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## Extended Transpalatine Approach for Excision of Juvenile Angiofibroma

### ABSTRACT

**Objective:** To describe the extended transpalatine approach (ETPA) with transection of the ipsilateral greater palatine artery and extension of the ipsilateral retromolar incision and its corresponding surgical outcomes and present it as an option in the excision of juvenile angiofibroma (JA).

#### Methods:

**Design:** Descriptive case series  
**Setting:** Tertiary Public University Hospital  
**Subjects:** 13 JA cases undergoing ETPA

**Results:** Records of JA in a tertiary hospital from 2007 – 2013 were reviewed. Out of 35 JA patients, 13 underwent excision via extended transpalatine approach. Preoperative work-up included CT scan with contrast with or without preoperative embolization. In all patients, the wide field allowed easy tumor excision and facilitated inspection and hemostasis. There was only one recurrence in our series compared to 1 each for 4 endoscopic and 18 transmaxillary approaches. Not one of the patients developed a fistula or hypernasal speech. All patients had minimal palatal scarring, symmetric alveolar growth and palatal function.

**Conclusion:** The ETPA is a robust technique. It provides good exposure of JA with minimal preoperative requirements and postoperative complications.

**Keywords:** *juvenile angiofibroma, juvenile nasopharyngeal angiofibroma, transpalatine approach*

**Juvenile angiofibroma (JA)** is a highly vascular, locally invasive benign tumor of the nasopharynx developing among adolescent males. Patients usually present with recurrent epistaxis and a nasopharyngeal tumor.<sup>1</sup> Management is excision of tumor from its origin and extensions in the nasal cavity, nasopharynx, sinuses and pterygomaxillary fissure into the infratemporal fossa. A bloody surgical field and narrow working area is a typical scenario during treatment. Pre-operative embolization of feeding vessels lessen intra-operative bleeding while blunt dissection decreases the chance of leaving tumor behind.

The growth pattern of JA is peculiar since it has a tendency to insinuate into crevices and cavities, resulting in multiple lobulations that may be left unexcised during surgery. The tumor originates in the posterior nasal cavity rather than in the nasopharynx itself. The specific site of origin is the posterior lateral and superior nasal cavity at the point where the sphenoidal process of the palatine bone meets the horizontal ala of the vomer and the root of the pterygoid process

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of the sphenoid bone.<sup>2</sup> This can extend anteriorly along the nasal cavity with the tumor pushing the septum to the opposite side, posteriorly into the nasopharynx, upwards to the sphenoid sinus, the area of the vidian canal and laterally into the pterygomaxillary fossa and infratemporal fossa producing a dumbbell type of tumor. The origin of the tumor which is embedded in bone is in an area that is more difficult to release.<sup>2</sup>

Anterior approaches to JA surgery include the endonasal, lateral rhinotomy, sublabial, midfacial degloving for soft tissue exposure and medial maxillectomy or Le-Fort I osteotomies for bony exposure. For large to extensive tumors, a transfacial approach is applied with varying degrees of exposure, resecting the bony sinonasal anatomy while leaving the palate bone intact. Endonasal approaches have been done to utilize the nostril as a natural access to the tumor using endoscopes.<sup>3, 4, 5</sup> The type of approach used depends on tumor classification or staging, surgeon experience and institutional preference.

The inferior transpalatine approach allows wide tumor exposure through the oral cavity with direct access to the nasal cavity, nasopharynx, sinuses and pterygomaxillary fissure with minimal disturbance to soft tissues and the bony anterior face. This can be combined with endoscopes or microscopes if additional visualization and documentation is desired. The transpalatine technique, as described in Lore's An Atlas of Head and Neck Surgery,<sup>3</sup> used to be the common approach to this tumor. However, it was observed that lateral extent of exposure was limited by the need to preserve the greater palatine foramen and palatine arteries. A modification of the procedure is the extended transpalatine approach (ETPA) where routine transection of the ipsilateral greater palatine artery and extension of the ipsilateral retromolar incision are done.

The objective of this case series is to describe the extended transpalatine approach (ETPA) and its corresponding surgical outcomes and present it as an option in the excision of juvenile nasopharyngeal angiofibroma (JA).

