



Clinicopathological study of Ossifying fibroma

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ABSTRACT

Ossifying fibroma is a benign neoplasm of bone and often considered a type of fibro-osseous lesion. It can affect both the mandible and the maxilla, particularly the mandible. Radiologically it presents as a mixed radiodense and radiolucent lesion that is well demarcated from normal bone and histopathologically it consists of highly cellular, fibrous tissue that contains varying amounts of calcified tissue resembling bone, cementum or both. The treatment consists in completely removing the lesion with curettage, surgical excision or en-block resection, depending on the size and location of the lesion. The aim of this study is to analyse the clinicopathological characteristics of ossifying fibroma and provide a proper management system.

Materials and methods - The prospective study was performed in the Department of Oral & Maxillofacial surgery, Dhaka Dental College and Hospital, Dhaka, *Bangladesh*, from a period of January 2015 to January 2019. All patients were selected for this study based on clinical, radiological and histopathological confirmation of ossifying fibroma. The management of each case and follow-up data were documented.

Result and observations - A total number of 25 patients of ossifying fibroma were selected for this study. The mean age of ossifying fibroma were 30.35 years with an age range 12 to 57 years. Female 17 (57%) represented the majority of the affected patients and more common in the mandible (60%). The radiographic appearances of ossifying fibroma presented 17(68%) mixed type and 18(72%) well-defined borders. Bone expansion 19(76%), tooth displacement 09(36%) and root resorption 10(40%) were observed in ossifying fibroma. Surgical resection, enucleation and curettage were treatment of choice in ossifying fibroma.

Conclusion - Ossifying fibroma occurs more commonly in women in the 2nd to 4th decade of life and presents a painless bony swelling and deformity in mandible and maxilla. Frequently it shows as a mixed radiographic image that is well demarcated from normal bone. The treatment consists in completely removing the lesion with curettage, surgical excision or en-block resection, depending on the size and location of the lesion in ossifying fibroma.

KEYWORDS: Ossifying fibroma, Jaw bone Neoplasm, Clinicopathological study

INTRODUCTION

Fibro-osseous lesions are a diverse group of disorders characterized by replacement of normal bone by a benign connective tissue matrix that displays various amount of mineralization in the form of woven bone or cementum. It includes developmental, reactive and neoplastic lesions.^{1,2}

Fibro-osseous lesions were first described by Lichtenstein in 1936. A simple classification was done in 2006 based on the World Health Organization (WHO) by Speight and Carlos and divides these lesions into fibrous dysplasia (FD), ossifying fibroma (OF) and osseous dysplasia (OD).³

Ossifying fibromas are considered as benign fibro-osseous neoplasms which are principally encountered within the jawbones and most common neoplastic component of the fibro osseous lesions. Although the cell of origin is unknown it may derive from elements present in the periodontal ligament

space.⁴ Some of ossifying fibromas contain prevalent cementum like calcifications and others show only bony material but a mixture of the two types of calcification is commonly seen in a single lesion. Some authors report that infection and dental extractions stimulate the periodontal membrane to produce and deposit cementum. It is possible that trauma could serve as a factor in the proliferation of ossifying fibromas.⁵

In 1968, Hamner et al. analysed 249 cases of fibro osseous jaw lesions of periodontal membrane origin and classified them. In 1973, Waldron and Giansanti reported 65 cases and concluded that this group of lesions was best considered as a spectrum of processes arising from cells in the periodontal ligament.⁵ Sawyer JR et al. found a balanced translocation with recurring breakpoints at Xq26 and 2q33 in patients affected with ossifying fibromas. Dal Cin et al. also reported a mandibular ossifying fibromas with an interstitial deletion on chromosome 2 between q31-32 and q35-36. Very few molecular studies have identified mutations in CDC73 (cell division cycle 73)/HRPT2 a gene that encodes parafibromin protein.⁴

The aim of this study is to analyse the clinicopathological characteristics of ossifying fibroma and provide a proper management system.

MATERIALS AND METHODS

The prospective study was performed in Department of Oral & Maxillofacial Surgery, Dhaka Dental College and Hospital from a period of January 2015 to January 2019.

A total number of 25 patients were selected for this study based on clinical, radiological and histopathological confirmation of ossifying fibroma.

In this study we included patients who were clinically diagnosed with ossifying fibroma by oral and maxillofacial surgeons and radiological findings by experienced radiologist. We also included the patients who were diagnosed ossifying fibroma histopathologically despite a preoperative radiological diagnosis which did not indicate ossifying fibroma.

