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Abstract

Objective: To report on a series of patients presenting with juvenile nasopharyngeal angiofibroma (JNA) in an effort to further define an optimal treatment algorithm.

Study Design: Retrospective Review.

Subjects and Methods: 18 patients presented to a tertiary care institution with JNA from 1999 to 2007. Patients were categorized by Andrews stage and data was collected on presentation, operative technique, and postoperative course.

Results: All patients underwent preoperative embolization. Stage 1, 2, and one 3a lesions were approached endoscopically while the remainder underwent open resection. In the endoscopic group the intraoperative blood loss was almost half that of the open group (506 vs. 934cc) and the average hospital stay was one day less (3 vs. 4 days).

Conclusion: Endoscopic resection is reasonable for Andrews stage 1, 2, and select 3a lesions and may allow for less bleeding and shorter hospital stay. This study supports the current trend of expansion of indications for endoscopic JNA resection.

Andrews Stage	
I	Tumor limited to the nasal cavity and nasopharynx
II	Tumor extension into the pterygopalatine fossa, maxillary, sphenoid, or ethmoid sinuses
IIIa	Extension into orbit or infratemporal fossa without intracranial extension
IIIb	Stage IIIa with small extradural intracranial (parasellar) involvement
IVa	Large extradural intracranial or intradural extension
IVb	Extension into cavernous sinus, pituitary, or optic chiasm

Table 1. Andrews Juvenile Nasopharyngeal Angiofibroma staging system⁸.

Andrews Stage	N	Approach
1	1	Transnasal
2	8	Transnasal
3a	1	Transnasal
	2	Caldwell-Luc
	2	Lateral Rhinotomy
4a	1	Lateral Rhinotomy
4b	3	Lateral Rhinotomy, Craniotomy

Table 2. Type of surgical approach used based on Andrews staging.

Initial Stage	Age at Recurrence	Time to Recurrence	Location	Treatment
3a	17	732 days	PPF, FRO	Observation
3a	16	249 days	PPF, FR	Endoscopic Resection
4a	20	1035 days	FR, CS	Radiation
4b	17	657 days	PPF, FR	Radiation

Table 3. Description of recurrences (PPF-pterygopalatine fossa; FR-foramen rotundum; FO-foramen ovale; CS-cavernous sinus).

Discussion

Juvenile nasopharyngeal angiofibroma represents a challenging clinical entity whose management has undergone significant evolution over the past decade. The juxtaposition of this benign yet locally invasive mass in an adolescent population mandate aggressive surgical resection while limiting scarring and disruption of midfacial growth potential.

As endoscopic techniques coupled to frameless stereotactic image guidance evolve the limits of transnasal resection continue to be challenged. Though initially utilized for tumors limited to the nasopharynx or paranasal sinuses, these approaches have recently been described for tumors involving the pterygopalatine fossa, infratemporal fossa, and even select lesions with limited intracranial involvement^{2,4,6,9}.

Limitations of the endoscopic technique include loss of a two handed dissection and obfuscation of the surgical field when heavy bleeding is encountered. Proponents cite multiple advantages including improvement in surgical visualization with magnified and multi-angled views as well as minimization of periosteal and bone disruption². Additionally two surgeon techniques have been described utilizing transeptal access through the contralateral nostril to aid in retraction and suctioning¹⁰.

In our series all patients with tumor restricted to the nasal cavity or pterygopalatine fossa (Andrews stage 1 and 2, n = 9) and one with limited infraorbital fissure involvement were resected transnasally. While these were early stage lesions, this approach did result in reduced intraoperative blood loss, shorter hospital stay, and no recurrences. Facial incisions were spared in two additional patients with infratemporal fossa extension utilizing a transnasal approach augmented by Caldwell Luc. Of note, overall operative time was not impacted by tumor stage or type of approach. Our experience supports the contention that an endoscopic approach can be successfully employed for Andrews stage 1, 2, and select stage 3a lesions with the caveat that additional exposure via Caldwell Luc may be required.

Many consider preoperative embolization to be an important adjunct to endoscopic resection however its benefits remain controversial. It is well established that embolization results in less intraoperative blood loss and lower subsequent requirement for blood transfusion^{2,4}. However, there remains evidence to suggest that it also disrupts the tumor border and may allow for tumor retreat into the cancellous bone leading to incomplete resection¹¹. McCombe et al¹² reported that the strongest predictor of tumor recurrence was preoperative embolization. Additionally, complications can occur following embolization including tissue devitalization and inadvertent occlusion of the ophthalmic artery or intracranial vasculature⁴. In our study all patients underwent uncomplicated embolization regardless of tumor stage or approach and thus its effect on intraoperative blood loss can not be ascertained from this series.

The incidence of recurrence has been reported at 6-50%¹³ with the majority occurring within a year of surgery. Rates have been shown to correlate with extent of lesion particularly with involvement of either the anterior or lateral skull base⁶. This is echoed in our findings as we noted a 22% recurrence rate which was restricted to patients with Andrews stage 3a or higher lesions. The choice of treatment for these recurrences was based on a variety of factors including patient age and site of recurrence. One patient underwent successful endoscopic re-resection for a lesion with a recurrence in the pterygopalatine fossa with limited encroachment on foramen rotundum. Two patients underwent radiation therapy which is controversial due to concerns of long term radiation sequelae in this young patient population. One had a symptomatic recurrence in the cavernous sinus which was not felt to be amenable to surgery. The other patient recurred early in the series (2001) and was treated at an outside institution with radiotherapy however he likely would have had an attempt at re-resection had he remained at our institution.

Over the past decade, the optimal management of juvenile nasopharyngeal angiofibroma has been redefined largely due to the expansion of the limits of transnasal surgery. Our findings are congruent with prior data indicating that endoscopic approaches are reasonable for Andrews stage 1, 2, and select 3a lesions and may allow for less bleeding and shorter hospital stay. While controversial, we support the use of preoperative embolization as it likely aids in reduction of intraoperative blood loss and, at our institution, is relatively safe. The management of recurrence is complex and must take into account a variety of factors including tumor location, patient age, and the potential for spontaneous involution and thus must be considered on an individual basis.

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