



Evaluation of Benign Fibro-Osseous Lesions of the Jaw: A Case Series With Cone Beam Computed Tomography Images

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ABSTRACT

Fibro-osseous lesions (FOLs) of the jaws are a group of lesions characterized by the replacement of normal bone by fibrous tissue. In this study, 4 cases of FOLs with different characteristics will be evaluated with CBCT (cone beam computed tomography) images. Focal-osseous dysplasia and florid-osseous dysplasia were incidentally detected in patients and diagnosed based on clinical and radiographic features. In cases of fibrous dysplasia and ossifying fibroma, patients applied to with complaints of swelling in the jaws. The wide spreads of the pathologies were determined by CBCT images and the diagnosis was made by histopathological examination. While two-dimensional conventional imaging is sufficient for asymptomatic and small-sized cases, CBCT is necessary for large lesions to assess their relations with surrounding tissues. It is important to interpret the CBCT images of these lesions correctly and to bring the cases with various clinical, radiographic and demographic features into the literature.

Keywords: *Cone-beam computed tomography; craniofacial fibrous dysplasia; florid cemento-osseous dysplasia; ossifying fibroma.*

INTRODUCTION

Benign fibro-osseous lesions (FOLs) of the jaw are a group of head and neck pathologies with a similar histological appearance that requires careful clinical and radiological examination. Often diagnosed on routine radiographic examination, these lesions may be developmental, reactive dysplastic, or neoplastic (Olgac *et al.*, 2021; Crane *et al.*, 2024). Although usually asymptomatic, they may cause cortical enlargement, tooth displacement, and maxillary sinus discomfort, depending on size. These lesions may also lead to complications associated with a simple bone cyst or osteomyelitis secondary infection. Failure to recognize these lesions may lead to incorrect and unnecessary endodontic or surgical interventions (Urs *et al.*, 2020).

Benign FOLs are classified into three main categories: osseous dysplasia (OD), fibrous dysplasia (FD), and ossifying fibroma (OF). ODs are the most common FOLs and are subdivided into periapical, focal (FOD), and florid osseous dysplasias (FLOD). FD is a dysplastic skeletal anomaly classified as monostatic and polyostatic. It is commonly observed in the jaw and facial bones. OF is a FOL with neoplastic features. It has clinical and pathological features that classify it into two groups: cemento-OF and juvenile OF (El-Mofty, 2014; Mainville *et al.*, 2017).

FOLs have a radiolucent, radiopaque, or mixed radiolucent-radiopaque appearance on radiographs. While their outer borders are usually well-defined, they may have an indistinct appearance that cannot be clearly distinguished from the surrounding bone tissue. Conventional two-dimensional images provide sufficient information in asymptomatic and small-sized cases, but cone beam computed tomography (CBCT) is used to evaluate their relationship to surrounding tissues in larger lesions (Olgac *et al.*, 2021). Although the diagnostic process is easier for oral and maxillofacial radiologists who focus on maxillofacial pathologies, it is important to know these lesions' clinical, radiologic, and demographic findings and properly manage the follow-up and treatment process (Ahmad & Gaalaas, 2018). This study aims to evaluate benign FOLs' clinical and radiographic characteristics and present sample cases with CBCT images.

CASE REPORT

Case 1

A 36-year-old female patient was admitted to the Department of Oral and Maxillofacial Radiology, Kirikkale University Faculty of Dentistry, from an outside centre because of increased radiopacity in the right mandibular region. The patient stated that she had a tooth extracted in this area four years ago and wanted to have a prosthesis placed. The intraoral and extraoral examinations were unremarkable. The panoramic radiograph showed a radiopaque mass at the level of the root of the extracted right first molar (Fig. 1a). The CBCT image obtained for further imaging showed a radiopaque mass approximately 1 cm in diameter, well-circumscribed, and surrounded by a radiolucent halo. No expansion or perforation of the cortex was observed on the CBCT sections. The lesion was located just above the mandibular canal and associated with the canal. It was approximately 4 mm below the alveolar crest and 3 mm from the roots of the nearest teeth, the 2nd premolar and 2nd molar (Fig. 1b, c, d). The patient was informed and followed up with a diagnosis of FOD.