Data were collected from data sheet provides age, sex, clinical presentation, anatomical location, radiological findings, histopathological findings and type of operation was done for a management of lesions. In all cases, imaging techniques orthopantomogram (OPG) and computed tomography (CT) were used for the evaluation of ossifying fibroma.

All procedures were carried out under general anaesthesia. An invasive surgery was performed in all patients who were selected for surgery and after operation the specimens were submitted for histopathological analysis, which was performed by experienced pathologists. The patients were regular evaluated for follow up at 1 month, 3 months and 6 months after the surgery.

RESULTS AND OBSERVATION

A total number of 25 patients were selected for this study based on clinical, radiological and histopathological confirmation of ossifying fibroma.

There were 16 (64%) female and 09 (36%) were male patients. Female represented the majority of the affected patients. (Figure-1) The mean age of patients ossifying fibroma the mean age were 30.35 years with an age range 12 to 57 years. (Table-1)

Anatomical location of among 25 cases of ossifying fibroma 17 (68%) were found in the mandible and 8(32%) were found in the maxilla. (Figure-2) In the mandibular region body of the mandible is the commonest site, particularly premolar and molar region 10(59%) and 07(41%) Cases were found body and whole ramus area.

Most of the patients present with noticeable swelling and deformity. As the lesions were slow growing it is not possible to assess the age at which they first developed. For all patients average duration of illness at presentation was 2 years with a range of 1 year to 2 years.

Ossifying fibroma presents a painless bony swelling on the maxillary and mandibular region in all most all patients. Expansion of cortical plate was present both buccally and lingually in mandible and palatally in maxilla which produce aesthetically visible deformities. some of patients developed headaches, nasal obstruction, epistaxis and symptoms like sinusitis when it was in maxilla. No one patients presents clinical manifestations related to compression or compromised of structures.

A total number of 25 patients radiographical records were evaluation for study. In ossifying fibroma 17(68%) radiographic appearances were mixed type, radio-opaque were 03 (12%) and radiolucent were 05 (20%). Ossifying fibroma presented 18(72%) well-defined borders and 07 (28%) ill-defined borders. Bone expansion 19(76%), tooth displacement 09(36%) and 10(40%) root resorption was observed in ossifying fibroma. (Table-2)

The histopathological analysis of ossifying fibroma included bone trabeculae with large osteocytes within the lacunae (68%), multiple curettage fragments (48%) and thick curvilinear trabeculae (29%), irregular osteoid masses (60%) were present.

Out of 25 patients of ossifying fibroma in case of mandible 09(36%) patients had enucleation & curettage of lesions, 08(32%) patients had segmental mandibular resection and in case of maxilla 05 (20%) patients had enucleation & curettage of lesions, 03 (12%) patients had partial maxillectomy. (Table-3)

Patients were discharged within 10 – 15 days after the operation was completed. The patient who developed complications stayed in hospital until complications resolved. In our study among 25 cases of ossifying fibroma 08 cases presented surgery-related complications; 03 case developed an infection in the treatment area. Pus cultures taken from infected area and treated effectively by sensitive antibiotics and were discharged with improved condition and 02 showed osteonecrosis signs which required an additional procedure involving curettage and bone remodeling. 03 patient had exposure of reconstruction plate intraoral 1-2 years after operation which were removed and reconstruction were done by fibula bone graft. The post-operative period of

uncomplicated cases were excellent. There were no evidence of recurrence found in the post-operative follow up period. No malignant transformation from the lesions were observed during postoperative period.

Table 1: Age distribution of the patients

Age	Frequency	Percentage
10 - 20	05	20
21 - 30	09	36
31 - 40	05	20
41 - 50	03	12
51 - 60	02	8
61 - 70	01	4
Total	25	100
Mean (±SD)	30.35 (+/-14.05)	Range 12 - 57

