

Prospective Study of Complications and its Management in Various Approaches of Juvenile Nasopharyngeal Angiofibroma

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ABSTRACT

Background: Juvenile Nasopharyngeal Angiofibroma (JNA) is a rare, benign but aggressive tumor predominantly affecting adolescent males, leading to significant morbidity. This study evaluated JNA patients' clinical presentation, surgical methods, complications, and recurrence rates.

Methods: A prospective study was conducted at Gauhati Medical College and Hospital, involving 14 male patients aged 11 to 25 years undergoing surgery for JNA. Preoperative assessments included CT angiography and MRI scans, with staging using Radkowski and Fisch systems. Data on clinical presentation, surgical approach, complications, and recurrence were collected.

Results: The most common stages were Fisch stage II (42.8%) and Radkowski stage IB (35.7%). The endoscopic transnasal approach was the most frequently used surgical method (57.14%), but also had the highest complication rate, including significant intraoperative hemorrhage and nasal crusting (78.57%). Preoperative embolization was performed in all cases to reduce intraoperative bleeding. The recurrence rate was 28.57%, with the endoscopic transnasal approach having the highest recurrence (37.5%).

Conclusion: Managing JNA involves balancing tumor exposure and minimizing complications. The endoscopic transnasal approach, despite being common, is linked with higher recurrence and complication rates. Proper patient selection and meticulous surgical technique are crucial to reducing these risks. A tailored surgical approach, considering the tumor's stage and the patient's condition, along with a multidisciplinary approach, is essential for optimal outcomes.

Key-words: Juvenile Nasopharyngeal Angiofibroma, Adolescents, Epistaxis, Surgery, Complications

INTRODUCTION

Juvenile Nasopharyngeal Angiofibroma (JNA) is a rare, highly vascular, benign tumor that predominantly affects adolescent males, typically between the ages of 10 and 25. Despite its benign histological nature, JNA is known for its aggressive local behavior, which can lead to significant morbidity. The tumor originates primarily from the posterolateral wall of the nasal cavity, near the sphenopalatine foramen, and extends into the

nasopharyngeal region.

In advanced cases, this specific localization often results in the tumor invading adjacent structures, including the nasal cavity, paranasal sinuses, orbit, and even the cranial cavity^[1,2].

The etiology of JNA remains poorly understood, though it is believed to be linked to hormonal influences, particularly androgens, given its almost exclusive occurrence in males. Genetic factors have also been implicated, with studies suggesting a possible association with familial adenomatous polyposis and mutations in the beta-catenin gene^[3,4].

The vascularity of JNA is a hallmark feature, with the primary blood supply typically arising from the Internal Maxillary Artery, a branch of the External Carotid Artery. In addition to the Internal Maxillary Artery, the Ascending Pharyngeal Artery, orbital branches, and other

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branches of the External Carotid Artery may also contribute to the tumor's vascular supply. In rare instances, the Internal Carotid Artery may also be involved, which complicates surgical management due to the risk of significant bleeding [5,6].

Clinically, patients with JNA often present with a constellation of symptoms, the most common being epistaxis. The nosebleeds associated with JNA are typically painless, profuse, and unprovoked, occurring frequently enough to lead to significant anemia in some cases [7]. Other presenting symptoms include nasal obstruction, which can lead to mouth breathing and altered speech resonance (rhinolalia clausa), headaches due to sinus involvement or intracranial extension, facial swelling or deformity, and proptosis in cases with orbital involvement [8,9]. Late symptoms, often indicative of more advanced disease, may include Otitis Media with Effusion due to Eustachian tube obstruction, diplopia from orbital invasion, and neurological symptoms from intracranial extension [10].

The diagnosis of JNA relies heavily on clinical history, endoscopic examination, and imaging studies. Endoscopy often reveals a smooth, lobulated mass in the nasopharynx or nasal cavity, which may be highly vascular and friable. Imaging, particularly contrast-enhanced CT and MRI, plays a crucial role in assessing the extent of the tumor and planning surgical intervention. These imaging modalities help delineate the tumor's vascularity, involvement with surrounding structures, and any intracranial extension [11,12].

Given the tumor's vascular nature, biopsy is generally avoided to prevent profuse bleeding. Instead, a definitive diagnosis is often made based on the clinical and radiological findings. Treatment primarily involves surgical excision, with preoperative embolization commonly employed to reduce intraoperative bleeding. Several surgical approaches exist, including lateral rhinotomy, endoscopic transnasal approaches, and conventional transpalatal approaches, each chosen based on the tumor's size, location, and extent [13,14].

Despite surgical intervention, JNA has a high recurrence rate, necessitating long-term follow-up. The management of recurrent disease often involves repeat surgery, with radiotherapy considered in cases where complete surgical resection is not possible or in recurrent cases that are not amenable to further surgery [15,16].

