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The Dual Doorway Technique for a Masticator Space Tumor in a 13-Year-Old Boy: Combining Deep Subfascial Temporal and Transoral Maxillary Vestibular Approaches

ABSTRACT

Objective: To discuss the dual-access technique combining the deep subfascial temporal and transoral maxillary vestibular approaches to the excision of a masticator space vascular malformation in a pediatric patient.

Methods:

Design: Surgical Innovation
Setting: Tertiary Government Training Hospital
Patient: One

A 13-year-old boy presented with a congenital progressively enlarging left temporal mass excised via a dual-access deep subfascial and intraoral maxillary vestibular approach. A deep subfascial incision provided lateral exposure with the frontal and zygomatic branch of the facial nerve preserved. Release of tumor through dissection beneath the subgalea and deep temporalis fascia was augmented with a transoral maxillary vestibular incision that enabled medial mobilization and complete resection. Postoperative weakness of the buccal branch improved to House-Brackmann Grade I after 1 month with full recovery of sensation, favorable cosmetic healing, and absence of pain.

Conclusion: The Dual Doorway Technique may be a safe, functional, and aesthetically advantageous strategy for resecting extensive masticator space tumors as seen in our pediatric case. This approach expands the application of the deep subfascial approach beyond condylar fractures and offers a hybrid alternative to more invasive classic methods.

Keywords: *hemangioma; pediatrics; vascular malformations; mastication; temporal muscle; adolescent; mandibular condyle; oral surgical procedures*

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Tumors and vascular malformations of the masticator space pose a surgical challenge due to their deep-seated location and proximity to critical neurovascular structures and multiple approaches have been described to address this challenge.[1] Access to the masticator space has traditionally required such extensive approaches as mandibulotomy and zygomatic osteotomy. Classic methods include the transmaxillary approach, transfacial transmandibular approach, pre-auricular subtemporal infratemporal approach, post-auricular (transtemporal) approach, facial translocation approach (hemicoronal incision, a modified Weber-Ferguson incision, orbitozygomatic osteotomy, and optionally, Le Fort I or II osteotomies).[1-3] However, these techniques are associated with morbidity including facial nerve injury, salivary fistula, and more visible external scarring,[2,3] making them less ideal for pediatric and cosmetically sensitive cases. Hence, the deep subfascial approach, originally used for condylar and temporomandibular joint surgeries,[4] has been adapted to give direct access to the masticator space in combination with transoral maxillary vestibular approach.[5] To the best of our knowledge, based on a search of HERDIN Plus, the Western Pacific Region Index Medicus, the Directory of Open Access Journals, MEDLINE through PubMed and PubMed Central, and Google Scholar using the terms "masticator space tumor," "deep subfascial temporal approach," "maxillary vestibular approach," "transoral approach," and "vascular malformation," we found no English-language report combining these techniques. Therefore, the term Dual Doorway Technique, coined by the authors, was utilized in this case to demonstrate the feasibility and safety of this hybrid approach in accessing and excising a large benign vascular malformation of the masticator space in a pediatric patient.

CASE REPORT

A 13-year-old boy presented with a gradually enlarging, non-tender congenital mass over the left temporal region. There were no prior medical or surgical treatments done. Due to the progressive enlargement, evaluation was sought at our institution.

Examination revealed an 8 × 6 cm soft, fixed, non-erythematous, non-tender mass at the left temporal area, extending anteriorly to the lateral orbital rim, inferiorly to the zygomatic arch, superiorly into the temporal scalp, and medially toward the lateral brow and canthus. *(Figure 1)* It transilluminated but had no bruit or thrill. Intraorally, a bulge was noted at the left maxillary gingivobuccal sulcus. The rest of the head, neck and neurologic examination were unremarkable.

Craniofacial magnetic resonance imaging (MRI) demonstrated a 7.0 × 2.9 × 11.4 cm well-defined, lobulated lesion centered at the left zygomatic region, with low to intermediate T1 and high T2/FLAIR signal intensities, internal septations, fluid-fluid levels, and areas of post-contrast enhancement. The lesion extended superiorly into the frontotemporal scalp, inferiorly toward the lateral wall of the maxillary sinus and maxillary alveolar process, and inferomedially into the ipsilateral masticator space, without bony erosion, intracranial extension, or perineural spread. T1 weighted images revealed low to intermediate signal density, *(Figure 2A)* while T2-weighted and FLAIR sequences showed hyperintense signal. *(Figure 2B)* Magnetic resonance angiography (MRA) and venography (MRV) demonstrated no definite feeding or draining vessel, consistent with a low-flow vascular lesion. *(Figure 2C)* There was no definite yield obtained with fine-needle aspiration biopsy (FNAB). The primary consideration was a masticator space hemangioma or lymphangioma.

