LE FORT I OSTEOTOMY APPROACH FOR ADVANCED NASOPHARYNGEAL ANGIOFIBROMA WITH INTRACRANIAL EXTENSION; REPORT OF A CASE

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Abstract- ***Angiofibromas are the most common benign tumors of the nasopharynx. Intracranial extension has been reported in approximately 20-25% of cases. Intracranial extension may be difficult to treat because of poor exposure that may lead to recurrence. A 16-year-old male patient presented with a 6-month history of nasal obstruction, intermittent epistaxis, right superior orbital fissure syndrome, and proptosis. Imaging studies revealed a large right sinonasal mass with significant intracranial and infratemporal extensions. The tumor was resected by Le Fort I technique because of dissatisfaction with other approaches. Postoperative period was uneventful and follow-up visits showed marked improvement in proptosis and ophthalmologic symptoms, without the evidence of tumor recurrence. Commonly used to treat facial deformities, the Le Fort I osteotomy with downfracturing of the entire palate has been adopted as a surgical option in the management of some angiofibromas. Compared with other popular techniques, it provides excellent exposure for angiofibromas. The merits and limitations of this approach as well as its details are discussed.***
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INTRODUCTION

There is little disagreement among otolaryngologists about the choice of surgery to treat juvenile nasopharyngeal angiofibromas (JNAs) that are not too large (1). The controversy concerns how to deal with patients with large tumors especially those with considerable intracranial extension (2,3).

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Wide selection of surgical approaches have been described in literature for gaining access to lesion involving intracranial tissues, infratemporal space and pterygomaxillary fossa (1,2,4). Lesions involving these areas remain a major challenge to head and surgeons. Le Fort I maxillary osteotomy is used to correct a variety of maxillofacial problems such as deformities of maxilla, cleft palate, posttrauma patient, and orthognathic surgery (5,6). The Le Fort 1 maxillary osteotomy, compared with other popular approaches, provides excellent exposure for angiofibromas, clivus tumors, and other tumors of the nasopharynx, nasal septum, and nasal cavity (7). Approaches using the Le Fort 1 were first described by von Langenbeck in 1861 for a benign tumor of the pterygopalatine fossa in two patients and in 1867 by Cheever for a nasopharyngeal tumor (8). Lanz, in 1893 , described and performed a midsagittal osteotomy and devided the inferior segment in halves so as to obtain better access to the pituitary gland (7). This approach then went into disrepute until it was resurrected in the 1930s for correcting maxillary fracture malunions and congenital maxillary hypoplasia (7). Archer et al., Uttley et al., and Belmont have again adapted its use for tumor surgery of the skull base nearly 130 years after von Langenbeck's original description (9).

Case report and surgical technique

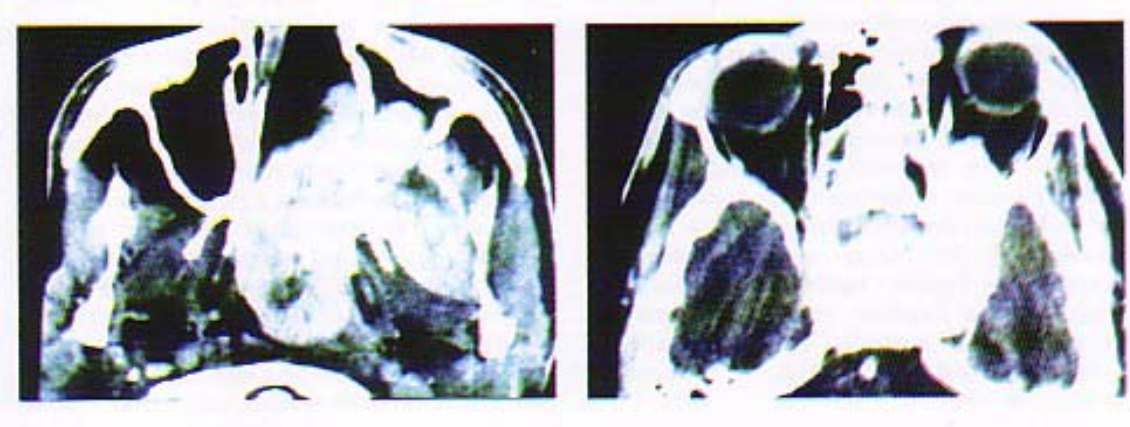
A 16-year-old male patient presented with 6-month history of nasal obstruction, intermittent epistaxis, right superior orbital fissure syndrome, and proptosis (Fig. 1). Imaging studies revealed a large right sinonasal mass with significant intracranial and infratemporal extensions (Fig. 2). The tumor was resected by Le Fort 1 technique. The operation was performed under hypotensive anesthesia with orotracheal intubation. A horizontal incision was made above the gingivobuccal sulcus extending from one maxillary tuberosity to the other. The periosteum was elevated to expose the entire anterior and lateral walls of the maxilla. Horizontal supra-apical osteotomies were performed from the pyriform rim to the pterygomaxillary fissure using a sharp 6 mm osteotome. The septum was separated from the anterior nasal spine and maxillary crest.