**METHODS**

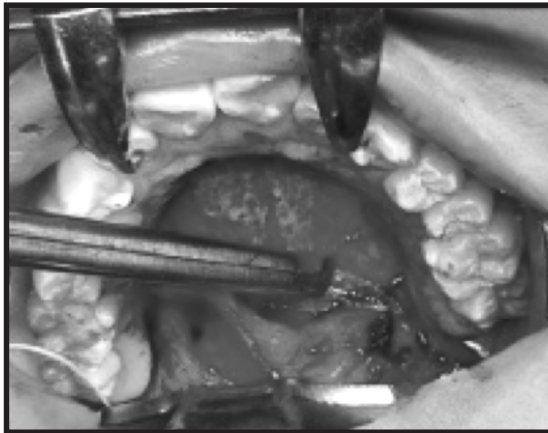
A retrospective review of records was conducted on all cases of JA operated on at the Department of Otorhinolaryngology, University of the Philippines - Philippine General Hospital from 2007 to 2013. Compliance with strict confidentiality of patient information was ensured; and approval from unit Institutional / Ethical Review Board was obtained. Diagnosis was based on findings of a fleshy nasal and nasopharyngeal mass, epistaxis, an enhancing tumor on CT-Scan involving the ipsilateral vidian canal, and final histopathology. All JA cases that underwent ETPA were evaluated. Adequacy of exposure and complications of oro-nasal fistula and speech problems were determined.

**ETPA Technique**

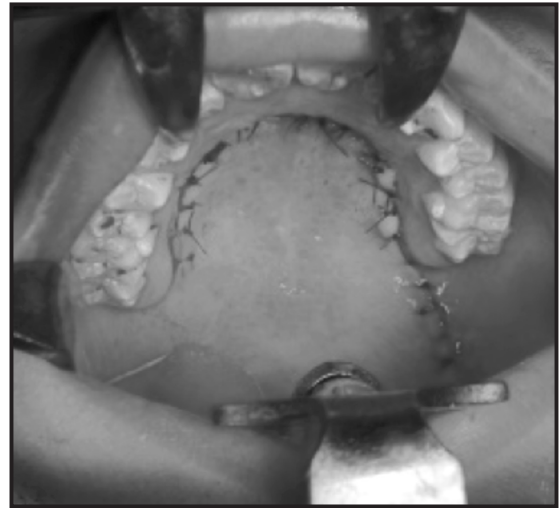
In each patient, general anesthesia was induced and the endotracheal tube was retracted from the operative site using the grooved tongue blade of a Dingman mouth-gag. Lidocaine 2% with epinephrine 1:100,000 was infiltrated locally, and an inverted 'U' palatal mucosal incision was made, extending posterior to the ipsilateral third molar toward the anterior tonsillar pillar. The ipsilateral greater palatine artery was routinely transected and ligated, and the palatal incision extended posteriorly towards the tonsillar pillar to ensure adequate exposure. To prevent the possible development of an oro-nasal fistula, the mucosa was incised lateral to and beyond the projected palatal bone excision. This ensured that palatal soft tissue would rest on remaining bone during repair. Using Kerrison rongeurs and/or a drill with cutting burrs, palatal bone was removed as anteriorly and laterally as possible without reaching the anterior or lateral mucosal incision line. Careful blunt dissection using a Freer periosteal elevator and fingers was performed to ensure that pseudopod-like extensions into crevices and fissures were not left behind. Bleeders were controlled using cautery. Hemostatic material (gelfoam®, surgicel®) was placed in areas with great possibility of bleeding. Packing was done using gauze impregnated with antibiotic ointment, nasal tampons or balloon nasal packs. Layered closure was done using polyglactin 4-0 with round needle. The nasal and nasopharyngeal mucosa, muscles of the soft palate and palatal mucosa were sutured with care. A pre-fabricated palatal obturator was positioned to allow immediated post-operative oral feeding with soft diet, or a thin hammock dressing was sutured in place. Extubation was delayed one day post-operatively to protect the airway in case of immediate post-operative bleeding. Nasal packs were removed from 3 to 7 days post – surgery. A representative case is illustrated. (Figures 1 to 6)



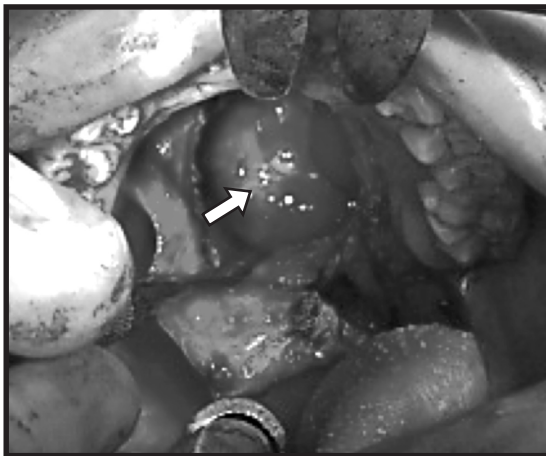
**Figure 1.** Transpalatine approach: Incision markings along the alveolar or palatine bone. Dots approximate location of the greater palatine arteries. Note planned incision extension posterior to the third molar, towards the tonsillar pillar on the patient's left (arrow).



**Figure 2.** Palatal incision extended to the ipsilateral tonsillar pillar. Ipsilateral greater palatine artery has been ligated and the palatal flap raised down to the periosteum and reflected inferiorly. The hard palate is being excised, leaving portions to support palatal flap during repair.