The head and neck and craniomaxillofacial sections planned a dual surgical approach involving a deep subfascial superior access and a transoral maxillary vestibular inferior exposure. Preoperative embolization was not considered due to the absence of a feeding vessel.

Surgical Technique

The patient was positioned supine under general endotracheal anesthesia with the head rotated contralaterally. A temporal question-mark shaped curvilinear incision was made posterior to the hairline, extending inferiorly along the preauricular region. Critical anatomical landmarks were delineated, including a point two cm superior to the zygomatic arch corresponding to the interface between the superficial temporalis fascia and the deep temporalis fascia, and the "danger zone" located approximately three cm superolateral to the lateral canthus at a 45-degree angle, representing the vulnerable course of the frontal branch of the facial nerve.[6] *(Figure 3A)* For the temporal approach, the skin incision was carried through the epidermis, dermis, subcutaneous tissue, and subgaleal fascia. A fasciocutaneous flap, incorporating the skin, subcutaneous fat, superficial temporal fascia, and subgaleal fascia, was elevated anteriorly to expose the temporalis fascia. *(Figure 3B)* Inferior dissection was limited to approximately two cm above the zygomatic arch. *(Figure 3C)* A 45-degree oblique incision was created in the temporalis fascia two cm superior to the zygomatic arch to expose the mass. Further dissection of the mass created a fasciocutaneous temporal flap and entry into the superficial temporal space to dissect the tumor from its lateral and medial attachments. Dissection was extended inferiorly at the medial aspect of the zygomatic arch into the lateral masticator space to delineate the tumor capsule and release the mass from its medial and lateral attachments. *(Figure 3D)* A secondary intraoral incision five mm superior to the mucogingival junction from the ipsilateral central incisors extending up to the second premolar was

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Figure 1. Preoperative clinical photographs demonstrating a congenital mass over the left temporal region. Photos published with permission.

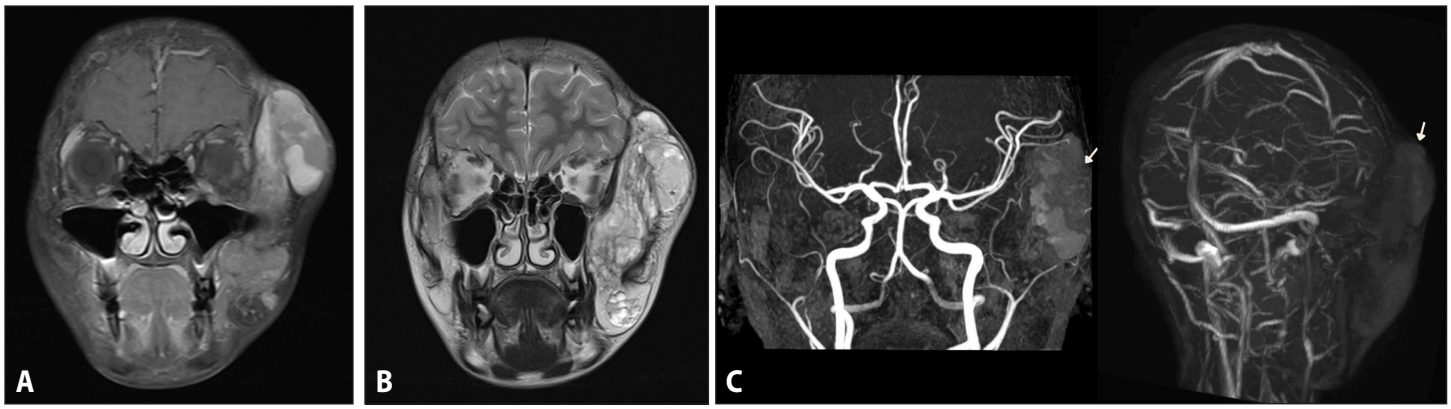


Figure 2. Preoperative magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA) of the left masticator space lesion: **A.** Coronal T1-weighted image demonstrating a well-defined, lobulated soft-tissue lesion within the left masticator space measuring approximately 7.0 × 2.9 × 11.4 cm with low-to-intermediate signal intensity; **B.** T2-weighted and fluid-attenuated inversion recovery images demonstrating hyperintense signal, internal septations, fluid–fluid levels, and areas of postcontrast enhancement; and **C.** MRA demonstrating the lobulated lesion without prominent internal flow voids or an identifiable feeding vessel, consistent with a low-flow vascular lesion. Arrows indicate the lesion