An osteotomy of the medial wall of the maxilla was performed extending posteriorly from pyriform fossa through the inferior meatus to the palatine canal vessels. The pterygoid plates were separated from the maxilla by a sharp osteotome. Then the maxilla was downfractured (Fig. 3). The lateral extents of the dissection were the pterygoid and temporal muscles. The posterior limits of the dissection were the clivus, posterior wall of the sphenoidal sinus and the greater wing of the sphenoid bone. The superior limit was the anterior cranial fossa. After wide exposure of the surgical field, the entire tumoral mass along with its maxillary sinus, infratemporal and intracranial extensions were resected (Fig. 4). Wide exposure assured immediate hemostasis by using electrocautery and packing. At closure, the buttresses of bone were approximated by wiring and 4 weeks of intermaxillary fixation. Postoperative period was uneventful and follow-up visits showed marked improvement in proptosis and ophthalmologic symptoms, without nasal deformity or evidence of tumor recurrence.

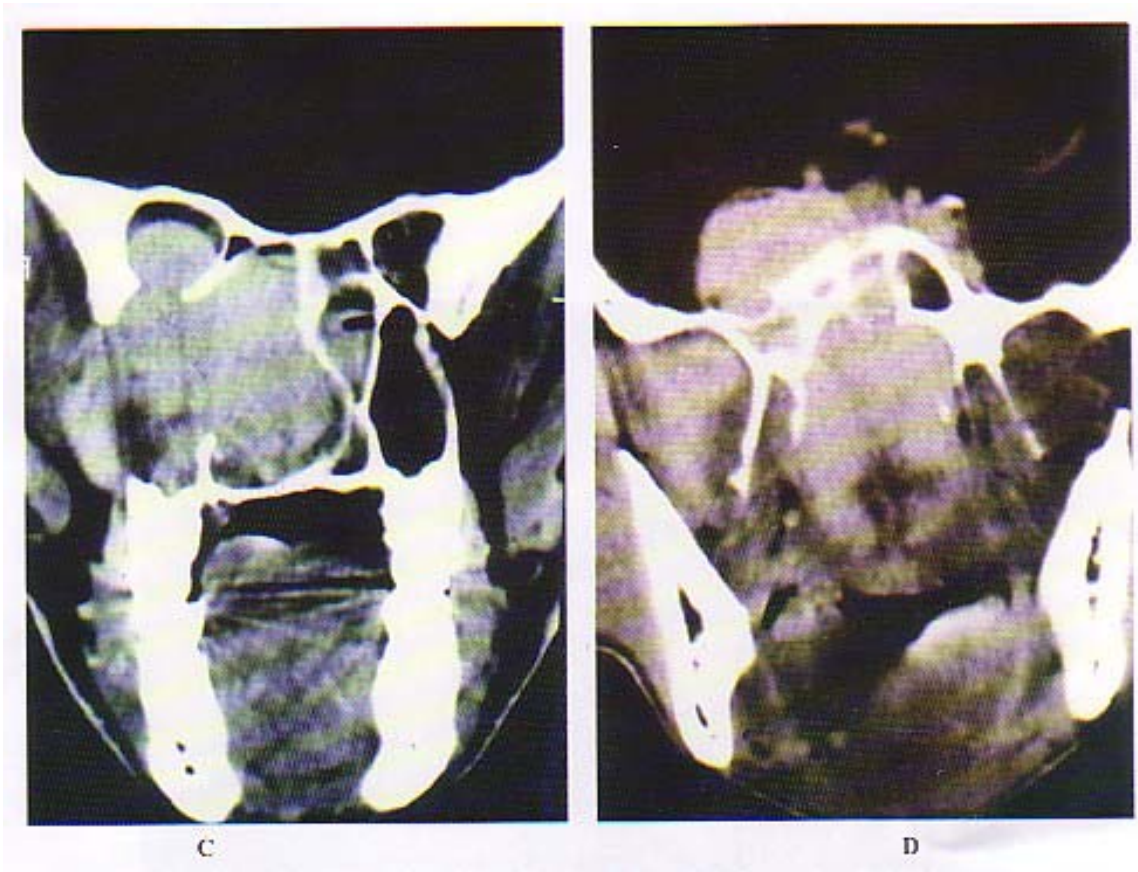
DISCUSSION

The central skull base is a difficult area to obtain adequate surgical exposure (7). The immense number of techniques and modifications of them that have been described attest to the ineffectiveness of using a single approach (2). The Le Fort 1 osteotomy is a standard orthognathic procedure that has been shown to be safe in providing access to the skull base. The principal advantage of this technique is better exposure compared to other approaches including transpalatal, midfacial degloving, and lateral rhinotomy (8,10,11). Nasal cavities, the maxillary, ethmoid, and sphenoid sinuses, and nasopharynx are all easily exposed (3). Furthermore, by avoiding facial scars, it has excellent cosmetic results (8,10,11). Also this approach facilitates associated dural repair and hemostasis (8). Palate splitting approaches provide a narrow field view often restricting exposure of the sphenoid by the bulk of soft palate tissue (10). In these approaches the major concern is the formation of a palatal fistula or wound dehiscence (8). The lateral rhinotomy approach provides good access to the anterior nose and sphenoid sinus but has the disadvantage of an external facial scar as well as providing poor access to the nasopharynx (3). The midfacial degloving approach provides excellent exposure to the anterior and lower parts of the