

Fibro-osseous lesion of the jaw

Lect-1

Oral Pathology

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Fibro-osseous lesions

are a diverse group of processes that are characterized by replacement of normal bone by fibrous tissue containing a newly formed mineralized product. The term fibro-osseous lesion is descriptive and does not constitute a specific diagnosis. Lesions belonging to this category may be developmental (hamartomatous), reactive, dysplastic, or neoplastic.

• BOX 14.1 Major Types of Fibro-Osseous Lesions of the Jaws

Fibrous dysplasia

- Monostotic fibrous dysplasia
- Polyostotic fibrous dysplasia
 - Isolated
 - Syndrome-related (i.e., McCune-Albright syndrome, Mazabraud syndrome)
- Cemento-osseous dysplasia
 - Focal cemento-osseous dysplasia
 - Periapical cemento-osseous dysplasia
 - Florid cemento-osseous dysplasia
- Ossifying fibroma
 - Cemento-ossifying fibroma
 - Juvenile ossifying fibroma
 - Trabecular variant
 - Psammomatoid variant

FIBROUS DYSPLASIA

Fibrous dysplasia is a developmental tumorlike condition, characterized by replacement of normal bone by a proliferation of cellular fibrous connective tissue with irregular bony trabeculae. This sporadic condition results from postzygotic, activating mutations in the GNAS gene, which encodes the alpha subunit of a stimulatory G protein. Clinically, fibrous dysplasia may involve one bone or multiple bones; in some cases, involvement of multiple bones may occur in conjunction with cutaneous and endocrine abnormalities.

The extent of disease depends on when the GNAS mutation occurs. During early embryonic development, mutation of a pluripotent stem cell can cause abnormalities in multiple cell types, including osteoblasts, melanocytes, and endocrine cells. In contrast, if the mutation occurs in a skeletal progenitor cell in a later stage of embryonic development, then only osteoblasts will be affected. Alternatively, if the mutation occurs during postnatal life, then osteoblasts in only a single bone will be affected.

Clinical and Radiographic Features

Monostotic Fibrous Dysplasia

About 80% of patients with fibrous dysplasia have disease limited to a single bone (monostotic fibrous dysplasia).

Commonly involved sites include the craniofacial bones, ribs, femur, and tibia. Males and females are affected with about equal frequency. The condition is diagnosed most often during the second and third decades of life. The mean age at diagnosis for cases involving the jaws is approximately 24–37 years; the maxilla is affected more than the mandible. There is a predilection for the posterior region. Although mandibular lesions are truly monostotic, maxillary lesions often extend to involve adjacent bones (e.g., zygoma, sphenoid, ethmoid, frontal bone, temporal bone, occiput)— **in which case the term craniofacial fibrous dysplasia is appropriate.**

Painless, unilateral swelling is the most common clinical finding. Growth is generally slow, and many cases are discovered incidentally during radiographic examination. Adjacent teeth may be displaced by the bony mass but usually remain firm.

The classic radiographic finding is a fine “ground-glass” opacification with poorly defined margins . However, some examples may appear radiolucent or mixed radiolucent-radiopaque. Sometimes there is “ground-glass” opacification surrounding a central radiolucency.

As the patient ages, there may be increased lesion heterogeneity or sclerosis. Mottled, diffusely sclerotic, “rind” sign (thick sclerotic margin), cotton wool, chalky, soap bubble, and fingerprint patterns are possible. There is often buccolingual expansion with cortical thinning.

Mandibular lesions may cause displacement of the inferior alveolar canal and bulging of the inferior border. Periapical radiographs may demonstrate narrowing of the periodontal ligament space and an ill-defined lamina dura that blends with the abnormal bone. Infrequent findings include tooth impaction and root resorption.

Maxillary lesions often cause superior displacement of the sinus floor and obliteration of the antrum. In addition, extensive skull involvement may be evident

Polyostotic Fibrous Dysplasia; McCune-Albright Syndrome

A minority of patients with fibrous dysplasia exhibits involvement of two or more bones (polyostotic fibrous dysplasia).

Most patients with polyostotic disease are diagnosed before 10 years of age, and there is a female predilection. The number of involved bones varies from a few to 75% of the entire skeleton. Commonly involved sites include the craniofacial region, pelvic bones, and femur.

Presenting signs and symptoms related to long bone involvement may include pain, pathologic fracture, limping, leg length discrepancy, and bowing deformity.

Craniofacial involvement is present in as many as 87% of patients with polyostotic disease and may result in facial asymmetry , malocclusion, vision changes,

A small subset of patients may exhibit polyostotic fibrous dysplasia in association with the following syndromes:

- **McCune-Albright syndrome,**

characterized by two or more of the following features: polyostotic fibrous dysplasia, cafe au lait (coffee with milk) pigmentation, and hyperfunctioning endocrinopathies (In the past, some authors used the term Jaffe-Lichtenstein syndrome for cases of polyostotic fibrous dysplasia with cafe au lait pigmentation but **no endocrinopathy**; however, according to current convention, such cases are regarded as a variation of McCune-Albright syndrome.)

- **Mazabraud syndrome,**

characterized by fibrous dysplasia and intramuscular myxomas. The cafe au lait pigmentation typically is seen on the skin at or shortly after birth. It consists of well-defined, tan macules with very irregular, jagged margins, resembling a map of the coastline of Maine. In contrast, the cafe au lait spots of neurofibromatosis usually exhibit smooth borders (like the coast of California)..

The cutaneous lesions in McCune-Albright syndrome tend to be unilateral and more or less respect the midline. In addition, similar pigmentation of the lips and intraoral mucosa may be noted; however, unlike the skin lesions, the oral lesions tend to develop in adulthood and may progress with age

In McCune-Albright syndrome, the most common endocrine abnormality is sexual precocity, particularly in females. Menstrual bleeding, breast development, and pubic hair may be apparent within the first few months or years of life. Other possible endocrinopathies include hyperthyroidism, hyperparathyroidism, neonatal hypercortisolism, and excess growth hormone.

Histopathologic Features

Microscopic examination typically shows irregularly shaped trabeculae of immature (woven) bone in a cellular fibrous stroma . At the periphery, the lesional bone fuses with normal bone, without a capsule or line of demarcation. The abnormal bony trabeculae tend to be thin and disconnected, with elongated, curvilinear shapes likened to Chinese characters or alphabet soup (often forming the letters “C,” “Y,” and “U”). Osteoblastic rimming is usually absent or minimal, and peri-trabecular clefting (artifactual retraction of the stroma from the bony trabeculae) is common. In later stages, the woven bone is replaced by lamellar bone with roughly parallel trabeculae .

Fibrous dysplasia may appear more sclerotic in the jaw and skull than other sites. Microscopic variations include a pagetoid pattern (characterized by thick, interconnected bone trabeculae) and a hypercellular pattern (characterized by parallel bone trabeculae with numerous osteocytes and polarized osteoblastic rimming).

Treatment and Prognosis

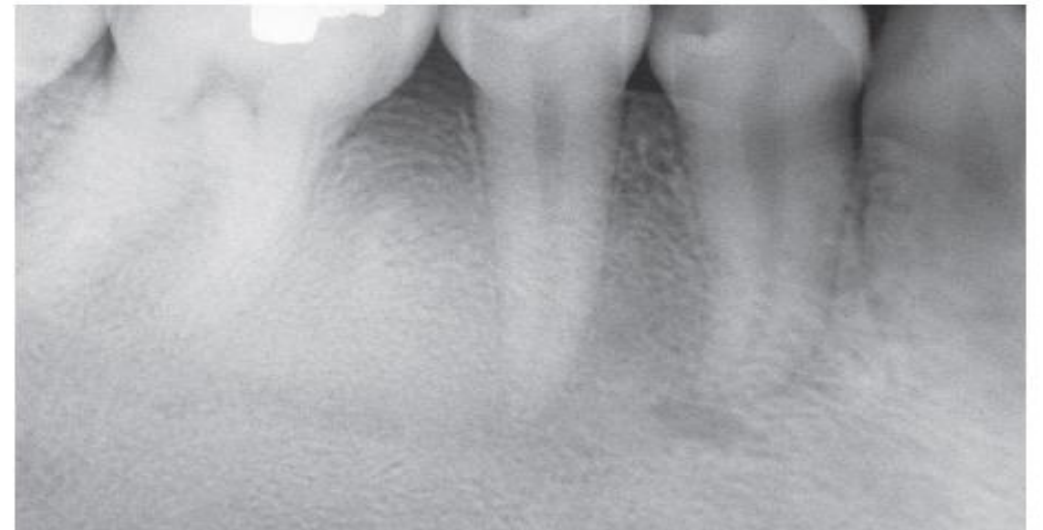
Fibrous dysplasia tends to stabilize upon skeletal maturation, and spontaneous regression even has been reported. Therefore, conservative management is preferred.

Patients with minimal cosmetic and functional disturbances may not require surgical treatment. For young patients with significant problems due to large or extensive lesions, surgical contouring, shaving, or other debulking procedures may be performed. However, subsequent regrowth may require additional surgery. Approximately 20%–50% of patients show some regrowth after surgical debulking, and the risk for regrowth is greater among younger than older patients.

Transformation into malignancy, usually an osteosarcoma, is estimated to occur in less than 1% of patients with fibrous dysplasia. The risk for sarcomatous transformation is greatest among those with a history of radiation therapy, McCune-Albright syndrome, or Mazabraud syndrome



• **Fig. 14.34 Fibrous Dysplasia.** Expansile mass of the left maxilla in a 45-year-old woman. This lesion was known to have been present for at least 20 years.



