Endoscopic Excision of Advanced-stage Angiofibroma: Predicting the Recurrence

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ABSTRACT

Objectives: To propose a novel scoring system for the prediction of recurrence disease after endoscopic excision in advanced stages of juvenile nasopharyngeal angiofibroma (JNA).

Materials and methods: Retrospective case series review of 30 cases of advanced-stage JNA patients encountered within a period of three years (2016–2019). All the patients underwent a complete endoscopic excision which was preceded by embolization. Postoperatively, all the patients were followed up for 4 weeks, 3 months, and 6 months for recurrent disease. A scoring system was devised to reanalyze the risk of recurrent disease in all the patients who were a part of the study.

Results: All the patients were male adolescents presenting with typical complaints of JNA like progressive unilateral nasal blockage, spontaneous painless epistaxis, and facial swelling. The patients who were recently diagnosed with JNA belonging to Fisch stages 3a, 3b, and 4 were only chosen for the study. Residual and recurrent cases were excluded. Preoperative contrast-enhanced computer tomography (CT) was done for all the patients. All the patients were preoperatively embolized, and the surgical technique used in all the patients was through a complete endoscopic approach.

Conclusion: The endoscopic approach is possible for all stages of JNA. The endoscopic method reduced the postoperative morbidity to a great extent. The risk of recurrence could be predicted using the scoring system which was statistically significant.

Keywords: Endoscopic excision, Juvenile angiofibroma, Recurrence, Recurrent.

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INTRODUCTION

Juvenile nasopharyngeal angiofibroma (JNA) is a rare, highly vascular benign tumor, found almost exclusively in adolescent males. Juvenile nasopharyngeal angiofibroma accounts for 0.05 to 0.5 of all head and neck tumors with an incidence of 1:150,000.⁴ The etiology of JNA is controversial. Some researchers believe that it is a true tumor while others consider that it is a result of vascular malformations caused by the nonabsorption of artery residues in the first branchial arch during development.⁵ Various hormonal and genetic effects are also related to its etiology.⁶ Several studies emphasized that it originates from the upper lip of the sphenopalatine foramen⁷ at the junction of the sphenoid process of the palate and the pterygoid process, while others stressed at its origin from the pterygoid canal.

There are various acceptable classification systems for JNA⁸−⁹ which dictates and defines the modality of treatment. The endoscopic resection has been considered a standard of care for removal of low-grade tumor; the high-grade tumors and tumors with skull base are classically managed by open approaches.

However, there has been a recent trend to challenge this notion and more reports are coming up where surgeons are attempting to manage higher grade of JNA by completely endoscopic or endoscopic-assisted pathways.⁸,⁹ Nevertheless, it is still to be seen which patients among higher grade JNA can be managed by endoscopy and which warrant an open approach. This study attempts to provide a performance scoring system by the evaluation of all the patients undergoing endoscopic excision of high-grade JNA to identify whether the patients can be managed by fully endoscopic procedures. We have termed the scoring scale as “Gupta scoring scale.”

MATERIALS AND METHODS

It was a retrospective study done at our institution after approval from Institute Ethics Committee. The patients with grade IIIa, IIIb, and IVa according to Fisch classification who completed the follow-up visits up to 2 years were included. The patients with recurrence or the patients with other comorbidities were excluded. A total of 30 patients met the criteria and were included for the final assessment and result compilation. All the patients underwent routine physical examination followed by nasal endoscopy (Fig. 1). Contrast-enhanced CT was ordered for all the patients which was used to stage the patients (Figs 2 and 3). All the patients underwent preoperative angiography. The feeding
vessel was identified and was embolized 24 hours before the surgery with no complications (Figs 4 and 5).

All the patients underwent transnasal endoscopic excision of the tumor under general anesthesia. The intraoperative blood loss and the operating time were the main parameters assessed. The records of the patients were analyzed based on six parameters. One parameter was stage of the disease (preoperative parameter), two per operative findings, i.e., intraoperative blood loss and operative time (in minutes). The postoperative parameters assessed were periosteal thickening in postoperative CT scans, length of hospital stay, and time taken to return to professional activity.

Following surgery, recurrence disease assessment done by serial nasal endoscopies and confirmatory imaging was done in suspected cases of recurrence of disease. The patients were followed up at 3 weeks, 6 weeks, 3 months, 6 months, and then biannually for at least 2 years.

**RESULTS**

All the patients underwent routine medical examination with nasal endoscopy using 0° and 30° endoscope. Nasal endoscopy revealed a vascular mass mainly occupying the nasopharynx in all the patients. No nasal biopsies were performed in any of the patient. All the patients underwent contrast-enhanced CT scans which were used for staging the patients.