This comprehensive overview highlights the complexity and challenges associated with diagnosing and managing Juvenile Nasopharyngeal Angiofibroma, emphasizing the need for a multidisciplinary approach involving otolaryngologists, radiologists, and surgeons specialized in head and neck oncology.

MATERIALS AND METHODS

Study Design and Setting- Over one year, the study was conducted at the Tertiary Health Care Centre, Gauhati Medical College and Hospital, Guwahati. This was an institution-based prospective study.

Patient Population- A total of 14 patients who underwent surgery for Juvenile Nasopharyngeal Angiofibroma (JNA) were included in the study. All patients were followed up for one year post-operatively. Informed consent was obtained from all patients, allowing the use of their clinical photographs for publication where necessary.

Inclusion Criteria

1. Patients aged between 10 and 25 years.
2. History of unprovoked epistaxis.
3. Patients presenting to the Department of ENT, GMCH.

Exclusion Criteria

1. Patients aged below 10 years or above 25 years.
2. Epistaxis due to trauma.
3. Patients lost to follow-up.

Diagnostic and Imaging Techniques- Preoperative evaluation included CT angiography and MRI scans to stage the patients using the standard Radkowski and Fisch staging systems. These imaging modalities were instrumental in determining the most beneficial surgical approach for each patient.

Data Collection and Patient Assessment- A detailed questionnaire was used to document the patient's history pre- and post-operatively. This included data on the duration and frequency of symptoms, the extent of tumor involvement, and previous medical treatments.

Endoscopic Examination- Endoscopic examinations were performed before and after surgery to assess the tumor's characteristics, including size, location, and

extent of involvement. Postoperative endoscopic evaluations were crucial in identifying any complications arising from the surgery and assessing the success of the treatment.

Ethical Considerations- All patients provided informed consent to participate in the study and use their clinical data and images. The study was conducted using ethical guidelines and approved by the institutional review board of Gauhati Medical College and Hospital.

RESULTS

The total cases operated on were 14 in the department of ENT, GMCH and all the cases were followed up immediately (a week), 6 months, and 1-year post-surgery. All the patients operated were male (100%), ranging from 11 to 25 years old, with the mean age being 15 years. By analysis of CT scan nose and PNS, it was observed that most patients presented at FISC stage II (42.8%) and Radkowski IB (35.7%). Other cases were Fisch stage I (14.28%), stage IIIA (35.7%), and stage IIIB (7.14%). Other cases were Radkowski stage IA (14.38%), stage IIA (21.42%), stage IIB (14.28%), and stage IIC (7.14%). The most common artery seen to be supplying the tumor was the internal maxillary artery in 71.42% of cases, followed by ascending pharyngeal (28.57%), ophthalmic (21.4%), other branches from the Internal Carotid artery (14.28%).

Table 1: Distribution of primary and recurrent cases against age

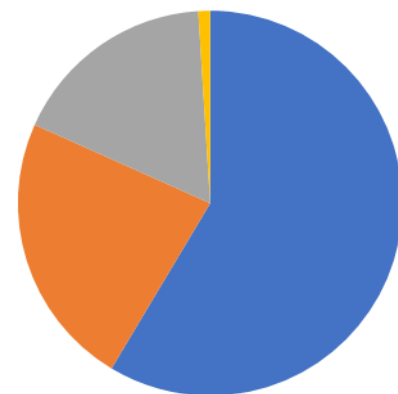
Age group	No of cases	Recurrence
11-15	8	3
16-20	4	1
21-25	2	0

All the patients (100%) were treated with preoperative embolization of the main artery supplying the tumor 24 to 48 hours before the surgery. 3 approaches for surgical excision approaches were used: lateral rhinotomy in 21.42% of cases, endoscopic transnasal approach in 57.14% of cases and conventional transpalatal approach in 21.42% of cases. All cases (100%) undergoing transpalatal approach were tracheostomized.

The complications following surgery were classified under early and late. The early complications occurred within 1 month of surgery. Late complications were

those that occurred beyond 1 month of surgery. The early complications included intraoperative hemorrhage requiring more than 2 units of blood transfusion (64.28%), post-procedure epistaxis (21.42%), nasal blockage (35.7%), nasal crusting (78.57%), ophthalmic problem (7.14%), post tracheostomy voice changes (21.42%). Late complications include recurrence in 28.57% of cases, nasal pain in 7.14% of cases and headache in 14.28% of cases. Most recurrence cases were observed between the ages of 11-15, with a mean age of 14

■ Internal Maxillary ■ Ascending Pharyngeal
 ■ Ophthalmic ■ Others



ARTERY

Fig. 1: Pie chart showing various arteries supplying the tumour mass

Table 2: Distribution of primary cases against complications

Complications	No of cases
Nasal mucosa crusting	11
Intraoperative massive blood loss (BT required during and post-surgery>2)	9
Nasal blockage	5
Recurrence	4
Post-tracheostomy changes in voice	3
Epistaxis	3
Headache	2
Ophthalmic	1
Nasal pain	1

