INTRAOPERATIVE BLOOD LOSS IN JUVENILE NASOPHARYNGEAL ANGIOFIBROMA FOLLOWING PRE-OPERATIVE EMBOLIZATION

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ABSTRACT

Background: The JNA (juvenile nasopharyngeal angiofibroma) is a benign and uncommon, neoplasm of circulatory system. It almost takes place in the whole nasopharynx of teenage boys. The JNA place of origin is yet controversial.

Objective: To assess the mean intraoperative blood loss in juvenile nasopharyngeal angiofibromas with pre-operative embolization.

Methods: It was a descriptive case series carried out at ENT Dept, Lahore General Hospital. The duration of study was six months. During study 35 cases were enrolled. Embolization was performed twenty-three hours prior to surgery and the spongeston (gel foam) was utilized for embolization. A proforma was used to record the amount of intraoperative blood loss. Intraoperative blood loss was noted according to operational definition.

Results: Among 35 patients, the mean age was 18.69±3.46 years (range 15-25 year) and all of them were males (100.0%). Fifteen (42.8%) patients were presented with stage I and II tumor while 20 (57.2%) patients were presented with stage III tumor. The size of tumor among 17 (48.6%) patients was between 2 to 4cm while among 18 (51.4%) patients was between 5 to 6cm. The mean intraoperative blood loss was 748.56±204.89 mL and the mean tumour size was 5.03±2.05cm.

Conclusion: Study concluded that mean intraoperative blood loss was 748.56±204.89 mL in juvenile nasopharyngeal angiofibroma's following preoperative embolization.

Keywords: Juvenile nasopharyngeal angiofibroma, pre-operative embolization, Intraoperative blood loss.

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INTRODUCTION

Angio-fibromas develop due to blood vessels and fibrous stroma complicated mixture. The JNA typically develops among males than females and is much prevalent among young age group patients, especially among teenagers. It is the age in which more hormonal changes take place and it raises the doubt that sexual hormones could have important impact on JNA growth. The JNA may be found in almost 0.05 percent among all neck and head tumours[1,2] while the range could be between 0.05 to 0.5 percent of total neck and head tumors. The JNA yearly incidence is about 1:150,000. The incidence is slightly found more among Egyptian and Indian people when compared with people in USA and Europe.[3]

The males who have red hair and skin fair color are found at an elevated risk for JNA.[4] Generally, it is believed that JNA anatomical origin could be present/grow within superior area of spheno-palatine foramen and nasal cavity postero-lateral wall. But a study carried out by Lloyd and teammates highlighted that according to MRI and CT scans pterygo-palatal fossa is the anatomical position for JNA growth.[5] Among significant majority of JNA cases, it acquires blood through inner maxillary arteria which is

the external carotid arteria branch. Thus, it has been suggested that such kind of tumor develops from vascular plexus.[6] Among some cases, feeders from internal carotid arteria could be exist as well.[7]

During surgery, significant blood loss from tumour due to tumour vascularity and postop recurrence are the possible management problems.[8, 9]

The significant choice for JNA treatment is surgical resection. The novel imaging methods including MRI and CT are considered best method for diagnosis. These tools play a significant part in the selection of correct approach regarding treatment as well as surgical methods. The JNA surgical excision with preop embolization is routinely practiced at several health facilities.[10] In a study, Wilms and colleagues reported 86.7 percent less bleeding. It is comparatively new method.[11]

Whether it helps in reducing the blood loss is still debatable. Leong described that mean intraoperative bleeding was 1709±2025 mL whereas the mean intraoperative bleeding was 1449 mL among thirty-nine individuals with preop embolization.[12] Therefore, current study was carried out to assess the frequency of intraoperative blood loss following efficient embolization. There is no local study available regarding this topic. Thus, this study could be useful in evaluating the use of preop embolization in our population.

OBJECTIVE

To assess the mean intraoperative blood loss in JNA with preop embolization.