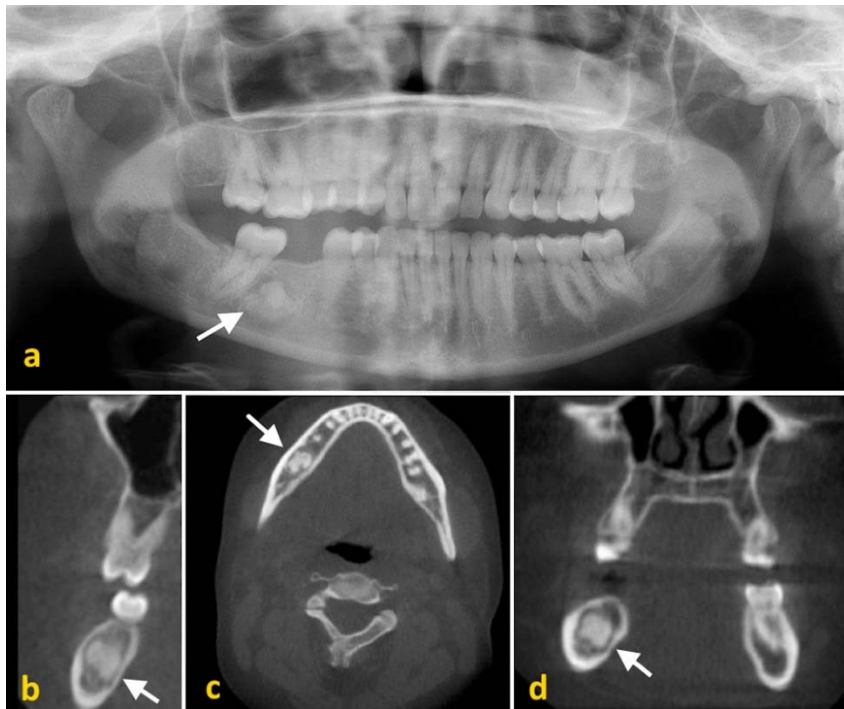


Fig. 1 (a) The panoramic radiography of FOD. The CBCT image of FOD: (b) sagittal, (c) axial, and (d) coronal section showed a radiopaque mass, well circumscribed, and surrounded by a radiolucent halo.

Case 2

A 40-year-old female patient was admitted to the Department of Oral and Maxillofacial Radiology, Kirikkale University Faculty of Dentistry, because of pain in her right upper and lower teeth. She had no systemic diseases in her medical history. Intraoral examination revealed proximal caries and gingivitis in the right maxillary second molar and right mandibular first molar. The panoramic radiograph showed multifocal, bilateral, radiolucent, and radiopaque lesions in the mandible. It was observed that a radiolucent band surrounded lobular broad radiopaque areas (Fig. 2a). The teeth associated with the lesions were asymptomatic and vital, and there was no root resorption on the teeth. CBCT images were obtained for a detailed examination of the lesions. In the coronal section, we observed multiple well-circumscribed opaque and lucent lesions associated with the roots of the mandibular right second premolars and right molars, left mandibular canine, first premolars, and first molars. The lesions located superior to the mandibular canal were not associated with the canal. The CBCT axial section showed cortical thinning with buccolingual expansion in the premolar and molar regions of the right mandible and in the canine and premolar regions of the left mandible (Fig. 2b, c, d). No lesions were found in the maxilla or other craniofacial bones. FLOD was diagnosed based on clinical and radiographic findings. No treatment was planned as the lesions were asymptomatic. The patient was informed. Follow-up was recommended.