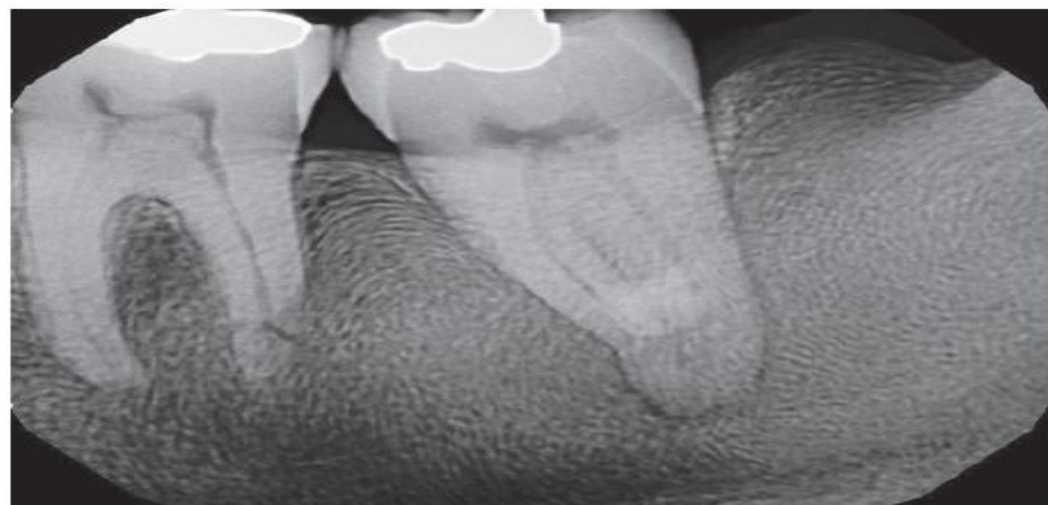
• **Fig. 14.36 Fibrous Dysplasia.** Periapical radiograph showing a diffuse “ground-glass” radiographic appearance.



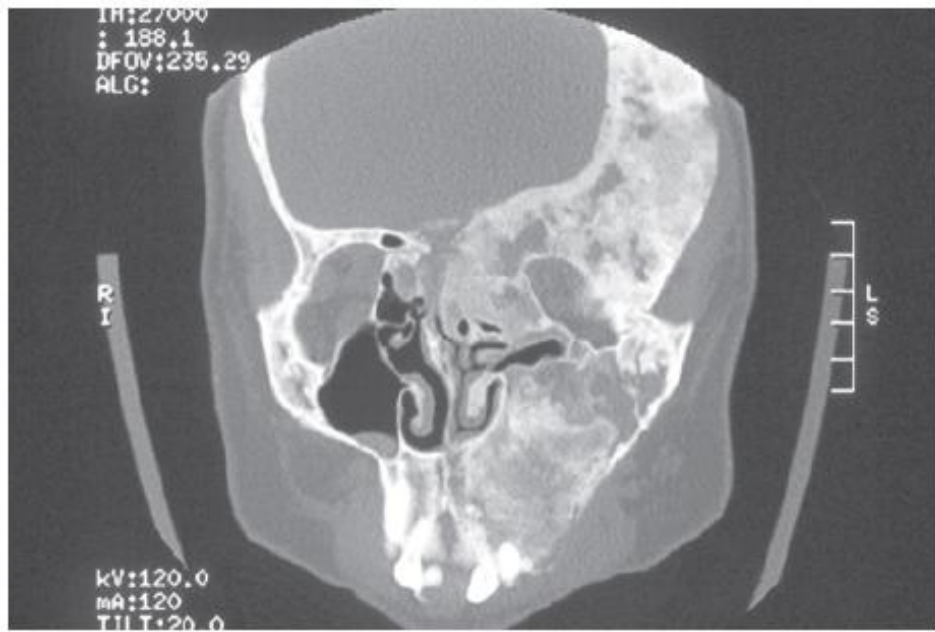
• **Fig. 14.35 Fibrous Dysplasia.** Panoramic radiograph of the patient shown in Fig. 14.34. A diffuse "ground-glass" radiopacity is evident. (Courtesy of Dr. Richard Brock.)



• **Fig. 14.37 Fibrous Dysplasia.** Occlusal radiograph showing localized expansion of the mandible and the "ground-glass" radiographic appearance. The margins of the lesion are not well defined and blend into the adjacent bone. (From Waldron CA, Giansanti JS: Benign fibro-osseous lesions of the jaws: a clinical-radiologic-histologic review of 65 cases. I. Fibrous dysplasia of the jaws, *Oral Surg Oral Med Oral Pathol* 35:190-201, 1973.)



• **Fig. 14.38 Fibrous Dysplasia.** Radiograph showing a "fingerprint" pattern.



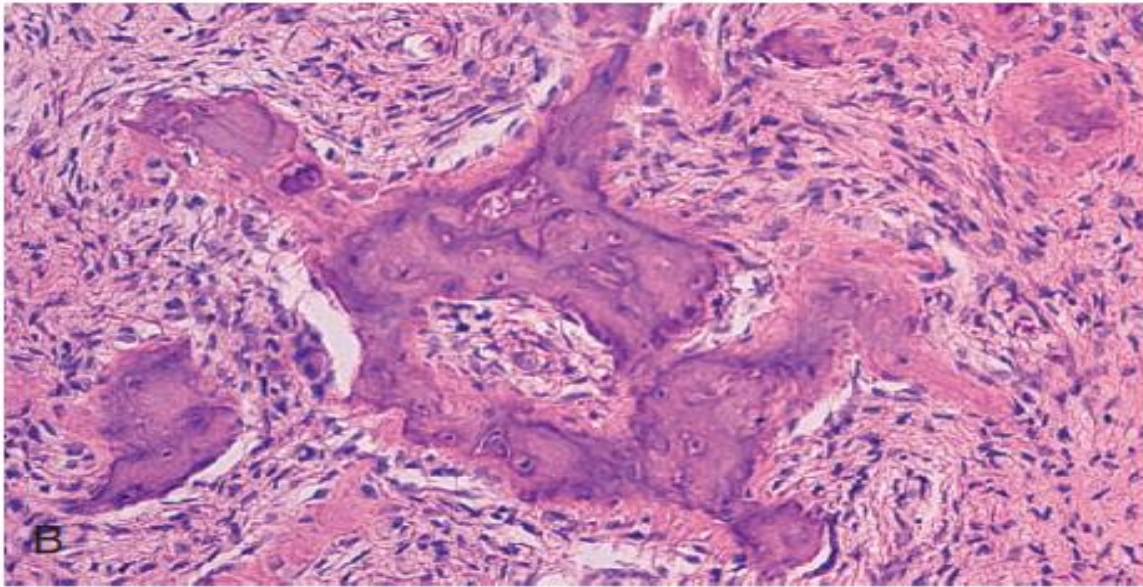
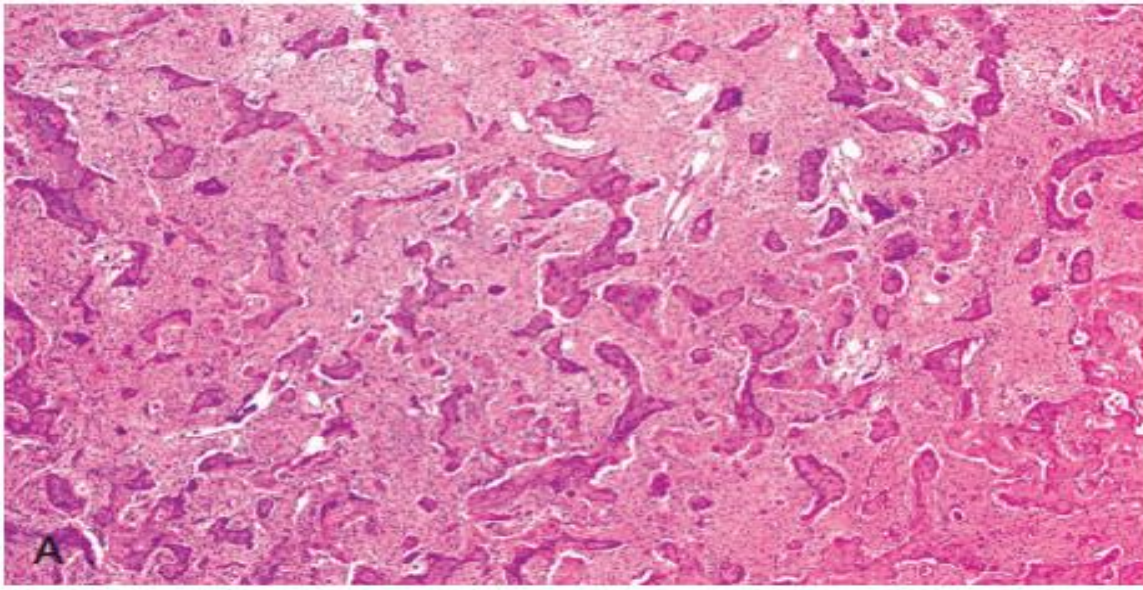
• **Fig. 14.39 Fibrous Dysplasia.** Computed tomography (CT) image showing extensive involvement of the maxilla and skull.