Figure 1: Gender distribution of the patients of ossifying fibroma

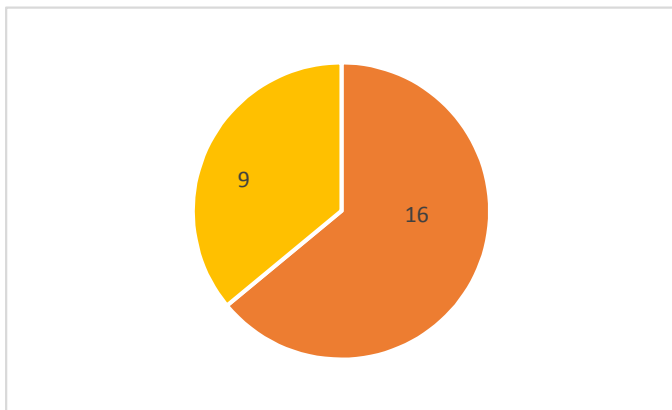


Table 2 : Radiological features of ossifying fibroma

Radiological features	Frequency	Percentage
General appearance		
Mixed type	17	68
Radio opaque	03	12
Radio lucent	05	20
Border		
Well defined	18	72
Ill defined	07	28
Effect on adjacent structure		
Bone expansion	19	76
Root resorption	10	40
Tooth displacement	09	36

Figure 2. Anatomical location of ossifying fibroma

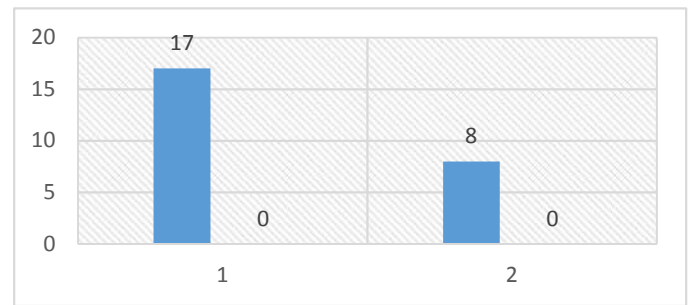


Table 3: Management of ossifying fibroma

Operation	Frequency	Percentage
Mandible		
Enucleation of the lesion & curettage	09	36
Segmental resection of jaw bone & reconstruction with reconstruction plate	03	12
Segmental resection of jaw bone & reconstruction with microvascular fibula graft	05	20
Maxilla		
Enucleation of the lesion & curettage	05	20
Partial maxillectomy	03	12

DISCUSSION

The term ossifying fibroma has been used since 1927. In 1971 the World Health Organization (WHO) classified four types of cementum containing lesions - fibrous dysplasia, ossifying fibroma, cementifying fibroma and cemento-ossifying fibroma. According to the second WHO classification, benign fibro-osseous lesions in the oral and maxillofacial regions were divided into two categories, osteogenic neoplasm and non-neoplastic bone lesions - cementifying ossifying fibroma belonged to the former category. However, the term cementifying ossifying fibroma was reduced to ossifying fibroma in the new WHO classification in 2005.⁵

Ossifying fibroma occurs at any ages - many authors confirmed that it occurs middle-aged patients but it is usually seen in second to fourth decades of life.⁵ Among the 3 subtypes, conventional ossifying fibroma is the most common and usually affects female in their 2nd to 4th decades of life.⁶ *In this study it was 2nd to 5th decade of life and the mean age was 30.35 which was comparable to Maki et al.⁷* The mean age of ossifying fibroma at diagnosis exhibits geographic variation. For example, higher mean ages of ossifying fibroma are found in Asia than in Africa.⁸ Whether this variation is attributable to geographic or racial factors or whether it is attributable to differences in diagnosis remains unknown.⁶

Ossifying fibroma of the jaw bone shows a predilection for females,^{9, 10,11} more often than men which was similar to this study. But Alsharif et al.¹² reported equal gender predilection for fibrous dysplasia and ossifying fibroma in Chinese patients.

Ossifying fibromas are characteristically monostotic. Less than 5% involve more than one bone and they are almost exclusively found in the cranial bones¹³ and rarely involves the

long bones.¹⁴ Among the craniofacial bones, the mandible is the most commonly involved site, typically inferior to the premolars and molars,¹⁴ mandibular premolar area (70–80%) and ramus area *particularly in posterior region*⁶ are the most common sites of ossifying fibroma which was similar to our study. A rarer reports of the involvement of ethmoid, frontal, and sphenoid sinuses, as well as the orbit, occiput, and temporal bone¹³ which was not seen in this study.

