

## SURGICAL MANAGEMENT OF THE MOST COMMON BENIGN CRANIOFACIAL FIBRO-OSSEOUS LESIONS

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### ABSTRACT

**Background:** fibro-osseous lesions of craniofacial bones are a challenging group of pathological conditions that are difficult to classify and treat. Unfortunately, there are no universally accepted clinical, radiological, or histopathological criteria that distinguish these lesions from one another. It is often quite challenge to establish their biologic behavior and treatment.

**Objective:** To outline the the different surgical modalities for management of the most common symptomatic craniofacial fibro-osseous lesions and to evaluate the appropriate surgical management with follow up results.

**Patients and methods:** Sixteen patients with biopsy confirmed craniofacial fibro-osseous lesions were enrolled in our study from Mars 2009 to Mars 2012 in otorhinolaryngology department zagazig university hospital. They were operated using endoscopic and open surgery. All patients were submitted in thorough history taking, clinical, radiological, and histopathological examinations, with a follow up period from six months to two years.

**Results:** The most common cases were osteoma 10 cases (62.5%), the fibrous dysplasia was the second most common 6 case (37.5%). Ethmoid and frontal sinus were the most common sinuses involved with osteoma, the maxillary sinus was the most common sinus involved with fibrous dysplasia. There were 3 complications the first was CSF leak, the second was incomplete removal of fibrous dysplasia, and the third was diminution of vision in the epsilateral eye of the huge ethmoidal osteoma due to optic nerve oedema resolved by medical treatment.

**Conclusion:** management of craniofacial fibro-osseous lesions is highly individualized and it is the task of the surgeon to tailor the surgical procedure according to the clinical and radiological data.

### INTRODUCTION

**B**enign fibro-osseous lesions of craniofacial bones constitute a varied group of lesions with a common histological characteristic which are the Substitution of normal bone by tissue composed of collagen and fibroblasts with variable amount of mineralized substance that may be bone, cement, or both [1]. These lesions include osteomas, fibrous dysplasia, and lesions originate from the periodontal ligament include ossifying fibroma, cementifying fibroma, cemento-ossifying fibroma, and periapical cemental dysplasia [2].

Osteomas are benign tumors, rarely found inside the Para nasal sinuses, even though they represent the most frequent bone neoplasm arising from facial bones. Osteomas of the Para nasal sinuses occur mainly in the frontal and ethmoid sinuses, maxillary or sphenoid sinus affection is rare. Frontal osteomas account for approximately 57% of all Para nasal osteomas. Osteomas usually present between the second and fifth decades of life, with a male to female ratio 3:1 [3].

They are slowly growing tumors, for this reason they are generally asymptomatic and frequently discovered coincidentally during radiological examination. Symptoms of ethmoid osteomas occur

earlier than frontal osteomas Headache localized over the area of osteoma, facial pain or deformity, rhinorrhoea, anosmia, and epistaxis, are common symptoms [4].

Fibrous dysplasia is a developmental lesion due to idiopathic arrest in the normal maturation of bone at the woven bone stage. Clinical presentation of these lesions varies according to the extent of the lesion and the primary bone affected. The most common clinical presentations however are facial asymmetry and asymptomatic swelling. Fibrous dysplasia usually has a clinical onset during late childhood or early adolescence with nearly equal sex distribution, however, the polystotic type of the disease tends to have a female sex predilection. Approximately one third of patients with fibrous dysplasia have an elevated level of serum alkaline phosphatase which is unrelated to the extent of the disease [5].

Radiologically; mature fibrous dysplasia has a ground glass or an orange peel appearance, the lesion tend to blend into the surrounding bone, so it lacks sharp marginal definition. CT scanning has been useful in establishing the diagnosis of this lesion and to assess the extent of the lesion. CT characteristics include expansion of the involved bone with heterogeneous densities associated with scattered or confluent islands of bone formation.

