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How I Do It

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# Endoscopic Removal of Juvenile Nasopharyngeal Angiofibromas: A Video Presentation

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Daekeun Joo, MD; Dinesh K. Chhetri, MD; Marilene B. Wang, MD

**Objectives/Hypothesis:** Juvenile nasal angiofibroma (JNA) is a relatively rare, benign neoplasm generally seen in prepubertal and adolescent males. In the past, surgical management included lateral rhinotomy, transpalatal and transmaxillary routes, and midface degloving approaches. Endoscopic approaches have become the treatment of choice, especially for tumors limited by size and location criteria. Our presentation demonstrates an endoscopic approach to excision of JNAs that are limited to the nasal cavity, nasopharynx, and paranasal sinuses. Through the use of a brief video presentation, participants will be able to visualize the endoscopic technique.

**Study Design and Methods:** A retrospective review of JNA patients treated at our institution identified 3 patients who underwent endoscopic removal. All patients underwent preoperative embolization followed by endoscopic resection.

**Results:** A video demonstration is presented of a patient with a 3.5 cm JNA who underwent successful endoscopic, endonasal excision. After medialization of the middle turbinate and anterior ethmoidectomy, the tumor could be mobilized using a Cottle elevator and microdebrider. The origin and attachment of the tumor were visualized and detached from the sphenopalatine foramen. The tumor was resected en bloc with minimal bleeding. There were no intraoperative complications, and postoperative bleeding was negligible. To date, there has been no evidence of recurrence of tumor in these individuals.

**Conclusions:** Endoscopic removal is the approach of choice for small to medium, limited-extent JNAs.

## INTRODUCTION

Juvenile nasopharyngeal angiofibroma (JNA) is a relatively rare, benign neoplasm generally seen in prepubertal and adolescent males. Patients usually present with nasal airway obstruction, recurrent unilateral epistaxis, headache, and facial swelling. JNA is thought to originate from nonchromaffin paraganglionic cells of the terminal branches of the maxillary artery. JNAs arise in close proximity to the posterior attachment of the middle turbinate, near the superior border of the sphenopalatine foramen, and can extend anteriorly into the nasal cavity and septum, superiorly into the sphenoid sinus, and laterally toward the pterygopalatine fossa.

In the past, surgical management included lateral rhinotomy, transpalatal and transmaxillary routes, and midface degloving approaches, depending on the size of the tumor as well as on the surgeon's experience. The use of endoscopic sinus surgery for resection of JNAs is a relatively new phenomenon that has recently become the standard approach for tumors that are limited to the nasal cavity and nasopharynx.<sup>1-3</sup> Endoscopic approaches have become the treatment of choice, especially for tumors limited by size and location criteria. Roger et al.<sup>1</sup> retrospectively reviewed 20 patients at their institution that had JNA. They used an exclusively endoscopic approach for resection of these tumors with a mean follow-up of 22 months. In their series, the mean dimensions of the tumors were 4.5 × 4 × 3 cm in size and none of these tumors had deep skull base or temporal fossa invasion. No recurrences were reported in their series, and their median estimated blood loss was 300 mL. In a more recent retrospective review by Pryor et al.,<sup>2</sup> 6 consecutive patients who underwent endoscopic excision of JNA were compared to 53 patients who underwent resection of JNA by traditional approaches (i.e., lateral rhinotomy and midface degloving). They showed that compared to the traditional surgery group, patients that underwent endoscopic JNA resection had less intraoperative blood loss, a shorter hospital stay, a lower rate of complications, and fewer recurrences.

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From the Department of Surgery, Division of Head and Neck Surgery, David Geffen School of Medicine at UCLA and Veterans Administration Medical Center, Los Angeles, California, USA.

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Send correspondence to Marilene B. Wang, MD, 200 UCLA Medical Plaza Suite 550, Los Angeles, CA 90095, USA. E-mail: mbwang@ucla.edu.

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At our institution, endoscopic JNA resection has been performed on three patients with JNAs of various sizes that had no evidence of intracranial extension. All patients underwent preoperative embolization followed by endoscopic resection. There have been no recurrences. A representative case report, as well as a video clip of the operation, is presented.