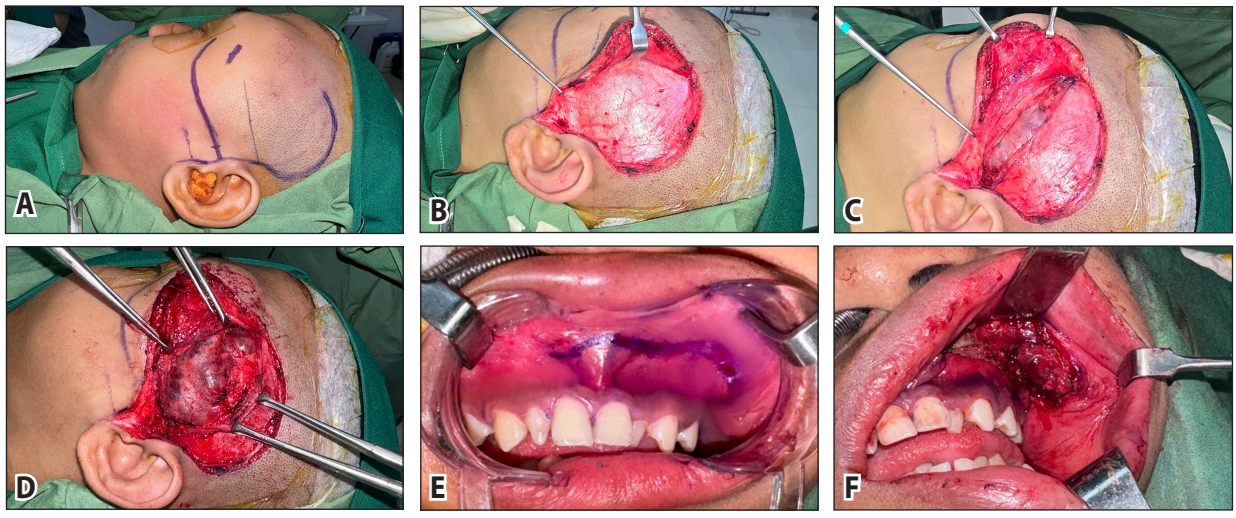


Figure 3. Sequential perioperative photographs demonstrating the Dual Doorway Technique combining deep subfascial temporal and transoral maxillary vestibular approaches: **A.** Preoperative markings showing the planned question-mark–shaped temporal–preauricular incision and relevant anatomical landmarks, including a reference line 2 cm superior to the zygomatic arch and the facial nerve "danger zone" approximately 3 cm superolateral to the lateral canthus along a 45-degree line; **B.** Elevation of the fasciocutaneous temporal flap to expose the temporalis fascia; **C.** Inferior dissection limited to approximately 2 cm superior to the zygomatic arch; **D.** Dissection and mobilization of the encapsulated lesion through the temporal corridor, providing access to its lateral and medial attachments within the masticator space; **E.** Planned transoral maxillary vestibular incision positioned approximately 5 mm superior to the mucogingival junction and extending from the ipsilateral central incisor to the second premolar; and **F.** Transoral dissection through the mucosa and submucosa, providing access to the inferior aspect of the lesion and establishing communication between the temporal and intraoral surgical fields.

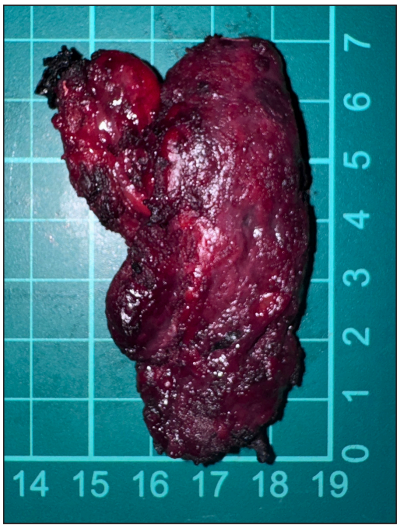


Figure 4. Gross specimen of the encapsulated masticator space lesion following complete en bloc excision and delivery through the temporal incision. The specimen measured approximately 7 × 4 cm. Final histopathologic examination confirmed a benign vascular malformation, favoring hemangioma.



Figure 5. Serial postoperative photographs demonstrating facial nerve function and surgical recovery: **A.** 7 hours postoperatively, evident mild left facial weakness predominantly involving the buccal distribution, consistent with transient postoperative facial nerve dysfunction; **B.** 7 days postoperatively, facial movement demonstrates interval improvement with mild residual asymmetry; and **C.** 1 month postoperatively, facial symmetry and movement have returned to baseline, consistent with resolution of the transient postoperative weakness. Photos published with permission.

made. *(Figure 3E)* The intraoral mucosa and submucosa were incised to enter the oral vestibule to provide adequate access to the inferior aspect of the mass. *(Figure 3F)* This facilitated communication between the intraoral and temporal surgical fields, establishing a continuous dissection plane within the masticator space. The encapsulated mass, measuring 7 × 4 cm, was excised *en bloc* and delivered through the temporal incision. *(Figure 4)* Both incisions were closed in layers with a Jackson-Pratt drain along the lateral temporal incision.