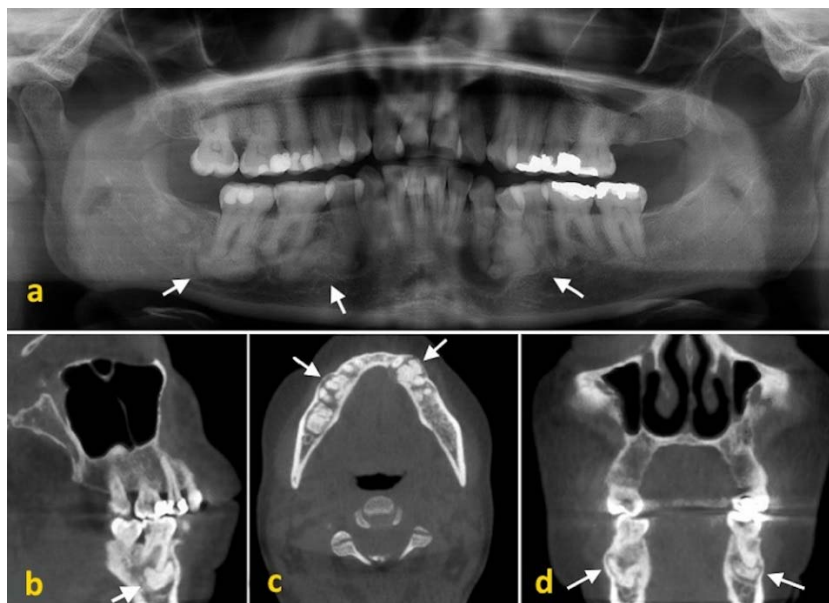


Fig. 2 (a) The panoramic radiography of FLOD. The CBCT image of FLOD: (b) sagittal, (c) axial, and (d) coronal section showed multiple well-circumscribed opaque and radiolucent lesions associated with the roots of the mandibular teeth.

Case 3

A 23-year-old female patient without systemic disease was admitted to the Department of Oral and Maxillofacial Radiology, Kirikkale University Faculty of Dentistry, with swelling and blunt pain in the left gingival region over approximately six months. Intraoral examination revealed buccopalatal expansion in the left posterior maxillary region (Fig. 3b). There were no abnormal findings in the teeth and mucosa in this region. All teeth in this region were vital. Extraoral findings included facial asymmetry and swelling on the left side. The panoramic radiograph showed a ground-glass appearance in the trabeculation of the left maxillary bone and increased radiopacity in the maxillary sinus (Fig. 3a). CBCT images obtained for further evaluation revealed a sizeable ground-glass lesion filling the maxillary sinus at the level of the left molar with buccopalatal expansion (Fig. 3 c, d, e). The patient was referred for a biopsy with a preliminary diagnosis of FD. The histopathological report confirmed a benign FOLs.

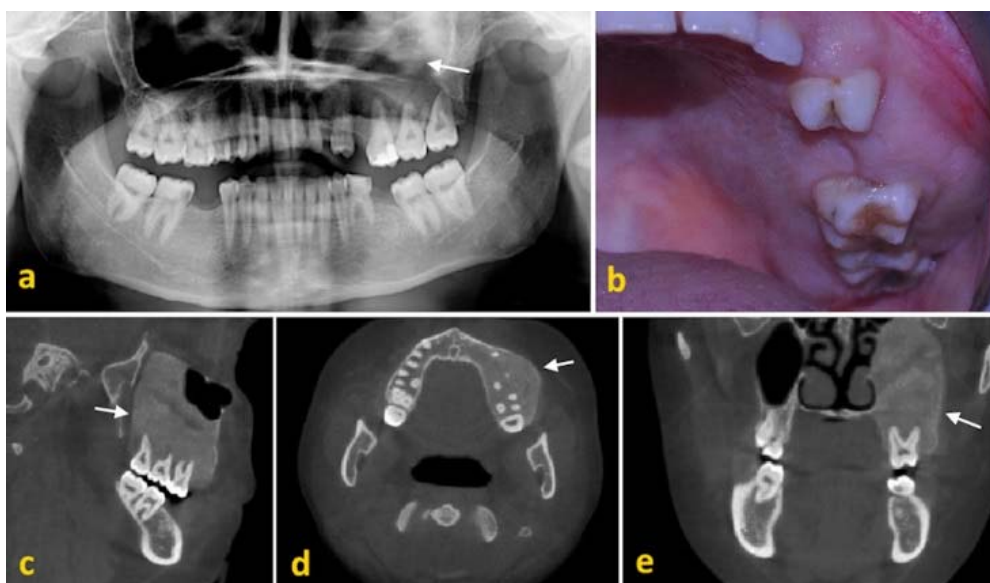


Fig. 3 (a) The panoramic radiography of FD. (b) Intraoral view of patient showed buccopalatal expansion in the left posterior maxillary region. The CBCT images of FD: (c) sagittal, (d) axial, and (e) coronal section showed a sizeable ground-glass lesion filling the maxillary sinus at the level of the left molar with buccopalatal expansion.