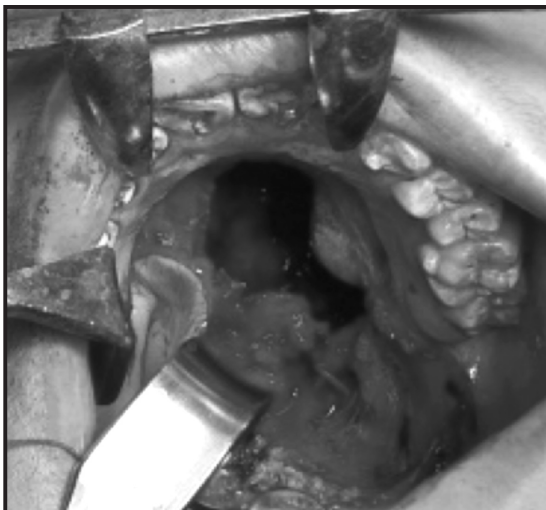
**Figure 5.** Layered closure of palatal flap.



**Figure 3.** Exposed tumor (arrow) bluntly dissected using a finger and elevators.



**Figure 6.** Application of pre-fabricated palatal obturator or hammock splint. Note antibiotic-impregnated gauze strip extending from ipsilateral nostril.



**Figure 4.** Surgical bed inspection and hemostasis before hemostatic material and antibiotic-impregnated gauze are packed in place.

## RESULTS

From 2007-2013, 35 cases diagnosed with juvenile angiofibroma underwent excision at our institution. Two were not initially diagnosed as having JA; one had no history of recurrent epistaxis while the other had a left unilateral nasal and nasopharyngeal mass with no destruction of the Vidian canal. Both cases underwent biopsy that produced significant hemorrhage upon biting the nasal mass necessitating tight nasal packing. Histopathologic diagnosis for both cases was juvenile nasopharyngeal angiofibroma.

All the 35 cases diagnosed with juvenile angiofibroma underwent CT-Scan of the nasopharynx. The surgical approach for 18 patients was transmaxillary (11 hemifacial degloving, 7 lateral rhinotomy). Four of these were endoscopically assisted. There were four other cases that underwent excision purely via endoscopic approach; all of them underwent pre-operative embolization.

**Table 1.** Thirteen cases of JA who underwent ETPA

|    | Age | Stage <sup>a</sup> | Embolization | Approach                          | Recurrence |
|----|-----|--------------------|--------------|-----------------------------------|------------|
| 1  | 15  | IIA                | Yes          | ETPA                              | None       |
| 2  | 15  | IA                 | Yes          | ETPA                              | None       |
| 3  | 15  | IB                 | None         | ETPA                              | None       |
| 4  | 15  | IA                 | None         | ETPA                              | None       |
| 5  | 18  | IA                 | None         | ETPA                              | None       |
| 6  | 13  | IA                 | None         | ETPA                              | None       |
| 7  | 18  | IIA                | None         | ETPA                              | None       |
| 8  | 17  | IB                 | None         | ETPA                              | None       |
| 9  | 11  | IIA                | None         | ETPA                              | None       |
| 10 | 17  | IB                 | Yes          | ETPA                              | None       |
| 11 | 16  | IIC                | None         | ETPA combined with transmaxillary | None       |
| 12 | 14  | IIA                | None         | ETPA                              | Yes        |
| 13 | 11  | IIB                | None         | ETPA                              | None       |

a-Radkowski Staging for JA

Thirteen out of 35 JA cases underwent ETPA. The mean age was 15 (11-18) years-old. Radkowski<sup>5</sup> stages IA, IB, IIA, IIB, IIC yielded 4, 3, 4, 1 and 1 case(s) respectively. (Table 1) There were no stage IIIA and IIIB cases or skull base erosion. Three had pre-operative embolization. One had an infratemporal extension and underwent a combined extended transpalatine and trans-maxillary approach. Of the 12 cases using a purely extended transpalatine approach, the surgeons found the approach very effective with a big part of the tumor visible to the surgeon at the start of excision. There was no need for an endoscope and both hands could be used for dissection. Finger-dissection or dissection using a periosteal elevator allowed adequate blunt dissection. Inspection of the bed and the site of origin of the tumor to assess possible residuals was also facilitated. Any bleeder was readily visualized and controlled. In all patients, the operative site was easily packed with surgical<sup>®</sup> or gelfoam<sup>®</sup> and antibiotic-impregnated gauze strips, and the palatal obturators or thin hammock dressings were positioned on the palate after closure of the palatal mucosa incision. Delayed extubation, 24 hours after the procedure, was uneventful in all cases. Packing was usually removed beginning on the third day and completely removed from 5 to 7 days. Of the 13 cases, not one developed oro-nasal or oro-nasopharyngeal fistula post-operatively. There were also no cases of hypernasality of speech. To the best of our knowledge, there was only one case of recurrence in our series, and this was in the area of the vidian canal. Follow-up for all cases ranged from 2 months to 7 years. The representative case with 7 years follow up is illustrated. (Figure 7-10)