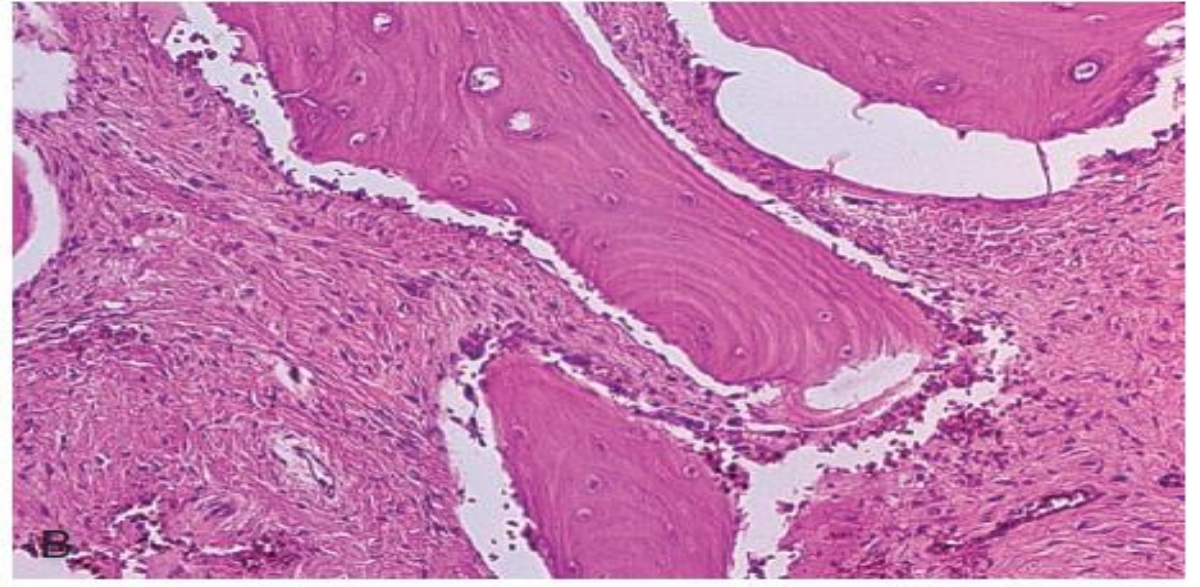
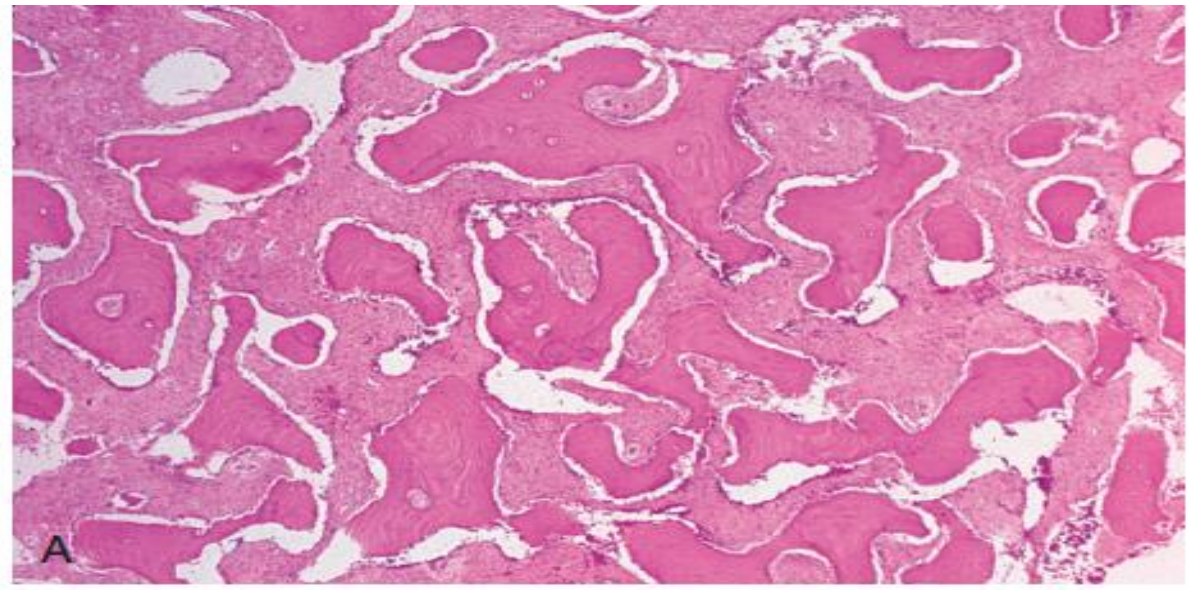
• **Fig. 14.41 Polyostotic Fibrous Dysplasia.** McCune-Albright syndrome. *Café au lait* pigmentation of the abdomen. This is the same patient as shown in Fig. 14.40.



• **Fig. 14.40 Polyostotic Fibrous Dysplasia.** McCune-Albright syndrome. **A**, Young man exhibiting enlargement of the right maxilla and mandible. **B**, Intraoral photograph showing unilateral maxillary expansion. **C**, Panoramic radiograph showing ill-defined lesions of the right side of both jaws.



• **Fig. 14.42 Fibrous Dysplasia.** **A**, Irregularly shaped trabeculae of woven bone in a fibrous stroma. **B**, Medium-power view showing peripheral osteoid without osteoblastic rimming.



• **Fig. 14.43 Mature Fibrous Dysplasia.** **A**, This long-standing lesion shows separate, broad trabeculae of bone within fibrous connective tissue. **B**, Note the lamellar maturation of the bone.

CEMENTO-OSSEOUS DYSPLASIAS

(OSSEOUS DYSPLASIA)

Cemento-osseous dysplasia occurs in the tooth-bearing areas of the jaws and is probably the most common fibro-osseous lesion encountered in clinical practice.

Because the histopathologic features share many similarities with fibrous dysplasia and ossifying fibroma, correct diagnosis can be problematic but is critical for appropriate management.

Clinical and Radiographic Features

Based on clinical and radiographic features, cemento-osseous dysplasia includes the following variants:

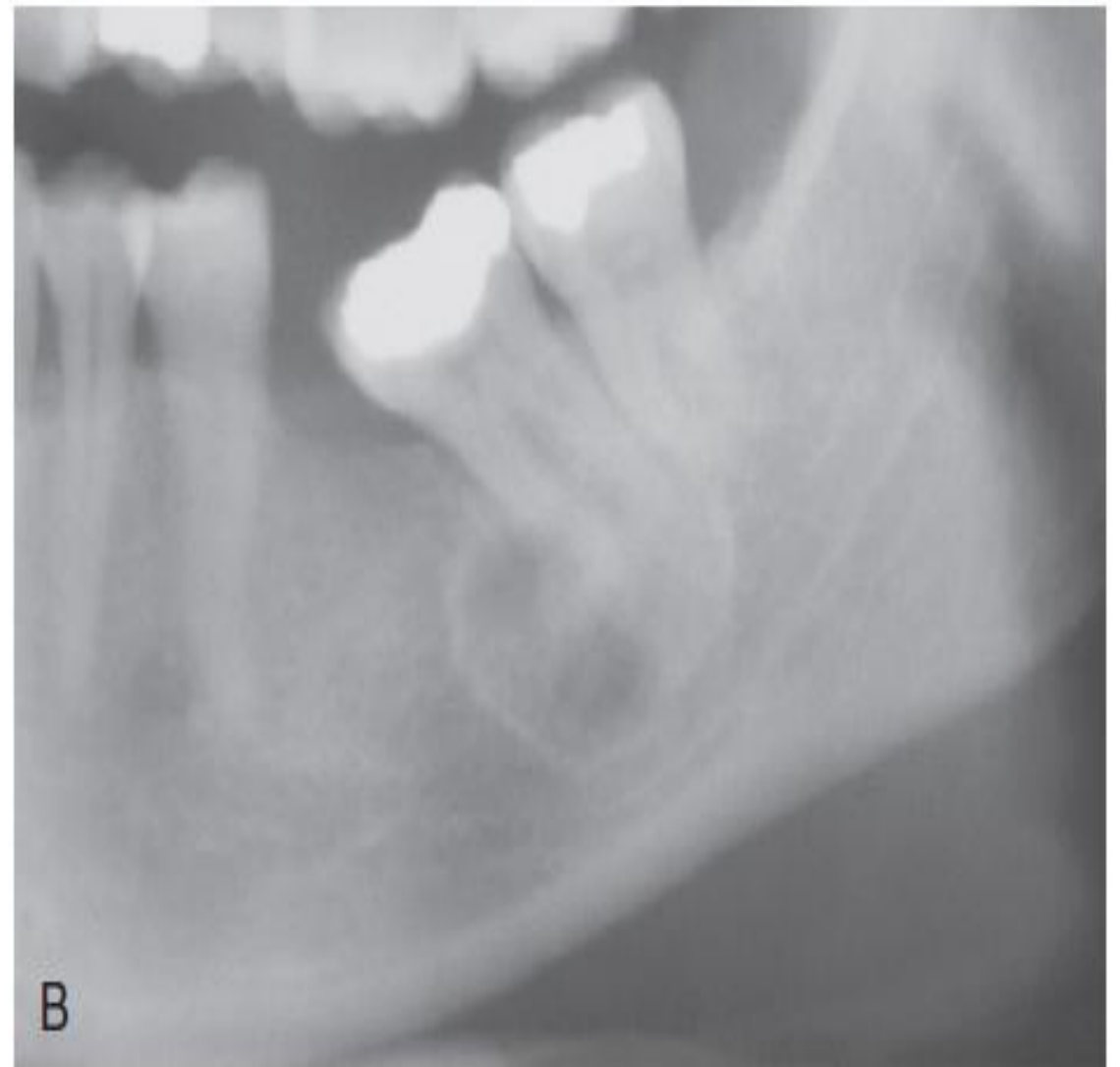
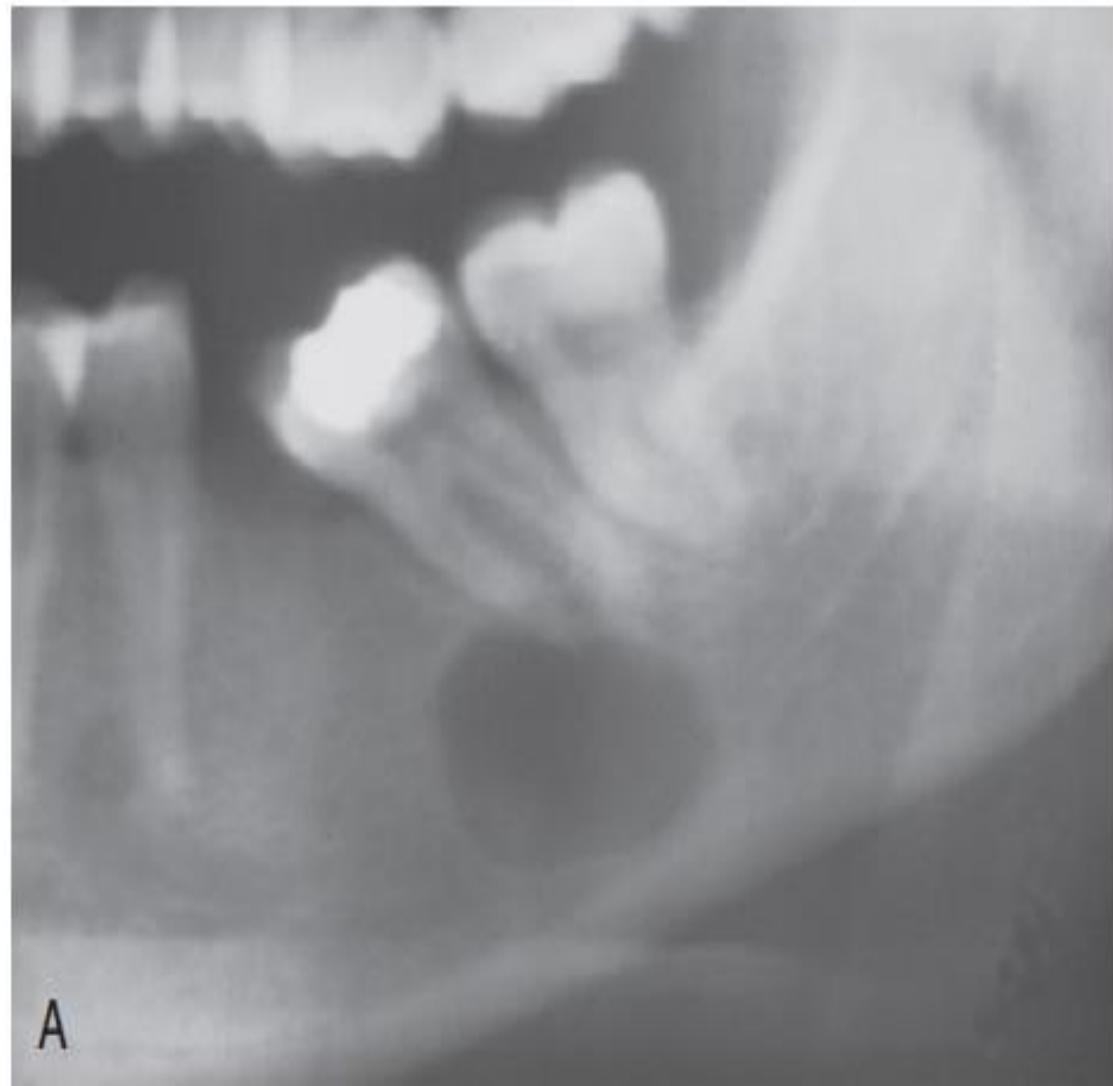
(1) focal, (2) periapical, and (3) florid.

