GROUP 22

Differential diagnosis of Jaw lesions
# Classification of jaw cysts

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<td>Nasopataline Cyst</td>
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Radicular Cyst

Cyst formed from tooth granuloma. The epithelium residue of Malassez proliferates among the granuloma tissue as a result of infectious irritation. The epithelium sections degenerate, necrotize and liquify. A cystic cavity forms filled with fluid and lined with non-keratinised multi-layered flat epithelium.

• Radiological image (monocytsic brightening which covers apex of non vital tooth)
• Type of fluid and EDI (non vital) identify radicular cysts from other jaw lesions
Follicular Cyst

forms through accumulating fluid between reduced enamel epithelium and tooth crown or through cystic degeneration of enamel organ itself. There are 4 types: central, eruptional, lateral, circumferential.

- Type of fluid (clear yellowish fluid with cholestrine crystals)
- Radiological image (monocystic brightening in which the crown of an uncut tooth lies) identify follicular cysts from other jaw lesions
Odontogenic Keratocyst

formed from the epithelium of the tooth plate and its epithelium residue. Radiographically there are 3 types: monocystic, polycystic and hiatus.

- the macrotype of intralumenal cystic fluid (creamy exudate with specific smell or yellowish liquid like ‘curd milk’) differentiates Keratocyst from other jaw lesions
Residual Cyst

remained in the bone after extraction of causative tooth, can also develop from the non-curettaged granuloma or parts of radicular cyst left after extraction of the tooth.

• based on radiological image (monocystic radiolucency in toothless section) differentiates residual cysts from other jaw lesions.
Parodontal Cyst

Develops due to inflammatory process on the gingival pocket of a vital tooth, localised near the gingival edge of a lateral/distal surface of a tooth root. When it develops directly from the lower wisdom tooth, it’s termed ‘retro-molar’ and normally results from frequent bouts of pericoronitis. Pathogenesis is similar to a radicular cyst.

DD:

- Cystic degeneration of/or unicystic ameloblastoma
- Gingival cyst
- Glandular odontogenic cyst
- Odontogenic keratocyst
Globulo-maxillar Cyst

develops in the point of accretion of the globular and maxillar callus. Typically located between the roots of the lateral incisor and the canine of the maxilla.

- typical localisation, radiographic image (pear-shaped brightening seen between roots of lateral incisor and canine of maxilla)
- type of fluid differentiate globullo-maxillar cyst from other jaw lesions.
Naso-alveolar Cyst develops from incarcerated epithelium on the point of accretion of the globular, maxillar and lateral nasal callus.

- Based on typical localisation and cystic fluid
Median Cyst of the Maxilla

Develops along the median line on the accretion spot of the palatal callus and the maxilla.

- Based on localisation (in front part of the hard palate or behind roots of central incisors and type of fluid help differentiate it from other jaw lesions
- It is difficult to differentiate it from the naso-palatine cyst
Median Cyst of the Mandible

Develops along the median line of the accretion point of the two lower jaws.

- Type of fluid helps differentiate it from the keratocyst
- If there is a non-vital tooth present in the region, it is difficult to differentiate from a radicular cyst
Dermoid Cyst

Typically present from birth, cystic structure lined by stratified squamous epithelium. Cyst lining contains sebaceous glands, hair follicles/shafts, eccrine sweat glands. Cyst contains keratinaceous, caseous, sebaceous or purulent debris with hair, nails, fat or cholesterol clefts. Often found in the floor of the mouth. Radiology shows a radiolucent unilocular lesion.

DD

- **Dentigerous cyst**: cuboidal, nonkeratinizing lining
- **Keratocystic odontogenic tumor**: orthokeratotic variant has stratified squamous lining and may have sebaceous differentiation, but no hair, no eccrine sweat ducts / coils
- **Radicular cyst**: stratified squamous lining with cholesterol clefts, but no sebaceous glands, eccrine glands or hair
Nasopalatine Cyst

Most common intraosseous, non odontogenic cyst of the maxilla. Located on the anterior midline of hard palate. Cyst can form within the incisive canal. Rarely develops within incisive papilla (as then termed cyst of incisive papilla).

