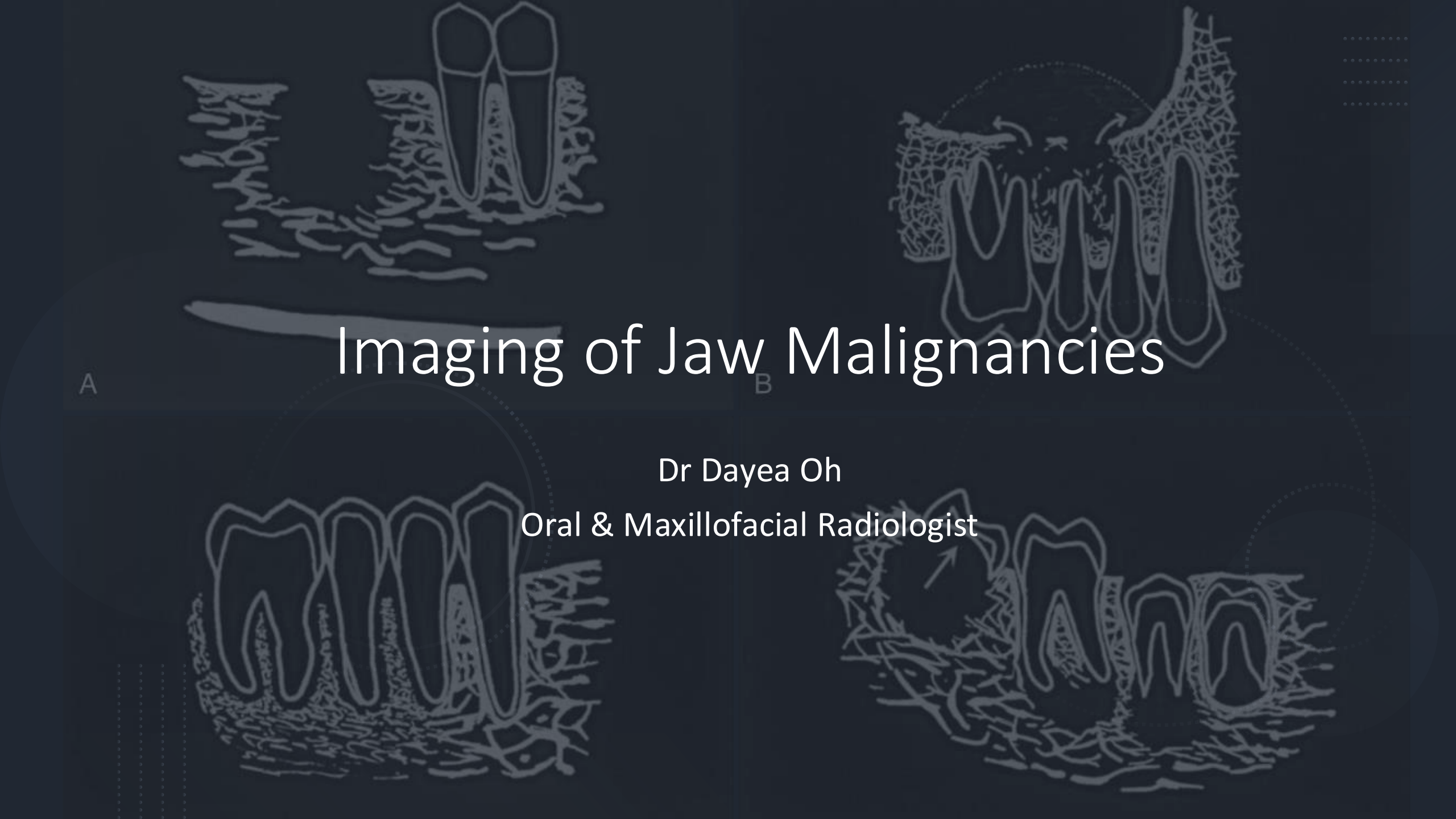


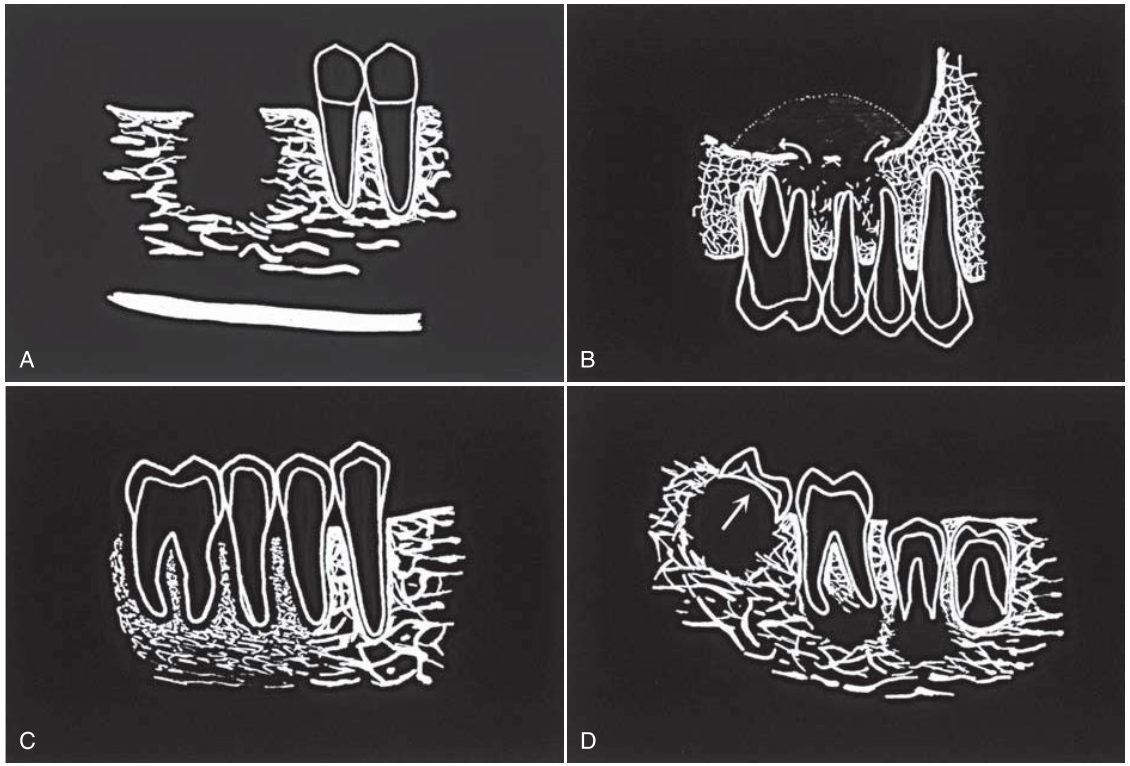
Imaging of Jaw Malignancies

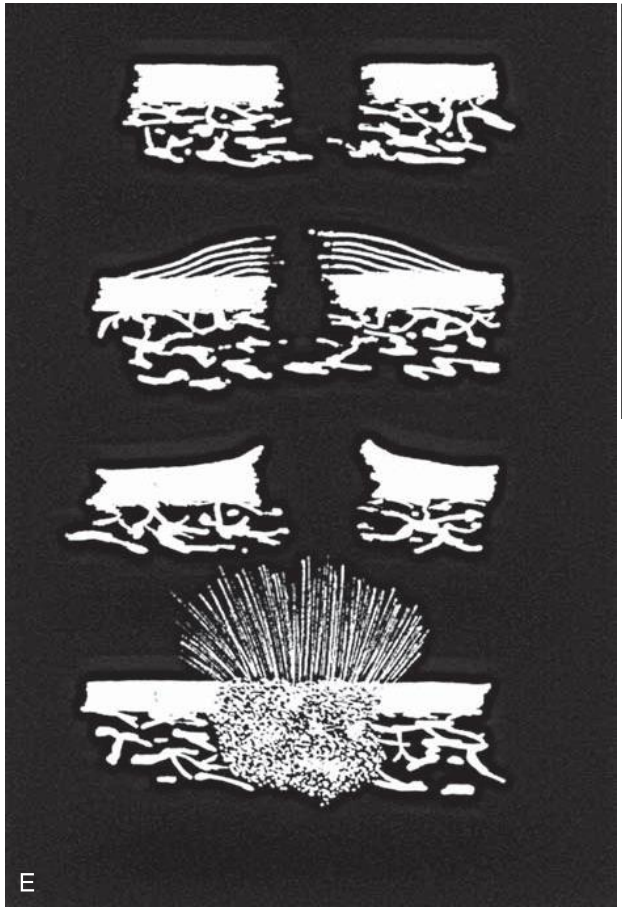
Dr Dayea Oh

Oral & Maxillofacial Radiologist

Malignant Diseases of the Jaws