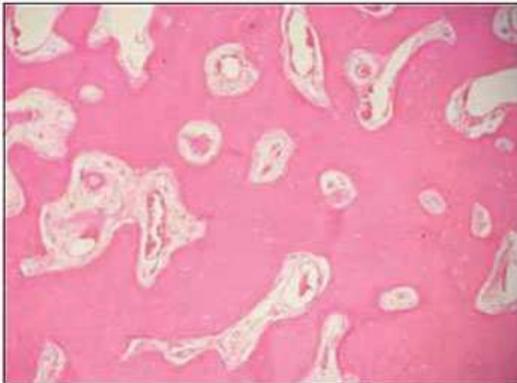
The aim of the study is to evaluate different surgical approaches with follow up results of management of these lesions.

#### PATIENTS AND METHODS

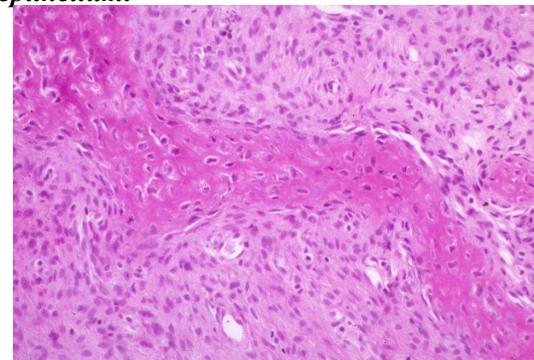
Sixteen patients with craniofacial benign fibro-osseous lesions, confirmed by post-operative histopathology (10 cases of osteoma 62.5 %, 6 cases of fibrous dysplasia 37.5 %) were enrolled in our study from Mars 2009 to Mars 2012 in otorhinolaryngology department of zagazig university hospital. They were operated using endoscopic and open surgical techniques. Evaluation of patients was done based upon age, sex, clinical, radiological and histopathological characteristics. Patients were followed up for a period ranging from 6 months to 2 years .Tools of follow up were clinical and radiological in the form of CT scanning 6 months to 2 years post-operative.

#### RESULTS

A total of 16 patients with craniofacial benign fibro-osseous lesions, distributed as, 10 cases of osteomas (62.5%), 6 cases of fibrous dysplasia (37.5%) were included in our study.



**Fig (1) Picture of osteoma with mature predominantly lamellar bone with adjacent areas lined with a pseudo stratified respiratory epithelium.**



**Fig (2) picture of fibrous dysplasia with immature osteoblast and osteoid tissue formation against dense fibrous tissue background.**

The mean patient's age was 33.5 years (ranges from 19-52 years). There were 11 males and 5 females. None of them reported family history of the disease or past history of trauma. The maxilla was the most common bone involved with fibrous dysplasia (32.5%) of cases. 6 patients presented with asymptomatic facial swelling, by CT examination pre-operatively giving the picture of fibrous dysplasia, and confirmed histopathologically post-operatively. 3 patients presented with asymptomatic forehead swelling by CT examination pre-operatively giving the picture of osteoma arising from the outer table of frontal sinus and confirmed by post-

Operative histopathological examination. Four patients presented with lateral proptosis 3 patients in the right eye and 1 patient in the left eye by pre-operative CT giving a radiological picture of osteoma involving anterior ethmoid air cells in 1 patient, and the anterior and posterior ethmoidal air cells in 3 patients one of them reaching the optic nerve without causing field defect in the affected eye. 3 patients presented with headache one of them presented with headache and epiphora by CT examination there were unilateral fronto-ethmoidal sinusitis on top of fronto-ethmoidal osteoma with obstruction of the frontal sinus drainage.

Nine cases, (6 cases of fibrous dysplasia, and 3 cases of frontal osteoma) managed by different open surgical approaches in the form of lateral rhinotomy approach, sublabial approach and osteoplastic flap technique.