METHODS

It was a descriptive case series carried out at ENT Dept, Lahore General Hospital, Lahore. The duration of study was six months (January 2024 to July 2024). During study 35 patients were included. The sample size was calculated utilizing 95 percent confidence level, d=0.12 taking anticipated mean intraoperative blood loss i.e. 1449 ± 1125 following nasopharyngeal angiofibroma removal.[12] Non-probability, consecutive sampling method was used to recruit the patients.

Patients diagnosed with JNA aged between 15 to 25 years were included in the study. The JNA was described as morphologically attributed to architecturally abnormal vessels ranging from sinusoidal & capillary shape vessels set in fibrous stroma variable amount. The JNA is diagnosed through histopathology when above-mentioned all findings are present. Patients with hemostasis disorders (PT>18, INR>1.5 and APTT>34) were not included in the study. A total of 35 patients with JNA after getting approval for ethical committee were enrolled. From all patients, informed written consent was acquired. The embolization was carried out twenty-four

hours prior to surgical treatment while spongeston (gel foam) was utilized for blockage. The patients' information such as age, gender and intraoperative blood loss was noted as complete blood loss during surgical treatment. The blood loss measurement through sponge (swab) and the suction apparatus (ml) was made during surgery. Weight difference in both new and used sponge was calculated and one milligram was considered as one milliliter of blood. Intraoperative embolization was described as vascular supply blockage to tumour. Blockage is carried out through endovascular technique and is performed twenty-four hours prior to surgical treatment and utilized sponge's ton for the embolization.

Data Analysis: All information collected was entered in computer software SPSS 15.0 and analyzed with same software. Descriptive statistics was applied. The mean±SDs were calculated regarding numerical data such as age and frequency of intraoperative blood loss.

RESULTS

Table-1 depicts that among 35 patients, 24 (68.6%) were 15-20 years old and 11 (31.4%) were 21-25 years old while the mean age was 18.69±3.46 years (range 15-25 year). Among these patients, all (100.0%) were males. Out of 35 patients, 15 (42.8%) had stage I and II tumor while 20 (57.2%) had stage III tumor. Among 35 patients, 17 (48.6%) had tumor size 2-4 cm and 18 (51.4%) had 5-9 cm while the mean tumor size was 5.03 ± 2.05 cm.

Result shows that mean intraoperative blood loss was 748.56±204.89 mL.

Table-2 demonstrates the stratification regarding age, size of tumour (cm) and tumour stage. The intraoperative blood loss was found more among individuals with stage-III than individuals with stage I&II and the size of tumor 5-9cm than 2-4cm.

Table-1: Characteristics of patients

	Frequency	Percentage
Age (year)		
15 to 20	24	68.6%
21 to 25	11	31.4%
Mean+SD	18.69±3.46	
Gender		
Male	35	100%
Female	0	0.0%
Tumor stage		
I & II	15	42.8%
III	20	57.2%
Tumor size(cm)		
2 to 4	17	48.6%
5 to 9	18	51.4%
Mean+SD	5.03±2.05	
Intraoperative blood loss (mL)	748.56±204.89	
Mean+SD		

Table-2: Stratification with regard to effect modifiers

	Intraoperative blood loss(mL)	P value

Age (years)	15-20	704.17 ± 185.28	0.07
	21-25	845.45 ± 220.74	
Tumor size (cm)	2-4	664.71 ± 157.88	0.02
	5-9	827.78 ± 216.40	
Stage of tumor	I and II	641.67 ± 144.33	0.01
	III	804.35 ± 212.08	

DISCUSSION

The JNA tumor complete removal through surgery is one of the best techniques of treatment. Because of their vascularity, significant risk of surgical treatment is excessive bleeding. Hence, the blood supply embolization before surgery to the tumor through inner maxillary arteria is generally carried out. Among numerous cases, the tumor significantly reduces following embolization while per-op bleeding is considerably decreased. Once tumour becomes enlarge, it requires additional blood from several branches of the outer carotid arteria and the bilateral blockage could be required. When skull base erosion is present, blood supply could be obtained via internal carotid arteria. The blood supply blocking from internal carotid arteria is not carried out caused by probable acute complications.[13]

