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Original Research Article

Surgical removal of angiofibroma under hypotensive anesthesia: a retrospective report

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ABSTRACT

Background: Juvenile nasopharyngeal angiofibroma (JNA) is a vascular tumor where surgical excision is often complicated by significant intraoperative hemorrhage. While preoperative embolization can reduce bleeding, it is not always available. Induced hypotension is an alternative technique to minimize blood loss.
Methods: We conducted a retrospective review of 62 patients who underwent surgical resection of JNA (without intracranial extension) from March 2010 to December 2025. Patients were divided into three groups: group I (normotensive anaesthesia, n=21), group II (hypotensive anaesthesia induced with propofol and halothane, n=21), and group III (hypotension induced with intravenous nitroglycerine infusion, n=20). The primary outcome measured was intraoperative blood transfusion requirements.
Results: The mean intraoperative blood transfusion requirement was lower in the hypotensive groups (3.2 units in group I vs approximately 1.75 units in groups II and III).
Conclusions: Induced hypotensive anaesthesia was associated with lower reported intraoperative blood transfusion requirements and can be used safely as an alternative to preoperative embolization during surgical resection of JNA.

Keywords: Juvenile nasopharyngeal angiofibroma, Hypotensive anaesthesia

INTRODUCTION

Hippocrates described the tumor in the 5th century BC, but Chaveau introduced the term juvenile nasopharyngeal angiofibroma (JNA) in 1906.[1] This benign tumor is characterized by aggressive local invasiveness and a tendency towards local recurrence after incomplete resection.[2] JNA accounts for 0.05% of all head and neck tumors. A frequency of 1:5,000-1:60,000 in otolaryngology patients has been reported.[3]

JNA occurs exclusively in adolescent males. Many studies have indicated that JNA originates in close proximity to the posterior attachment of the middle turbinate, near the superior border of the sphenopalatine foramen, in the pterygopalatine fossa at the aperture of the pterygoid canal.[4] From there, it can extend to surrounding structures, including the nasal cavity, sphenoid sinus and sella, infratemporal fossa, inferior orbital fissure, and intracranial area.[5]

A diagnosis of JNA is by clinical features, suggested by the classic triad of epistaxis, nasal obstruction, and a nasopharyngeal mass. The presence of other symptoms depends on the direction and extent of tumor spread.[6,7] Contrast enhanced computed tomography (CT) scan is investigation of choice. Biopsy is contraindicated. JNA is a non-encapsulated, submucosal spreading tumor made up of fibrous connective tissue and an abundance of endothelium-lined vascular spaces devoid of muscle layer and fibrous tissue.[8] The treatment of choice for localized primary tumors is surgical resection. A hormonal theory has been suggested because of the lesion's occurrence in adolescent males. Differential diagnosis is infected antrochoanal polyp, malignancy, rhinosporidiosis, chondroma, chordoma and craniopharyngioma.

The objective of this study was to evaluate the effect of hypotensive anaesthesia on intraoperative blood transfusion requirements and perioperative outcomes in patients undergoing surgical resection of JNA without intracranial extension.

METHODS

This retrospective study was conducted in our institution from March 2010 to December 2025. A total of 62 patients were operated on by the department of ENT. These cases were mainly from the Hadoti region including Kota, Bundi, Baran, Sawai Madhopur and Jhalawar, as well as adjoining districts of Madhya Pradesh such as Guna, Sheopur and Shivpuri.

Selection criteria

Inclusion criteria were patients with clinically and radiologically diagnosed JNA who underwent surgical resection at our institution and had no intracranial extension. Exclusion criterion was JNA with intracranial extension.

Tumor extent was retrospectively classified according to the Radkowski staging system, which is a modification of the Fisch system and is particularly useful for predicting surgical morbidity.[9] The staging is as follows: stage I (Ia: limited to nose/nasopharynx; Ib: extension into paranasal sinuses), stage II (IIa: minimal extension into pterygopalatine fossa; IIb: full extension into pterygopalatine fossa with bowing of the posterior maxillary wall; IIc: extension into infratemporal fossa), and stage III (IIIa: skull base erosion with minimal intracranial extension; IIIb: skull base erosion with extensive intracranial extension).[10]

Surgical excision was performed using the following approaches: transpalatal approach, transpalatal with sublabial approach, extended lateral rhinotomy, extended Denker's approach, maxillary swing approach, and infratemporal fossa approach.

