



Endoscopic embolization with onyx prior to resection of JNA: A new approach

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ABSTRACT

Objective: To report a novel pioneering approach of endoscopic embolization (EE) and resection of juvenile nasopharyngeal angiofibroma (JNA) and describe all outcomes and results.

Methods: Four patients presented to the University of Miami with repeated episodes of unilateral epistaxis diagnosed by fiberoptic and radiographic examination as nasal JNA. Subsequently, in conjunction with neurosurgery, endoscopic visualization was provided to perform intratumor needle insertion, through which the liquid embolic agent Onyx was infused to embolize the JNA's under fluoroscopic and endoscopic guidance. The day after EE, endoscopic resection was performed. Operating room time, estimated blood loss (EBL), and other intraoperative and post-operative results are reported and compared to published literature.

Results: A total of 4 patients (all males), had EE of JNA and subsequent endoscopic resection between September 2008 and January 2009. Average EBL during surgery was 412.5 ml (range 150–800) with an average operating room time of 228 min (range 95–485). We experienced no bleeding from the tumor or its attachments, only from the approach. Two patients experienced mild numbness in the V2 distribution, which began to resolve one week post-operatively. No other complications were encountered.

Conclusions: This is the first published report of direct endoscopic embolization of JNA with Onyx. Although further studies are needed, it seems to provide a safe, less invasive alternative to traditional embolization and endoscopic resection, but must be done in cooperation with interventional neurosurgery to maximize its safety profile.

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1. Introduction

Juvenile nasopharyngeal angiofibromas (JNA) are rare, comprising 0.05% of all head and neck tumors [1], and are found primarily in adolescent boys. They originate in the sphenopalatine foramen and most often present as unilateral epistaxis and nasal airway obstruction. They often present a challenge for the pediatric otolaryngologist.

Traditionally, JNAs have been removed via open techniques, including transpalatal, transantral, lateral rhinotomy, midface degloving, Lefort I, and infratemporal fossa approaches. The traditional open procedures have been utilized for extensive or invasive tumors, mainly including those with skull base and intracranial involvement. However, over the past two decades most JNA tumors have begun to be removed endoscopically. Several JNA tumor staging systems have been described but the most commonly utilized is the Radkowski staging system (Table 1) [2]. Recurrence of JNA tumors using open techniques have been

reported in the literature ranging between rates of 7% for Radkowski Stages I–II and 40% for Radkowski Stage III [3]. Additionally open procedures may have drawbacks of long hospital stays and unsightly scars. Most otolaryngologists now advocate the endoscopic approach as the primary surgical option for JNA resection, provided that the surgeon has adequate experience, equipment, and a multidisciplinary team. Less blood loss and shorter hospital stays have favored endoscopic resection when compared to traditional open procedures [4].

Pre-operative embolization of JNAs via the traditional intra-arterial approach has been reported to reduce blood loss during resection [5–8]. Endovascular therapy has become an important tool in the management of head and neck tumors. Preoperative embolization of vascular tumors in order to decrease intra-operative blood loss, palliative embolization to control intractable tumor bleeding, and administration of intra-arterial chemotherapy have become common practice. While traditional transarterial embolization is commonly employed, direct tumoral puncture has also been advocated as an alternative [9–10]. Onyx (ethylene vinyl alcohol copolymer, EV3 Micro Therapeutics Inc., Irvine, CA) is a relatively new liquid embolic agent initially approved for the treatment of cerebral arteriovenous malformations. Onyx has been used successfully in cranial and spinal arteriovenous malformations and fistulas, thereby fostering interest in its use for head and

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Table 1
Radkowski staging of juvenile nasopharyngeal angiofibromas.

Stage IA: Involvement limited to the nose and/or nasopharynx
Stage IB: Extension into one or more sinuses
Stage IIA: Minimal extension into the pterygopalatine fossa
Stage IIB: Occupation of the entire pterygopalatine fossa
Stage IIC: Involvement of the infratemporal fossa with or without extension into the cheek or posterior to the pterygoid plates
Stage IIIA: Erosion of the skull base (middle cranial fossa/base of pterygoids); minimal intracranial extension
Stage IIIB: Erosion of the skull base; extensive intracranial extension with or without cavernous sinus invasion

neck tumor embolization [11–13]. The benefits of Onyx over traditional embolic materials are primarily due to the slower precipitation properties of Onyx, which allows deep penetration within the tumor vasculature, and the ability to interrupt injection several times during the procedure to allow embolization pattern assessment and recognition of dangerous intracranial anastomoses [11]. This article describes the first cases of endoscopic-assisted direct puncture embolization of a JNA with Onyx, followed by endoscopic resection.