Focal Cemento-Osseous Dysplasia

Focal cemento-osseous dysplasia involves a single site. About 90% of cases of focal cemento-osseous dysplasia occur in females, with a predilection for the third to sixth decades. Focal cemento-osseous dysplasia most commonly involves the posterior mandible. The disease typically is asymptomatic. Most lesions are smaller than 1.5 cm in diameter.

Radiographically, the lesion varies from completely radiolucent to densely radiopaque with a thin peripheral radiolucent rim. Most commonly, however, there is a mixed radiolucent and radiopaque pattern. The borders tend to be well defined but slightly irregular, and a sclerotic margin occasionally may be noted. The condition typically occurs around tooth apices or in extraction sites. Thinning or perforation of the cortex and resorption of adjacent tooth roots may be evident in some cases on CBCT examination.

Most examples are not expansile, although mild expansion is possible.



• **Fig. 14.44 Focal Cemento-Osseous Dysplasia.** **A**, A radiolucent area involves the edentulous first molar area and the apical area of the second molar. **B**, Radiograph of the same patient taken 9 years later showing a mixed radiolucent and radiopaque pattern.

Periapical Cemento-Osseous Dysplasia (Osseous Dysplasia; Periapical Cemental Dysplasia; Periapical Cementoma; Anterior Mandibular Osseous Dysplasia)

Periapical cemento-osseous dysplasia predominantly involves the periapical region of the anterior mandible. Solitary lesions may occur, but multiple foci typically are present. There is a marked female predilection specially black one . Most patients are diagnosed initially between 30 and 50 years of age. The associated teeth are usually vital and seldom have restorations.

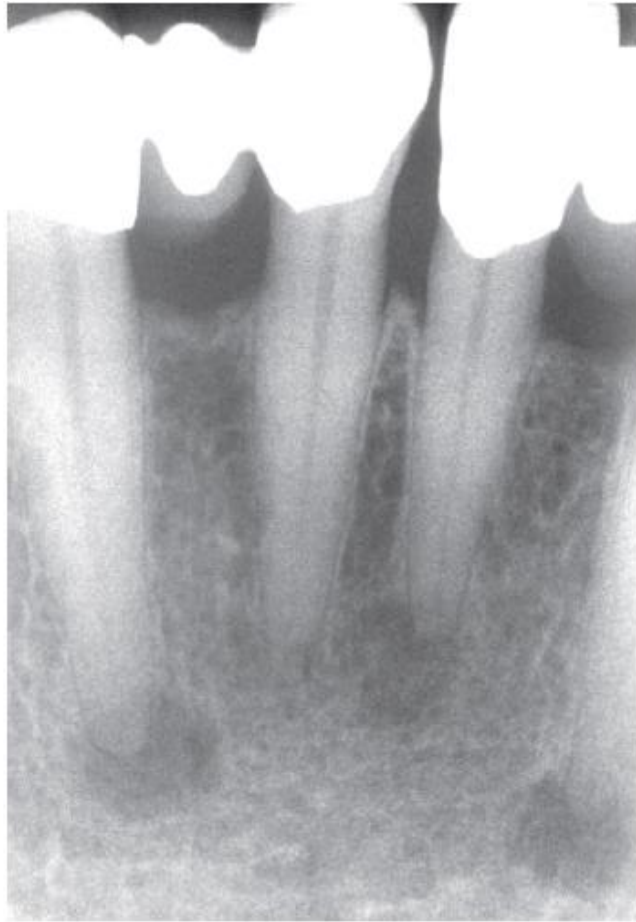
Periapical cemento-osseous dysplasia is an asymptomatic condition that often is discovered when radiographs are taken for other purposes. Early lesions appear as circumscribed periapical radiolucencies, similar to periapical granulomas or periapical cysts . However, unlike periapical inflammatory disease, periapical cemento-osseous dysplasia may produce lesions that are not exactly centered on the anatomic root apices . adjacent lesions fuse to form a linear radiolucency that envelops the apices of several teeth .

Over time, the lesions tend to “mature” and become mixed radiolucent-radiopaque . The radiopaque component may appear round, ovoid, or irregular. In the end stage, the lesions appear as circumscribed, dense radiopacities with narrow radiolucent rims. The radiolucent rims may be surrounded by sclerotic margins. The periodontal ligament space usually appears intact, and fusion to the tooth is rare..

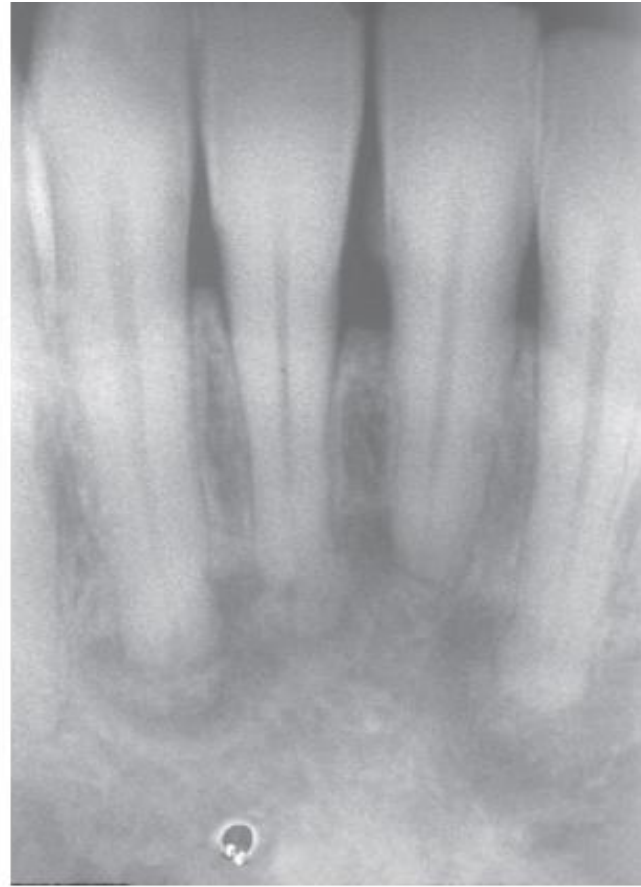
The lesions are typically non-expansile. mild expansion and thinning or perforation of the cortical plates at times may occur with resorption of adjacent tooth roots .