nasal cavities. However, access to the lateral maxillary sinus is limited (3) and complications are scar contractures of the oral vestibule injury to the infraorbital nerve, nasal vestibular stenosis, and cartilaginous nasal deformity (12). The infratemporal approach provides better exposure of lateral extensions or lateral to the pterygoid plates but there are significant complications (conductive hearing loss, trismus, neuralgia, numbness of the lower lip, and temporal depression) (8,13,14).

Fig. 1. The patient is draped for surgery. Right proptosis is easily visible



2a **2b**



C **D**

Fig. 2. Preoperative axial CT scans. A: Axial CT shows involvement of the infratemporal fossa. B: Axial CT reveals involvement of orbital apex and cavernous sinus. C: Coronal CT shows orbital apex involvement. D: Coronal CT depicts intracranial involvement of the cavernous sinus

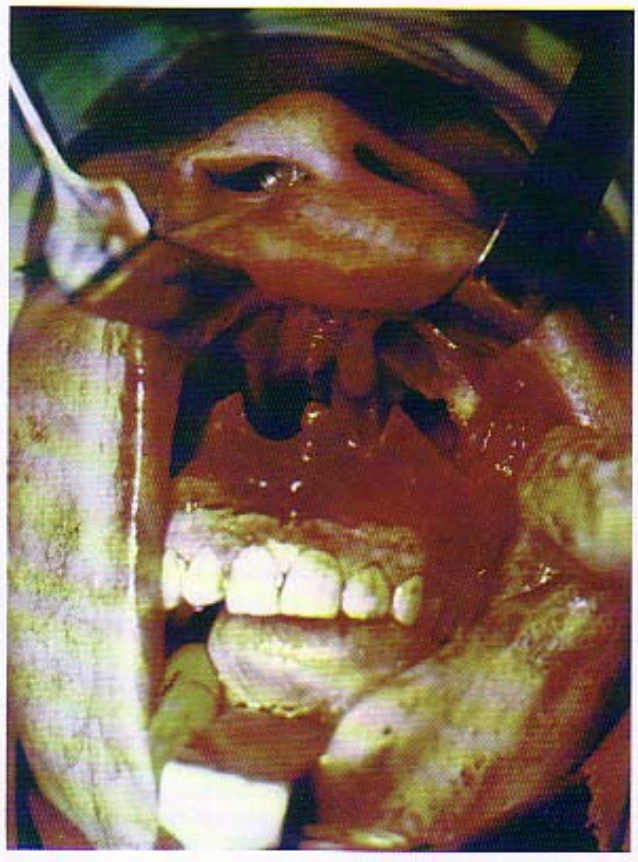


Fig. 3. Intraoperative view of the patient after Le Fort 1 maxillary osteotomy. Downfracturing of the maxilla provided excellent exposure and facilitated tumor removal

Fig. 4. Tumor mass after removal. Compare the size of the tumor to a needle

Experimental findings on healing after maxillary osteotomies have shown that the incisive canal vessels, descending palatine arteries, and superior alveolar arteries do not need to be preserved if the periostium is preserved. Of course there are some potential limitations and complications that can be avoided by meticulous technique and careful patient selection (7). This approach may be contraindicated in young children because of the possible disruption of midfacial growth and unerupted teeth (3). There is a remote possibility of palatal necrosis if the palatine arteries are sacrificed (10). Some other rare complications are malocclusion, hemorrhage, and subcutaneous emphysema (8). The Le Fort 1 osteotomy is widely used by oral-maxillofacial surgeons for orthognatic surgeries. Our experience with Le Fort 1 osteotomy approach to an advanced angiofibroma has been generally favorable. There is no question that this technique is superlative in terms of access, exposure, and cosmesis. The Le Fort 1 osteotomy approach is not presented with the purpose of recommending it to replace other approaches. It is our intent to remind surgeons that Le Fort 1 approch exists and can be easily adopted by head and neck oncological surgeons.

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