Case 4

A 60-year-old female patient presented to the Department of Oral and Maxillofacial Radiology, Kirikkale University Faculty of Dentistry, with the complaint of being unable to use her prosthesis due to painful swelling in the mandible that had developed over a period of ten months. She had been using a full dentures for 30 years and had hypertension and diabetes, for which she took regular medication. Extraoral examination revealed swelling in the anterior region of the mandible causing facial asymmetry. Intraoral examination revealed a hard, palpable mass approximately 3 cm in diameter extending from the lingual lower anterior crest toward the floor of the mouth (Fig. 4a). We noted a soft mass with an epulis fissuratum appearance, approximately 0.5 cm in diameter on the right and 2 cm on the left, thought to be caused by a maladjusted prosthesis in the upper alveolar arch (Fig. 4b). A panoramic radiograph showed a multilocular mixed lesion extending from the anterior mandible to both posteriors, a unilocular mixed lesion in the left posterior region, and a unilocular radiolucent lesion just inferior to the coronoid process in the left ramus (Fig. 5a). CBCT images were obtained to evaluate the lesions in more detail. The CBCT axial and coronal sections showed a multilocular lesion causing buccolingual expansion and cortical bone destruction extending from the anterior mandible to the posterior, a unilocular lesion destroying the crest of the left posterior mandible and just below the coronoid process in the anterior ramus, and a slightly expanding multilocular lesion destroying the midline of the anterior maxilla (Fig. 5b, c, d). A biopsy was performed under local anesthesia. The patient was diagnosed with an OF and referred for surgical intervention. However, all surgical procedures, including the excision of epulis fissuratum, were postponed until the insulin levels were under control.

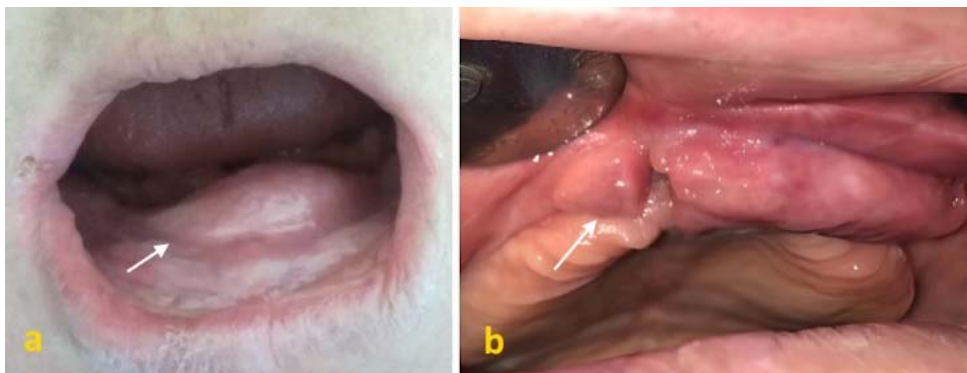


Fig. 4 (a) Intraoral view of patient showed a mass on the floor of the mouth. (b) An epulis fissuratum, in the upper alveolar arch.

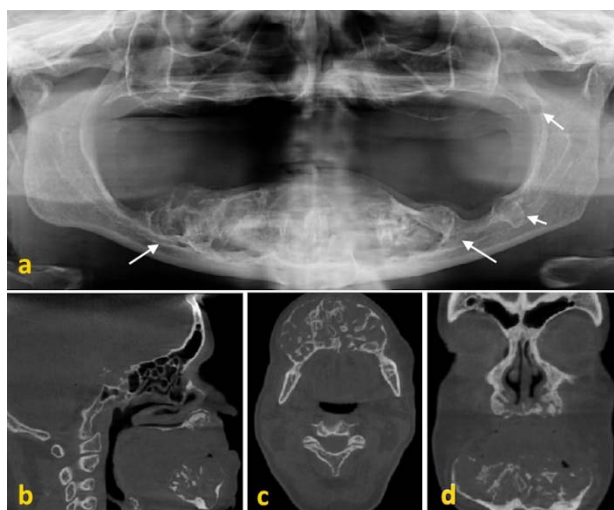


Fig. 5 (a) The panoramic radiography of OF. The CBCT image of OF: (b) sagittal, (c) axial, and (d) coronal section showed multilocular lesion in the anterior mandible, a unilocular lesion at the left posterior mandible, and multilocular lesion on the anterior maxilla.