- Malignant lesions in the jaws share common imaging features:
  - **Destructive & Invasive/infiltrative (lytic and ill-defined)**
- Malignancies that can affect the jaws are divided into four categories:
  - **Carcinomas** (lesions of epithelial origin)
  - **Sarcomas** (lesions of mesenchymal origin)
  - Malignancies of the **hematopoietic system** (lymphoma, leukemia, myeloma)
  - **Metastatic lesions** from distant sites





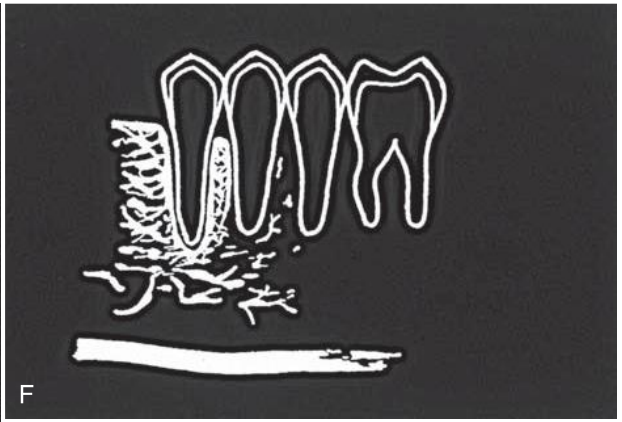
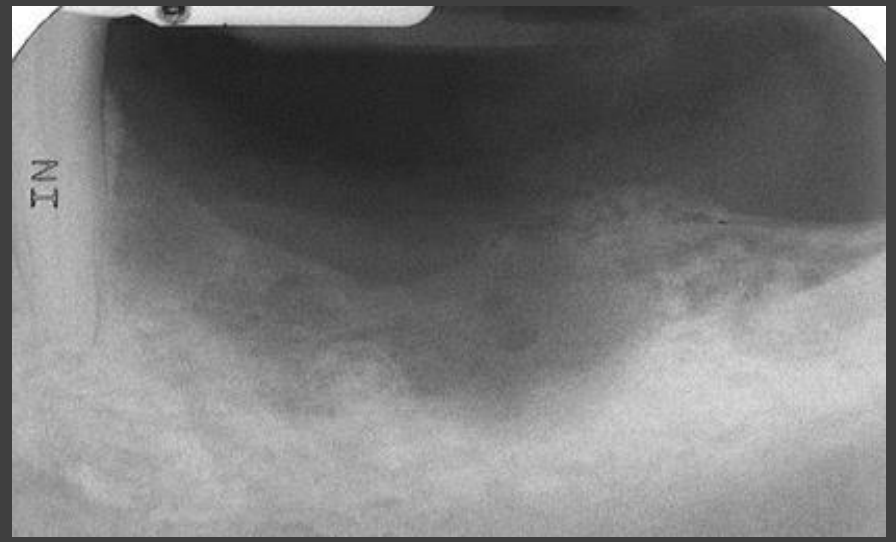