Florid Cemento-Osseous Dysplasia

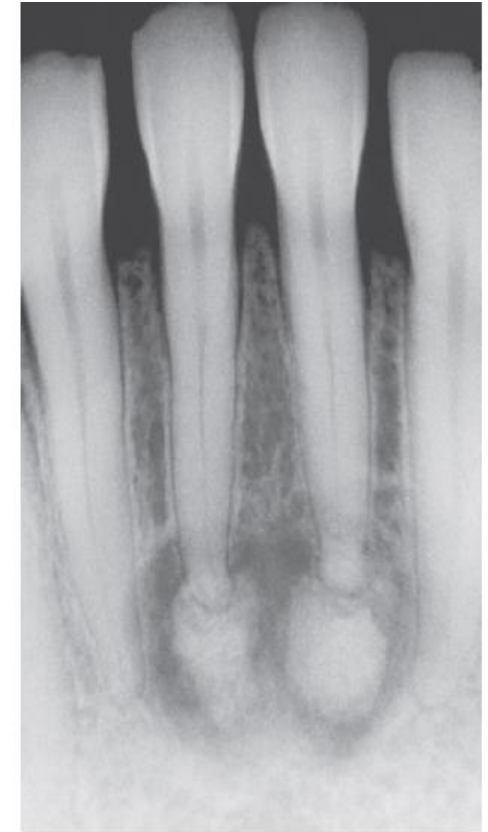
Florid cemento-osseous dysplasia exhibits multifocal involvement not limited to the anterior mandible. many cases affect only the posterior portions of the jaws. Like the periapical pattern, this form predominantly affects black females with a marked predilection for middle-aged to older adults.



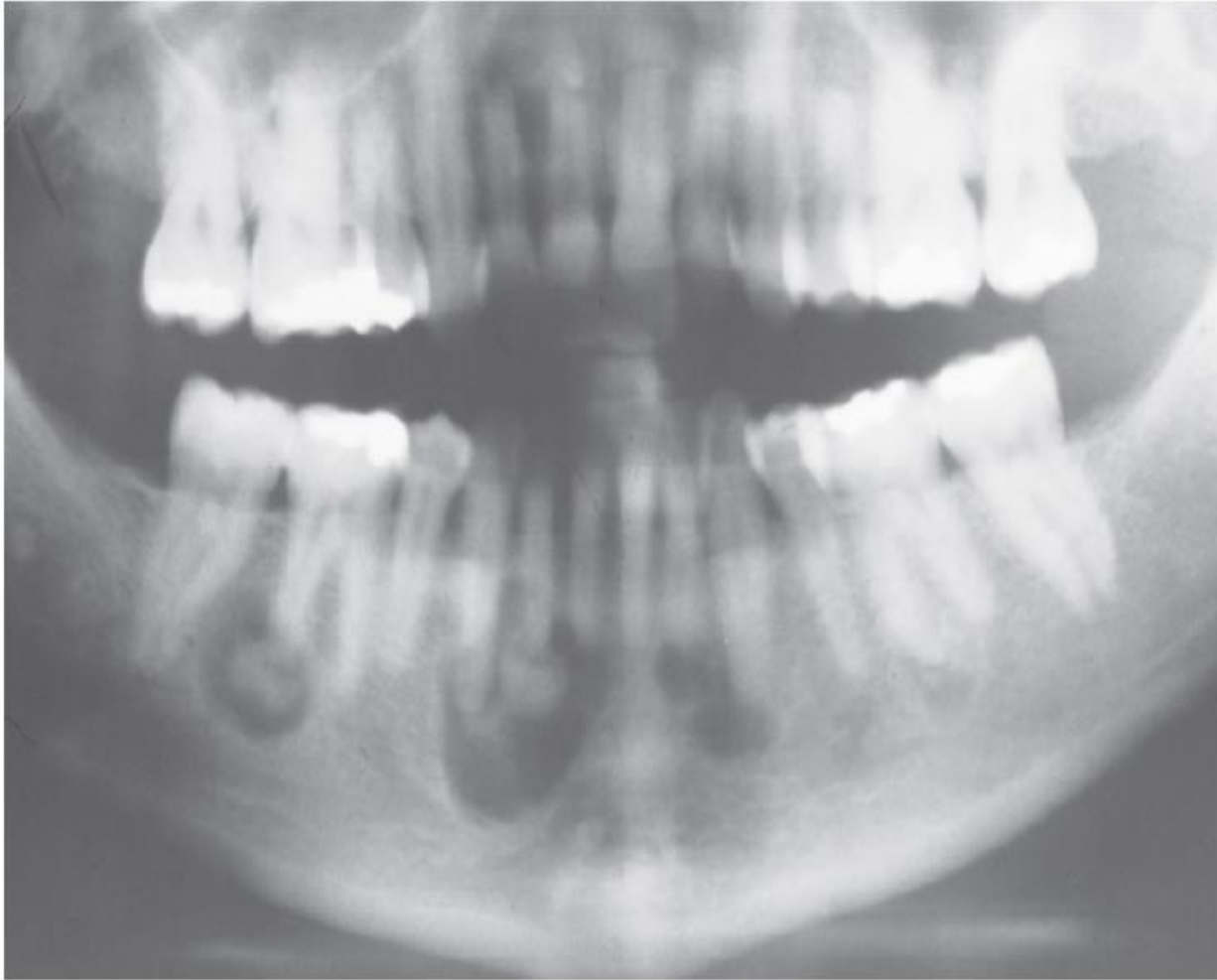
• **Fig. 14.45** **Periapical Cemento-Osseous Dysplasia.** Periapical radiograph showing multiple radiolucent lesions at the apices of the anterior mandibular teeth. (Courtesy of Dr. Aaron Camer.)



• **Fig. 14.46** **Periapical Cemento-Osseous Dysplasia.** Later-stage lesions exhibiting significant mineralization.



• **Fig. 14.47** **Periapical Cemento-Osseous Dysplasia.** Later-stage lesions exhibiting significant mineralization.



• **Fig. 14.48 Florid Cemento-Osseous Dysplasia.** Multiple mixed radiolucent and radiopaque lesions involving the anterior and posterior regions of the mandible.



• **Fig. 14.49 Florid Cemento-Osseous Dysplasia.** Multiple mixed radiolucent and radiopaque lesions throughout the mandible. (Courtesy of Dr. Haitham Hadeed.)

The lesions show a tendency for bilateral and fairly symmetrical involvement of the mandible, with extensive involvement in all four quadrants. At times the disease may be asymptomatic. In other cases, patients may have dull pain, alveolar sinus tracts, and exposure of yellowish, avascular bone to the oral cavity. Jaw expansion may be evident.

Radiographically, Initially, the lesions are predominantly radiolucent then become mixed, then predominantly radiopaque with only a thin radiolucent rim. On occasion, a lesion can become almost totally radiopaque and blend with the adjacent normal-appearing bone. Both dentulous and edentulous areas may be affected. Typically, the radiopacities remain separated from adjacent teeth with intact periodontal ligament space.

the cemento-osseous material may fuse with the tooth root surface to produce thickened root apices surrounded by radiolucency (or a “hypercementosis-like” appearance).

Histopathologic Features

All three patterns of cemento-osseous dysplasia demonstrate similar histopathologic features. There are typically fragments of cellular fibrovascular connective tissue with scattered hemorrhage and a variable mixture of woven bone, lamellar bone, and cementum-like particles.

As the lesions mature, the ratio of fibrous connective tissue to mineralized material decreases. Over time, the bony trabeculae become thick and curvilinear, with shapes likened to ginger roots.

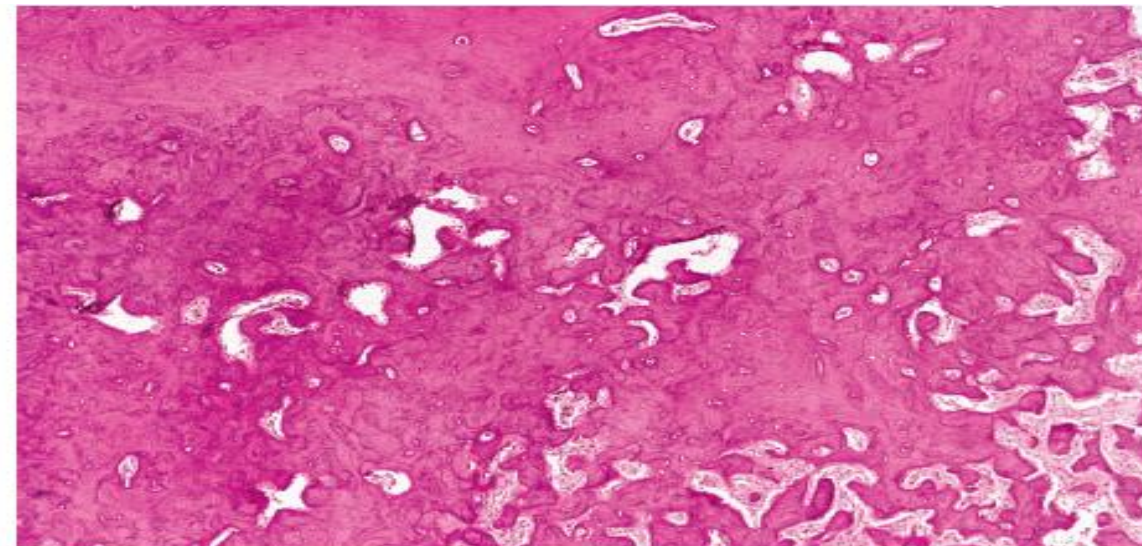
In the final radiopaque stage, the individual trabeculae fuse to form sheetlike or globular masses of sclerotic, disorganized cemento-osseous material

