Common/Important Radiolucencies

I. Periapical Pathosis

A. Age, Sex, Race – Adults.

B. Most Common Location – Apex of permanent first molar, rare in primary teeth.

C. Clinical Findings – Usually a history of pain often has a large restoration or history of trauma. At least a portion or the entire tooth is nonvital.

D. Radiographic Features –
   1. Well-defined, circular.
   2. Sclerotic border.
   3. Usually at apex but can occur anywhere on root.
   4. Slow growth.

E. Treatment – Endodontics or extraction depending on the status of the tooth, along with curettage of the lesion. No recurrence expected but surgery may lead to a fibrous bony defect.

F. Synonyms – Periapical cyst, apical periodontal cyst, periapical granuloma, periapical abscess, fibrous bony defect.

II. Dentigerous Cyst

This is one of the most common developmental cysts of the jaws and accounts for 20% of the epithelial lined cysts of the jaws. It arises from separation of the follicle from around the crown of an unerupted tooth.

A. Age, Sex, Race – Young adults, if you don’t have a dentigerous cyst by the age of 35 years, then you probably will not get one. Most cases between 10 and 30.
B. **Most Common Location** – Mandibular third molars, maxillary canines, mandibular premolars, and maxillary third molars. Roughly 2.5% of all patients with unerupted teeth have a dentigerous cyst.

C. **Clinical Findings** – Usually asymptomatic, often noticed during a routine examination or because of the delayed eruption of a tooth. Rarely will cause expansion.

D. **Radiographic Features** –
   1. Well-defined, around the crown of an impacted tooth.
   2. >3.0 mm from crown to edge of radiolucency.

E. **Treatment** – Curettage of cyst with extraction of impacted tooth. No recurrence expected. Marsupialization of larger lesions.
   1. May involve apex of adjacent tooth and cause resorption.
   2. May give multilocular impression because of persistence of bone trabeculae within radiolucency.

F. **Synonyms** – Follicular cyst, paradental cyst.

G. **Eruption Cyst** - Soft tissue analogue of DC and results from separation of the dental follicle from around crown of erupting tooth. This occurs in children less than 20 years of age in the mandibular molar region.

### III. Residual Cyst

A. **Age, Sex, Race** – Mean age = 52 years, males > females.

B. **Most Common Location** – Maxilla > mandible.

C. **Clinical Findings** – Usually asymptomatic but may cause expansion. In order to make the diagnosis there has to be a history of a cyst (usually radicular or dentigerous) that was incompletely removed.

D. **Radiographic Features** –
   1. Circular or elliptical
   2. Sclerotic border.

E. **Treatment** – Curettage, no recurrence expected.

### IV. Odontogenic Keratocyst

A. Arises from rests of the dental lamina and accounts for 10-12% of odontogenic developmental cysts. OKC grow in an anterior-posterior direction within medullary bone without causing obvious bone expansion.
B. **Age, Sex, Race** – Mean age = 38 years, 61.5% males, 87% Caucasian, 60% between 10 and 30.

C. **Most Common Location** – 70% mandible, 51% in molar region.

D. **Clinical Findings** – 19% are symptomatic, most common complaints being swelling and pain. Four percent of cases are associated with the basal cell nevus syndrome.

E. **Radiographic Features** –
   1. Hazy “Milky Way” appearance to central portion of lesion.
   2. Forty eight percent associated with impacted tooth.
   3. Thin, well-defined borders.

F. **Treatment** – Controversy as to treatment. Marsupialization is increasing in popularity due to the difficulty in removing this lesion surgically. Some feel aggressive curettage or resection is indicated because of the high recurrence rate (42.6%) of the parakeratinized variant. I am against radical surgery. The treatment is worse than the disease and this lesion is only a cyst. Multiple odontogenic keratocysts strongly suggest the possibility of the autosomal dominant basal cell nevus syndrome.

V. **Traumatic Bone Cyst**

A. Thought to be trauma to bone insufficient to cause fracture which results in an intraosseous hematoma. If the hematoma does not organize, it may liquefy and result in the empty bone cavity found on exploration.

B. **Age, Sex, Race** – Rare before 5 or after 35, most cases between 10 and 20, mean = 18 years; males = females; 75% Caucasian.

D. **Most Common Location** – 98.5% mandible, 73% posterior.

E. **Clinical Findings** – Teeth almost always vital, usually does not have a history of trauma, 25% will have expansion.