Swelling in the affected region is the most common clinical sign observed in ossifying fibroma and they are usually painless and eventually identified in routine radiographic examination.¹⁵ From the 25 cases presented in this study, most of them exhibited swelling on the tumour site and only 8 reported mild pain on the affected site. (Fig 1,2,3,4) Though ossifying fibroma is usually a painless slow growing and often asymptomatic tumor; a rapid growth pattern with a malignant behavior is sometimes noted when the tumor is located outside the mandible.¹⁶ When it is involve in the mid face and paranasal sinuses, patients commonly have a painless swelling of the cheek, unilateral proptosis with diplopia, persistent nasal obstruction, rhinorrhea, epiphora, recurrent epistaxis and hemoptysis.¹⁷



Fig.1. A painless hard swelling & facial deformity present on the right side of mandible. Fig.2 - (Intra oral view). Expansion of both buccal and lingual plate and displacement of tooth present Fig 3 – Ossifying fibroma – Mild swelling on left maxilla. Fig 4 – Ossifying fibroma – a painless swelling on right mandible. (Figure are arranged from left to right)

Ossifying fibroma may cause tooth displacement and root resorption in adjacent teeth.¹⁸ In this study, 6 cases presented tooth displacement and root resorption was observed in 8 cases.



Fig 6 – Well defined, multilocular mixed radiolucency, root resorption was seen on right side of mandible. Fig 7- Well defined, multilocular radiolucency, root resorption was seen on left side of mandible.



Fig 7- Well defined, multilocular radiolucency, root resorption was seen on left side of mandible.

Ossifying fibroma presents as a mixed radiodense and radiolucent lesion that is well demarcated from normal bone.¹⁹ Early lesions are largely radiolucent with a cyst-like in appearance. As they enlarge and mature they will become mixed radiolucent-radiopaque then completely radiopaque surrounded by a radiolucent rim.¹⁷ In the early stages, the lesion presents as radiolucent areas in which bone densities appear as the lesion matures, transforming the image into

unilocular or multilocular masses of radiopaque tissue surrounded by less ossified tissue.²⁰ A radiolucent band of capsule at the periphery separated the more mature internal radiopaque portion from the surrounding normal bone in ossifying fibroma.⁵

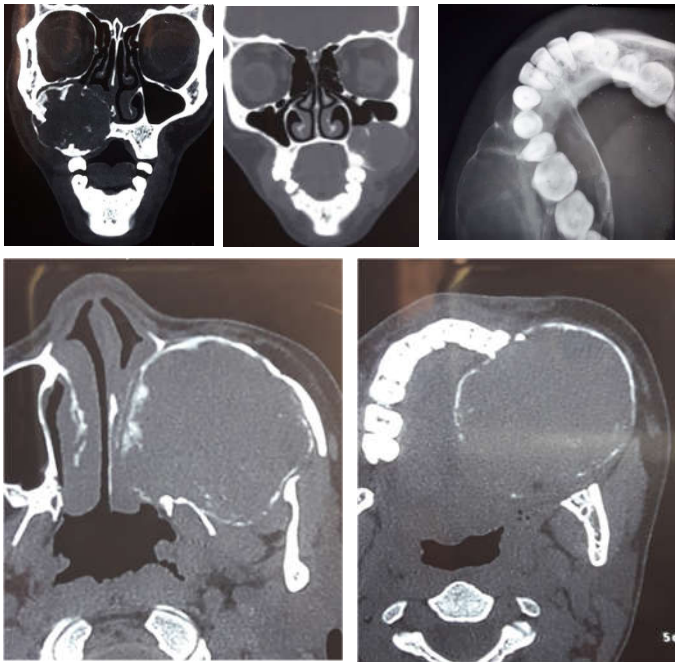


Fig 8 (First Two from left to right) – CT scan (sagittal view) showing well demarked mixed lesion on right and left maxilla. Fig 9 (3rd image in upper row) - Occulosal view showing expansion of both cortical plate on mandible Fig 10 (Last two images in lower row)– CT scan (axial view) showing well circumscribed mixed image

The radiographic borders of the tumours appear relatively smooth, well defined, and mostly corticated and the contour is regular. It may present as irregular in shape, specially if the tumour recurs or grows quickly in a short time period.⁵

The lesion tends to be concentric within the medullary part of the bone with outward expansion approximately equal in all directions. This can result in the expansion of the outer cortical plate of bone. A significant point is that the outer cortical plate, although displaced and thinned, remains intact, specially in those giant tumours. Some lesions exhibited aggressive growth and those massive expansile lesions can involve the whole jaw bone.⁵

The expansion of the tumour can result in displacement of teeth or the inferior alveolar canal and root resorption of the adjacent tooth is a pathological effect of *ossifying fibroma*.⁵ Most ossifying fibroma present with mixed radiological images¹⁷(68%) and well defined border¹⁸(72%) in this study. (Fig 5,6,7,8,9,10.)