Diagnosis

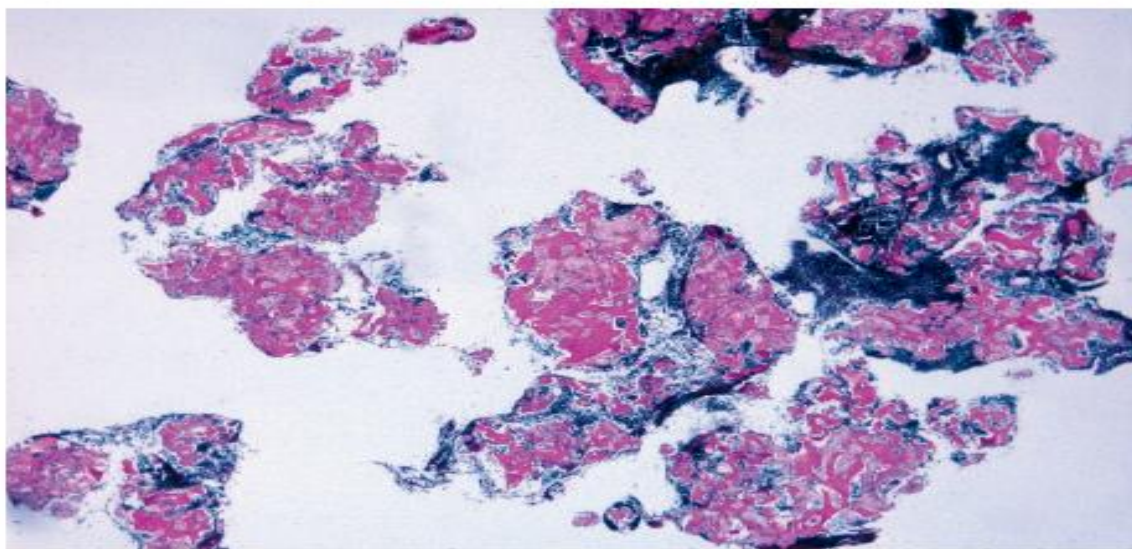
In most instances of florid or periapical cemento-osseous dysplasia, the distinctive clinical and radiographic findings (e.g., a black female patient with multiquadrant involvement or multiple lesions involving vital lower incisor teeth) allow a strong presumptive diagnosis. In contrast, the features of focal cemento-osseous dysplasia tend to be less specific, and biopsy often is needed for diagnosis.



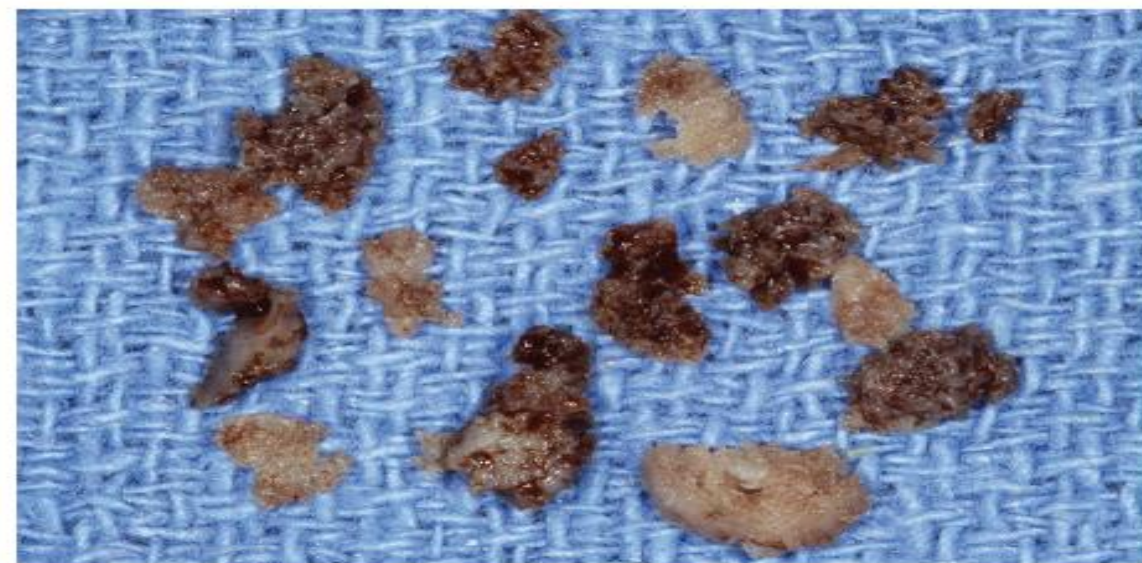
• **Fig. 14.50 Florid Cemento-Osseous Dysplasia.** Yellowish, avascular cementum-like material is beginning to exfoliate through the oral mucosa.



• **Fig. 14.53 Cemento-Osseous Dysplasia.** Late-stage lesion showing a sclerotic mass of cemento-osseous material.



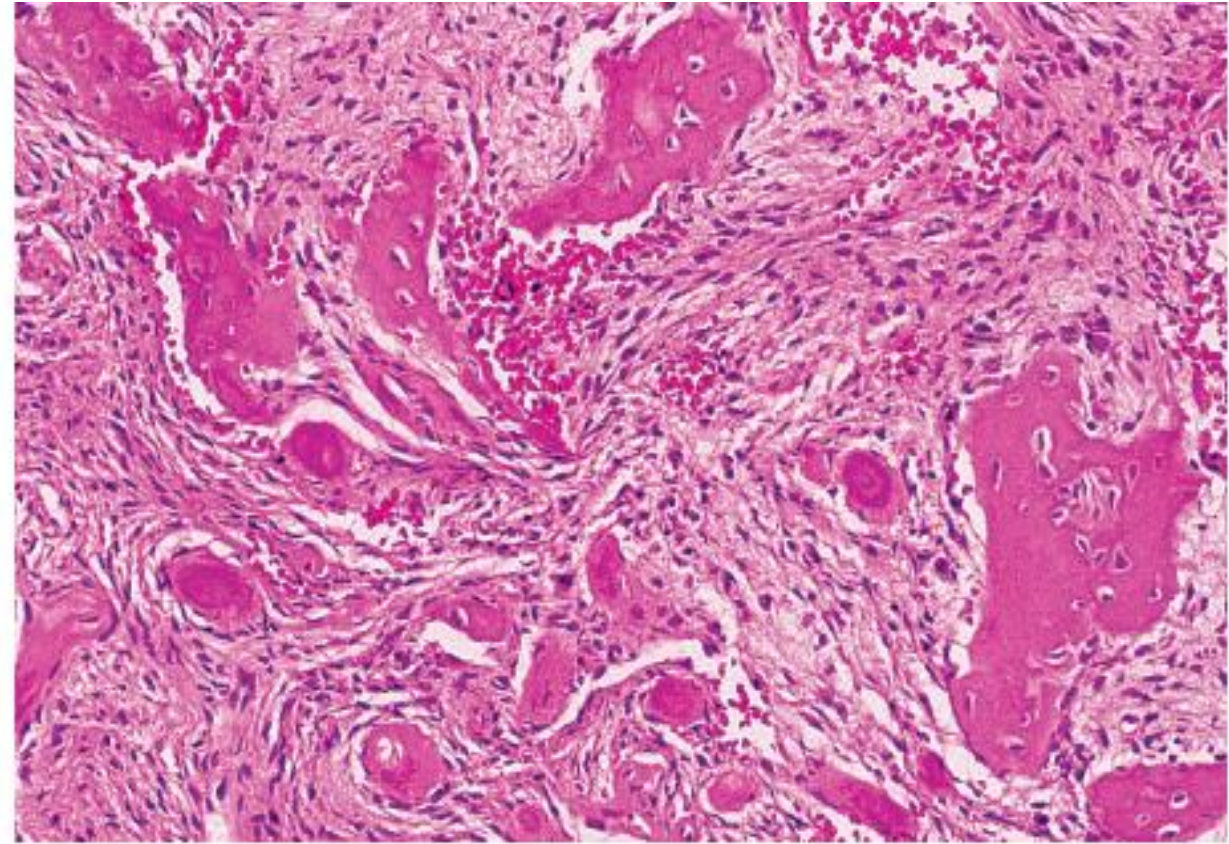
• **Fig. 14.51 Cemento-Osseous Dysplasia.** Low-power photomicrograph showing fragments of cellular fibrous connective tissue containing scattered trabeculae of bone.



• **Fig. 14.54 Cemento-Osseous Dysplasia.** Gross specimen comprised of small, gritty tissue fragments.

Treatment and Prognosis

Cemento-osseous dysplasia does not appear to be neoplastic and, therefore, generally does not require removal. During the predominantly radiolucent phase, the lesions cause few problems. In the sclerotic phase, the lesions tend to be hypovascular and prone to necrosis with secondary infection. For the asymptomatic patient, the best management consists of regular recall examinations with prophylaxis and oral hygiene reinforcement to control periodontal disease and prevent tooth loss. Because the onset of symptoms usually is associated with exposure of the sclerotic masses to the oral cavity, surgical procedures (e.g., biopsy, elective tooth extraction) should be avoided. In some instances, symptoms begin after lesion exposure resulting from progressive alveolar atrophy under a denture. Therefore, affected patients should be encouraged to retain their teeth. Management of the symptomatic patient who has developed secondary osteomyelitis is more difficult. Antibiotics may be indicated but often are not effective. Sequestration of the sclerotic cementum-like masses occurs slowly and is followed by healing. Saucerization of dead bone may speed healing.