For the removal of JNA, numerous surgical approaches are available. The traditional open methods usually require facial cut as well as osteotomies with capricious results on the growing adolescent skeleton. In literature, following the open surgical technique, complications as well as morbidities are well-documented, including haemorrhage, cerebrospinal fluid leak, diplopia and hypoesthesia.[14] Tumor that expands within skull base, middle fossa and orbit requires complete exposure, accumulative surgical problems and morbidity that could avert the entire tumor removal. Thus, few investigators proposed that individuals who were treated with main skull-base / intra-cranial expansion having preop or postop radio-therapy for "un-resectable" disease (30 to 46 Gy), estimating comparable control rates in the favor of surgical treatment alone.[15]

Although, Mendenhall and colleagues performed a radio-therapy case, highlighting few significant point which should not be ignored.[16] Firstly, a review carried out by McAfee and teammates indicated that disease or gigantic tumor is found less responsive to radio-therapy alone whereas it could require to perform surgical debulking prior to radio-therapy.[15] Because of that, normally the patients with intracranial enlargement have massive tumor that usually require surgical removal, only way for the treatment of JNA should be selected, if attainable. Secondly, because JNA is considered benign disease and has insignificant growth, just the locally aggressive tumours and local control is sufficient, if carried out through surgical treatment only. Thirdly, Mendenhall and

colleagues mainly compared the open surgery cohort with radio-therapy cohort.[16]

Actually, only surgical sequence along with an important number of endoscopic techniques where significant morbidity outcomes as well as control rates were from "Pittsburgh Medical Center University" as well.[17] In brief, exposure to the radiation transfers significant risks for the development of late carcinoma, thyroid dysfunction, otologic illness and cataract,.[18] Because the individuals are exposed already to surgical risks related to tumor debulking, thus it is better to complete surgical treatment to reduce the additional risks owing to radiation exposure. The findings of our study highlighted that preop blood loss was 748.56±204.89 mL.

Twu and teammates[19] indicated that a reduction was observed in mean blood loss during surgery when preop embolization was carried out. Significantly decreased intraoperative bleeding encouraged the ongoing surgery and decreased complications related to blood transfusions made it probable for the resection of tumor through less aggressive techniques, for example, transnasal endoscopic surgical treatment. The difficulties associated with transarterial embolization comprise technical failure, the escape of emboli in ophthalmic arteria/intracranial circulation, infection on puncture location, hematoma, anaphylactoid reaction and blood loss. An efficient angiographic method can reduce these problems because they are mostly due to technical inadequacies.[20]

The main purpose of surgical treatment is to completely resect the tumor with minimum bleeding and insignificant complications. Due to intraoperative bleeding, true tumour capsule nonexistence, potential for submucosal tumor expansion as well as difficulty regarding cranial base structure, successful removal necessitates best surgical exposure and useful methods. Numerous surgical techniques have been supported by several investigators such as transantral method, transpalatal method, midfacial degloving, lateral rhinotomy along with medial maxillectomy, transzygomatic method, craniofacial resection and maxillary swing.[21, 22] In our series, main procedures were transpalatal and lateral rhinotomy techniques, all of them are appropriate for tumors of early stage. These methods offered optimum exposure for lesion and did not lead to cosmetic issues.

CONCLUSION

Study concluded that mean intraoperative blood loss in juvenile nasopharyngeal angiofibromas with preoperative embolization was 748.56±204.89 mL. Preoperative embolization of external carotid branches seems to assist the removal of high-grade tumours.

ETHICAL APPROVAL

Ethical approval of synopsis was granted by the Institutional Ethical Committee of AMC/PGMI/LGH;

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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AUTHOR'S CONTRIBUTIONS

MA: Sampling and writing
AA: Help in sampling
MD: Help in writing
GD: Help during embolization
WA: Help during surgery
RK: Help in transplant
All Authors: Approval of the final version of the manuscript to be published

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