F. **Radiographic Features** –
   1. Well-defined margins may have sclerotic border.
   2. Has a tendency to “scallop” between the roots of the teeth.
   3. Above the mandibular canal.
   4. Does not displace teeth or resorb roots.

G. **Treatment** – Simple curettage of the bony wall is adequate, <5% recur. Untreated lesions spontaneously resolve, which explains the rarity of traumatic bone cysts in patients over the age of 40 years.
H. **Synonyms** – simple bone cyst, solitary bone cyst, hemorrhagic bone cyst, unicameral cyst, and idiopathic bone cavity.

VI. Lateral Periodontal Cyst

A. **Age, Sex, Race** – Mean age = 50 years, 67% males.

B. **Most Common Location** – 67% occur in mandibular premolar/canine region, 33% in maxillary lateral incisor region.

C. **Clinical Findings** – Occasionally causes expansion, teeth are vital. This is **not** related to periodontal disease. This is the intraosseous counterpart to the soft tissue gingival cyst.

D. **Radiographic Features** –
   1. Usually <1 cm in diameter.
   2. Ovoid or elliptical shape.
   3. The border is usually of variable thickness.
   4. Rarely causes cortical perforation.

E. **Treatment** – Curettage, very low recurrence rate.

VII. Nasopalatine Duct Cyst

A. **Age, Sex, Race** – Mean age = 43 years, 54% males; 93% Caucasian.

B. **Most Common Location** – Midline anterior maxilla.

C. **Clinical Findings** – 52% have swelling, 25% have drainage, and 20% have pain.

D. **Radiographic Features** –
   1. **Minimum of 6 mm in diameter**. Mean radiographic diameter = 17.1 mm. There is no correlation between radiographic size and the presence of symptoms.
   2. Appears between the apices of the maxillary central incisors. Teeth are vital.
   3. Usually ovoid but may have the classical “heart-shaped” appearance when viewed with an occlusal radiograph.

E. **Treatment** – Curettage, 2% recurrence rate.

F. **Synonyms** – Incisive canal cyst.

VIII. Central Giant Cell Granuloma

A. **Age, Sex, Race** – Mean age = 26 years, females >> males
B. **Most Common Location** – 96% anterior to the second molars 70% mandible.

C. **Clinical Findings** – Expansion is a relatively common finding.

D. **Radiographic Features** –
   1. 18% are multilocular, but fine trabeculae are often seen.
   2. Has a tendency to cross the midline.
   3. Resorption of roots and displacement of teeth are common.

E. **Treatment** – Curettage, low recurrence rate. The histologic findings are similar to hyperparathyroidism so a serum calcium should be done to rule out this possibility if there are multiple bony lesions present.

**IX. Ameloblastoma**

Most commonly clinically significant odontogenic tumor. Thought to arise from: 1.) Cell rests of enamel organ; 2.) Developing enamel organ; 3.) Epithelial lining of odontogenic cysts; 4.) Basal cells of oral mucosa.

A. **Age, Sex, Race** – Mean age = 35 years.

B. **Most Common Location** – 59% occur in posterior mandible, 85% in mandible. 80% of the maxillary lesions are associated with the molars and/or antrum.

C. **Clinical Findings** – 80% present with a painless expansion. 15-30% arise from a dentigerous cyst but this is unlikely after the age of 40 years.

D. **Radiographic Features** –
   1. 53% are multilocular. The mean age for unilocular cases is about 10 years younger than multilocular ones.
   2. 80% show root resorption.
   3. Many associated with impacted teeth.
   4. Usually does not perforate the inferior border of the mandible.
   5. Tends to infiltrate between intact cancellous bone trabeculae at periphery of lesion before bone resorption becomes evident on s-ray. Therefore tumor islands are approximately 1 cm further than they appear on radiographs.

E. **Treatment** – Small unilocular lesions that have not perforated the cortex can be successfully treated with aggressive curettage. However, multilocular ameloblastomas or ones that have perforated the cortex should be treated by resection with an adequate margin of uninvolved bone.

**X. Lingual Mandibular Bone Defect**

A. **Age, Sex, Race** – Adult, 90% males.
B. Most Common Location – Posterior mandible, but occasional cases are seen in the anterior mandible.

C. Clinical Findings – Found in 0.5% of adult panoramic radiographs. Asymptomatic.

D. Radiographic Features –

1. Well-defined with sclerotic border.
2. Elliptical shape.
3. Below the mandibular canal.
4. Shows slow progressive growth but rarely exceed 2 cm in diameter.