• **Fig. 14.52** Cemento-Osseous Dysplasia. High-power photomicrograph showing spicules of bone and cementum-like hard tissue within moderately cellular fibrous connective tissue. Note the hemorrhage around the bony trabeculae.

CEMENTO-OSSIFYING FIBROMA (CONVENTIONAL OSSIFYING FIBROMA; OSSIFYING FIBROMA; CEMENTIFYING FIBROMA)

Although it can resemble focal cemento-osseous dysplasia radiographically and histopathologically, cemento-ossifying fibroma is **a true neoplasm with significant growth potential**. The origin of cemento-ossifying fibroma is somewhat controversial. Based upon its predilection for tooth-bearing areas of the jaws and ability to produce a variable mixture of bony trabeculae and cementum-like spherules, investigators have suggested that the origin is odontogenic or from periodontal ligament progenitor cells. However, microscopically identical neoplasms with cementum-like differentiation also have been reported in the orbital, frontal, ethmoid, sphenoid, and temporal bones or non-toothbearing areas of the jaws, and many authorities regard the cementum-like material in cemento-ossifying fibromas as a variation of bone. Indeed, some contend that bone and cementum are essentially the same mineralized product and only can be distinguished based on anatomic location (i.e., presence of cementum along root surfaces). Therefore, a non-odontogenic origin also has been proposed.

Clinical and Radiographic Features

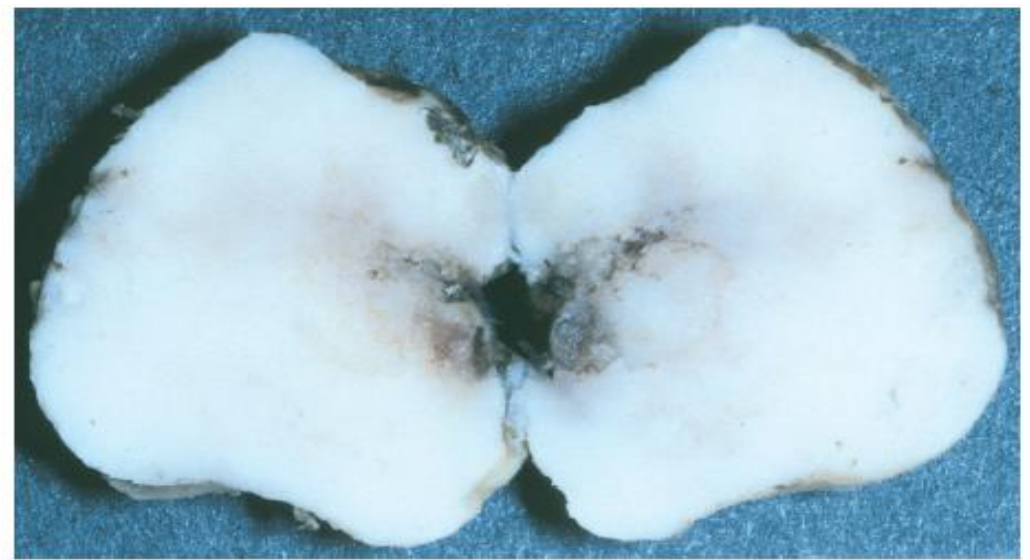
Cemento-ossifying fibromas occur in the third and fourth decades of life. There is a female predilection, with the mandible involved more than the maxilla. The mandibular premolar and molar area is the most common site. Maxillary lesions tend to involve the antrum and canine fossa.

Small lesions are often asymptomatic. Larger tumors may produce painless jaw swelling and obvious facial asymmetry. massive lesions cause considerable deformity. Pain and tooth mobility are infrequent , and paresthesia is rare. Most examples are solitary but multiple lesions have been reported.it may be a component of hyperparathyroidism-jaw tumor syndrome.

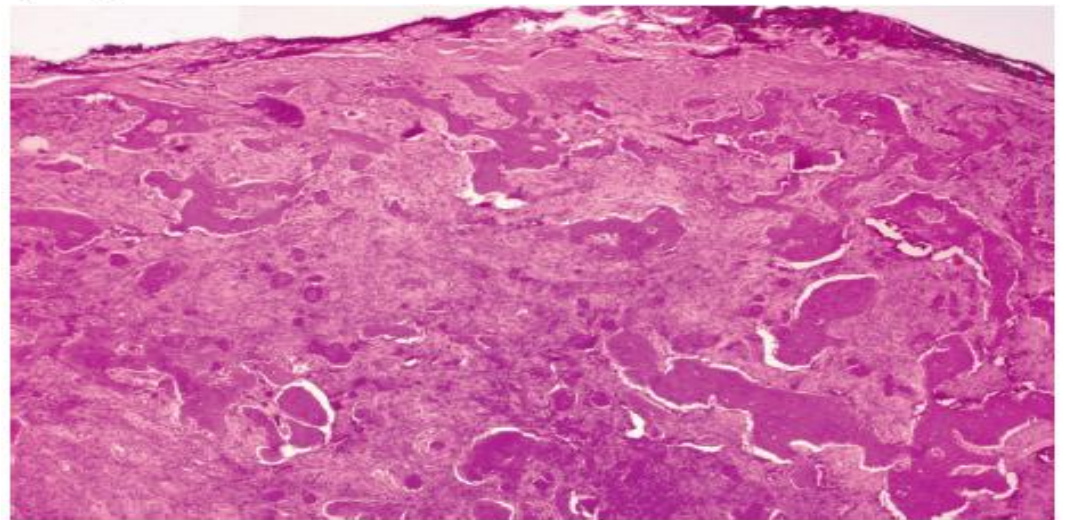
Depending on the amount of calcification, radiographic examination shows a well-defined lesion that is radiolucent, mixed radiolucent and radiopaque, or mostly radiopaque. Some examples exhibit a sclerotic border. Buccolingual bony expansion is common. The adjacent teeth may exhibit root divergence or root resorption. Maxillary lesions may displace the sinus floor.



• **Fig. 14.57 Cemento-ossifying Fibroma.** Clinical image (A) and computed tomography (CT) scan (B) showing a large, expansile lesion of the posterior maxilla. (Courtesy of Dr. Greg Cobetto.)



• **Fig. 14.58 Cemento-ossifying Fibroma.** Gross specimen showing a well-circumscribed tumor that shelled out in one piece and subsequently was hemisected.



• **Fig. 14.59 Cemento-ossifying Fibroma.** This low-magnification photomicrograph shows a well-circumscribed solid tumor mass. Trabeculae of bone and droplets of cementum-like material can be seen forming within a background of cellular fibrous connective tissue.

Histopathologic Features

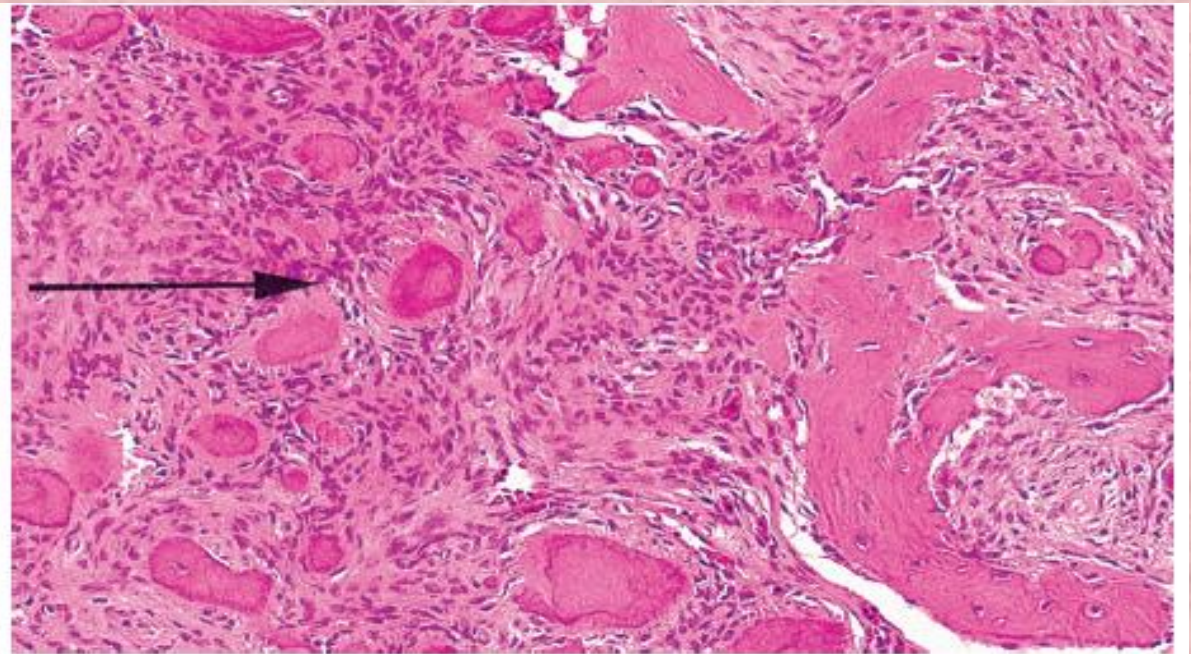
At surgery, the lesion tends to separate easily from the surrounding bone; thus, the tumor usually is submitted as one mass or a few large pieces. Grossly and microscopically, most lesions are well demarcated but unencapsulated. Microscopic examination shows cellular fibrous tissue with mineralized product .

The mineralized component may include a variable admixture of osteoid, bone, and basophilic acellular (or “cementum-like”) spherules.