Figure 7. Two weeks post surgery

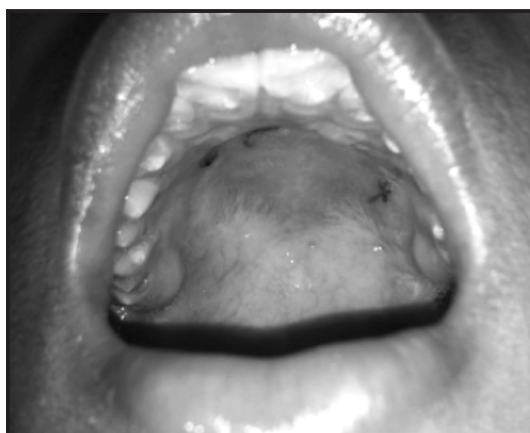


Figure 8. One month post surgery



Figure 9. Seven years post-surgery showing minimal scarring of the palate and symmetrical alveolar growth





Figure 10. Seven years post-surgery showing symmetrical alveolar growth and palatal elevation

## DISCUSSION

Juvenile Angiofibroma excision has always been considered difficult because of its bloody nature and anatomic location. A common cause of residual or recurrent disease is incomplete exposure of and access to tumor stalk or extensions during surgery. Preoperative angiography with embolization allows less intraoperative bleeding with the objective of better surgical site exposure and less blood loss.<sup>6</sup> However, not all patients can afford the cost of pre-operative embolization of feeding vessels supplying the tumor, which are mainly branches of the internal maxillary artery. Moreover, while preoperative embolization allows a less bloody surgical field, it is not always available and is associated with tumor residual.<sup>2, 5, 7</sup> In the absence of preoperative embolization, the transpalatine approach to JA has provided good results with minimal morbidity and mortality.<sup>7</sup>

The ETPA, a modification of the transpalatine approach,<sup>3</sup> allows direct access to tumor with a wide surgical exposure. As a primary approach, it does not violate the soft tissue and bony face. The components allowing wide exposure both for visualization and dissection are: 1. a wider entry site, *i.e.*, the oral cavity (compared to the nasal or transmaxillary route); and 2. wide and direct tumor access with an inferiorly-reflected palatal flap, transection of the ipsilateral greater palatine artery plus extended incision of the soft palate behind the ipsilateral molar and removal of a big part of the bony palate. (Figure 3, 4)

The approach may be likened to a wider funnel providing access to the nasal cavity, nasopharynx and pterygomaxillary fossa. Blunt dissection of the tumor lessens the amount of bleeding in the operative field. Sharp dissection will cut tumor tissue and expose the sinusoids which will allow blood to flood the operative site. The excised tumor is

inspected for any raw or unsmooth areas which may suggest a portion left behind. After tumor removal, bleeding areas may suggest residual disease and must be bluntly dissected to determine whether part of the tumor has been left behind. With a bigger field to work in, bleeders are more easily visualized, accessed and controlled.

To the best of our knowledge, there was only one recurrence in our series, in the area of the vidian canal. This is comparable to recurrence rates among the other 22 cases managed with other approaches, as there was 1 recurrence among the 4 endoscopic approaches, and 1 recurrence in the transmaxillary approach.

A limitation of our study is the great variation in our follow-up period ranging from 2 months to 7 years. In our setting, many patients only follow up when they experience intolerable symptoms such as recurrent, persistent epistaxis. Another limitation is that postoperative CT or MRI imaging was not routinely performed on our patients due to cost considerations, as repeat imaging is usually requested only for recurrence of symptoms.

To our knowledge, not one of the 13 cases of JA who underwent ETPA developed oroantral fistula or nasal resonance problems. Having a bony bed at the incision site may provide support and serve as a scaffold during healing, such that even minor dehiscence is not expected to result in fistula formation. Hypernasality of speech was not observed for any of the 13 cases that we know of. The use of a palatal obturator has allowed patients to ingest a liquid diet immediately post-operatively without need for a nasogastric tube. Delayed extubation also prevented the need for a tracheotomy.

An extended transpalatine approach with transection of the ipsilateral greater palatine artery seems to provide good exposure of JA and the operative site. This approach allows the surgeon to more effectively handle most cases of juvenile nasopharyngeal angiofibroma confined to the nasal cavity, nasopharynx, paranasal sinuses and limited pterygomaxillary fossa. Cases with infratemporal fossa extension may need a modified approach. The robustness of the ETPA allows it to be very versatile as a primary approach or in combination with other techniques in managing JA.

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