The location of these tumors makes conventional surgery difficult. Interest in hypotensive anaesthesia during tumor resection has increased, particularly in institutions where endoscopic removal facilities are not available.

In our study the patients were divided into three groups. Group I patients were operated under normal blood pressure, while patients in groups II and III were operated under hypotensive conditions. Sixty-two cases of proven nasopharyngeal angiofibroma without intracranial extension, after clinical evaluation, imaging and angiography, were subjected to surgical resection. Excellent surgical clearance of the tumor mass was achieved with minimal risk of recurrence.

Post-operative recovery and recurrence were assessed during follow-up. Preoperative embolization was not performed because intraoperative bleeding could be effectively controlled with hypotensive general anaesthesia. Another reason for avoiding embolization was the potential complications associated with the procedure.[11]

During hypotensive general anaesthesia, the target mean arterial blood pressure was maintained between 65-75 mmHg, which is considered safe for young and otherwise healthy patients. In our study, no patient experienced any anaesthesia-related complications.

Statistical analysis

Data were analyzed using licensed statistical package for the social sciences (SPSS) software version 21.0 (Chicago, Illinois). Descriptive/univariate analysis was performed, and the results were presented in the form of tables. Because patient-level data and measures of dispersion were not available for the retrospective dataset, inferential statistical testing and p values were not calculated.

RESULTS

Age-wise distribution of cases is given in Table 1.

Table 1: Age distribution of patients with juvenile nasopharyngeal angiofibroma.

Age group (years)	Number of cases (n=62)
11-13	5
14-19	34
20-22	15
23-25	8
Mean age	17

Tumor extension was observed as follows: nasopharynx 07, nasopharynx + nose + ethmoids 32, nasopharynx + nose + ethmoids + sphenoids 14, and nasopharynx + nose + ethmoids + sphenoids + infratemporal fossa 09 (Table 2).

Table 2: Tumor extension and Radkowiski in juvenile nasopharyngeal angiofibroma.

Tumor extension pattern	Number of cases	Radkowiski staging
Nasopharynx only	7	Ia
Nasopharynx + nasal cavity + ethmoid sinus	32	Ib
Nasopharynx + nasal cavity + ethmoid + sphenoid sinus	14	Ib/IIa*
Nasopharynx + nasal cavity + ethmoid + sphenoid + infratemporal fossa	9	IIc
Total	62	

*Statistically significant.

Angiofibromas were approached through natural orifices, lateral rhinotomy, palatal approaches and Weber-Ferguson incision with maxillary swing approaches. Each case was packed anteriorly and posteriorly for 48 hours post-operatively to achieve hemostasis. Tumors extending to the cranial cavity were excluded from the study.

Use of hypotensive anaesthesia

Group I

Normotensive anaesthesia was used in 21 cases. Propofol or propofol with 1% halothane at normotensive doses.

Group II

Hypotensive doses of propofol with 2% or more halothane were used to produce hypotensive anaesthesia in 21 cases.

Group III

Hypotension was induced and maintained using intravenous nitroglycerine infusion with close monitoring of the patient's vital parameters in 20 cases.

Blood requirement

Group I average 3.2 units of blood, group II average 1.8 units of blood, and group III average 1.7 units of blood.

Table 3: Comparison of blood transfusion requirement among anaesthesia groups.

Group	Anaesthesia technique used	Cases	Mean blood units transfu-sed
Group I	Normotensive anaesthesia	21	3.2
Group II	Hypotensive anaesthesia (Propofol + ≥2% Halothane)	21	1.8
Group III	Controlled hypotension using IV Nitroglycerine infusion	20	1.7
	Total cases studied	62	

The average blood requirement was 3.2 units in group I. In groups II and III (hypotensive anaesthesia), the average blood requirement was reduced to approximately 1.75 units intraoperatively. Per-operative hypotensive anaesthesia significantly reduced intraoperative blood loss.

Out of the 62 cases, recurrence occurred in four patients. All four cases were re-operated successfully and no deaths were reported.