E. Treatment – No treatment indicated. However, if the lesion does not have all the classical signs or if it occurs in the anterior mandible, a biopsy may be indicated. Sialography should be considered in some cases.

F. Synonyms – Stafne’s bone cyst, static bone cavity, latent bone cyst, and developmental lingual mandibular salivary gland depression.

XI. Central Hemangioma

A. Age, sex, Face – Majority between 10-20 years old, females > males.

B. Most Common Location – Posterior mandible, 65% in mandible.

C. Clinical Findings – Mobile teeth, spontaneous bleeding in gingival crevice, pulsation when palpated, bruit upon auscultation, and paresthesia have all been reported. Most cases are symptomatic at the time of diagnosis.

D. Radiographic Features –

1. 50% are multilocular, but will often have trabeculae of variable diameter coursing through the lesion.
2. Borders may be well or poorly defined.
3. May have sunray appearance at periphery.
4. Can be extremely variable in its radiographic presentation.

E. Treatment – This is the reason you always do an aspiration prior to entering a radiolucent lesion! Patients have exsanguinated from reckless surgery. Arteriography is essential in the treatment planning for this lesion, which can be treated by surgery, injection of sclerosing agents, embolization, or radiation therapy.

XII. Metastatic Malignancies
A. **Age, sex, race** – general > 40 years.

B. **Most Common Location** – Mandible 5x maxilla, soft tissues are infrequently involved. Premolar and molar regions are the most common. Most primary lesions arise from either the breast, lung or kidney.

C. **Clinical Findings** – Pain, swelling, paresthesia are common. Tooth mobility, tooth displacement, and paresthesia are uncommon.

D. **Radiographic Features** –
   1. Usually RL but can have a RO component.
   2. Ill-defined margins, cortical expansion.
   3. Wide range of variability due to the primary tumor.

E. **Treatment** – The prognosis for metastases to the jaw is poor, with death usually occurring within one year.

**COMMON/IMPORTANT RADIOPACITIES**

**I. Condensing Osteitis**

A. **Age, Sex, Race** – Usually diagnosed in the second or third decade of life, but rarely seen before 10 years.

B. **Most Common Location** – Mandible.

C. **Clinical Findings** – Asymptomatic unless coincidental tooth is involved. Will persist for many years without any apparent change in size or shape. Present in 8% of adult population. Caused by a low-grade bacterial infection from the tooth. It indicates a proliferative response to the infection.

D. **Radiographic Features** –
   1. Either well defined or poorly defined RO foci that have little tendency to change.
   2. Sometimes seen in close proximity to a residual root tip.
   3. Often seen at the apical region of a tooth but does not obscure the root.
   4. Not unusual to see a radiolucent zone around the condensing osteitis.

E. **Treatment** – Leave alone, check vitality of adjacent tooth.

F. **Synonyms** – Chronic focal sclerosing osteomyelitis, focal periapical osteopetrosis, sclerosing osteitis.

**II. Osteosclerosis**

A. **Age, Sex, Race** – Young adults, rarely seen in first decade of life.
B. **Most Common Location** – Mandible canine, thought to be due to bruxism. Also found in extraction sites.

C. **Clinical Findings** – Asymptomatic, nonexpansile. Teeth are vital. Etiology thought to be trauma instead of bacterial infections. Found in 4.3% of adults radiographs.

D. **Radiographic Features** –
   1. Similar, if not identical, to condensing osteitis.
   2. Not always associated with the apex of a tooth.

E. **Treatment** – Leave alone.

G. **Synonyms** – Enostosis, dense bone island.

**III. Impacted Tooth**

A. **Age, Sex, Race** – Young adults.

B. **Most Common Location** – Maxillary third molars (22%), mandibular third molars (18%), maxillary canines (0.9%). 17% of adults have at least one impacted tooth.

C. **Clinical Findings** – Wide range in symptoms, often discovered radiographically. The dentigerous cyst is the most common pathology that develops around an impacted tooth. If you have not developed a dentigerous cyst around an impacted tooth by the age of 35 years, it is unlikely that you ever will. Therefore, there is little justification to exact impacted teeth for the sake of pathology in older adults. Mesioangular impactions are the ones most likely to remain impacted.