Four cases of ethmoidal and fronto-ethmoidal osteomas were managed by endoscopic surgery. Three cases of fronto-ethmoidal osteomas required combined approach endoscopic and open lynch approach

Complications presented in 3 cases, 1 case presented with cerebrospinal fluid leak, this case managed endoscopic ally in second step after 2 weeks by facia lata graft and fibrin glue. The second complication was incomplete removal of fibrous dysplasia discovered by postoperative minimal swelling after subsiding of facial oedema and confirmed by CT and managed by second step shaving after one year. The third was diminution of vision in the epsilateral eye of the huge ethmoidal osteoma due to optic nerve oedema discovered 6 hours post-operatively and after consultation of ophthalmologist oedema resolved by medical treatment in the form of steroid.

Table (1):

No	Age	Sex	Location	Clinically	Radiologically	Histologically	Treatment
1	24	F	Maxilla	Asymptomatic facial swelling	Diffuse mixed lesion	FD	<i>Sublabial approach</i>
2	19	M	Maxilla	Asymptomatic facial swelling	Diffuse mixed lesion	FD	<i>Sublabial approach</i>
3	22	M	Maxilla	Asymptomatic facial swelling	Diffuse mixed lesion	FD	<i>Sublabial approach</i>
4	21	F	Maxilla	Asymptomatic facial swelling	Diffuse radio-opaque lesion	FD	<i>Lateral rhinotomy approach</i>
5	23	F	Maxilla	Asymptomatic facial swelling	Diffuse mixed lesion	FD	<i>Sub labial approach</i>
6	32	F	Ethmoid	Asymptomatic facial swelling	Diffuse mixed lesion	FD	<i>Lateral rhinotomy approach</i>
7	25	M	Fronto-ethmoid	Asymptomatic forehead swelling	Circumscribed radio-opaque swelling	Osteoma	<i>Combined approach &amp; Endoscopic Lynch</i>
8	35	M	Frontal	Asymptomatic forehead swelling	Circumscribed radio-opaque swelling	Osteoma	<i>Osteoplastic flap technique</i>
9	45	M	Fronto-ethmoid	Proptosis	Circumscribed radio-opaque swelling	Osteoma	<i>Endoscopic excision</i>
10	36	M	Fronto-ethmoid	Headache	Circumscribed radio-opaque swelling	Osteoma	<i>Endoscopic excision</i>
11	52	M	Frontal	Asymptomatic forehead swelling	Circumscribed radio-opaque swelling	Osteoma	<i>Osteoplastic flap technique</i>
12	27	F	Fronto-ethmoid	Proptosis	Circumscribed radio-opaque swelling	Osteoma	<i>Combina approach &amp; Endoscopic Lynch</i>
13	34	M	Ethmoid	Asymptomatic facial swelling	Circumscribed radio-opaque swelling	Osteoma	<i>Endoscopic excision</i>
14	46	M	Ethmoid	Headache	Circumscribed radio-opaque swelling	Osteoma	<i>Endoscopic excision</i>
15	48	M	Frontal	Asymptomatic forehead swelling	Circumscribed radio-opaque swelling	Osteoma	<i>Osteoplastic flap technique</i>
16	46	M	Fronto-ethmoid	Headache	Circumscribed radio-opaque swelling	Osteoma	<i>Combina approach &amp; Endoscopic Lynch</i>

- A case of female patient 27 years old, presented with left eye medial swelling leading to downward and lateral proptosis. By CT scanning it was fronto-ethmoidal osteoma. This case managed by external fronto-ethmoidectomy (Lynch) approach.

□



**Figure (3) : CT scan coronal cut shows Fronto-ethmoid osteoma. Lynch incision**



**Fig (4) Intraoperative photo of**



**Fig (5) photo of frontoethmoid osteoma**

*A case of male patient 46 years old presented with headache and right nasal discharge, radiologically it was right ethmoidal osteoma. This case managed by endoscopic technique*



**Fig (6) CT coronal cut of ethmoidal osteoma pre-operative**



**fig (7) Endoscopic view of**



**Fig (8) CT coronal cut of ethmoidal osteoma post-operative.**

- ❖ A case of male patient 48 years old presented with fore head swelling, by CT scanning it was frontal osteoma originating from outer table of the frontal sinus. This case managed by osteoplastic flap technique.