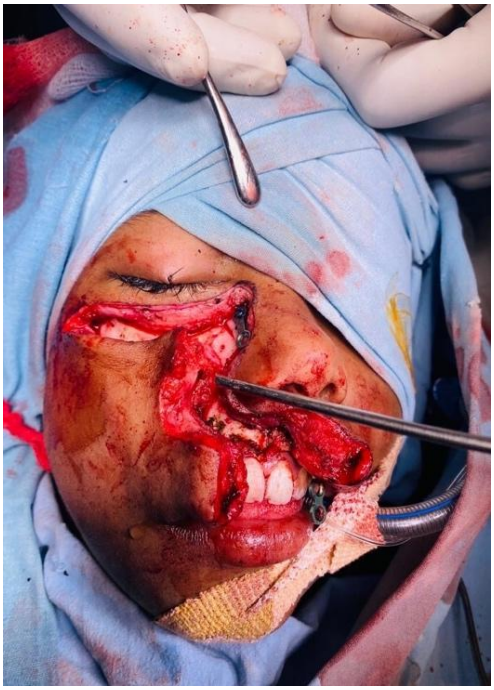

Figure 1: Intraoperative photograph demonstrating the maxillary swing approach used for surgical removal of juvenile nasopharyngeal angiofibroma. The approach provides wide exposure of the nasopharynx and adjacent structures facilitating safe tumor excision.

DISCUSSION

Hypotensive anaesthesia is commonly used to reduce intraoperative blood loss during surgery. Various surgical approaches have been recommended for the management of juvenile nasopharyngeal angiofibroma, including transpalatal, transantral, lateral rhinotomy with medial maxillectomy, midfacial degloving, maxillary swing and endoscopic surgical excision.[2,7,12]

The choice of surgical approach depends on the stage and extent of the tumor.[9] Per-operative hypotensive anaesthesia is essential because it significantly reduces intraoperative blood loss and allows precise and complete removal of the tumor mass.

Our findings are consistent with recent studies demonstrating the efficacy of hypotensive anaesthesia without preoperative embolization. Uzokov et al reported successful endoscopic resection of JNA in 23 patients under hypotensive general anesthesia without embolization, with acceptable intraoperative blood loss and only one recurrence during follow-up.[13]

Similarly, Chiraz et al described complete endoscopic excision of a JNA with infratemporal fossa extension in a 17-year-old male using hypotensive anaesthesia without embolization, with no recurrence at one year follow-up.[14]

Bremer et al studied a series of 150 patients with histologically confirmed angiofibroma between 1945 and 1983 and compared different treatment methods and surgical approaches. They also advocated the use of hypotensive anaesthesia to reduce blood loss during surgery.[15]

The role of preoperative embolization remains debated in the literature. A recent meta-analysis by Elsayed et al comparing embolization versus non-embolization in 309 patients found that while embolization reduced intraoperative blood loss and operative time, it was associated with higher postoperative complication rates.[16] This supports our approach of avoiding routine preoperative embolization.

Conversely, Agarwal et al prospectively studied 50 patients who underwent preoperative embolization using polyvinyl alcohol particles and reported a mean blood loss of 246 ml with no major complications, suggesting that when performed with correct technique, embolization can be safe.[17]

Hypotensive general anaesthesia may be useful in various surgical procedures including head Hypotensive general anaesthesia may be useful in various surgical procedures including head and neck surgery, neurosurgery, large orthopedic operations and plastic surgery.[18-20]

Possible complications of hypotensive anaesthesia mainly involve the nervous system. The most common complications include dizziness and cerebral thrombosis.[13] Less common complications include hemiplegia, retinal thrombosis and even death.

Fortunately, none of these complications were encountered in our study, consistent with other recent series reporting the safety of this technique.[17,20] The safety of controlled hypotension when appropriately monitored has been reinforced by recent literature. Li et al, in a response published in the British Journal of Anaesthesia, emphasized that maintaining mean arterial pressure between 65-75 mmHg is safe in young, healthy patients when combined with careful perioperative monitoring.[21]

Limitations

This study has limitations, including its retrospective, single-institution design, relatively small sample size, exclusion of tumors with intracranial extension, and the absence of a contemporaneous embolization control group. These factors may limit the generalizability of the findings and warrant confirmation in larger prospective studies.

CONCLUSION

Angiofibroma is a notable clinical entity in the Hadoti region of Rajasthan and occurs predominantly in adolescent males. Surgical excision remains the definitive treatment for this condition. With the availability of modern hypotensive anaesthesia techniques and good blood bank support, surgery can be performed safely with minimal complications. Hypotensive anaesthesia significantly reduces intraoperative blood loss and may decrease the recurrence rate by allowing complete removal of the tumor mass.

Based on our findings, we recommend surgical removal of JNA using hypotensive anaesthesia without preoperative embolization as a safe and effective strategy, particularly in settings where embolization facilities may not be readily available.

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