- Enlarged incisive fossa - the incisive foramen by convention is not expected to exceed 6 mm, a radiolucency in this region with ill defined borders is regarded as a large incisive fossa
- Distinction from a nasopalatine duct cyst can be made clinically by aspiration
- Central giant cell granuloma, can have similar radiologic findings, histologic features of CGCG consist of a proliferation of fibrous tissue, hemorrhagic fociuses, hemosiderin deposits, osteoclast-like giant cells and reactive bone formation
- Ameloblastoma
- Keratocystic Odontogenic Tumor
- Periapical (radicular) cyst, on radiograph and CT, is well circumscribed, rounded or heart shaped radiolucency of anterior maxilla
## Odontogenic Tumours

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<th>BENIGN</th>
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<td>Ameloblastoma</td>
<td>Ameloblastic Carcinoma</td>
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<tr>
<td>Pindborgs Tumour</td>
<td>Ameloblastic fibro-sarcoma</td>
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<tr>
<td>Adenoameloblastoma</td>
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<tr>
<td>Cementoma</td>
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<tr>
<td>Odontoma</td>
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<tr>
<td>Ameloblastic fibroma</td>
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<tr>
<td>Ameloblastic fibro-odontoma</td>
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Ameloblastoma

Benign odontogenic tumor with ectodermal origin. It is the most common odontogenic tumour. There are 3 types: unicystic, multi cystic and peripheral. It is locally aggressive and slow growing. Mandible is more often affected than the maxilla. Most often accidentally found on radiographs, there is a painless swelling, malocclusions and altered sensation in area.

DD:

• With the different types of cysts and other bone tumours

• Histopathology test: show cells that have a tendency to move nucleus away from the basement membrane
Pindborg’s Tumour

(Calcifying epithelial odontogenic tumour) is common in the posterior mandible of adults, between ages 40-50. Characterised by slow growing but invasive development, most cases show intraosseous growth. There may be a painless swelling, and it is often concurrent with an impacted tooth.

DD:

Histopathology test will reveal prominent intercellular bridges and nuclear changes such as pleomorphism, hyperchromatism and prominent nuclei.

- Ameloblastoma
- Giant cell granuloma
- Ossifying fibroma
- Myxoma
- Malignant metastases
Adenoameloblastoma

Is an uncommon epithelial tumour of the jaw mostly affecting young people, predominantly female. 3 clinicopathological variants: follicular (73%), extra follicular (24%) and peripheral. Shows an increasing painless swelling which may eventually cause facial deformity.

DD:

• Odontogenic cysts (typically misdiagnosed as this)
• Bone tumours with cystic ray image
Cementoma

Benign tumour of mesenchymal origin, composition is like dental cement and tumour is surrounded by a capsule. Its development begins at eruption of the teeth and then calcifies. Painless growth that develops slowly, and is asymptomatic for a long time. 4 types have been distinguished, it is usually discovered upon looking at a dental radiograph.

DD: (other bone tumours of mesenchymal origin)

- Osteoma
- Osteoblastoclastoma
- Ossifying fibroma
- Osteosarcoma
Odontoma

Benign tumour formed by epithelial and mesenchymal structures: enamel dentin, pulp and cement. Slow expansive growth, causing disorders in tooth eruption or developing maxillofacial deformities. Types: ordinary, complex and complex-mixed.

DD:
• Osteoma
• Ossifying fibroma
• Cementoma
• Atypically located teeth
Ameloblastic Fibroma

(mixed odontogenic tumour) Neoplasms of odontogenic epithelium and mesenchymal tissues. Commonly found on the posterior part of the mandible, followed by posterior maxillae segments. It develops slowly and for a long time is asymptomatic, 75% of cases are associated with an impacted tooth. Radiographically presents as unilocular lesion but occasionally multilocular when larger.

DD:
• Odontogenic myxoma
• Odontogenic fibroma
Ameloblastic fibro-odontoma

Mixed benign tumour which has the general features of ameloblastic fibroma, but also contains enamel and dentin. Commonly located on posterior parts of max/mand. Most cases associated with an impacted tooth. It may inhibit tooth eruption or displace involved teeth, it is a painless slowly increasing swelling.

DD:

- Ameloblastoma
- All tumours with cystic ray image
Ameloblastic Carcinoma

Malignant tumour deriving its origin from dental epithelium: epithelial cell from dental germ, epithelium of odontogenic cyst or primary/recurrent ameloblastoma. May be asymptomatic, if symptomatic: progressive painful swelling of the mandible (usually). Fast, aggressive, local destructive growth.

DD

- Pain is common amongst malignant odontogenic tumours
- Other odontogenic tumours and cysts must be differentiated (Especially ameloblastoma)
- Must be also differentiated from metastases from a different primary site (i.e. lung cancer)
Ameloblastic fibro-sarcoma

Rare odontogenic tumour comprising of a benign epithelial component and malignant mesenchymal component. 30% of cases arise from recurrent ameloblastic fibroma, at an older age. It has expansive destructive growth, patient may have pain and sensory disorders. Rarely metastasises.