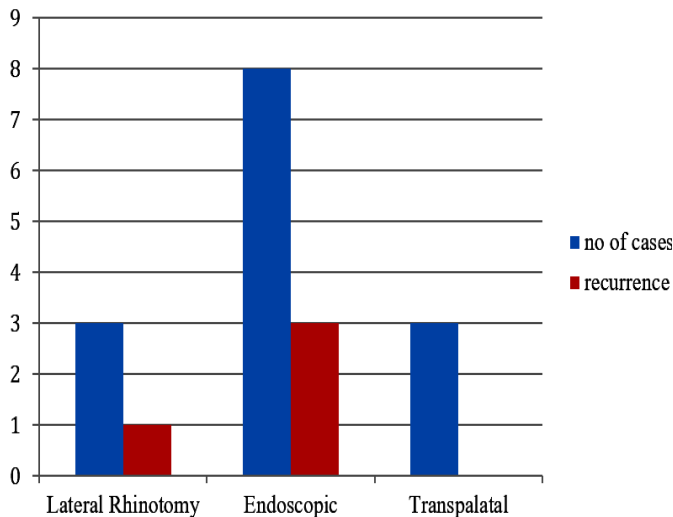


Fig. 2: Bar diagram showing primary and recurrent cases against types of approach to surgical excision.

DISCUSSION

Out of 14 cases operated, the most frequent early complication encountered was massive blood loss requiring more than 2-unit blood transfusion. The maximum number of blood transfusions a patient requires is 7 during the entire hospital stay. Patients requiring less than two blood transfusions underwent transpalatal approach to surgery. The patient requiring 7-unit transfusion underwent a lateral rhinotomy approach for surgery. The maximum number of patients with massive blood loss were operated on through the endoscopic transnasal approach^[17].

The mean number of blood transfusions required is 4, mainly in the endoscopic transnasal approach. 4 out of 9 patients (44.4%) who received more than 2 units BT were shifted to intensive care units for further management of blood loss. 3 out of 9 (33.3%) patients required posterior and anterior nasal packing. All 3 patients were operated through an endoscopic transnasal approach. 33.3% of cases that underwent transpalatal approach for excision also required posterior nasal packing. Preoperative embolization techniques have been established to reduce blood loss during surgery and facilitate surgery.^[18] The main techniques include either endovascular arterial catheterization or direct percutaneous puncture.^[19] In our cases, the prior was performed.

All patients who presented with post-procedure epistaxis showed recurrence or reappearance within 1 year of surgery. Nasal blockage was experienced in 35.7% of cases; the maximum of those cases underwent surgery

through an endoscopic transnasal approach followed by a lateral rhinotomy approach. All cases operated through transnasal endoscopic and lateral rhinotomy experienced nasal crusting. Endoscopic removal of crusts was performed, followed by alkaline (sodium bicarbonate) nasal douching to prevent further crusting. All cases that underwent transpalatal approach surgery were tracheostomized for intubation, and all three experienced voice changes. Post-tracheostomy closure patients were sent for speech therapy, which helped them to improve their voices. A case operated through lateral rhinotomy approach had ophthalmic complication post-operatively which was iatrogenic^[20].

Out of all the cases operated on, 28.57% of the cases presented with recurrence within a year of surgery. The most common age group to have recurrence was between 11 to 15 years, with a mean age of 14 years. Patients operated via endoscopic transnasal approach had a maximum recurrence of 37.5% followed by lateral rhinotomy approach. Not a single patient operated via transpalatal approach had presented with recurrence to date. All patients that presented with recurrence were re-operated via the Lateral rhinotomy approach. A single patient operated via lateral rhinotomy approach had complaints of nasal pain post 3 months of surgery, which was managed on an open basis.

CONCLUSIONS

Our study observed that the most common presentation stages for Juvenile Nasopharyngeal Angiofibroma were FISCH stage II and RADKOWSKI stage IB, characterized by tumor invasion into one or more sinuses. The endoscopic transnasal approach emerged as the most frequently utilized surgical method. However, this technique also had the highest complication rate, possibly due to inadequate visualization of the tumor mass, leading to higher recurrence rates. Nasal crusting was the most common postoperative complication, which can be minimized with proper nasal douching techniques. Preoperative embolization, while not a guarantee against significant blood loss, can help prevent catastrophic bleeding by targeting major arteries. Although open approaches like lateral rhinotomy provide better tumor exposure and vascular control, they also carry risks, such as potential injury to ophthalmic structures. The recurrence of the tumor seems to depend on patient-specific factors like hormonal influences and the

surgeon's choice of approach relative to the disease stage.

CONTRIBUTION OF AUTHORS

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