# Multifocal mixed radiolucent-radiopaque lesions in an adult

Ari S. Rosen, BA; Hector L. Sarmiento, DDS, MSc; Paul S. Rosen, DMD, MS; Scott M. Peters, DDS

## THE CHALLENGE

An 66-year-old Black woman was referred to her periodontist for evaluation of pain and facial swelling involving her mandible, in particular the mandibular left quadrant. She described the discomfort as beginning approximately 3 to 4 weeks before her appointment. She stated that several of her teeth were deemed unrestorable by her referring oral health care provider and needed extraction. Her medical history was significant for hypertension, arthritis, asthma, and a heart murmur. Clinical examination revealed an edentulous area in the maxillary left molar region corresponding to teeth nos. 14 and 15. Several teeth showing recurrent caries were also observed. Extraoral examination revealed soft-tissue expansion of the mandibular left region with slight involvement of the inferior aspect of the nasolabial fold (Figure 1). The mandibular left quadrant showed swelling in the vestibule compared with the right side (Figure 2). Radiographic images were obtained, and multiple mixed radiolucent-radiopaque lesions were identified. The central portions of these lesions consisted of sclerotic, hyperostotic material. These central zones were surrounded by well-defined radiolucencies of various sizes. The roots of some of the mandibular premolars and molars appeared broadened and bulbous (Figure 3). Despite these lesions, all of the teeth tested vital with the exception of the mandibular left first and second molars.

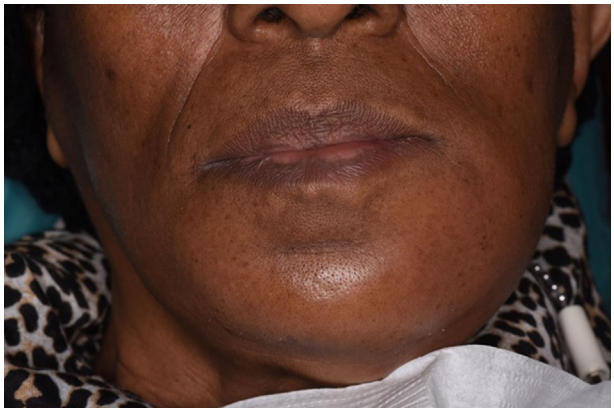

**Figure 1.** Extraoral photograph showing a left-sided facial swelling involving the mandibular soft tissue and inferior aspect of the nasolabial fold.

*(Please see next page for additional images.)*

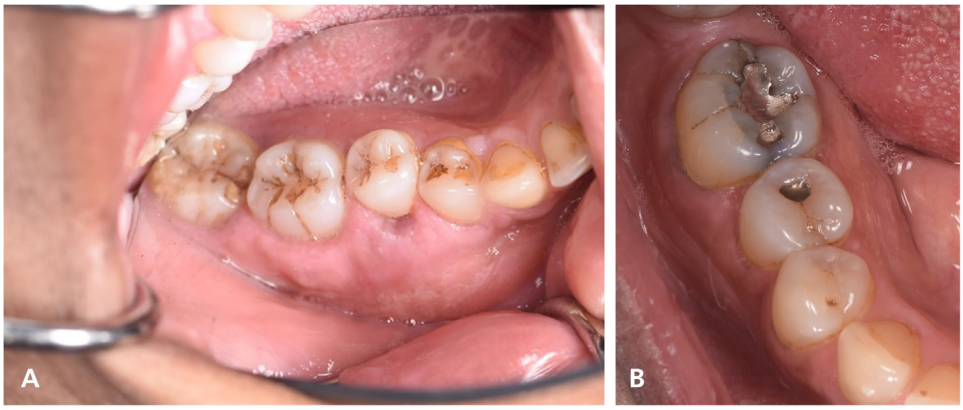


**Figure 2.** Intraoral photograph showing expansion of the left mandibular alveolar ridge (**A**) when compared with the right mandibular alveolar ridge (**B**).

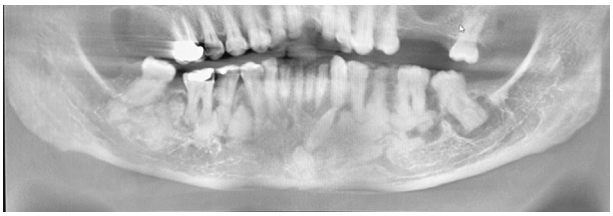

**Figure 3.** Panoramic radiograph showing multiple mixed radiolucent-radiopaque lesions of the mandible.

## Can you make the diagnosis?

**A.** florid cemento-osseous dysplasia (FCOD)
**B.** Gardner syndrome (GS)
**C.** Paget disease (PD)
**D.** familial gigantiform cementoma (FGC)
**E.** chronic recurrent multifocal osteomyelitis (CRMO)