The procedure was completed in seven hours and 26 minutes without need for blood transfusion. Post-operative mild weakness of the buccal branch of the facial nerve was evident as mild asymmetry during smiling with preserved tone at rest. *(Figure 5A)* Pain was minimal, rated 3–5/10 on the Visual Analog Scale, and effectively managed with oral analgesics. There were no deficits in mastication, trismus, dysphagia, or malocclusion, and no hypesthesia was noted. At seven days post-operatively, the surgical sites showed favorable cosmetic healing, and normal oral function was maintained without hypesthesia. The buccal branch remained weak *(Figure 5B)* but returned to baseline at one-month follow-up, with buccal branch function improved to House–Brackmann Grade I. *(Figure 5C)* Final histopathologic examination confirmed a benign vascular malformation, favoring hemangioma.

DISCUSSION

Our patient is a 13-year-old boy who presented with an expansive congenital mass at the left masticator space with histopathology confirming a benign vascular malformation consistent with hemangioma. Given the expansile characteristic of the mass affecting multiple compartments in the head, a single surgical corridor was considered insufficient. The transoral vestibular and endoscopic transmaxillary endoscopic approach, although scar-sparing, also offers limited working space and restricted vascular control, rendering it suboptimal for managing large vascular tumors.[7] In contrast, the conventional preauricular subtemporal, postauricular infratemporal, and combined transfacial–transcranial approaches provide improved exposure to the lateral masticator compartment and infratemporal fossa, but may result higher morbidity and visible scarring, with increased risk of injury to the facial nerve.[1]

In the present case, the transoral vestibular and endoscopic transmaxillary approaches were considered insufficient due to the deep-seated location of the lesion within the masticator space, which would have limited operative visualization, instrument maneuverability, and vascular control. Conversely, the preauricular subtemporal, postauricular infratemporal, and combined transfacial–transcranial approaches were considered more extensive than necessary, given their potential requirements for facial nerve dissection, temporalis muscle mobilization, osteotomy, mastoidectomy, craniotomy, or external facial incisions. Considering the benign histopathology and the patient's pediatric age, we favored an approach that provided adequate surgical exposure for complete excision while minimizing operative morbidity and preserving facial nerve function and craniofacial integrity.

The Dual Doorway Technique coined by our team provides access to the superior extent of the lesion through the deep subfascial temporal approach and to its inferior aspect through the transoral maxillary vestibular approach. This avoids mandibulotomy or zygomatic osteotomy, thereby reducing bony and soft tissue disruption associated with transmandibular and transzygomatic osteotomy-based approaches. The deep subfascial temporal approach utilizes a defined fascial plane deep to the subgaleal fascia and superficial to the temporalis fascia, providing access medial to the zygomatic arch and lateral masticator space while minimizing manipulation of the

facial nerve. Originally intended for condylar and temporomandibular joint surgery, the deep subfascial temporal incision was adapted to access the masticator space.[4] The two surgical corridors comprising the Dual Doorway Technique provide adequate tumor exposure with the additional advantage of limiting visible external scarring.

Although the surgical corridor and visual field are narrower compared to wider transfacial exposures, this trade-off may be justified by a significant reduction in morbidity. The risk of injury to the facial nerve, especially the buccal and temporal branches, remains a consideration due to their proximity to the dissection field. In our patient, transient postoperative weakness involving the buccal distribution was observed. This was likely related to traction-induced neuropraxia during tissue retraction and manipulation through the transoral maxillary vestibular approach, rather than direct nerve disruption, as evidenced by complete recovery of facial nerve function after one month. Gentle tissue retraction and adherence to anatomical planes are therefore important. Intraoral contamination is another concern and can be mitigated by preoperative antiseptic rinses and meticulous, layered, watertight closure.

In our case, the Dual Doorway Technique achieved gross total resection with minimal morbidity. Intraoperative bleeding was controlled, no osteotomy was required, and facial aesthetics were preserved. There were no deficits in mastication, no hypesthesia, and no wound complications. This rendered our patient with full oral and feeding functions leading to further decrease in morbidity as well as shorter hospital stay duration.

This case illustrates the utility of a compartment-based, multiplanar approach for complete and safe excision of benign masticator space lesions as seen in our pediatric patient. The favorable surgical outcome in our case supports the utility of hybrid access techniques in managing complex, benign masticator space tumors, particularly in young patients where long-term function and appearance are critical. Future studies may further refine indications and optimize outcomes for this emerging surgical strategy.

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