Histologically, ossifying fibroma present a relatively avascular fibrous stroma consisting of fusiform cells intermingled with bone trabeculae and spheroidal calcifications that resemble cement like structure. Focally scattered multinucleated giant cells also may be seen. The calcified material may consist of thin, irregularly shaped trabeculae of woven bone; scattered

trabeculae of lamellar bone; deposits of basophilic staining, round or ovoid, cellular or acellular calcified deposits that have been linked to cementum or any combination.¹³ which was comparable to our study.

Microscopically, ossifying fibroma consists in a cellular connective tissue that presents mineralized material with an osteoblastic rimming commonly observed on the surface of the mineralized tissue²¹ similar to observed in most cases of this study.



Fig 11 - Ossifying fibroma – per operative picture – an expansile growth in the left maxilla.

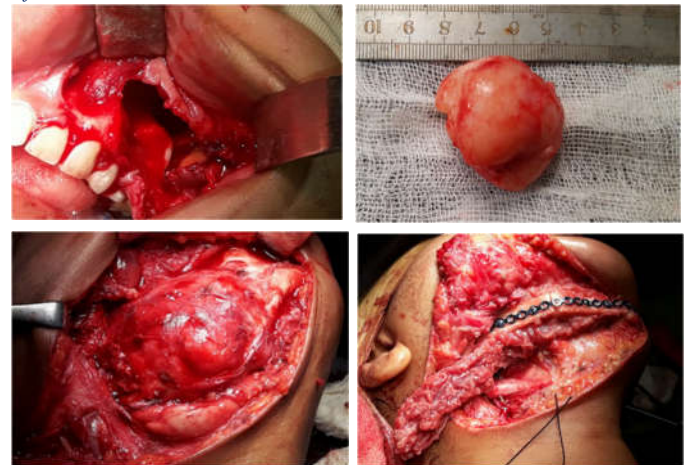


Fig 12 - Ossifying fibroma – per operative picture – enucleation of the lesion Fig 13 - Ossifying fibroma – per operative picture – after enucleation of the lesion from left maxilla Fig 14 – Per operative case of ossifying fibroma. Fig 15 – Per operative case of ossifying fibroma. Reconstruction was done by fibula graft. (Images are from left to right)

The treatment of *ossifying fibroma* consists in completely removing the lesion with curettage, surgical excision or en-block resection, depending on the size and location of the lesion.^{15,22} *Ossifying fibroma* requires radical surgery because of the tendency for recurrence and possibility of malignant transformation.⁵ When a fibrous capsule is around in lesions the surgical excision may be performed more easily.¹⁷

In this study out of 25 patients of *ossifying fibroma* in case of mandible 09(36%) patients had enucleation & curettage of lesions, 03(32%) patients had segmental mandibular resection and reconstruction with reconstruction plate 05 patients had reconstruction with micro vascular fibula graft and in case of

maxilla 05 (20%) patients had enucleation & curettage of lesions, 03 (12%) patients had partial maxillectomy. (Fig 11,12,13,14,15)



Fig.16 – Ossifying fibroma - post operative case. After surgical excision of lesion reconstruction was done by reconstruction plate. After 18 months later reconstruction plate was exposed

It is known that after completely excised most *ossifying fibromas* once do not recurrence⁵ and recurrences are rarely observed.²³ All reported patients with partial or incomplete resection and enucleation experienced recurrence. The time of recurrence was always unpredictable, ranging from 6 months to 7 years after the operation. Therefore, there must be a long enough follow-up period of at least 10 year.⁵

CONCLUSION

Ossifying fibroma occurs more commonly in women in the 2nd to 4th decade of life and presents a painless bony swelling and deformity in maxilla and mandible. Frequently it shows as a mixed radiographic image that is well demarcated from normal bone. The treatment consists in completely removing the lesion with curettage, surgical excision or en-block resection, depending on the size and location of the lesion in ossifying fibroma. A correlation between clinical, radiological and histopathological features is the key to establish the correct diagnosis. This short time study reveals that a more detailed and longer duration of study is needed to clarify the present study for better management of Ossifying fibroma.

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