D. **Radiographic Features** –
   1. Easy to identify, may sometimes be surrounded by an area that resembles osteosclerosis.

E. **Treatment** – Removal depends on the circumstances.

**IV. Root Tips**

A. **Age, Sex, Race** – Adults

B. **Most Common Location** – Mandibular molar and premolar region.

C. **Clinical Findings** – Asymptomatic, usually a history of previous extraction or amputation of crown by caries.

D. **Radiographic Features** –
   1. Irregular shape that has the radiographic density of a tooth root. Typically found in the apical region.
2. Fairly common to find an area of associated condensing osteitis.

E. **Treatment** – None indicated unless there is evidenced of a radiolucent zone around the root tip or if there are symptoms. Prophylactic removal of impacted asymptomatic root tips for prosthodontic reasons do **not** seem to be warranted.

**V. Odontoma**

A. **Age, Sex, Race** – Mean age = 16 years, males = females, higher than expected incidence in blacks.

B. **Most Common Location** – Anterior maxilla (34%), anterior mandible (24%).

C. **Clinical Findings** – 48% associated with an impacted tooth so you might expect some disturbance in tooth eruption. Expansion is noted in at least 15% of patients.

D. **Radiographic Features** –
   1. Variable degrees of irregularity, ranging from looking like little teeth to globs. There is no value in trying to distinguish between compound and complex odontomas.
   2. **Always** have RO foci that are the density of enamel.
   3. Well-defined, seldom larger that the size of a tooth.

E. **Treatment** – Removal of the Odontoma if it is blocking the eruption of a tooth. There is little indication for its removal in an adult with an intact dentition and no evidence of surrounding pathology. Again, the principle holds that if no pathology has developed by the age of 35 years, then it is not likely to do so.

**VI. Supernumerary Tooth**

A. **Age, Sex, Race** – Young adults, males 2x > females.

B. **Most Common Location** – Midline anterior maxilla, maxillary fourth molar. 90% are in maxilla.

C. **Clinical Findings** – Occurs in 0.5% of the population with some hereditary tendencies. Very uncommon with primary teeth.

D. **Radiographic Features** –
   1. Usually looks like a small, malformed incisor.

E. **Treatment** – None indicated if there are no eruption problems and no obvious pathology surrounding the supernumerary tooth.

**VII. Sialolith**
A. **Age, Sex, Race** – Adults

B. **Most Common Location** – Submandibular gland (80%), parotid gland (19%).

C. **Clinical Findings** – Pain prior to mealtime. May be able to see a palpable mass in the floor of the mouth.

**Radiographic Features** –
1. Well-defined radiopacity that is best visualized with an occlusal radiograph of the floor of the mouth. In general, parotid sialoliths do not image well.

**Treatment** – Removal of the sialolith, with occasional removal of the associated gland. Give patients instructions to keep well hydrated to prevent recurrence. Also, try to establish if there is some underlying cause of the sputum stasis such as drugs, diabetes, alcohol, etc.

**VIII. Antral pseudocyst of the maxillary sinus**

A. **Age, Sex, Race** – Adults.

B. **Most Common Location** – Maxillary sinus, approximately 10% of cases are bilateral.

C. **Clinical Findings** – Most are asymptomatic, but pain, numbness and expansion of the maxilla have been reported. It is not uncommon for these patients to have the typical seasonal “hay fever” complaints.

D. **Radiographic Features** –
   1. Well-defined, homogenous, dome-shaped lesion that usually sits on the floor of the maxillary sinus. Bony landmarks can usually be visualized through the lesion.
   2. Not unusual to see some seasonal variation in the size and configuration of the lesion throughout the seasons.

E. **Treatment** – None indicated unless the symptoms become severe. Medicinal treatment typically consists of antihistamines but surgery is required in more severe cases.

G. **Synonyms** – Mucous retention cyst of the maxillary sinus, antral polyp, antral retention cysts. These are not the same as a mucocele of the sinus, which is an aggressive, bone-destroying tumor.

**COMMON/IMPORTANT RADIOLUCENCIES/RADIOPACITIES**

**I. Osteomyelitis**

A. Age, Sex, Race – Usually > 30 years, males > females.

B. **Most Common Location** – Mandible
C. **Clinical Findings** – Typical causes are either trauma or underlying systemic problems that prevents the proper repair of bone. A sinus tract can typically be found, which is helping with the drainage. The soft tissue is often swollen and red. The general area is tender to palpation and the teeth may themselves be sensitive to percussion. Patients will usually have a leukocytosis and may be febrile.