DD

- Other odontogenic malignant tumours (ameloblastic carcinoma and spindle cell carcinoma)
# Bone Tumors (non-odontogenic)

<table>
<thead>
<tr>
<th>BENIGN</th>
<th>MALIGNANT</th>
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<tbody>
<tr>
<td>Osteoma</td>
<td>Osteosarcoma</td>
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<tr>
<td>Chondroma (of hyalin cartilage)</td>
<td>Chondrosarcoma</td>
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<tr>
<td>Osteoblastoclastoma (giant cell tumour)</td>
<td>Ewings Sarcoma</td>
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<td>Osteoblastoma</td>
<td>Multiple Myeloma</td>
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<td>Hemangioma</td>
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<tr>
<td>Primary Neuroectodermal tumour of infancy</td>
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</table>
Osteoma

Osteomas are benign tumors that represent a proliferation of mature cancellous or compact bone. They may develop anywhere in the bone and rarely in the jaws. Multiple osteomas of the jaws are a common manifestation of Gardner’s syndrome, oral soft tissue osteomas are, however, rare. Lesions have been described in the palate, buccal mucosa, tongue, and alveolar process. Clinically, soft-tissue osteoma appears as a well-defined, asymptomatic hard tumor covered by thin and smooth normal epithelium.

DD:
- Torus palatinus
- Exostoses
- Fibroma
- Diagnosis established by histopathologic examination.
Chondroma

Benign tumor of mature cartilage. The occurrence of these lesions in the jaws is extremely rare. It presents as a painless slowly progressive swelling, which may result in mucosal ulceration. Most tumours occur under the age of 50. Radiographically they present as irregular radiolucent lesions.

DD:
- Low grade chondrosarcoma
The clinical history, immunohistochemistry, or genetic markers have to bemused to differentiate lesions containing giant cells.

- Low grade osteosarcoma
- Histologically it is similar to central giant cell granuloma, except the giant cells are larger with more nuclei and more evenly spread out

Osteoblastoclastoma

(giant cell tumour) is normally found in the long bones and its presence in the jaws is extremely rare. It has 3 forms in jaw bones: lytic, mono cystic and polycystic.

DD:
The clinical history, immunohistochemistry, or genetic markers have to bemused to differentiate lesions containing giant cells.

- Low grade osteosarcoma
- Histologically it is similar to central giant cell granuloma, except the giant cells are larger with more nuclei and more evenly spread out
Osteoblastoma

The osteoblastoma occurs primarily in the vertebrae and long bones, but it has been described in the jaws. Clinically it often grows rapidly and the predominant clinical feature is pain which is localised to the lesion itself. They are well circumscribed radiographically with a thin radiolucency surrounding the variably calcified contents.

DD:

- Ossifying fibroma
- Fibrous dysplasia
- Osteosarcoma
Hemangioma

Hemangioma is a common benign lesion of the oral cavity, characterized by the proliferation of blood vessels. It is not a true neoplasm, but rather a developmental abnormality. This concept is supported by the frequent presence of hemangiomas at birth or shortly after. On histologic criteria, two main types of hemangiomas are recognized: capillary hemangioma, which consists of numerous small capillaries and clinically appears as a flat red surface (Fig. 515), and cavernous hemangioma.

DD: (histopath exam)

- pyogenic granuloma
- hemangioendothelioma
- hemangiopericytoma
- Kaposi's sarcoma
- syndromes with oral vascular lesions: such as the Sturge-Weber syndrome, Maffucci’s syndrome
Melanotic neuroectodermal tumour of infancy is a rare benign tumour of neural crest origin with a propensity to appear in tooth-bearing areas. It appears only in infants less than 6 months of age and shows no sex predilection. It occurs mostly in the maxilla (79.1%), but a few cases have also been reported in the skull, mandible, shoulder region, skin, mediastinum, brain, epididymis, uterus, etc. Clinically, it is a rapidly growing, painless tumor covered by normal epithelium of redbrown or normal color, and of elastic consistency. The tumor may cause bone resorption and this, together with the rapid development, mimics a malignant tumor.