2. Methods

Four patients presented to a tertiary care academic medical center with repeated episodes of unilateral epistaxis. JNA was diagnosed with endoscopic examination and further illustrated by MRI and CT radiographic studies (Fig. 1). Each patient was evaluated by neurosurgery and a collective decision was made to perform endoscopic-assisted direct puncture embolization with Onyx followed by endoscopic resection. After the procedures, differences in approaches, and risks were explained to the parents and a written consent was obtained, the patients were scheduled for endoscopic embolization followed by endoscopic resection within 24 h. Operating room time, estimated blood loss (EBL), hospital stay, tumor size, Radkowski staging, and post-operative complications were recorded and compared to published literature. This is a presentation of four cases, which was excluded from institutional review due to the number of patients.

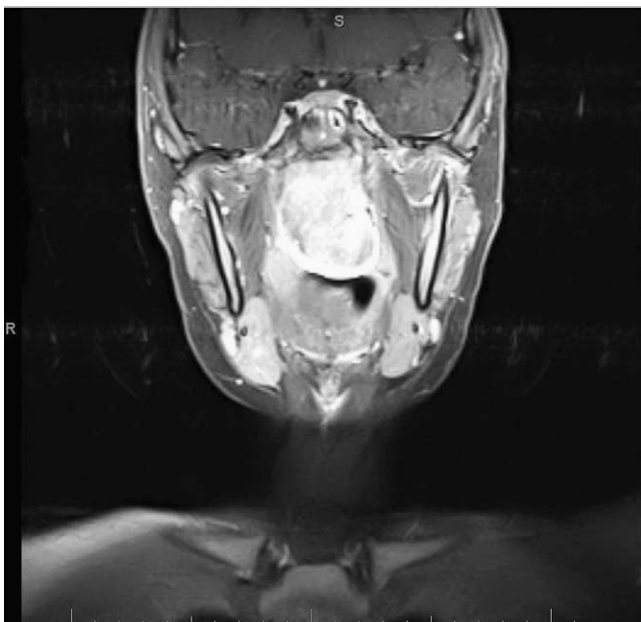


Fig. 1. MRI of a Radkowski Stage IIB juvenile nasopharyngeal angiofibroma.

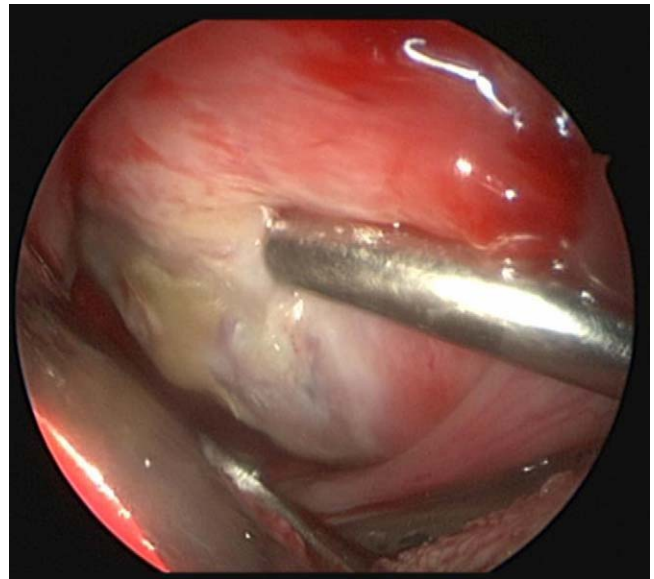


Fig. 2. Endoscopic image of JNA pre-embolization, note the beefy red color.

Twenty-four hours prior to endoscopic removal of juvenile nasopharyngeal angiofibromas, we provided endoscopic visualization of the tumors, so that neurosurgery could perform direct intratumoral embolization (Fig. 2). We inserted an 18 gauge needle directly into the tumor, through which the embolic agent was injected (Figs. 2 and 3). Onyx (ethylene vinyl alcohol copolymer) was used to embolize the tumors. The four patients that we embolized were the first four intratumoral endoscopic embolizations with Onyx ever performed. Traditional angiograms were done by neurosurgery to image the tumor pre, during, and post-embolization (Fig. 4). Embolization was done in the interventional neuroradiology suites, and the patient was placed in a monitored setting post-embolization. Tumors were localized using a 5 mm zero degree rigid endoscope (Karl Storz, Germany) introduced endonasally, and an 18 gauge spinal needle was inserted into the tumor surface under direct vision. The needle was advanced to the center of the tumor under



Fig. 3. Endoscopic image of JNA post-endoscopic embolization, note the blanching of the tumor.

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