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Le-fort I access osteotomy to nasopharyngeal tumor – A case-report



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ABSTRACT

Removal of extensive central skull base and paranasal sinus tumors is a significant challenge that is often hampered by limited access and exposure. The safety and efficacy of the Le Fort I osteotomy approach to the skull base have been well established. The purpose of this article is to describe the use of Le fort-1I osteotomy as an access procedure to reach tumors in the nasopharyngeal region in a young patient. The large mass which he presented within the nasopharyngeal region, later diagnosed to be juvenile nasopharyngeal angiofibroma, posed a challenge for surgical access.

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1. Introduction

Many a time tumors arising from the nasopharyngeal structures and those arising from the adjacent paranasal sinuses may extend to involve the region.[1] The nasopharynx along with its adjacent basi-sphenoid and posterior ethmoid regions present one of the most difficult problems in our specialty, from the view point of both – diagnosis and treatment.[2,3] The problem of access to this region is not new and as long ago as 1853, Mihaux described for this purpose an approach of lateral rhinotomy approach and since then many a variety of operations designed to improve access have been described.[1,2,4] Though many of these operations like the trans-naso-ethmoidal approach, the transpalatal approach, the trans oral approach etc are designed for dealing with tumors of the maxillo–ethmoid regions, most are alike in aiming to improve the approach to this inaccessible area. The Le fort-1 maxillary osteotomy; initially used for correcting mid facial deformities and orthognathic problems, provides an excellent exposure to tumors in this area, as well as those extending into the clivus, the nasal septum and the nasopharynx.[6] The Le fort-1 osteotomy approach was first described by von Langenback in 1861.[8] Archer et al; Uttley et al; and Belmont have used it for access and tumor surgery of the skull base.[9]

This paper describes the classical Le fort-I down fracture access osteotomy for the management of Juvenile Nasopharyngeal Angiofibroma in a young boy.

2. Case report and surgical technique

A 13-year-old boy was referred with a history of recurrent, intermittent epistaxis and snoring since last 8 months. An ENT endoscopic visualization revealed a reddish mass in the nasopharynx on the right side sitting over the soft palate, with unknown superior extension. A provisional diagnosis of angiofibroma was made considering the age of the patient and the clinical features.

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A contrast CT scan revealed an extensive mass 4 cm × 5 cm in the right nasopharynx extending up to the sphenoid sinus (Figs.1 and 2). CT angiogram revealed feeders from the right internal maxillary artery, the ascending pharyngeal and the sphenoidal artery. Surgery was undertaken after the necessary pre-operative investigations. The surgical strategy of separating the tumor from the adjacent walls was undertaken after conducting a digital subtraction angiography and embolization with gel foam 24 h prior to the planned procedure via right femoral catheterization (Fig. 3).

A bilateral Le fort-I access osteotomy was done under oro-endotracheal intubation and hypotensive anesthesia (Figs. 4 and 5). Adequate blood was arranged for transfusion if need be considering the notoriety of the mass towards hemorrhage. A trans vestibular incision was placed extending between the upper 1st molars after adequate retraction of the lips and cheeks. Infiltration with 5 ml of 2% lignocaine with 1:200,000 adrenaline for local anesthesia and hemostasis was used. Bone cuts were marked and classical Le fort-I osteotomy was performed with high powered electric bone saw, after pre-drilling the bone for plate fixation.

Once the external wall of the maxilla was cut, the nasal mucosa was freed from the pyriform rim and the cuts were carried on to the lateral wall of the nose. As the posterior extension was limited by the tumor, the osteotomy was continued here with nasal chisels up till the posterior nasal apertures. Finally the nasal septum and the vomer were freed using guarded septal chisel and mallet. Once the cuts were through, the pterygomaxillary disjunction is facilitated using Rowe's maxillary disimpaction forceps, mobilized and pedicled on the soft tissues and retracted downwards (Fig. 6). This procedure gave excellent exposure of the nasopharynx and facilitated good visualization of the tumor which could then be easily approached. Further exposure and additional space



Fig. 1 – CT scan showing a large mass in the right nasopharynx and sphenoid sinus.