**DD:**
The diagnosis is confirmed by histological examination, but radiographs and the detection of vanillylmandelic acid in the urine are also helpful.
- Congenital Epulis of the new born
- Malignant melanoma
- Schwannoma
- Neuroblastoma
- Odontogenic tumors
- Sarcomas
Osteosarcoma

Osteosarcoma is the most common primary malignant neoplasm of bone. It affects males more than females and usually occurs between 10 and 20 years of age. The jaws are affected in 6 to 7% of the cases, the mandible and maxilla equally often. The tumor usually appears about 10 years later than a primary tumor elsewhere in the skeleton. Clinically, the lesion presents as a rapidly growing hard swelling of the jaw bone that progressively produces facial deformity.

DD:
Lab test to confirm the diagnosis is histopathological and x-ray examination
- Chondrosarcoma
- Fibrosarcoma
- Rarely odontogenic tumours
Chondrosarcoma

relatively common malignant neoplasm characterized by the formation of aberrant cartilage tissue. It is mainly found in the ribs, pelvis, femur, shoulder girdle, and jaws. Chondrosarcoma is subclassified as primary when it arises de novo and secondary when it arises from a preexisting benign cartilage tumor. Chondrosarcoma of the jaws is rare and may involve either jaw.

DD:
Lab test to confirm the diagnosis is histopathologic examination.

• Osteosarcoma
• Fibrosarcoma
• Chondroma
• Central and peripheral giant cell granuloma
Ewings Sarcoma

Ewings is rare but, when it affects the head and neck region, has a predilection for the body of the mandible. Typical symptoms are bone swelling and often pain, progressing over a period of months. Teeth may loosen and the overlying mucosa may ulcerate. Fever, leukocytosis, a raised ESR and anaemia may be associated and indicate a poor prognosis.

- DD
- Osteogenic sarcoma
- Neuroblastoma
- Lymphosarcoma
- Histiocytosis X
- Osteomyelitis
- Metastatic carcinoma
Multiple Myeloma

is a generalized malignant plasma cell disorder of unknown cause. The disease originates in the bone marrow, but extramedullary lesions may also develop during the course of the disease. Abnormal proliferation of plasma cells, bone marrow dysfunction, and abnormal immunoglobulin production are the basic disorders. The skull, sternum, pelvis, ribs, and clavicles are common sites of bone involvement. Involvement of the jaws, particularly the mandible, is frequent and may be the presenting manifestation.

DD:

Lab test confirming the diagnosis is bone marrow biopsy. Serum and urine proteins electrophoresis and radiographic bone examinations are also helpful.

• Non hodgkins lymphoma
• Gingival cyst of adults
• Benign and malignant oral tumors
<table>
<thead>
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<th>FINDINGS FAVOURING BENIGNITY</th>
<th>FINDINGS FAVOURING MALIGNANCY</th>
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<tr>
<td>NARROW ZONE OF TRANSITION</td>
<td>BROAD ZONE OF TRANSITION</td>
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<td>BENIGN PERIOSTEALREACTION</td>
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<td>ABSENCE OF CORTICAL DESTRUCTION</td>
<td>PRESENCE OF CORTICAL DESTRUCTION</td>
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<td>STABILITY WITH TIME</td>
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# Other Benign Non-Odontogenic Lesions

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<td>Vascular Malformations</td>
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<td>Langerhans Cell Histiocytosis</td>
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<td>Neurogenic Tumors</td>
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<tr>
<td>Pagets Disease</td>
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<tr>
<td>Massive Osteolysis (Gorham’s Disease)</td>
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<tr>
<td>Tori</td>
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Differential diagnosis of giant cell lesions of the jaws

• Hyperparathyroidism: histologically indistinguishable from giant cell granuloma but serum calcium levels are raised

• Cherubism: may be indistinguishable from giant cell granuloma histologically, but lesions are symmetrical, near the angles of the mandible

• Giant Cell Tumour: aggressive tumour of long bones. Broadly similar histologically to giant cell granuloma but a distinct entity in terms of behaviour

• Aneurysmal bone cysts: may contain many giant cells but consist predominantly of multiple blood filled spaces

• Fibrous dysplasia: only limited foci of giant cells. No defined margins radiographically. Growth ceases with skeletal maturity
Fibrous Dysplasia

Monostotic fibrous dysplasia is a localised swelling, usually affecting people under 20 years. It most frequently affects the jaws compared to other regions in the head and neck. Clinically, it appears as a painless, smooth rounded swelling and is likely to be in the maxilla. The mass may grow to interfere with function and may even cause malocclusion by displacing the teeth. There is also polyostotic fibrous dysplasia but this is more rare. It is associated with Albright’s syndrome.