**Fig (9) exposure of the tumor sinus.**



**fig (10) Templates of the frontal**



**Fig (11) Tumor exposure after drilling of the outer table of the frontal bone  
The frontal sinus**



**fig (12) reconstruction of**

## DISCUSSION

Familiarity of fibro-osseous lesions of craniofacial bones is critical for proper imaging interpretation of these lesions. On different diagnostic imaging modalities, the lesions may share similar features making it difficult to establish a definitive diagnosis. Adequate clinical and paraclinical information, such as patient age, sex, site of the lesion, duration of symptoms, imaging characteristics, and histopathological findings are necessary to reach an accurate diagnosis [6].

Most osteomas are asymptomatic and are incidentally found on radiologic examinations. The CT scans are standard tests required for the planning of treatment. Surgery is generally accepted for symptomatic osteomas. Whether intranasal endoscopic or external approach, the best decisions must be made based on individual presentation [7]. Traditionally, resection of such hard tumors requires an open approach. The advent of endoscopic technology has revolutionized the rhinologist's view point to the approach to sinusal lesions. Even though the endoscopic technique using the intranasal drill has been applied successfully to osteomas with orbital extension, the choice of surgical approaches is individualized and depends on the tumour location and size [8]. A detailed assessment of the margins of the tumor and definition of its relations with the surrounding structures is required in order to choose the most precise approach to be planned. CT scan is a fundamental tool that not only permits diagnosis but also allows the correct surgical approach to be planned [9].

Endoscopic transnasal resection is ideal for tumors confined to the ethmoid and nasal cavity. The main advantages of the method are the minimal soft tissue dissection, the absence of facial bony disruption, and the avoidance of a facial incision. The magnification and the different angled view, which are possible with the use of endoscopes, may facilitate the removal of fibro-osseous lesions [10].

Surgical removal of paranasal sinus fibro-osseous lesions is preserved for clinically symptomatic patients when: (1) they cause orbital or intracranial complications; (2) the initial symptoms of nasal obstruction or sinusitis fail to resolve even on maximal medication therapy; (3) asymptomatic lesions are located near the opening of the frontal sinuses where obstruction may lead to severe consequences; (4) an obvious increase in tumor size is noted [11].

In our study, selection of the appropriate surgical approach and the extent of bone resection depend on the site and size of the lesion, its proximity to critical anatomic structures (ie, internal carotid artery, optic nerve, orbital cavity, anterior and middle cranial fossae), age of the patient, and severity of signs and symptoms.

Although external approaches were performed in the majority of patients (n=9), endoscopic surgery was suitable for 4 patients, and combined approach was suitable for 3 cases. The success of endoscopic approach was achieved in localized lesions, with no involvement of intracranial structures. We believe that endoscopic approach in the treatment of paranasal sinus fibro-osseous lesions is a viable technique in the absence of significant orbital extension or skull base invasion. Although it is a safe technique, meticulous care and patience is necessary. In bifrontal craniotomy approach, we believe that, preservation of the frontal sinus mucosa and patent sinus ostium makes it possible not to obliterate the sinus.

## CONCLUSION

We could conclude from the previously reported data that management of craniofacial fibro-osseous lesions requires collaboration of efforts of the surgeon, radiologist, and histopathologist. Also, it is the task of the surgeon to tailor the surgical approach according to the clinical and radiological findings.

Usually fibro-osseous lesions of the craniofacial bones doesn't require biopsy pre-operative. But any sudden change in the clinical presentation or behavior of the lesion further investigation and biopsy should be carried out before surgery. Surgical intervention should be carried on as soon as possible if, there are, rapid growth of the tumour, tumour causing bone erosion, tumour occupying more than 50% of the frontal sinus, and presence of complications.

Finally, patient factors, availability of surgical expertise and technology should also be taken into account before contemplating an endoscopic approach. Open approach will remain a surgical technique that will offer the endoscopic surgeon an adjunctive approach for providing comprehensive management of the frontal sinus.

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