Written informed consent was obtained from all the cases.

DISCUSSION

Cemento-OD, the most common benign FOL of the jaw, is a reactive process associated with tooth location. In periapical cemento-OD, the affected region is localised in the periapical regions of the mandibular incisors. FOD dysplasia affects a single quadrant, whereas FLOD describes multifocal involvement with lesions in multiple quadrants (Nelson & Phillips, 2019). These three lesions are variants of the same pathologic process. The lesions predominantly affect women and individuals of African descent in the fourth and fifth decades of life (Cavalcanti *et al.*, 2018).

Cavalcanti *et al.* (2018) retrospectively analysed CBCT images to determine the distribution of cemento-OD based on sex, age, and site of choice. They found a prevalence of 0.4% in 82 patients diagnosed with cemento-OD with a mean age of 49.8 years. The majority of patients were female (86.6%). The most common types were periapical (57.3%), focal (28%), and florid (14.6%). The lesions were more frequently located in the mandible (Cavalcanti *et al.*, 2018).

In their literature review, Mac Donald *et al.* conducted a literature search and reported that FLOD affected 97% of women with a mean age of 49. Half of the cases were incidental. Nearly half of the cases presented with pain (48%), 31% with swelling, and 30% with discharge or fistula. The mandible is involved in 100% of cases, and the maxilla in 67%. FOD predominantly affects females (88%) with a mean age of 41. More than half of the cases were incidental (64%); 25% presented with swelling, 28% with pain, and 17% with numbness. The posterior sextants of the mandible and maxilla were involved in 80% and 74% of cases, respectively (MacDonald, 2015). FODs are mainly localised in edentulous areas of the posterior mandible, which should be considered when placing osseointegrated implants (Macdonald-Jankowski, 2008). In the present case report, incidentally detected osseous dysplastic lesions were located in the mandibles of women around 40 years of age, which is consistent with the literature.

Periapical and FOD do not require treatment because the affected teeth are vital. Therefore, radiographic follow-up is sufficient (Nelson & Phillips, 2019). Bone infection after any surgical procedure (e.g. surgical excision or mandibular tooth extraction) in cemento-OD may lead to osteomyelitis (Seifi *et al.*, 2022). Treatment of the resulting infection is complicated by reduced vascularity and increased bone hardness, making the affected area more susceptible to necrosis. Tooth extraction and the use of total dentures are known to predispose to the development of osteomyelitis. Therefore, edentulous adults and the elderly with cemento-OD in the jaw should be closely monitored to minimise the risk of trauma (Kato *et al.*, 2020). Patients with focal and florid bone dysplasia admitted to our clinic were informed about the lesions. Radiographic follow-up was decided.

FD is a benign congenital condition in which normal bone tissue is replaced by fibrous stroma and structurally weak, immature bone. Clinically, it is divided into three groups. Monostotic FD affects only one bone. Polyostotic FD affects multiple bones. FD associated with endocrinopathies is most commonly associated with McCune-Albright syndrome. Craniofacial FD is the type that occurs in the bones of the skull and face. In the jaw bones, it is most common in the second and third decades, about twice as common in the maxilla, and usually unilateral (Hong *et al.*, 2020). In the presented FD case, the unilateral maxillary lesion affects a female patient in the second decade.

The radiologic appearance of FD begins with an initial radiolucent phase, progresses to a more mature mixed phase with both radiopaque and radiolucent internal structures, and finally changes to a radiopaque appearance. The lesion usually has a diffuse, fuzzy, "ground-glass" appearance with indistinct borders that blend imperceptibly with the surrounding normal bone. It may also have a radiographic appearance, such as fingerprints, orange peel, discarded cotton, or a granular pattern. We may observe thinning of the cortical plate, buccolingual expansion, displacement in four directions of the mandibular canal (usually upward), and occasionally an accompanying simple bone cyst (Davidova *et al.*, 2020). Tooth migration, loss of the lamina dura, narrowing of the periodontal ligament space, and rarely root resorption may occur. When the paranasal sinuses are involved, symptoms such as nasal congestion, visual impairment in lesions extending to the orbit, hearing loss in temporal bone lesions, facial headaches, or facial numbness may develop (Unal Erzurumlu *et al.*, 2015). In the FD patient admitted to our clinic, the lesion causing unilateral expansion and facial asymmetry had a ground-glass appearance on radiographs.

