Endoscopic Approach to Fisch Stage II to III-b Juvenile Nasopharyngeal Angiofibroma

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Received: 25 August 2010 / Accepted: 10 October 2010 / Published online: 13 January 2011
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Abstract Juvenile nasopharyngeal angiofibroma (JNA) are locally growing highly vascular tumours treated primarily by surgical excision (open approach as wide as a mid facial degloving or endoscopic approach). All our patients underwent exclusive endoscopic tumour excision after a pre-operative embolisation. The tumours were completely resected with acceptable blood loss and no recurrences or residual masses were seen. Post-operative morbidity was minimal without external scar-marks. To conclude endoscopic excision is a very effective method to resect JNA even for extensive tumours.

Keywords Endoscopy · Juvenile nasopharyngeal angiofibroma · Intracranial · Extradural · Antral window · Septal window

Introduction

Juvenile nasopharyngeal angiofibroma (JNA) is a benign vascular tumour forming about 0.05% of all head and neck tumours [1]. Grossly, these are pale red to blue smooth masses often lobulated, non-encapsulated, sessile or pedunculated arising in pterygopalatine fossa. They grow along the tissue planes following the path of least resistance and this is of benefit in surgical clearance. Out of various theories described for their pathogenesis androgen dependence theory is most accepted.

The patient presents with recurrent epistaxis and nasal blockage [2] with intranasal mass. Cheek swelling, visual

changes, hearing impairment and neurological deficits may be present some times.

Various management options for control of JNA, include radiotherapy, chemotherapy, hormonal therapy, electrocoagulation and surgery. Surgery remains the mainstay of treatment [2]. Surgical approaches range from extensive mid facial degloving to minimally invasive transnasal endoscopic excision.

The knowledge of wide maxillary antrostomies, anterior ethmoidectomies, middle turbinate removal, maxillectomies, and accessibility to pterygomaxillary fissure is a prerequisite.

Although open approaches give the benefit of wider exposure high morbidity, more hospitalisation, more bleeding, facial disfigurement, sometimes delayed bone growth in children, is a cause of concern. All these drawbacks are preventable by endoscopic resection without compromising the tumour excision. Pre-operative embolisations help in blocking the feeding vessel (internal maxillary artery) and thus decrease tumour vascularity. The sinoscope gives better illumination and a panoramic view and without disturbing the functional anatomy of the sinuses. A residual mass may be left behind in extensive tumours but this is rare.

Management of these patients is essentially based on a thorough clinical and radiological study. The radiograph of the paranasal sinuses and nasopharynx reveal presence of a nasopharyngeal mass, anterior bowing of the posterior wall of maxillary antrum (pathognomonic) and nasal septal displacement. CT-MRI with contrast gives a better vision of the extent of the tumour and a good delineation of the tumour margins and are therefore more informative and diagnostic tools. Angiography and embolisation pre-operatively help to assess tumour vascularity and reduce it respectively.

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Recurrences and relapses can be avoided by proper evaluation, staging and good surgical plan. The recurrence is common when tumours reach skull base [3], roof of infratemporal fossa, cavernous sinus or body of sphenoid. Fortunately these tumour remnants either regress or remain stable [4, 5]. If clinically or radiologically the tumour is stable a close surveillance is all that is required.

Materials and Methods

Between Jan 2007 and Mar 2010, 12 patients with JNA ranging from Stage II to Stage III-B (Fisch classification), all young males in the age group of 10–17 years, were diagnosed and operated by a transnasal endoscopic excision with pre-operative embolisation. Post-operative CT scan and endoscopy did not reveal any residual disease or recurrences.

Surgical Technique

After adequate decongestion, tumour exposure was the first requirement and following steps were adopted, the lower part of middle turbinate amputated, creation of septal window, removal of uncinate process, the maxillary ostia widening, and removal of the medial wall of maxillary sinus. Smaller tumours could be accessed with this exposure. To create a septal window the posterior part of the bony septum was removed. In this way a two surgeon-two nostril approach was adopted and a wider working space created. For larger tumours further exposure was achieved by removing medial and posterior maxillary walls as per the case. When the maxillary artery was encountered it was coagulated. The tumour was mobilised from the most lateral part of the pterygopalatine fossa. Then the sphenoid extension was mobilised and displaced inferiorly. The plane of dissection was further followed into the nasopharyngeal region and the tumour delivered orally. During the entire operation bone removal was facilitated by use of Kerrison's punches and a microdebrider with a sharp burr.

In Case no. 5 the entire medial wall was removed along with the posterior wall far laterally to get access to the infratemporal fossa. The tumour in this case was reaching up to the cavernous sinus intracranially but was safely extradural which could be accessed and removed by traction and blunt dissection under endoscopic vision reaching up to lateral aspect of the sphenoid.