FIG. **23-1** Diagrammatic representation of radiologic features of oral malignancy. **A,** Ill-defined invasive borders followed by bone destruction. **B,** Destruction of the cortical boundary (floor of maxillary antrum) with an adjacent soft tissue mass *(arrows).* **C,** Tumor invasion along the periodontal membrane space causing irregular thickening of this space. **D,** Multifocal lesions located at root apices and in the papilla of a developing tooth destroying the crypt cortex and displacing the developing tooth in an occlusal direction *(arrow).* **E,** Four types of effects on cortical bone and periosteal reaction, from top to the bottom: cortical bone destruction without periosteal reaction, laminated periosteal reaction with destruction of the cortical bone and the new periosteal bone, destruction of cortical bone with periosteal reaction at the periphery forming Codman's triangles, and a spiculated or sunray type of periosteal reaction. **F,** Bone destruction around existing teeth, producing an appearance of teeth floating in space.

Carcinomas

- **Squamous Cell Carcinoma (SCC)**
  - **SCC of the Oral Mucosa**
    - The **most common** malignant tumour of the head and neck, originating from surface epithelium
  - **Primary Intraosseous SCC**
    - Arises within the jawbones and has no original connection with the surface epithelium of the oral mucosa (rare)
  - **SCC Originating in a Cyst**
    - The lining squamous epithelium of a **cyst** gives rise to the malignant neoplasm (rare)
- Radiographic Features on Dental Imaging (PA, OPG & CBCT)
  - Ill-defined hypodensity "Moth eaten"
  - Destruction of adjacent cortical structures such as cortical plates, lamina dura and antral floors
  - Irregular PDL space widening of affected teeth. If extensive, the teeth appear "floating"
  - Irregular MC widening



