Radiolucent - Radiopaque Lesions

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Overall Concept for radiographic lesions
•Radiopaque lesions
  Not a rush, take your time
•Radiolucent lesions
  Make a decision, NOW!

Radiographs help you make a differential diagnosis
Radiographs lead you to your NEXT step to obtain a final diagnosis

Pulp Vitality Testing
It is the KEY to good diagnosis

Vitality Test!
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Why does a dentist remove intraboney soft tissue and send it for a biopsy?
To make sure it is not a neoplasm or other significant pathologic process not related to a necrotic tooth - not as part of the endodontic treatment

Should you throw soft tissue removed at surgery in the waste basket?

For insurance purposes
Biopsy request forms:
• Clinical/Surgical findings: Don’t say “failed endo”, “apex of endodontically treated tooth”. Say “radiolucent lesion (location).
• Clinical impression: Say “rule out neoplasm or other pathologic process”

DIFFERENTIAL DIAGNOSIS FOR RADIOPAQUE LESIONS (1)
1. Condensing Osteitis
2. Focal Osteosclerosis
3. Periapical Cemento-osseous Dysplasia
4. Florid Cemento-osseous Dysplasia
5. Focal Cemento-osseous Dysplasia

DIFFERENTIAL DIAGNOSIS FOR RADIOPAQUE LESIONS (2)
6. Odontoma
7. Ossifying (Cemento-ossifying) Fibroma
8. Fibrous Dysplasia
9. Paget Disease
10. Osteogenic Sarcoma

Lesions Near the Apices of Teeth
• Condensing Osteitis
  – Reactive
  – Non-vital pulp
  – Posterior mandible
• (Idiopathic) Focal Osteosclerosis
  – Vital pulp
• Periapical Cemento-osseous Dysplasia
  – Vital pulp
  – Black females
  – Anterior mandible
Lesions Not Necessarily Associated with Teeth (1)

- Florid Cemento-osseous Dysplasia
  - Black females - generalized mandible or maxilla
- Focal Cemento-osseous Dysplasia
  - White females
  - Posterior mandible

Lesions Not Necessarily Associated with Teeth (2)

- Odontoma
  - Compound (anomalous tooth forms)
  - Complex (dental elements)
- Ossifying (Cemento-ossifying) Fibroma
  - Young adults
  - Expansile
  - Considered a tumor

Lesions Not Necessarily Associated with Teeth (3)

- Fibrous Dysplasia
  - Histologically looks just like the other fibro-osseous lesions
  - Radiographically there is no clear demarcation from the surrounding bone
  - “Ground Glass” appearance
  - Can be monostotic or polyostotic
Lesions Not Necessarily Associated with Teeth (3)

• Fibrous Dysplasia (Continued)
  – Can be associated with syndromes
    • McCune-Albright, Jaffe
  – Usually stops expanding at puberty
  – No treatment needed except for esthetics
  – DO NOT IRRADIATE - osteosarcoma

Lesions Not Necessarily Associated with Teeth (4)

• Paget Disease (Osteitis Deformans)
  – Adults
  – Bilateral expansion
  – “Cotton Wool” radiographic appearance
• Osteogenic Sarcoma
  – “Sun Burst” radiographic appearance

Radiolucent Lesions

Differential Diagnosis
Is Critical

Differential Diagnosis for Radiolucent Lesions (1)

Most Common Radiolucent Lesions

1. Periapical Granuloma (Localized Osteitis)
2. Periapical (radicular) Cyst
3. Residual Cyst
4. Early Periapical Cemento-osseous Dysplasia; Early Focal C-O Dysplasia
5. Nasopalatine Duct (Incisive Canal) Cyst
6. “Globulomaxillary” Cyst
7. Traumatic (Simple) Bone Cyst
8. Dentigerous (Follicular) Cyst

Differential Diagnosis for Radiolucent Lesions (2)

9. Odontogenic Keratocyst (OKC)
10. Adenomatoid Odontogenic Tumor (AOT)
11. Ameloblastoma
12. Odontogenic Mxoma
13. Langerhans Cell Disease (Histiocytosis X)
14. Central Giant Cell Granuloma
15. Osteogenic Sarcoma
16. Primary tumor (malignant - lymphoma, multiple myeloma; benign - odontogenic fibroma, neurofibroma, hemangioma)
17. Metastatic Tumor

Lesions Near the Apices of Teeth

Non-vital pulp

• Periapical Granuloma (Localized Osteitis)
• Periapical Cyst
Insurance Driven Nomenclature

- Oral Pathology - Medical Insurance
- CPT - procedure code
- ICD-9 diagnosis code
- Many medical insurance computers lock out 522.x and 523.x ICD-9 codes
- Periapical granuloma = 522.6
- Osteitis/osteomyelitis = 526.4
- Periapical cyst = 522.8

Periapical Granuloma vs. Periapical Granuloma

Dental term

- Not a good pathologic term
  - It is not a granuloma
  - It is an inflammatory process of bone (osteitis or osteomyelitis)

Why does a periapical cyst form instead of just a granuloma?