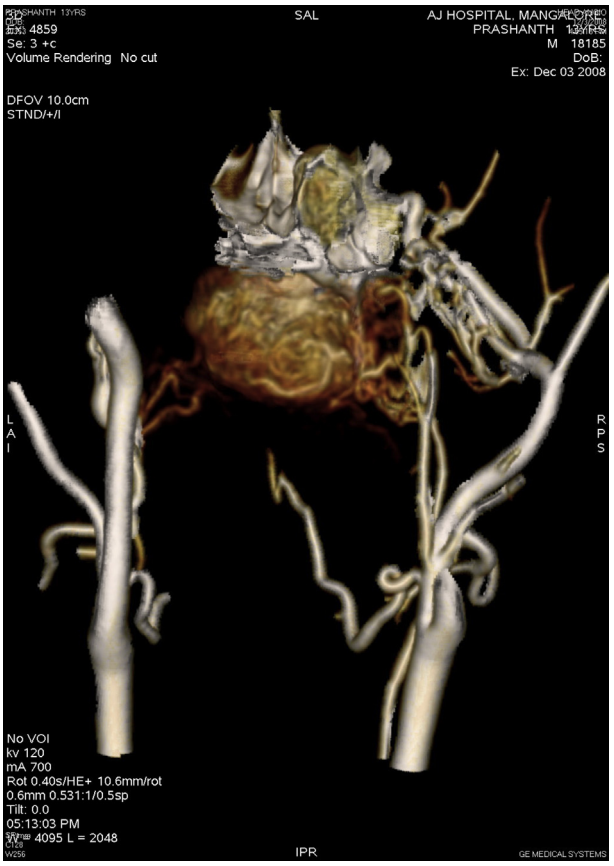


Fig. 2 – 3D CT angiogram of the lesion with feeders.

for delivery of the mass was obtained by incising the nasal mucosa posterior-inferiorly as required. Since the intra nasal extension of the tumor came off easily, the tumor could be freed from its superior attachment through the access gained. The bleeding was minimal and the whole mass was mobilized via a releasing incision in the posterior nasal mucosa. The osteotomised segment was reattached in position accurately with mini plates and screws.[8] As the whole tumor was excised with intact capsule the overall blood loss was minimal (less than 300 ml). The whole procedure lasted only about 2 h, and



Fig. 3 – Lefort I osteotomy.

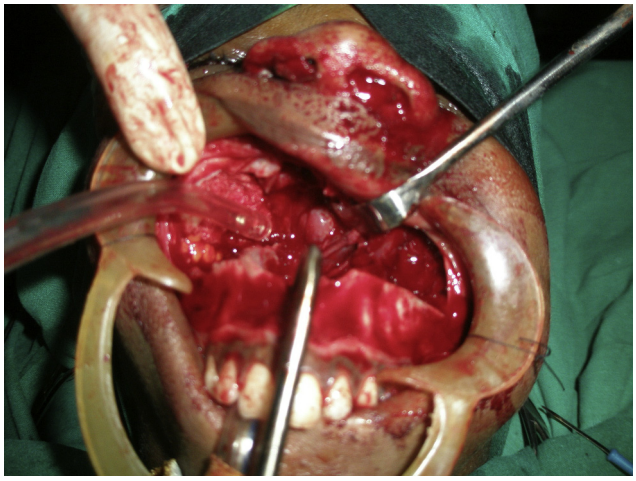


Fig. 4 – Tumor exposed via posterior nasal mucosal incision.

blood transfusion was altogether avoided. The patient was back to normal on the 3rd post-op. day and was duly discharged on the 5th day. There was absolutely no post-operative morbidity seen even at 6 month follow up and the osteotomised segments had united uneventfully. The histological report of juvenile nasopharyngeal angiofibroma was consistent with the provisional diagnosis.

3. Discussion

The surgical exposure of the central skull base has always posed a challenge to the operative surgeon.[6] The numerous techniques and their modifications are examples to prove the ineffectiveness of a single method.[2] Le fort-I fracture has come a long way since its first description by the French anatomist Rene lefort in 1901. Being an orthognathic procedure it has been shown to safely provide adequate access to the skull base. This technique gives better access and exposure than other standard techniques viz; transpalatal, lateral rhinotomy and mid facial degloving approach.[8–10] Structures like the nasopharynx, nasal cavity and their paranasal sinuses (except the frontal sinuses) are easily approached.[3] It has