## The diagnosis:

### A. FCOD

FCOD is a type of benign fibro-osseous lesion (BFOL). It is characterized by the replacement of normal bone with cellular fibrous connective tissue. Cemento-osseous dysplasia (COD) is subclassified on the basis of where it occurs in the jaw. Periapical COD describes lesions primarily involving the anterior mandible. A single site of involvement in the posterior mandible is known as focal COD. When multiple areas of the jaw are involved, as in our patient, it is referred to as FCOD. COD occurs traditionally in Black, Asian, and Hispanic women in the fourth to fifth decades of life.[1] Although cases of COD are more common among Blacks, they are not confined to this patient demographic. FCOD, in particular, may be seen more frequently in those of White or East Asian background.[2]

Most cases of COD are detected via incidental radiographic findings. The lesions vary radiographically depending on their stage. Early lesions of COD appear as a radiolucent lesion at the apex of the root, due to osteoclastic breakdown of bone. Over time, the lesions mature into a mixed stage, in which they appear both radiolucent and radiopaque due to increased osteoblastic activity. Late-stage lesions appear mostly radiopaque with a thin radiolucent rim.[3] This is because osteoclastic breakdown of bone is halted at this stage.

The diagnosis of COD is usually made radiographically. Patients with COD are typically asymptomatic. Swelling and cortical expansion should not be observed, although some cases of FCOD may manifest occasionally with limited cortical expansion, as was noted in our patient. However, in our patient, the observed pain and bony expansion were limited to the mandibular left quadrant and were determined to be the result of nonrestorable teeth in the area. These teeth have been in the process of being addressed for their endodontic and restorative needs. The radiographic differential diagnosis of COD will vary given the stage of the lesion. The differential diagnosis for early-stage lesions will include more commonly encountered inflammatory lesions such as radicular cysts, periapical granulomas, or rarefying osteitis.[4] In the case of COD, however, the surrounding teeth will be vital, and care should be taken to avoid any unnecessary endodontic procedures. When the lesions develop radiopaque features, they may be mistaken for other radiopaque entities of the jaw such as dense bone islands (idiopathic osteosclerosis), condensing osteitis, and cementoblastoma, among others. These lesions can be differentiated from COD on the basis of clinical, radiographic, and histologic findings. Dense bone islands will appear as entirely radiopaque lesions; even in the late stages of COD, the lesions will still possess some radiolucent component. Condensing osteitis is associated with a nonvital tooth. Cementoblastoma, which is a benign neoplasm of cementum, will be fused to the root of the affected tooth and have painful cortical expansion in approximately 75% of cases.[5] Although biopsy is not required for diagnosis of most cases of COD, histologic examination of these lesions will show spicules of bone and cementumlike hard tissue within a moderately cellular and well-vascularized stroma.[6] These histologic features are seen in all types of BFOLs, including fibrous dysplasia and ossifying fibroma.

No treatment is needed for COD unless secondary infection occurs. It is important to follow up these lesions regularly, however, as there is a propensity for secondary infection, especially in later stages.[6] Patients should maintain proper oral hygiene to avoid periodontal and pulp diseases. In patients with FCOD who develop expansion of the affected jawbones, Paget disease should be ruled out by performing a serum alkaline phosphatase test. In some instances, the distinction between focal COD and an ossifying fibroma will present a diagnostic challenge. Both of these lesions are BFOLs and will have similar radiographic and histologic findings. They are distinguished on the basis of clinical findings.[7] Ossifying fibromas are neoplasms that will manifest with a painless cortical expansion; this finding would be uncharacteristic of focal COD. In patients who require dental rehabilitation, COD may present a restorative challenge. Blood supply in late-stage COD is poor, and this could be associated with an increased risk of developing osteomyelitis after dental extractions.[8] Regarding dental implant placements in patients with COD, this could be associated with a higher failure rate. Similarly, orthodontics may be ill-advised because of complications stemming from both the dense and poorly disorganized bone. Because remodeling of the bone during active orthodontic therapy is fundamental to the success of tooth movement, these patients may not achieve a successful result.[9]

## DIFFERENTIAL DIAGNOSIS

### GS

GS is a rare condition that represents a variant of familial adenomatous polyposis. It is inherited in an autosomal dominant pattern and is caused by mutations in the adenomatous polyposis coli–encoding gene on chromosome 5.[10] Patients with GS are at increased risk of colorectal carcinoma and often require prophylactic colectomies. Other findings in patients with GS include epidermoid cysts of the skin, desmoid tumors, lipomas, and hypertrophy of retinal pigment.[11] Its relevance to the oral health care provider is that osteomas of the jaws and multiple supernumerary teeth are other commonly observed features of GS. The osteomas will often precede the development of any gastrointestinal findings and can help lead to early detection of this condition. The osteomas of GS will manifest as multiple well-defined radiopaque masses in both the maxilla and mandible.[12] They are often detected as incidental radiographic findings and usually do not result in significant swelling or expansion of the jaws. If examined histologically, the osteomas will appear as masses of benign, dense cortical bone. GS was included in our differential diagnosis because of the presence of multiple bony lesions; however, in this case, the radiographic characteristics of these lesions and the patient's reported history were both inconsistent with making this diagnosis.