Out of the 30 patients, six patients belonged to grade IIIa, 18 patients to 3b, and six were with grade IV tumor. Retrospectively, the scoring scale was applied on these patients. Out of the 30 patients, 20 patients had a score of less than 11 and other 10 cases had a score of 11 and above. 90% (9/10) of the cases with a score of 11 or more had recurrence while 10% (2/20) of the cases with a score less than 11 showed recurrence in two year follow-up (Table 1).

**DISCUSSION**

Angiofibroma is a relatively rare benign vascular tumor of the skull base affecting young adolescent males. It affects almost exclusively male adolescents with a median age of 15 years; raising suspicion about the role of sexual hormones in its pathogenesis. They originate predominantly in the posterolateral wall of the nasopharynx, specifically at the trifurcation of the sphenoidal process of the palatine bone, the horizontal process of the vomer, and the roof of the pterygoid process.2 The patients usually present at the late stage of the disease with typical complaints of nasal obstruction and recurrent epistaxis and but rarely may present as swelling on face.2 Extensive growth of tumor may cause facial swelling, proptosis, diplopia with disturbance in speech and conductive hearing loss. The common JNA presenting features are recurrent spontaneous painless unilateral epistaxis with progressive nasal blockage. Delayed presentation of the disease manifests with facial deformities, diplopia, proptosis, headache, and blindness. Tumor diagnosis and staging is performed using radiological imaging via CT and magnetic resonance imaging (MRI).3 Endoscopic transnasal
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The approach has advantages of noncosmetic sequelae, less hemorrhage, and no disruption in the facial skeleton. Besides, this method allows better visualization of tumor contiguity and enables dissection and ligature of vascular structures in JNA surgery.\textsuperscript{10–13}

The score encompasses six parameters which are given individual scores (Table 2). The stage of the disease carries a maximum score (4 for stage 4a) as a higher grade stage is one of the most significant markers for increased chances of recurrence.

Table 2: Scoring chart

| Score   | 1 | 2 | 3 | 4 |
|---------|---|---|---|---|
| Intraoperative blood loss (in mL) | <500 | >500 |
| Operative time (in minutes)       | <150 | >150 |
| Periosteal thickening              | No   | Yes |
| Return to professional activity    | <7 days | >7 days |
| Stage of tumor                     | 3a   | 3b | 4a |

Intraoperative blood loss was considered as JNA is a vascular tumor and interoperative bleeding compromises clear dissection which increases the chances of recurrent disease. The criteria of significant blood loss were taken as 500 mL. Intraoperative time also determines the precision of the surgeon. A meticulously done surgery in a reasonable time ensures that all the disease has been removed. Increased time taken directs toward unsure methodology and sequence of steps which may lead to incomplete removal of tumor. Postoperative periosteal thickening of more than 5 mm on postoperative radiological scan has higher correlation with disease outcome. Both postoperative hospital stay and return to professional activity enlighten less interoperative complication disabling disease pathology to progress.

The chances for tumor clearance are paramount and outweigh the decision for an endoscopic transcanal approach in any patient be it any grade. Complete tumor resection is mandatory either by venturing in for an open or combined approach. The angiofibroma performance scale shows that the risk of recurrence is more if the score is more or equal to 11 and therefore directs the surgeon to be more vigilant regarding the increased chances of recurrence. It screens for the patients at high risk for recurrence postsurgery, irrespective of preoperative size of tumor.

Gupta et al. scale not only establishes clearly the use of endoscopic approach over open approaches using interoperative and postoperative parameters but also justifies a need to evaluate all the patients with a score of 11 or more to be in scrutiny for recurrent disease. Hence, entire tumor removal using endonasal endoscopic approach is feasible but with guarded follow-up.

Table 1: Number of recurrence in each group

|                | Without residual disease | With residual disease | Total |
|----------------|--------------------------|-----------------------|-------|
| Score <11      | 18                       | 2                     | 20    |
| Score ≥11      | 1                        | 9                     | 10    |
| Total          | 19                       | 11                    | 30    |

*p value < 0.001 (using Fisher's exact)
This study does not negate the usefulness of an open approach for the excision of high-grade JNA rather establishes a scaling system to evaluate recurrent disease for reexploration. The patients with a score of less than 11 despite high-grade JNA are more likely to be spared from ghastly looking postoperative scar or longer postoperative complications following endoscopic approach.14,15

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