### CASE REPORT

A 12-year-old boy with no major past medical history presented to the UCLA Head and Neck Surgery clinic with a 1-month history of intermittent, persistent epistaxis exclusively from the right nasal cavity. A computed tomography scan and magnetic resonance imaging demonstrated a mass in the nasopharynx with extension into the right pterygopalatine fossa consistent with a juvenile nasopharyngeal angiofibroma (Fig. 1).

Initial endoscopic exam with a 30-degree rigid sinus endoscope revealed a fleshy, polypoid mass completely filling the right nasal cavity and nasopharynx. This mass was friable but showed no evidence of bleeding at that time. On introduction of the endoscope into the left nasal cavity, the mass was again visible, however the bulk of the tumor was located on the right side. Based on review of the size and location of the tumor as delineated on imaging studies, this mass was about a 3.5-cm tumor located posterior to the right middle turbinate without evidence of intracranial extension. The decision was made to approach this tumor from an endoscopic, endonasal approach. The patient underwent preoperative embolization as is the established protocol with all patients with these types of tumors at our institution (Fig. 2).

### Technique

The patient was taken to the operating room. He was placed on the operating table, intubated, and given general endotracheal anesthesia. The table was then turned 90 degrees. The patient's nose was then prepared with topical oxymetazoline (Afrin) nasal spray and cotton pledgets soaked with 4% cocaine solution, and 1% lidocaine with 1:100,000 epinephrine was infiltrated into the middle turbinate, inferior turbinates as well as the polypoid soft mass located in the nasopharynx.

The 25-degree endoscope was then inserted into the right nasal cavity and the medial turbinate was medialized using a Cottle elevator (V. Mueller, Dublin, OH). Using the same instrument, an incision was made in the uncinete process. Next, the anterior and posterior ethmoid air cells were opened up and cleaned out completely using a microdebrider along with straight and up-



Fig. 2. All patients at our institution undergo preoperative embolization with interventional radiology prior to surgery.

biting forceps. The natural maxillary ostium was then identified and enlarged. This allowed for further medialization of the middle turbinate and good exposure of the pterygopalatine fossa.

The lateral attachments of the nasal angiofibroma were incised using the Cottle elevator and Weil-Blakesley forceps (V. Mueller). All of the posterior and lateral attachments were severed using the microdebrider and the angiofibroma was mobilized. After the final attachment of this tumor was taken down, the delivery of this mass was initiated. Because of its large size, the mass could not be brought out through the nasal cavity; rather, it was pushed posteriorly toward the posterior nasopharyngeal wall, brought out through the oropharynx, and finally delivered through the mouth. The tumor specimen itself measured approximately  $3 \times 4$  cm in diameter (Fig. 3).

After the mass was removed, the nasal cavity and sinuses were inspected and there was no active bleeding seen. Afrin nasal spray was again instilled into bilateral nasal cavities and then the nose was packed on the right side with a MeroGel sheet (Medtronic ENT, Jacksonville, FL) that was moistened with saline. The packing



Fig. 1. T1-weighted MRI shows avid enhancement of the tumor in the patient's nasopharynx.



Fig. 3. The final tumor mass measuring about 3.5 cm in diameter. The mass was removed from the nasopharynx by dunking the tumor through the choana and removing it through the oropharynx and oral cavity.

was placed into the ethmoid cavity and posterior attachment of the middle turbinate. The patient was then awakened from anesthesia, extubated, and taken to the recovery room in stable condition. There were no complications during this procedure and the estimated blood loss was about 25 mL. The patient tolerated the procedure well. He was admitted overnight for postoperative monitoring and deemed stable for discharge on postoperative day 1. To date the patient has no evidence of recurrence.

## DISCUSSION

In the past, surgical approaches for removal of even small JNAs were limited to open approaches. As techniques have improved and surgeons' experience has increased, endoscopic sinus surgery has become the approach of choice for small to medium, limited-extent JNAs. Our series has been consistent with the findings of recent studies in regard to the ability to successfully approach tu-

mors based on location and size criteria as well as blood loss, complication rate, and length of hospital stay.

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