The bony trabeculae vary in size and frequently demonstrate both woven and lamellar patterns. Peripheral osteoid and osteoblastic rimming are usually present. The cementum-like spherules often demonstrate brush borders that blend into the adjacent connective tissue. These spherules may be surrounded by radiating collagen fibers reminiscent of Sharpey fibers within the periodontal ligament. The heterogeneous mineralized product characteristic of cemento-ossifying fibroma differs from the more uniform osseous pattern of fibrous dysplasia.

Treatment and Prognosis

The circumscribed nature of the cemento-ossifying fibroma generally permits enucleation or curettage of the tumor with relative ease. Large lesions that have caused considerable bone destruction may necessitate surgical resection and bone grafting. Recurrence is uncommon. the prognosis is very good, and there is no apparent potential for malignant transformation.



• **Fig. 14.60** Cemento-ossifying Fibroma. High-power photomicrograph showing a mixture of woven bone and cementum-like material. Note the spherules demonstrating peripheral brush borders (arrow).

JUVENILE OSSIFYING FIBROMA (JUVENILE ACTIVE OSSIFYING FIBROMA; JUVENILE AGGRESSIVE OSSIFYING FIBROMA; AGGRESSIVE OSSIFYING FIBROMA)

The juvenile ossifying fibroma is a controversial lesion that has been distinguished from cemento-ossifying fibroma on the basis of patient age, site predilection, and clinical behavior.

The term includes two distinct clinicopathologic variants: (1) trabecular and (2) psammomatoid. The psammomatoid variant involving the craniofacial skeleton more frequently than the trabecular variant.

Clinical and Radiographic Features

Juvenile ossifying fibromas most often arise in children, adolescents, and young adults. A broader age range has been reported for the psammomatoid variant (3 months to 72 years) than the trabecular variant (1–33 years). The average age at diagnosis is younger for the trabecular variant than the psammomatoid variant. No significant gender predilection.

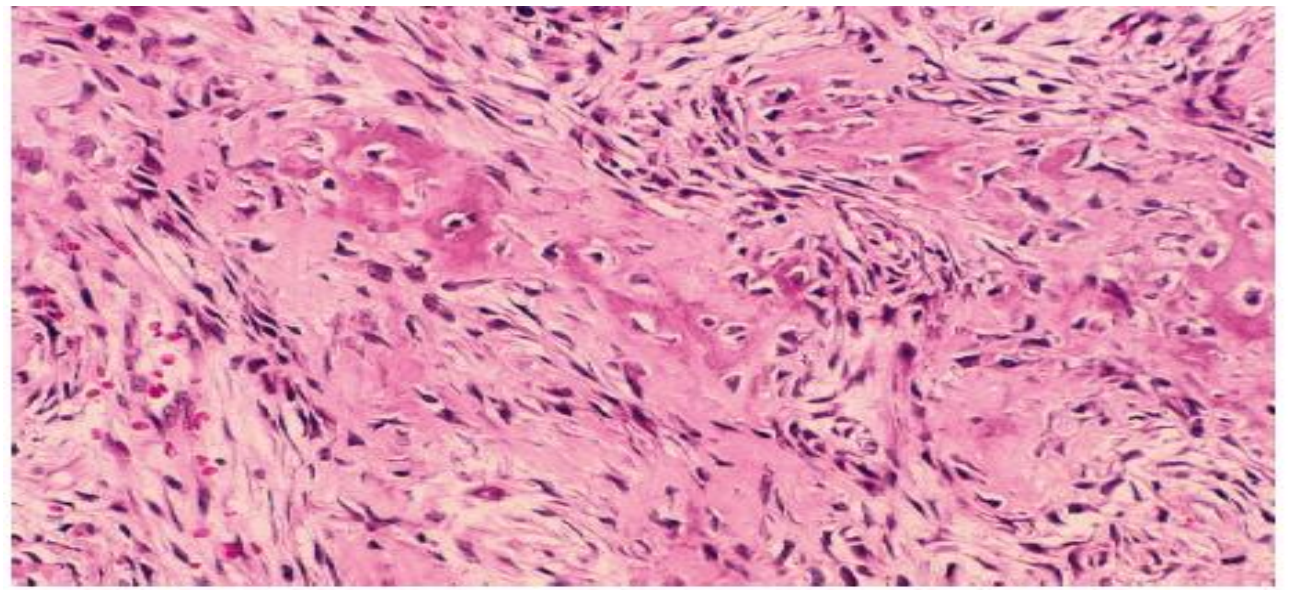
The trabecular variant arises primarily in the jaws, whereas the psammomatoid variant often involves the paranasal sinuses and orbital region. In both variants, gnathic involvement slightly favors the maxilla.

Some cases exhibit slow, progressive enlargement, others exhibit rapid, aggressive growth. Small lesions may be discovered incidentally during routine radiographic examination, larger lesions tend to cause painless swelling and obvious facial enlargement. Tumors arising in the paranasal sinuses may penetrate the orbital, nasal, and cranial cavities. Nasal obstruction, epistaxis, sinusitis, headaches, proptosis, diplopia, and blindness may result. Intracranial extension may cause encephalitis and meningitis.

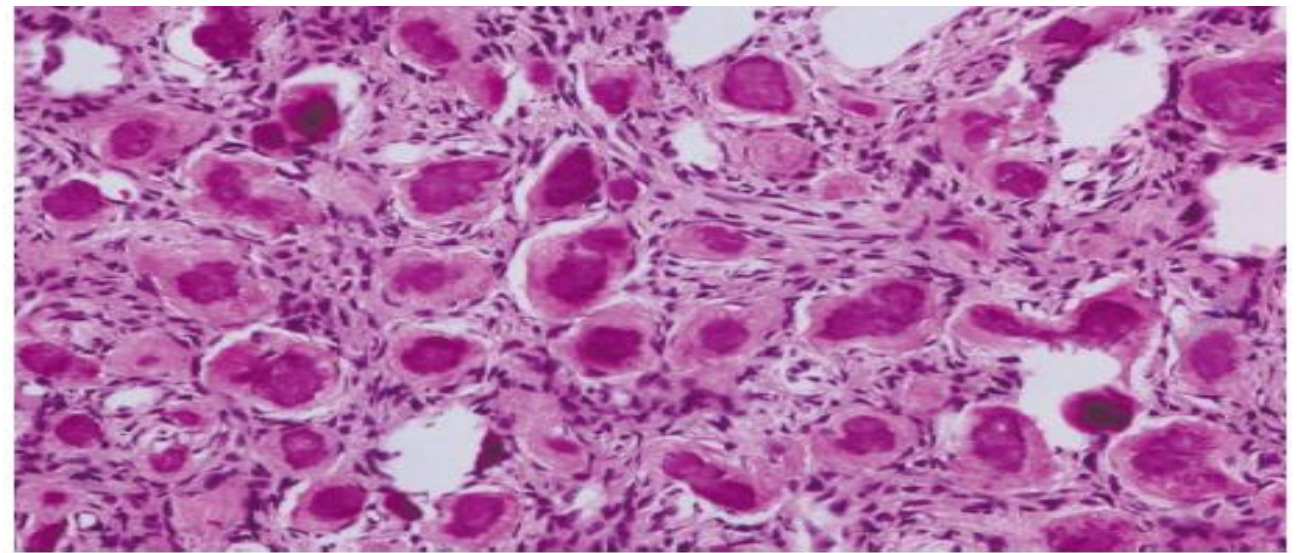
Radiographic examination typically shows a well-circumscribed radiolucency or mixed radiolucency and radiopacity. A sclerotic border may be evident in some cases. Homogeneous “ground-glass” opacification, “ground-glass” opacification with central radiolucency, discrete calcifications, or a multilocular “honeycomb” pattern also may be observed. Aggressive lesions often cause expansion and cortical thinning or perforation. Jaw lesions also can cause tooth displacement, root resorption, and failure of tooth development.



• **Fig. 14.61 Juvenile Ossifying Fibroma.** Computed tomography (CT) scan showing a large tumor involving the left maxilla and maxillary sinus of a 12-year-old girl. Clinically, the tumor was growing rapidly.



• **Fig. 14.62 Juvenile Ossifying Fibroma, Trabecular Variant.** Trabeculae of cellular woven bone are present in a cellular fibrous stroma.



• **Fig. 14.63 Juvenile Ossifying Fibroma, Psammomatoid Variant.** Cellular fibrous connective tissue containing spherical ossicles with basophilic centers and peripheral eosinophilic rims.

Histopathologic Features

Both patterns are typically well demarcated but unencapsulated. The mineralized component differs between the two variants.

The trabecular variant shows irregular strands of highly cellular osteoid encasing plump and irregular osteocytes. These strands often are lined by plump osteoblasts and multinucleated osteoclasts.

the psammomatoid variant exhibits concentric lamellated ossicles that vary in size and may be round, ovoid, or crescentic in shape. The ossicles typically appear basophilic with peripheral eosinophilic osteoid rims and brush borders that blend into the surrounding stroma.

In both variants, the mineralized product is set within the background of a fibrous stroma. The stroma is often hypercellular. Mitotic figures may be noted. Scattered aggregates of osteoclastic giant cells are often evident in the trabecular variant, whereas giant cells are an infrequent finding in the psammomatoid variant. In the trabecular variant, the newly formed osteoid often blends imperceptibly with the surrounding fibrous stroma. Zones of hemorrhage, giant cells, edema, and pseudocystic degeneration may correlate with grossly evident brown, curvilinear strands on the tumor's cut surface.

Treatment and Prognosis

For small lesions, complete local excision or thorough curettage appears adequate. Combining enucleation with curettage or peripheral ostectomy may decrease the risk for recurrence. For large or aggressive lesions, wider resection may be required. Malignant transformation has not been documented.