D. **Radiographic Features** –
   1. It takes approximately one week for the radiographic changes to become apparent. There is a dissolution of the normal trabecular structure with a “fuzziness” of the involved bone. With time, the situation deteriorates and larger radiolucent foci are noted.
   2. Sequestra (necrotic bone fragments) develop with time.

C. **Treatment** – Removal or treatment of the underlying cause, aggressive antibiotics, removal of any sequestra and the consideration of hyperbaric oxygen treatment in severe cases.

II. **Periapical Cemento-Osseous Dysplasia**

A. **Age, Sex, Race** – Usually over 30 years, 93% in women, 71% in blacks.

B. **Most Common Location** – Anterior mandible.

C. **Clinical Findings** – Asymptomatic. Associated teeth are vital.

D. **Radiographic Features** –
   1. Multiple, well-defined lesions along the apices of the mandibular incisors.
   2. Various radiographic stages are present: RL (29%), RL/RO (54%), RO (18%).
   3. Amount of calcification increases with time but the separate lesions do not mature at the same rate, therefore, there are various stages present at one time. Even the mature RO lesions will have a thin RL rim around them.

E. **Treatment** – None indicated, it would be prudent to check the vitality of the involved teeth because it would be difficult to detect a true periapical pathosis within one of these lesions.

F. **Synonyms** – Cementoma.

III. **Florid Cemento-Osseous Dysplasia**

A. **Age, Sex, Race** – Mean age = 50 years, 77-100% are women, 85% black.

B. **Most Common Location** – Most cases involve the mandible, but all four quadrants are involved in 59% of patients. Greater involvement is in the posterior mandible.
C. **Clinical Findings** – Most are asymptomatic but some develop painful expansion and mucosal ulceration. This is not related to periodontal disease.

D. **Radiographic Features** –
   1. Multiple, diffuse RL/RO lesions throughout the jaws. The lesions resemble periapical cemental dysplasia except they are larger. With time, increased calcification occurs.
   2. The development of RL foci within a RO area should prompt you to consider the possibility of a true osteomyelitis in the case.
   3. Some people feel that this is a more severe variant of periapical cemental dysplasia.

E. **Treatment** – No treatment indicated in the asymptomatic case. If symptomatic, need to consider aggressive IV antibiotics, systemic steroids, or hyperbaric oxygen therapy. A key factor to problems because of the compromised blood flow to the affected bone. Consider antibiotic coverage before extraction of teeth.

F. **Synonyms** – Chronic diffuse sclerosing osteomyelitis, gigantiform cementoma, multiple enostoses, sclerotic cemental masses and florid osseous dysplasia.

**IV. Central Ossifying Fibroma**

A. **Age, Sex, Race** – Mean = 30 years, 80% in females, 50% in blacks.

B. **Most Common Location** – 66% in mandibular molar-premolar region.

C. **Clinical Findings** – Slow growth eventually produces a noticeable expansion

D. **Radiographic Features** –
   1. Solitary, well-defined lesion.
   2. Grows in a circular fashion producing some expansion, but rarely causes perforation.
   3. RO foci are scattered throughout the central portion of the lesion in the mature lesions. It is entirely RL in the early stages.
   4. Sometimes has a ground glass appearance.

E. **Treatment** – Curettage is indicated but the recurrence rate is as high as 28%.

F. **Synonyms** – Central cementifying fibroma, central cemento-ossifying fibroma.

**DESCRIPTING RADIOGRAPHS**

The key to describing radiographs is to have a system that you use every time so you won’t forget anything important. Here are some suggestions.

Age, sex and race of the patient.
The type of radiograph and the date it was exposed.

Size of the radiographic lesion.

Anatomic site.

Known duration of the lesion.

Symptoms.

Solitary vs. multiple lesions.

RL/RO/RL-RO

Border
Well or poorly defined?
Sclerotic?
Discontinuous?

Uni vs. Multilocular

Tooth associated?

Adjacent structures affected?

In a similar fashion, it is wise to have a consistent plan on what to do if you see a radiographic abnormality. Here are some suggestions:

Get a good history, even if this is an established patient.

Get old radiographs for comparison.

Palpate the area to see if there is expansion.

Check the tooth vitality.

Repeat the original radiograph to rule out the possibility of an artifact.

Take another view from another angle.