For case no. 12 the posterior wall removal was through transantral window and it was possible to access the most lateral extension in the infratemporal fossa. The endoscope was introduced through the maxillary sinus and the tumour dealt through the nasal cavity.

Anterior nasal packing was done for haemostasis which was removed the second post-op day and discharged between the third and fifth post-operative day. First follow-up was after 2 weeks and then every month for 3 months. Overall, the length of follow-up was between 6 and 26 months.

There were no recurrences. Two patients developed mucocoele which were endoscopically excised.

Results

All patients were discharged within a period of 2–5 days post-operatively as against 10–15 days in an open approach.

The tumours ranged from stage II to III-B as per Fisch classification (Table 1).

Pre-operative embolisation (Figs. 1, 2, 3) was done in all patients. This helped to minimize the intraoperative blood loss. Only two patients needed one unit of blood, one patient needed two units of blood and rest did well without blood transfusion.

There were no recurrences or complication.

Discussion

A young male presenting with complaints of epistaxis, nasal obstruction and a nasopharyngeal mass is almost diagnostic of JNA. The presence of anterior bowing of the posterior wall of the maxillary sinus on imaging (Holman-Miller sign) is a known pathognomonic finding [6].

These tumours grow slowly and do not erode surrounding structures. All our patients had a history of nasal obstruction for last 2–4 years and none had symptoms of surrounding structures involvement. Intracranial extension is very rare as in one of our cases (stage III-B) is rare which was also excised by an exclusive endoscopic approach and tumour delivered orally. Almost all, (if not all) JNAs with intracranial extension remain extradural and extra cavernous and this property allows for a safer dissection.

Endoscopic removal of JNA has been limited up to II-A stage as per literature [7]. In an article by Jorissen et al. [8] endoscopic treatment for more than II-A stage has been done. Carrau et al. [9] considered that the sphenoid involvement can be treated with endoscopy alone.

Endoscopic resection in management of angiofibromas is now a established approach. Our experience also substantiates that JFA can be safely and effectively excised by endoscopic approach, with negligible morbidity. Several studies which favour this approach as it is true with our series also.

Table 1 Details of observations made for endoscopically excised extensive angiofibromas

S No.	Stage	Nose & Npx	S S	PPF	ITF	Retro pter ext	Intra Cr.	Extra dural	Pre-op embo	Av. Bld loss (ml)
1	II	+	+	+	–	–	–	–	+	300
2	III-a	+	+	+	+	+	+	–	+	1200
3	II	+	+	+	–	+	–	–	+	400
4	III-a	+	+	+	+	–	–	–	+	300
5	III-b	+	+	+	+	+	+	–	+	700
6	III-a	+	+	+	+	–	–	–	+	500
7	II	+	+	+	–	–	–	–	+	350
8	II	+	+	+	–	–	–	–	+	400
9	II	+	+	+	–	–	–	–	+	550
10	II	+	+	+	–	–	–	–	+	1200
11	II	+	+	+	–	–	–	–	+	500
12	III-A	+	+	+	+	+	+	–	+	900

Npx Nasopharynx, *SS* Sphenoid Sinus, *PPF* Pterygopalatine Fossa, *ITF* Infratemporal Fossa, *Retro pter ext* Retro pterygoid extension, *Intr/Cr* Intracranial Extension, *Extr/dur* Extradural, *Preop/embo* Pre-operative embolisation, *Av. Bld loss* Average blood loss

Fig. 1 MRI showing enhancing mass (angiofibroma) in the sphenoid extending intracranially (extradural) into right cavernous sinus of case no. 5

For tumours reaching infratemporal fossa an endonasal approach assisted by transantral window as was done for case no. 4 helps to achieve a wider exposure and improves visualisation as wide angle endoscopes give a panoramic view. Case no. 5 had an intracranial extradural extension and this was completely removed under endoscopic guidance by removing the medial maxillary sinus wall and a part of medial pterygoid plate. In our study also we could

Fig. 2 Case-12 exposure of most lateral Part of tumour in infratemporal fossa

access the intracranial extension endonasally and there was no recurrence. Onerci et al. recommended endoscopic resection for lesions with minimal extension into the cranium [10].

Pre-operative embolisation was instrumental for good haemostasis. All patients in this study were embolised 24–36 h pre-operatively. There are studies in which authors have reported less bleeding with hypotensive anaesthesia alone without pre-operative embolisation. Haemostasis was further achieved with harmonic and ligasure cautery.

Fig. 3 One year post-operative endoscopic picture showing optic chiasma in case no. 5

Recurrence or any other complication was not seen in any of the patients. Extensive tumours were also excised endonasally without any external incision irrespective of stage. Recurrence however if seen, as these masses are inactive, is followed by a close surveillance alone and considered for revision surgery only when they become symptomatic.

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