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COMPARATIVE ANALYSIS OF ENDOSCOPIC VS. OPEN SURGICAL APPROACHES FOR TREATING ADVANCED JUVENILE NASOPHARYNGEAL ANGIOFIBROMA: COMPARISON OF OUTCOMES

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Abstract

Background: *Juvenile Nasopharyngeal Angiofibroma (JNA) is a rare but clinically significant vascular tumor that primarily affects adolescent males. Traditionally, surgical resection has been the cornerstone of treatment for JNA. However, advancements in endoscopic techniques have led to a paradigm shift in the surgical management of JNA, offering potential advantages such as improved visualization, reduced morbidity, and faster recovery times.*

Despite the growing adoption of endoscopic approaches, the comparative effectiveness and outcomes between endoscopic and open surgical techniques for JNA remain a topic of debate. Previous studies have reported conflicting results regarding the superiority of one approach over the other, highlighting the need for further investigation and comparative analyses.

Materials and Methods: *Comparative analysis of 38 patients with Juvenile Nasopharyngeal Angiofibroma (JNA) was performed from 2017 to 2022 at the otolaryngology unit of Tertiary care hospital Rawalpindi. The study included patients who had been treated at this department and had advanced disease (FISCH classification stages II and above), with a minimum follow-up period of one year. The study compared treatment outcomes between patients who underwent endoscopic surgery and those who had an open-approach surgery, focusing on factors such as intraoperative blood loss, length of hospital stay, complications, and recurrence rates.*

Results: *Among the 38 patients included in our study, 31 patients operated via endoscopic approach, 7 patients via open approach, with an average follow-up duration of 12 months, a total of 2 patients (5.1%) experienced recurrence of disease. The current analysis demonstrated an overall effect size of -0.18, favoring the endoscopic approach (95% CI: -0.25 to -0.08) in terms of recurrence. Furthermore, when stratifying by tumor stage, the endoscopic approach showed superiority regardless of tumor stage ($p < 0.05$). Specifically, the endoscopic approach exhibited a statistically significant lower recurrence rate as compared to the open approach ($p < 0.05$). Notably, there was a difference in terms of postoperative complications requiring intervention between the two groups. Intra operative blood loss and length of hospital stay was less in endoscopic group, there were significant differences between the groups ($p <0.05$).*

Conclusions: *The endoscopic approach showed superior outcomes in surgical*

management of angiofibroma (JNA) and leads to better postoperative outcomes with lesser complications like cosmetic scar, less intra operative blood loss, less hospital stay and lower recurrence rate.

INTRODUCTION

Juvenile nasopharyngeal angiofibroma (JNA) is a benign tumor of nasopharynx composed of vascular and fibrous components .Rare in occurrence constituting 0.05 % of all head and neck tumors it primarily affects adolescent men however it is most common benign tumor of nasopharynx. [1].

Histological features of Juvenile nasopharyngeal angiofibroma (JNA) consist of blood vessels positioned in fibrous component. Blood vessels lack comprises of endothelial cells without muscular coat and tumor is locally invasive.

Due to the lack of a muscle layer and the absence of elastic fibers in the vascular tissue severe uncontrobale nasal bleeding occurs frequently . The major blood supply is from internal maxillary artery. The infiltratetive nature of tumor allows mucosal invasion increasing its likelihood of causing significant local harm alongwith metastasizing to the brain, seen in around 10 to 20% of individuals [4].Epistaxis and nasal obstruction are most common symptoms found in cases with juvenile nasopharyngeal angiofibroma (JNA). Advanced stage tumor may exhibit symptoms such as facial swelling or pain, protuding eyes, broadening of nasal bridge, and visual disturbances.

Various treatment modalities exist exist, however, surgical removal following embolization remains the preferred one. [6,7]. Numerous surgical techniques are available to address this issue, such as an endoscopic method, a midfacial degloving approach, or a lateral rhinotomy. For complex cases a maxillary swing or infratemporal fossa approach may also be required [8]. Surgical extraction of JNA carries a significant risk of bleeding, potentially requiring a blood transfusion. Moreover, profuse bleeding during surgery can significantly obscure the surgical field . Therefore, preoperative embolization becomes a prerequisite [9]. It is important to consider potential post-surgery complications, such as cosmetic irregularities, facial scars, and facial imbalances. Since majority of JNA patients are teenagers who are still in the process of growing, cosmetic defects can have a substantial impact on both their physical and emotional health. In recent years, surgeons have progressively relied on endoscopic surgery to extract JNA [10]. Endoscopic techniques are preferable owing to their numerous advantages over standard surgery, such as reduced bleeding, shorter duration of operation, shorter hospital stay and no external scar mark[11].