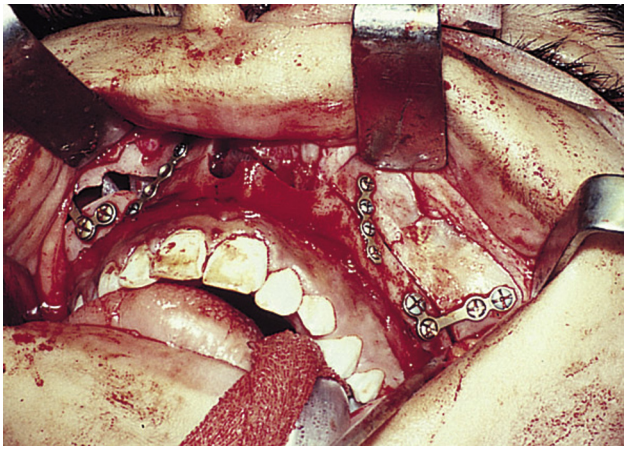


Fig. 5 – Bone plates in place.



Fig. 6 – Excised tumor mass with intact capsule.

excellent cosmetic result as it completely avoids any facial scar. The palatal splitting approach provides a narrow field of view often restricting exposure of the sphenoid by the bulky soft palate tissue. Another complication of this approach is formation of fistula and wound dehiscence.[12] The tumor could also be easily reached with a lateral rhinotomy approach, with good access to the anterior nose and sphenoid sinus, but the compromise of post-operative scaring, poor access to the nasopharynx and injury to the nasal septum cannot be underestimated.[3] The mid facial degloving approach offers excellent anterior exposure to anterior and lower part of the nasal cavity but with limited access to the lateral maxillary sinus,[3] as well as contracture of the oral vestibule due to scaring, sensory disturbances of the infraorbital nerve, nasal vestibular stenosis and cartilaginous nasal deformities are common post operative sequelae.[13]

Le fort-I osteotomy separated the floor of the inferior aspect of the tumor and provided place for its inferior displacement during the separation from the sphenoid bone. In contrast to the palatal splitting incision, this procedure gave a distinct line of sight for the tumor removal, not hindered by soft palate and offers excellent post-operative results by avoiding external scars.[5,7]

Findings on healing after maxillary Le fort-1 osteotomies have that the incisive canal vessels, descending palatine artery or superior alveolar artery need not be preserved if the osteotomised segment has intact periosteom and soft tissue attachment.[14] Pre-drilling the plate fixation prior to the osteotomy avoids post-operative occlusal problems. Disturbances in facial growth are unlikely as the osteotomy line does not pass through any growth centers. However in very young children, this procedure is contraindicated due to possible disruption of mid facial growth and unerupted teeth.[3] Rare complications include malocclusion (avoided with pre-drilling of the maxilla), hemorrhage (avoided with pre-surgical embolization) and soft tissue air emphysema (avoided by judicious use of irrigation during osteotomy).[12]

The pre-operative embolization and hypotensive anesthesia drastically reduced the bleeding and provided an almost bloodless field during the procedure, there by enhancing the surgical field and making it much easier and quicker.

For a very large lesion involving the adjacent structures; the technique has the scope for modification to involve the naso-maxillary-orbital transposition with or without mandibulotomy for greater access to the pterygoid regions.[8]

No surgical access is best suited for all presentations of tumors in the nasopharyngeal regions in children. The lefort-I osteotomy is a relatively simple and versatile technique for approach to the nasopharyngeal, mid facial and the middle skull base.

4. Conclusion

According to international literature, the treatment of choice for nasopharyngeal angiofibroma is surgical removal.[11] It must be carefully planned for the best approach as this is fundamentally important for the exposure of the tumor, radical removal, control of possible intra operative hemorrhage, and for the best esthetic and functional result.

The Lefort1 osteotomy is a widely used procedure for orthognathic surgery among oral and maxillofacial surgeons. The young age and the character of the lesion limit the array of surgical access considering the esthetics, functional and developmental problems.

Early diagnosis together with preoperative embolization of the angiofibroma permits less aggressive surgical approach and makes the removal easier. It also obsoletes the adjuvant therapies like radiation, chemotherapy and hormonal therapy.

Because of the young age of the patients affected and the character of the lesion, it is important to minimize the esthetic, functional and developmental problems that the surgical approach may cause.

The ease of the technique, extensive access gained, visualization, re approximation of the osteotomised segment and the predictably uncomplicated post-operative healing and rehabilitation made it the ideal technique in this case.

Conflicts of interest

All authors have none to declare.

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