DD:
- Non ossifying fibroma
- Osteofibrous dysplasia
- Aneurysmal bone cyst
- Adamatinoma
- Giant cell tutor
- Low grade central osteosarcoma
Langerhans Cell Histiocytosis

Caused by Langerhans cells - dendritic cells in the skin and mucosa with a macrophage-like function. **Acute disseminated** form usually affects young children. Multi-system in nature affecting skin, bones and internal organs and is frequently fatal. **Chronic disseminated form** of the disease is classically associated with a triad of punched-out bone lesions (often affecting skull and jaws).

DD:

- Any fairly well defined radiolucency.
- Other histiocytic/dendritic lesions
- Lymphoma
- Langerhans cell sarcoma
Pagets Disease

Pagets disease of bone (osteitis deformans) causes bone distortion and weakening, particularly in the elderly. Enlargement of skull, thickening but weakness of long bones and bone pain. Occasionally affects maxilla and rarely affects mandible.

DD:

- Osteomyelitis of the jaw, particularly chronic diffuse sclerosing osteomyelitis.
Gorham’s Disease

A very rare skeletal condition of unknown cause, characterised by the uncontrolled proliferation of distended, thin-walled vascular or lymphatic channels within bone, which leads to resorption and replacement of bone with angiomas and/or fibrosis.

DD:
- Osteolytic lesions
- Paget’s disease
- Langerhans cell histiocytosis
- Fibrous dysplasia
Tori

Tori mandibularis - a bony growth in the mandible along the surface closest to the tongue. May require surgical removal.

Tori palatinus - Bony growth in the hard palate. May require surgical removal if it interferes with denture placement, eating/speaking/oral hygiene or overly protruding.

DD:
• Osteoma
• Peripheral ossifying fibroma
• Osteochondroma
• Osteoid osteoma
• Osteoblastoma
Mixed lytic and sclerotic jaw lesions

<table>
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<th>Condition</th>
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<tr>
<td>Osteoradionecrosis</td>
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<tr>
<td>Biphosphonate-related osteonecrosis of the jaw</td>
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<tr>
<td>Mandibular Osteomyelitis</td>
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<tr>
<td>Primary Chronic Osteomyelitis</td>
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37% of patients who undergo radiation therapy to the head and neck develop bone necrosis secondary to hypoxia, hypovascularity, hypocellularity, and fibrosis. The mandible is involved more frequently than the maxilla, probably because of its less robust blood supply. The buccal cortex is more vulnerable than the lingual cortex, and the mandibular body is most commonly affected. The chin and angles of the mandible are spared, presumably because of its muscular insertions. At imaging, osteoradionecrosis appears as an area of marked sclerosis with a loss of trabeculation in spongiosa, cortical interruptions, bone fragmentation or sequestration, and areas of gas attenuation in bone with poorly marginated adjacent fluid collections or areas of soft-tissue attenuation.
BRONJ

is associated with the use of oral or intravenous bisphosphonates to treat various bone conditions such as osteoporosis, multiple myeloma, metastasis, and Paget disease. Osteonecrosis may be spontaneous; it commonly occurs in the mylohyoid ridge or is precipitated by a traumatic procedure such as tooth extraction or dental surgery. BRONJ should be considered in patients undergoing bisphosphonate therapy with findings of bone necrosis and no history of radiation therapy. At imaging, BRONJ is seen as a poorly marginated diffuse area of low attenuation with bilateral symmetric sclerosis.

DD:

• alveolar osteitis
• Gingivitis
• Periodontitis
• Periodical pathology
• Osteoradionecrosis
Mandibular Osteomyelitis

Osteomyelitis is much more common in the mandible than the maxilla. Most patients with mandibular osteomyelitis have a history of antecedent dental caries or dental extractions. Other causes of osteomyelitis include dental or mandibular fractures, osteoradionecrosis and, rarely, hematogenous spread of infection.

Imaging findings of mandibular osteomyelitis include cortical interruption, sclerotic sequestra in low-attenuation zones, periosteal new bone formation, and areas of gas attenuation. Most cases are unifocal.
Primary Chronic Osteomyelitis

Primary chronic osteomyelitis has no acute phase and manifests with insidious jaw swelling and normal mucosa. Its occurrence is unrelated to dentition status, and it peaks in childhood or early adolescence and after age 50. Absence of a fever and leukocytosis are characteristic, and associated teeth are typically vital. At imaging, it may initially appear as a poorly marginated lesion with progressive sclerosis, scattered osteolysis, bone expansion, and an “onion skin” periosteal reaction.

DD:

- Fibrous dysplasia
- Paget disease
- Hyper cementosis
- Early malignant tumours of the bone