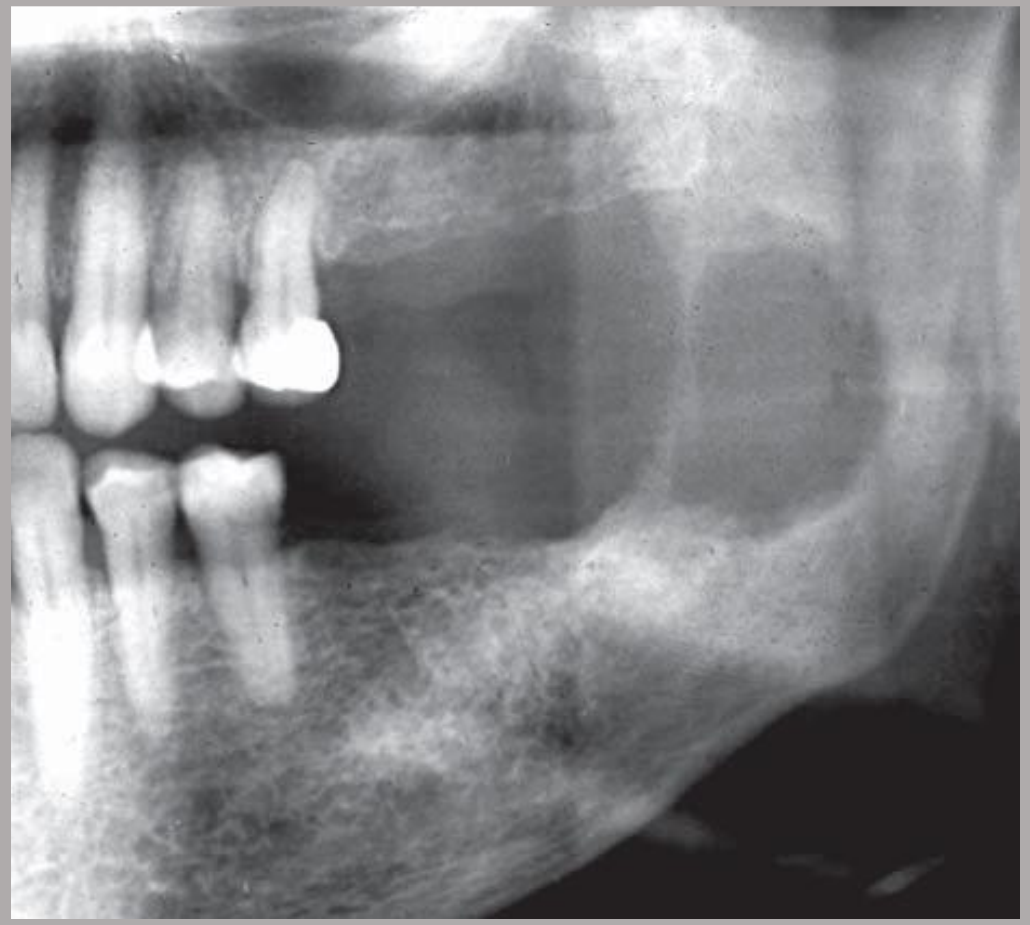


FIG. **23-4** This primary intraosseous carcinoma in the left mandible exhibits no internal structure, a poorly defined periphery, and thinning of the overlying mandibular bone.

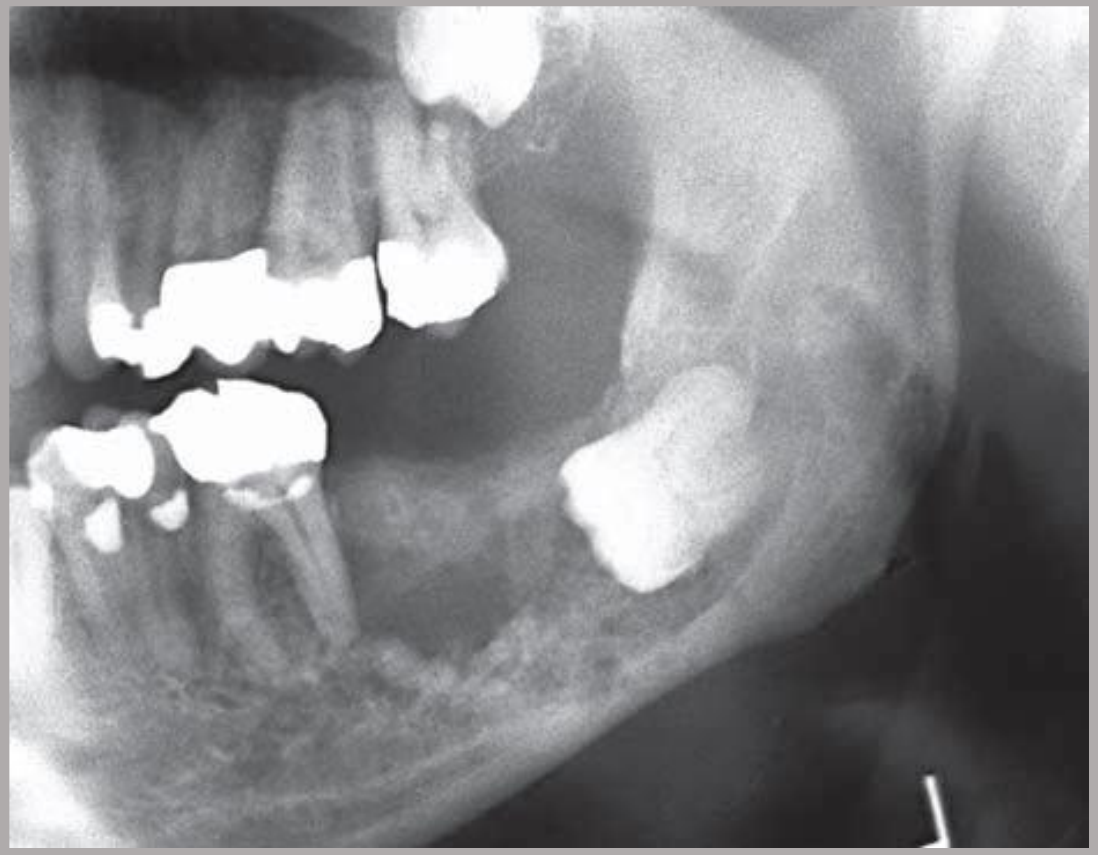


FIG. **23-5** Carcinoma arising in a preexisting dentigerous cyst related to the mandibular left third molar shows absence of a cyst cortex, invasion into adjacent bone, and ill-defined borders.