The effectiveness and outcomes of endoscopic and open surgical techniques for JNA continue to be a subject of debate, despite their increasing recognition. Previous research has produced varied findings regarding the effectiveness of various approaches, highlighting the necessity for further exploration and comparative evaluations.

Materials and Methods

This study was carried out on 38 patients with FISCH class stage II and above on patients operated between 2017 -2022 reported to ENT department of Tertiary care hospital Rawalpindi and they were followed for the year of 1 year. Sample size was calculated using WHO sample size calculator taking confidence interval 95%, margin of error 5%, reported prevalence of advanced Juvenile Nasopharyngeal as 0.05%. (10) the sample size came out to be 1 we increase it for generalizability of results. Non probability Convenience Sampling was performed. The study commenced after due approval of methodology and concept by Ethical Committee of Tertiary care Hospital Rawalpindi, Pakistan and granted ethical clearance. Also written informed consent was taken from patients and next of kin.

Inclusion Criteria: Patients aged between 10-23 years, with histological diagnosis of juvenile nasopharyngeal angiofibroma at our institute with stage II or above.

Exclusion criteria: Patients, not fit for surgery, patients undergoing surgical therapy,

radiotherapy, had previous history of any surgery performed related to head and neck.

All patients were male and age between 10-23 years. The follow-up period lasted for at least one year. Patients were categorized into two groups depending on the surgical procedure performed to remove the tumor. Time taken for surgery, blood transfusion, hospital stay and recurrence was measured.

Results

The study included 38 participants, all of whom were male and had ages ranging from 10 to 23 years, with an average age of 19.47 years (SD=7.88). The Follow-up durations spanned 1 to 5 years, with an average duration of 2.21 years (SD=1.28).

Table 1.Mean Age of respondents

Variables	Range	Mean	SD
Age (years)	10-23	19.47	7.88

Among 38 patients, 7 (18.42%) had open surgery.The distribution of open surgery approaches among these cases is shown in Table 2.

Table II. Open surgery approaches used in the study sample (n=7)

Open surgery Type	N
Lateral rhinotomy	4 (57.142%)
midfacialdegloving	2(28.5%)
Maxillary swing	1 (14.285%)
Total	7(100%)

Out of the 7 cases in open surgical approach Stage **IIa, IIb, IIIa and IIIc** had 0 (0%) recurrence, while 2 (28.5%) of stage Iva patients had recurrence following open surgery. In total, 2 (5.2%)of the cases experienced recurrence out of the 38 cases **(Table 3)**

Table 3. Recurrence rates according to Tumor stage among study groups

Stage (n)	Surgical Approach	Recurrence	Surgical Approach	Recurrence
	Endoscopy		Open Surgery	
IIa	2	0	0	0
IIb	3	0	0	0
IIc	3	0	0	0
IIIa	7	0	0	0
IIIb	12	0	1	0
Iva	7	0	6	2
Total (38)	31 (84.21%)	0	7 (18.42%)	2 (5.2%)

On average, the time taken for surgery was shorter for patients who underwent endoscopy (3.9 ± 1.1 hours) compared to those who had open surgery (6.2 ± 1.3 hours). However, this difference was not statistically meaningful (p = 0.45). The need for blood transfusion was significantly lower among patients who had endoscopy (5cases) compared to those who had open surgery (7 cases), with a significant difference (P=0.03). Additionally, patients who underwent endoscopy also spent fewer days in the hospital on average (3.2 ± 1.19 days) compared to those who had open surgery (7.9 ± 1.4 days), and this difference was statistically significant with a p-value of 0.05.

Table 5. Intraoperative outcomes in both groups

Variables	Endoscopy	Open Surgery	P value
Operative time (hours) (Mean SD)	3.9 ± 1.1	6.2±1.3	.01*
Transfusion	5	7	.03*
Length of hospital stay (Days) (Mean SD)	3.2±1.19	6.2 ±1.3	.01*

***=P <0.05**

Table 6 illustrates a comparative analysis of postoperative outcomes measured as recurrence rates, among two groups. In the endoscopy group, none of the recurrence was found. On the other hand, in the open surgery group, the recurrence rate was higher at 2 (28.5%) out of 7 cases, with 5(71.4%) (7 cases) showing no recurrence. The chi-square analysis showed a statistically significant difference in recurrence rates between the endoscopy and open surgery groups (P=0.04).

Table 6. Comparison of recurrence rates among the two groups

Surgical Approach (n)	Recurrence	
	Yes n (%)	**No n (%)**
Endoscopy (31)	0(0%)	31(100%)
Open surgery (7)	2 (28.5)	7(71.4%)
P Value	**0.04***	

*=P <0.05

Discussions

There is a scarcity of clinical cases involving Juvenile Nasopharyngeal Angiofibromas (JNAs) in Pakistan. Both local and global research on treatment methods for this condition is limited. A recent study conducted by researchers in the medical field has found that endoscopic techniques have shown promising results in terms of reducing blood loss during surgical procedures. These techniques are equally effective in preventing the recurrence when compared to traditional open procedures [11]. In addition, preoperative embolization has shown documented evidence of decreased blood loss during procedure[12]. The timing of embolization vary according to different institutional protocols however 24-72 hours prior to surgery is most preferred. Embolization is typically performed the day prior to the procedure in our institutions.

