerve and maxillary artery (Fig. 4c) were traced out and the tumor was found to be attached to the medial pterygoid muscle (Fig. 4d). On retraction of the medial pterygoid muscle, the inferior alveolar nerve was identified. The tumour was then dissected from the neurovascular structures and removed piece-meal (Fig. 5). Hemostasis was achieved and the cavity was inspected by endoscopic visualization, following which surgicel and gel foam was placed in the cavity and the mucosal incision was sutured in a single layer with 3-0 absorbable suture material.

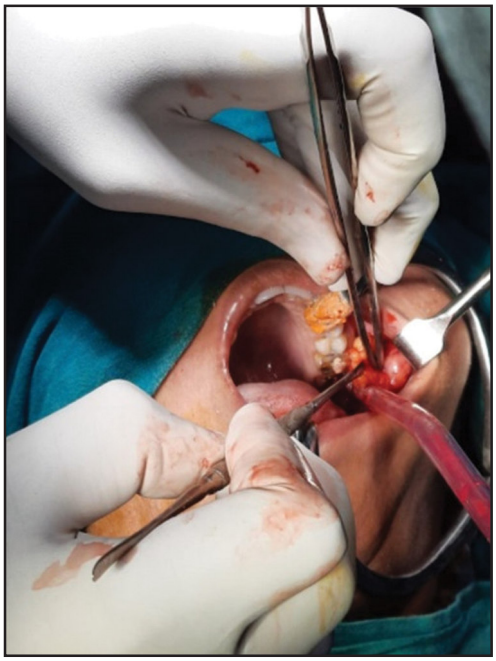


Fig. 2. Intraoral manipulation of the tumor for excision

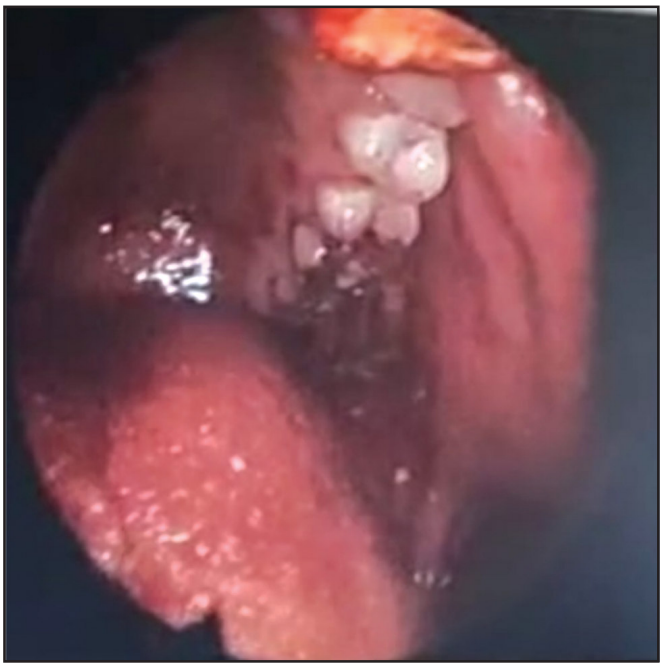
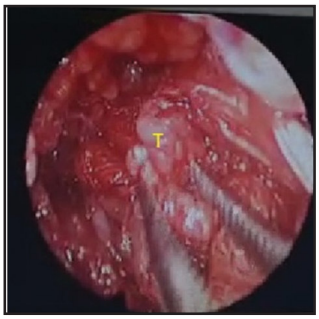


Fig. 3. Intra-oral approach: endoscopic image

4a



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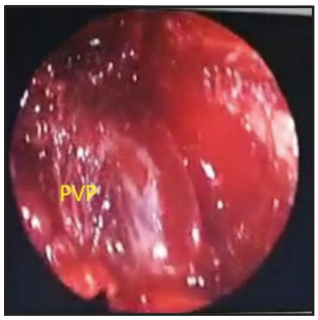

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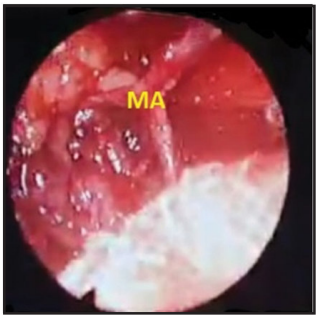

4d

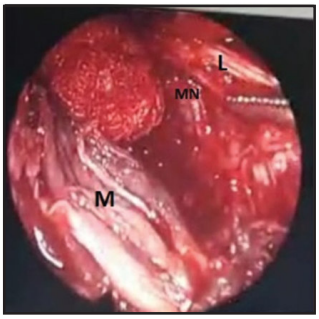

Fig. 4 - 4a. Tumor (T) removal under endoscopic guidance. 4b. Endoscopic image showing Pterygoid venous plexus (PVP). 4c. Endoscopic image showing dissected structures. MA – maxillary artery. 4d. Endoscopic image showing lateral (L) and medial (M) pterygoid muscles and Mandibular nerve (MN)