### PD

PD, also known as osteitis deformans, is a chronic disorder that affects bone remodeling. In patients with PD there is altered deposition and resorption of osseous tissues resulting in soft, fragile, misshapen bone at high risk of fracture. The cause of PD is unknown, but researchers suspect that environmental and hereditary factors play a role. It is seen more often in older adults, with men 50 years and older at higher risk of this condition.[13] Most examples of PD involve the axial skeleton, with the jaws affected in approximately 37% of cases. When the maxilla and mandible are involved, they will show patchy areas of sclerosis. This is described as a "cotton wool" appearance of bone on radiographs. Patients with PD may be asymptomatic.[14] Those who have symptoms usually report pain of the affected bones, gradual bony enlargement resulting in items of clothing no longer fitting, hearing loss, and difficulty walking.[15] Patients with PD are also at increased risk of developing bony malignancies such as osteosarcoma. Diagnosis of PD is confirmed via serologic studies, with elevated levels of serum alkaline phosphatase being the most important finding.[16] PD is treated by bisphosphonate therapy, which can slow the progression of the disease and alleviate bone pain. PD was included in the differential diagnosis because the appearance of FCOD may closely resemble the cotton wool appearance of bone seen in PD. It was distinguished from PD by the lack of generalized bony expansion. Although this patient did report some bony swelling, it was localized to the area of the infected mandibular left second molar and appears to be resolving with endodontic treatment.

### FGC

FGC is an infrequently encountered type of cemento-osseous lesion. Like FCOD, it involves multiple quadrants of the jaws.[17] Unlike FCOD, however, FGC manifests with massive expansion of the involved jawbones. FGC is inherited in an autosomal dominant fashion.[18] Although FCOD is seen most often in Blacks and women, FGC does not show any significant sex or racial predilections.[19] Patients with FGC will show clinically obvious expansion of the affected jawbones by early adolescence. Radiographically, the lesions will appear similar to those of FCOD. Initial lesions are entirely radiolucent; however, as they progress they will become mixed radiolucent-radiopaque. In later stages, the lesions of FGC are mostly radiopaque with radiolucent borders.[20] The multifocal nature and quality of the lesions are indistinguishable from FCOD. However, patients with FGC will show generalized expansion of the affected jawbones, which is absent in FCOD. Our patient's demographics and clinical presentation were inconsistent with a diagnosis of FGC.

### CRMO

CRMO, also referred to as chronic nonbacterial osteomyelitis, is a rare autoimmune disease that causes inflammation of the bone. People with this condition commonly experience episodes of pain in the affected bones followed by periods of remission. The cause of CRMO is unknown; however, genetics and environmental factors are thought to play a role. It is usually diagnosed in children

approximately 10 years old. It is also seen more commonly in female rather than male patients. Symptoms include bone pain, swelling, and fever. The diagnosis of CRMO is made through a combination of radiography, which shows a pattern of either sclerosis or lysis; blood tests; and bone biopsy.[21] Treatment consists of nonsteroidal antiinflammatory drugs, corticosteroids, and antirheumatics.[22] CRMO differs from chronic suppurative osteomyelitis in that the latter is an inflammatory process of bone resulting from an unresolved bacterial infection. CRMO was included in the differential diagnosis for our patient because of the presence of multiple mixed radiolucent and radiopaque lesions of the jaws. However, the patient's symptoms and reported history were not supportive of this diagnosis.

## CONCLUSION

Because of the radiographic similarities between FCOD and other conditions, diagnosis may prove to be challenging. It is incumbent on the clinician to obtain a thorough medical history and, in addition, to perform detailed clinical, histologic, and serologic analyses to arrive at a final diagnosis. ■

## DISCLOSURES

None of the authors reported any disclosures.

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Mr. Rosen is a student, Columbia University College of Dental Medicine, New York, NY.

Dr. Sarmiento is a clinical associate professor, Department of Periodontics, University of Pennsylvania School of Dental Medicine, Philadelphia, PA, and in private practice, New York, NY.

Dr. Rosen is a clinical professor, Department of Periodontics, Rutgers University School of Dental Medicine, Newark, NJ, and in private practice, New York, NY.

Dr. Peters is an assistant professor, Division of Oral and Maxillofacial Pathology, Columbia University Irving Medical Center, New York, NY. Address correspondence to Dr. Peters, Division of Oral and Maxillofacial Pathology, Columbia University Irving Medical Center, 630 W 168th St, PH15-1562W, New York, NY 10032, email smp2140@columbia.edu.

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