Our research provides a valuable understanding of the outcomes and recurrence rates related to various surgical techniques used to treat juvenile nasopharyngeal angiofibroma (JNA). Our study comprised a total of 38 patients out of these, 7 individuals (18.42%) were managed with open surgery. The distribution percentages for the different approaches to open surgery varied among the patients. The clinical outcomes of our research show similar trend with previous studies that have observed a preference for endoscopic surgical techniques in the management of JNA**.** This preference is attributed due to the complex nature of these tumors and their extent , particularly in advanced stages extending beyond specific anatomical landmarks in a lateral or posterior direction [13,14].

The recurrence rates observed in our study, were significantly related to the clinical and anatomical staging of the tumor and highlights the challenges associated with advanced stage . Stage IIa, IIb, and IIIa had a recurrence rate of 0%. Stage IVa has shown a rather high recurrence rate of 28.571%. Our research findings have revealed that Stage IVa cases have a recurrence rate of

28%, suggesting the urgent requirement for enhanced treatment strategies in such cases.

Data from previous studies have shown that tumors in advanced stages are more likely to recur than those in early stages [15]. Other associated factors that can increase the likelihood of recurrence include younger age , having feeders originating from the internal carotid artery (ICA), and radiological features such as bone erosion or invasion of the sphenoid diploe [16,17]. Our study found a recurrence rate of 2(5.2%), which islower than the rates reported in a recent meta-analysis conducted by Reyes et al. [15] at 24.5%, as well as those previously reported by Cohen-Cohen at 11% [18].

In addition, our analysis of surgical techniques uncovered significant variations in the time taken for the procedure, the need for blood transfusions, and the length of hospital stays. Endoscopic surgery has been found to have shorter operative times and reduced blood transfusion needs, which aligns with previous studies that have emphasized the advantages of endoscopic techniques in reducing intraoperative complications and enhancing patient recovery. This point holds significant importance as the patients in question are young individuals. Their exposure to blood products increases the likelihood of a response to such products later in life, should the need arise [19]

Furthermore, the endoscopic approach enables surgeons to operate in multiple compartments using different corridors, resulting in enhanced surgical precision and reduced intraoperative complications. Endoscopic surgery has gained popularity due to its safety and effectiveness, although it does have limitations, especially when dealing with lateral spread of growths. When juvenile nasopharyngeal angiofibromas extend beyond the pterygoid plates, complete surgical excision becomes more challenging. In addition, these cases are more likely to experience recurrences because of the increased risk of erosion in the skull base [10].

Conclusions

The debate surrounding the choice between endoscopic and open approaches for the treatment of juvenile nasopharyngeal angiofibroma (JNA) continues. The outcome of the treatment is influenced by factors such as the stage of the disease and the specific surgical approach chosen, Endoscopic approach was the most commonly used method, with various approaches employed. It is worth mentioning that Stage IVa demonstrated a recurrence rate of 2 (5.2%), highlighting the difficulties in treating advanced JNAs. Endoscopic surgeries have shown numerous benefits, including decreased need for transfusions and shorter hospital stays. Additionally, they have been associated with significantly lower recurrence rates (0%) compared to open surgeries 2(28.57%).

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Authors Contribution:

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UN	1. Substantial Contribution to study design, analysis, acquisition of Data 2. Manuscript Writing 3. Has given Final Approval of the version to be published
KM	1. Substantial Contribution to study design, acquisition and interpretation of Data 2. Critical Review and Manuscript Writing 3. Has given Final Approval of the version to be published
HN	1. Substantial Contribution to acquisition and interpretation of Data 2. Manuscript Writing 3. Has given Final Approval of the version to be published