Simply the chance of Rests of Malassez being in the area of inflammation
2006 periapical biopsies

- 36% periapical (radicular cysts)
- 64% localized osteitis

Periapical Inflammation

1. Cells in the rest proliferate due to the inflammation

2. The ball of cells gets so big the center gets too far from the blood supply, the cells in the center die

3. The center of the ball of cells then has a higher protein concentration than the surrounding tissue

4. Fluid flows into the center by osmotic pressure, cyst expands, more cells grow around the periphery, more cells in the center die, concentration increases again
A radiolucency in the jaws must be investigated

If the teeth in the area are vital, you must biopsy the radiolucent area.
If non-vital, obviously RCT

Lesions Near the Apices of (Vital) Teeth
- Early Periapical Cemento-osseous Dysplasia
- Focal Cemento-osseous Dysplasia
- Odontogenic Keratocyst (OKC)
- Nasopalatine Duct (Incisive Canal) Cyst
- “Globulomaxillary” Cyst
- Traumatic (Simple) Bone Cyst
- Any of the other radiolucent lesions, e.g. Central Giant Cell Lesion, Primary Benign or Malignant Tumors, Metastatic Tumors

Periapical Cemento-osseous Dysplasia
- Black females
- Anterior Mandible
- Vital teeth
- Diagnosis can almost always be made clinically

NO TREATMENT
Focal Cemento-osseous Dysplasia
• White females
• Posterior Mandible
• Vital teeth
• Diagnosis can almost NEVER be made clinically

BIOPSY NECESSARY

Keratocystic Odontogenic Tumor

(OKC)

“Daughter” Cyst

Odontogenic Keratocyst
Because of its behavior, many oral pathologists now consider the OKC an odontogenic tumor that has a cystic form

2005 Classification by the W.H.O.

Keratocystic Odontogenic Tumor
Odontogenic Keratocyst
(Keratocystic Odontogenic Tumor)

Three important things associated with this diagnosis:
1. High recurrence rate (up to 60%)
2. Highly aggressive
3. Relation to Gorlin syndrome

Keratocystic Odontogenic Tumor (OKC)

• Can be in the location of any odontogenic cyst
• Can be isolated in the jaws

Keratocystic Odontogenic Tumor (OKC)
Diagnosis entirely depends on the histology of the cyst lining

Nasopalatine Duct Cyst

So-called “Globulomaxillary Cyst”
All Lambda (or Kappa) = Monoclonal
Therefore, malignant plasma cell myeloma

Lesions Associated with the Crown of a Tooth
- Dentigerous Cyst
- Ameloblastoma
- Odontogenic Keratocyst (OKC)
- Adenomatoid Odontogenic Tumor (AOT)

Differential Diagnosis
- Dentigerous Cyst
- Keratocystic Odontogenic Tumor
- Ameloblastoma

If a radiolucency is ASSOCIATED with an unerupted tooth,
Dentigerous cyst should be your FIRST differential diagnosis

ADENOMATOID ODONTOGENIC TUMOR
- Young patients
- Anterior, usually maxilla
- Almost always looks like a dentigerous cyst
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<tr>
<th>Lesions Not Necessarily Associated with Teeth (1)</th>
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<tbody>
<tr>
<td>• Residual Cyst</td>
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<tr>
<td>• Odontogenic Keratocyst</td>
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<tr>
<td>• Ameloblastoma</td>
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<td>• Odontogenic Myxoma</td>
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<th>Lesions Not Necessarily Associated with Teeth (2)</th>
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<tr>
<td>Langerhans Cell Disease (Histiocytosis X)</td>
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<tr>
<td>• Acute Disseminated (Letterer-Siwe)</td>
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<tr>
<td>• Chronic Disseminated (Hand-Schuller-Christian)</td>
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<td>• Chronic Focal (Eosinophilic Granuloma)</td>
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<th>Classic radiographic finding</th>
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<td>Teeth “Floating In Air”</td>
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<th>Lesions Not Necessarily Associated with Teeth (3)</th>
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<tr>
<td>Central Giant Cell Granuloma</td>
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<td>Relation to Hyperparathyroidism and Cherubism</td>
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<th>Lesions Not Necessarily Associated with Teeth (4)</th>
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<td>Stafne bone defect</td>
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<tr>
<td>- Below the inferior alveolar nerve</td>
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<td>- Lingual salivary gland depression</td>
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<td>- May have adipose tissue in the defect</td>
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<tr>
<th>Lesions Not Necessarily Associated with Teeth (5)</th>
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<tr>
<td>• Osteogenic Sarcoma (Chondrosarcoma)</td>
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<td>- Widened periodontal ligament</td>
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<td>- Pain</td>
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Lesions Not Necessarily Associated with Teeth (6)
• Primary Tumors
  Multiple Myeloma (Plasmacytoma)
  Malignant Lymphoma
  Central Mucoepidermoid Carcinoma
  Central Odontogenic Fibroma
  Clear Cell Odontogenic Carcinoma

Lesions Not Necessarily Associated with Teeth (7)
• Metastatic Tumors
  - Metastatic tumors to the jaws (decreasing frequency)
    • Breast* - 31%
    • Lung - 18%
    • Renal cell - 15%
    • Prostate* - 6%
    • Thyroid - 6%
    • Gastrointestinal tract (colon) - 6%
  *May be radiolucent or mixed radiolucent/radiopaque

Metastatic Disease to the Jaws
• May be the first evidence of dissemination
• Paresthesia/anesthesia to lower lip/chin
• Loose teeth/swelling
• Posterior mandible most common
• Radiopaque/lucent; poorly defined; “seeded”
• Palliative therapy

Radiopaque Lesions
  “Take your time”

Radiolucent Lesions
  “Make a decision and do something”

Radiolucent Lesions
  “If the tooth is vital or can’t be tested
   (includes RCT teeth)
   the area must be biopsied”