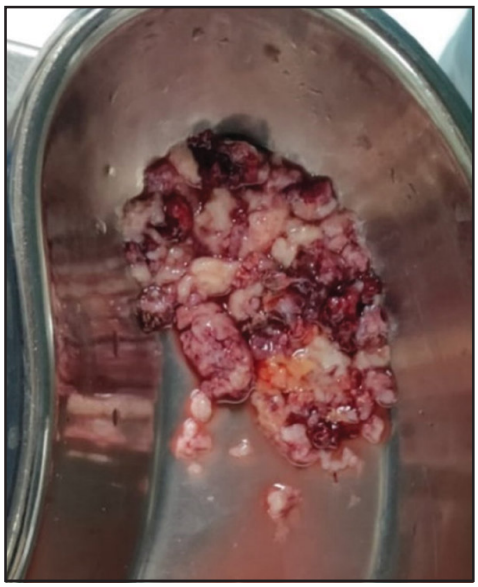

Fig. 5. Soft tissue mass removed piecemeal

Post operatively, she had painless left cheek edema which subsided within 3 days. She was managed in the ward and had an uneventful post-operative period, not necessitating intensive care. Oral feeds were started on the first post operative day and she was discharged from the hospital the next day.

The histopathological diagnosis of a Meningioma was obtained from the operated specimen, following which Immunohistochemistry was carried out, showing strong and diffuse positivity for Myo D1, positivity for CD 56 and Vimentin, with a weak and focal Desmin positivity, suggesting a diagnosis of Spindle cell Rhabdomyosarcoma. Other markers such as S100 and EMA were negative, ruling out the diagnosis of Schwannoma and Meningioma, respectively. She was hence planned for post operative Chemoradiotherapy and subsequently received a total dose of 5040 Gray of VMAT Radiation (28# Fractions) over 1 month. Her chemotherapy regimen included 3 weekly Vincristine, Actinomycin and Cyclophosphamide for a total of 40 weeks.

She is currently one year post surgery and remains symptom free with an excellent cosmetic outcome and return to her daily activities.

Discussion

A tumour developing in the infratemporal fossa could arise from any of the structures that lie within it. Benign tumours in this region are limited by its anatomical boundaries as against malignant ones which tend to infiltrate and erode surrounding structures, resulting in local metastasis. The presenting complaints could range from incidental detection on imaging to cranial nerve palsies, trismus and Eustachian tube dysfunction due to mass effect.[5]

The usual surgical approaches to these tumours include those via the lateral skull base, i.e., transcervical, especially for those in the lower compartment, where the styloid process is resected for better tumour delivery. Tumours in the middle compartment require a parotid exploration, dissection of branches of the facial nerve and a mandibulotomy to improve access. Upper compartment tumours require a transcervical trans mastoid approach wherein the sigmoid sinus and jugular bulb are exposed.[6] Trans-maxillary trans-pterygoid approaches have also been described enabling gross tumour margin resection. The complications of these procedures can range from facial numbness, oroantral fistula, atrophic rhinitis due to excessive turbinate resection and recurrent sinusitis.[4]

Endoscopic approaches have gained popularity in recent years, be it in the transnasal approach or the transoral approach, as described by Chan et al. They described 4 cases of pterygopalatine and infratemporal fossa tumours removal via an intra oral endoscopic transvestibular paramandibular approach; 3 for benign tumours and 1 for a malignant tumour (mucoepidermoid carcinoma).[7] Dallan et al. described a retrospective analysis of 10 patients operated on by an endoscopic assisted trans-oral trans-pharyngeal approach, with a special emphasis on feasibility and safety of the procedure.[8] A similar case report describing the removal of a capsulated benign tumour (Schwannoma) via the transoral approach, was described by Torres Gaya et al, wherein there was no significant surgical morbidity or sequelae.[9]

In our case, the pre-operative contrast MRI characteristics pointed more in favour of a benign tumour

which prompted us to undertake a similar intra-oral approach. On dissection and exposure of the tumour, it was found to lack a smooth capsule and after tracing the maxillary artery and mandibular nerve, was found to be adherent to the medial pterygoid muscle. Hence it posed a diagnostic dilemma at this stage. The guidance of an endoscope enabled complete tumour removal in that circumstance, albeit piecemeal. The histopathology was reported as Meningioma and had suggested further immunohistochemical analysis, which then revealed a spindle cell rhabdomyosarcoma, ruling out markers for Meningioma and Schwannoma. Hence, the aim of our case report is to shed light on our experience with this diagnostic dilemma and our surgical technique given the circumstance, for removal of tumours in the Infratemporal fossa region. It also aims to highlight the challenging hemostatic procedure within a narrow surgical corridor, which was achieved effectively under endoscopic visualisation, with a bipolar cautery and the use of surgicel and gelfoam.

This approach is however, not without limitations. The narrow surgical corridor and intricate anatomy in this region meant restricted manoeuverability of instrumentation, an experienced surgical hand and a steep learning curve to control vessels and nerves in that area It also cannot serve as the sole treatment modality for resection of all tumours in that area, as achieving a negative surgical margin for malignant tumours could be tricky. Our aim in describing this approach is therefore, not to replace any of the existing modalities for treatment, but as an alternative in select cases where deemed feasible.

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