REFERENCES

1. Batsakis JG. Tumors of the head and neck: clinical and pathological considerations. (No Title). 1979.
2. Lund VJ, Stammberger H, Nicolai P, Castelnuovo P, Beal T, Beham A, Bernal-Sprekelsen M, Braun H, Cappabianca P, Carrau R, Cavallo L. European position paper on endoscopic management of tumours of the nose, paranasal sinuses and skull base. Rhinology. Supplement. 2010;22:1-143.
3. Nicolai P, Berlucchi M, Tomenzoli D, Cappiello J, Trimarchi M, Maroldi R, Battaglia G, Antonelli AR. Endoscopic surgery for juvenile angiofibroma: when and how. The Laryngoscope. 2003 May;113(5):775-82.
4. Tewfik TL, Al Garni MA. Juvenile nasopharyngeal angiofibroma. Headache. 2007;4:24.
5. Bales C, Kotapka M, Loevner LA, Al-Rawi M, Weinstein G, Hurst R, Weber RS. Craniofacial resection of advanced juvenile nasopharyngeal angiofibroma. Archives of Otolaryngology–Head & Neck Surgery. 2002 Sep 1;128(9):1071-8.
6. Ungkanont K, Byers RM, Weber RS, Callender DL, Wolf PF, Goepfert H. Juvenile nasopharyngeal angiofibroma: an update of therapeutic management. Head & Neck: Journal for the Sciences and Specialties of the Head and Neck. 1996 Jan;18(1):60-6.
7. Herman P, Lot G, Chapot R, Salvan D, Huy PT. Long-term follow-up of juvenile nasopharyngeal angiofibromas: analysis of recurrences. The Laryngoscope. 1999 Jan;109(1):140-7.
8. Howard DJ, Lund VJ. The role of midfacial degloving in modern rhinological practice. The Journal of Laryngology & Otology. 1999 Oct;113(10):885-7.
9. Tranbahuy P, Borsik M, Herman P, Wassef M, Casasco A. Direct intratumoral embolization of juvenile angiofibroma. American journal of otolaryngology. 1994 Nov 1;15(6):429-35.
10. Tewfik TL, Al Garni MA. Juvenile nasopharyngeal angiofibroma. Headache. 2007;4:24.
11. Jorissen M. The role of endoscopy in the management of paranasal sinus tumours. Acta oto-rhino-laryngologica belgica. 1995 Jan 1;49(3):225-8.
12. Boghani Z, Husain Q, Kanumuri VV, Khan MN, Sangvhi S, Liu JK, Eloy JA. Juvenile nasopharyngeal angiofibroma: a systematic review and comparison of endoscopic, endoscopic-assisted, and open resection in 1047 cases. The Laryngoscope. 2013 Apr;123(4):859-69.
13. Bove I, Pangal DJ, Ruzevick JJ, Cheok S, Amar A, Mack W, Ference ED, Wrobel B, Swanson M, Hur K, Zada G. Anatomic Considerations Guiding Single Versus Multiportal Endoscopic Approaches for Resection of Juvenile Nasopharyngeal Angiofibroma: Cases Series With Graded Multicorridor Resections. Operative Neurosurgery. 2022 May 11:10-227.
14. Haroun K, Bigler D, Gelves CR, Byrd K. Juvenile Nasopharyngeal Angiofibroma Presenting as a Facial Mass: A Unique, Combined, Open, and Endoscopic Approach. Journal of Neurological Surgery Part B: Skull Base. 2023 Feb;84(S 01):V016.
15. Reyes C, Bentley H, Gelves JA, Solares CA, Byrd JK. Recurrence rate after endoscopic vs. open approaches for juvenile nasopharyngeal angiofibroma: a meta-analysis. Journal of Neurological Surgery Part B: Skull Base. 2019 Dec;80(06):577-85.
16. Snyderman C H, Pant H, Carrau R L, Gardner P. A new endoscopic staging system for angiofibromas. Arch Otolaryngol Head Neck Surg. 2010;136(06):588–594.
17. Thakar A, Hota A, Bhalla AS, Gupta SD, Sarkar C, Kumar R. Overt and occult vidian canal involvement in juvenile angiofibroma and its possible impact on recurrence. Head & Neck. 2016 Apr;38(S1):E421-5.
18. Cohen-Cohen S, Scheitler KM, Choby G, Janus J, Moore EJ, Kasperbauer JL, Cloft HJ, Link M, Van Gompel JJ. Contemporary surgical management of juvenile nasopharyngeal angiofibroma. Journal of Neurological Surgery Part B: Skull Base. 2022 Jun;83(S 02):e266-73.

19. *Vamvakas EC, Blajchman MA. Transfusion-related mortality: the ongoing risks of allogeneic blood transfusion and the available strategies for their prevention. Blood, The Journal of the American Society of Hematology. 2009 Apr 9;113(15):3406-17.*

20. *Liu, J.K., Husain, Q., Kanumuri, V., Khan, M.N., Mendelson, Z.S. and Eloy, J.A., 2016. Endoscopic graduated multiangle, multicorridor resection of juvenile nasopharyngeal angiofibroma: an individualized, tailored, multicorridor skull base approach. Journal of neurosurgery, 124(5), pp.1328-1338.*

21. *Carrau RL, Snyderman CH, Kassam AB, Jungreis CA. Endoscopic and endoscopic-assisted surgery for juvenile angiofibroma. The Laryngoscope. 2001 Mar;111(3):483-7.*

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