Depending on the site of involvement, symptoms, and patient preference, a conservative approach (e.g. bone contouring or radical excision followed by reconstruction) may be considered for the treatment of FD. Malignant transformation of FD is rare, accounting for less than 1% of all cases. Most malignancies develop in patients who have undergone radiotherapy (Kochanowski *et al.*, 2018; Davidova *et al.*, 2020). In the case of the FD patient in this case report, surgical contouring was planned, but the patient refused treatment because she had no aesthetic or functional complaints.

OF is an encapsulated, slow-growing, benign neoplasm consisting of variable amounts of bone-like tissue within the stroma of fibrous tissue. It is most commonly found in the mandibular premolar and molar region, above the mandibular canal, often in the third and fourth decades of life, predominantly in women. Among the cranial and facial bones, the periorbital, frontal, ethmoid, sphenoid, and temporal bones are also common sites of this tumor (Jih & Kim, 2020). Initially asymptomatic, the growth of the lesion is slow and concentric. As it grows, it may cause swelling and deformity. Displacement of teeth is an early clinical sign.

Sometimes, dull pain and paresthesia may develop due to pressure on adjacent nerves (Patait *et al.*, 2020). Mandibular lesions often cause expansion of the cortical bone and inferior displacement of the inferior margin. Large lesions may involve the nasal septum, orbital floor, and infraorbital foramen. They are rarely associated with the destruction of extraosseous soft tissue components (Guddadarangiah *et al.*, 2021). The presented case of OF involved a female patient in her sixth decade, which is inconsistent with the literature regarding the age range. The patient had no symptoms except for a painless swelling in the mandible that grew slowly, causing a notable facial asymmetry and inability to use the denture.

OF are well-defined lesions characterized by a round or oval shape with mixed radiodensity and encapsulated by fibrous tissue with a radiolucent border. Eversole *et al.* identified two different patterns of OF on radiographs: expanding unilocular radiolucencies and multilocular configurations. Barberi *et al.* described three different radiographic appearances: a well-defined lesion without a sclerotic rim (40%), a well-defined lesion with a sclerotic rim (45%), and a lesion with ill-defined borders (15%) (Bala *et al.*, 2017). Pick *et al.* (2022) reported that 20% of cases appear as radiolucencies and that the internal structure may vary depending on the maturity of the lesion and the amount of mineralized tissue. They also noted that a sclerotic cortical line may be visible at the interface with the surrounding bone tissue (Pick *et al.*, 2022). Liu *et al.* (2010) reported different patterns of radiographic appearance in 20 cases of OF. Even large lesions may have a widened, displaced, and thinned outer cortical plate while remaining intact (Liu *et al.*, 2010). In the present case, the OF has rather unusual radiographic features. The multilocular expansile lesion in the anterior mandible has indistinct borders, whereas the unilocular radiolucencies have a well-defined shape with sclerotic borders in the corpus and well-defined borders without sclerotic lines in the ramus. The anterior maxilla has a slightly expanding mixed lesion with a well-defined, radiolucent internal structure.

Conservative surgical excision or curettage is the preferred treatment for OF. The presence of a fibrous capsule facilitates tumor removal. The recurrence rate has been reported to be less than 5%. Radiographic surveillance should be performed to rule out recurrence. Malignant transformation has not been reported (Gomes-Ferreira *et al.*, 2017; Ahmad & Gaalaas, 2018). In the present case, surgical curettage was planned for the patient with OF.

CONCLUSION

Experts should be able to make differential diagnoses of benign FOLs with different clinical and radiographic appearances and offer appropriate treatment options. Advanced imaging systems that allow for three-dimensional evaluation have become commonplace in the diagnostic process in clinics. It is crucial to correctly interpret CBCT images of these lesions and add cases with different clinical, radiographic, and demographic characteristics to the literature.

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