Other *Rare* Carcinomas of the Jaws

- **Central** Mucoepidermoid Carcinoma
  - Mucoepidermoid carcinoma is usually salivary gland malignancy. Central type is ***rare***
  - Likely originates from pluripotential odontogenic epithelium or from a cyst lining.
    - Histologically indistinguishable from its soft tissue counterpart.
  - Radiographically, **unilocular or multilocular expansile** mass often well defined and well corticated (ddx. Ameloblastoma)
    - Teeth remain largely unaffected by this disease, although adjacent lamina dura may be lost.
- Malignant Ameloblastoma, etc.

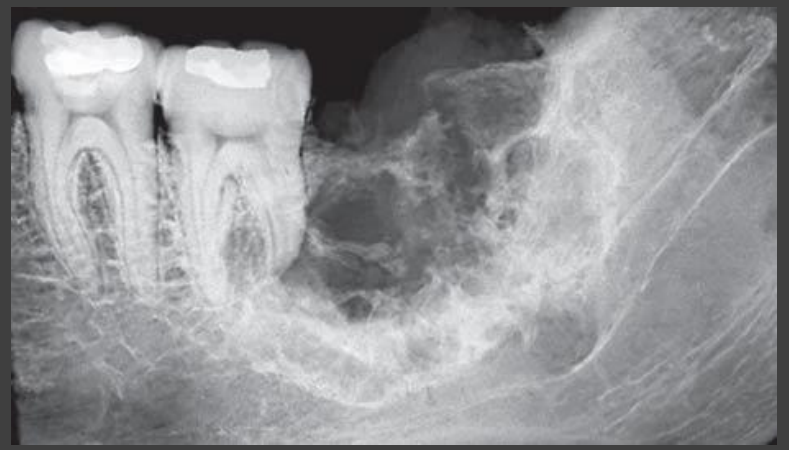
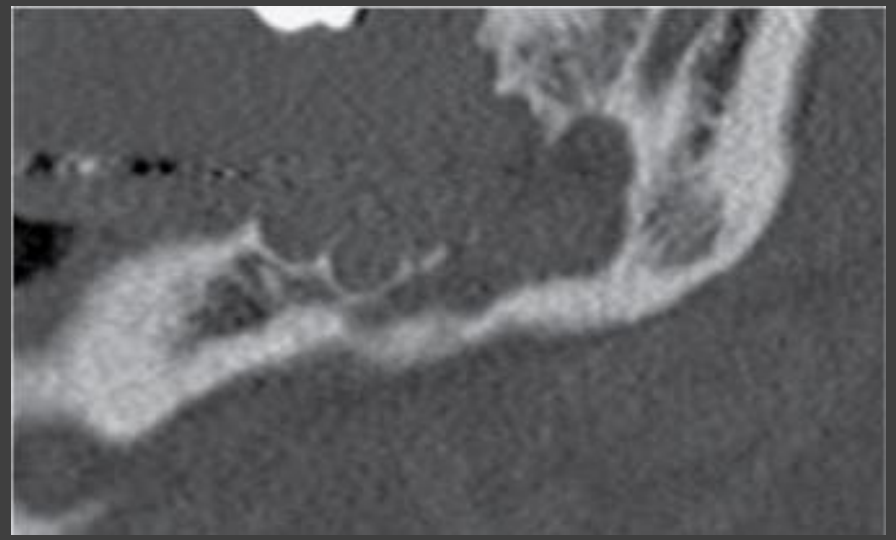
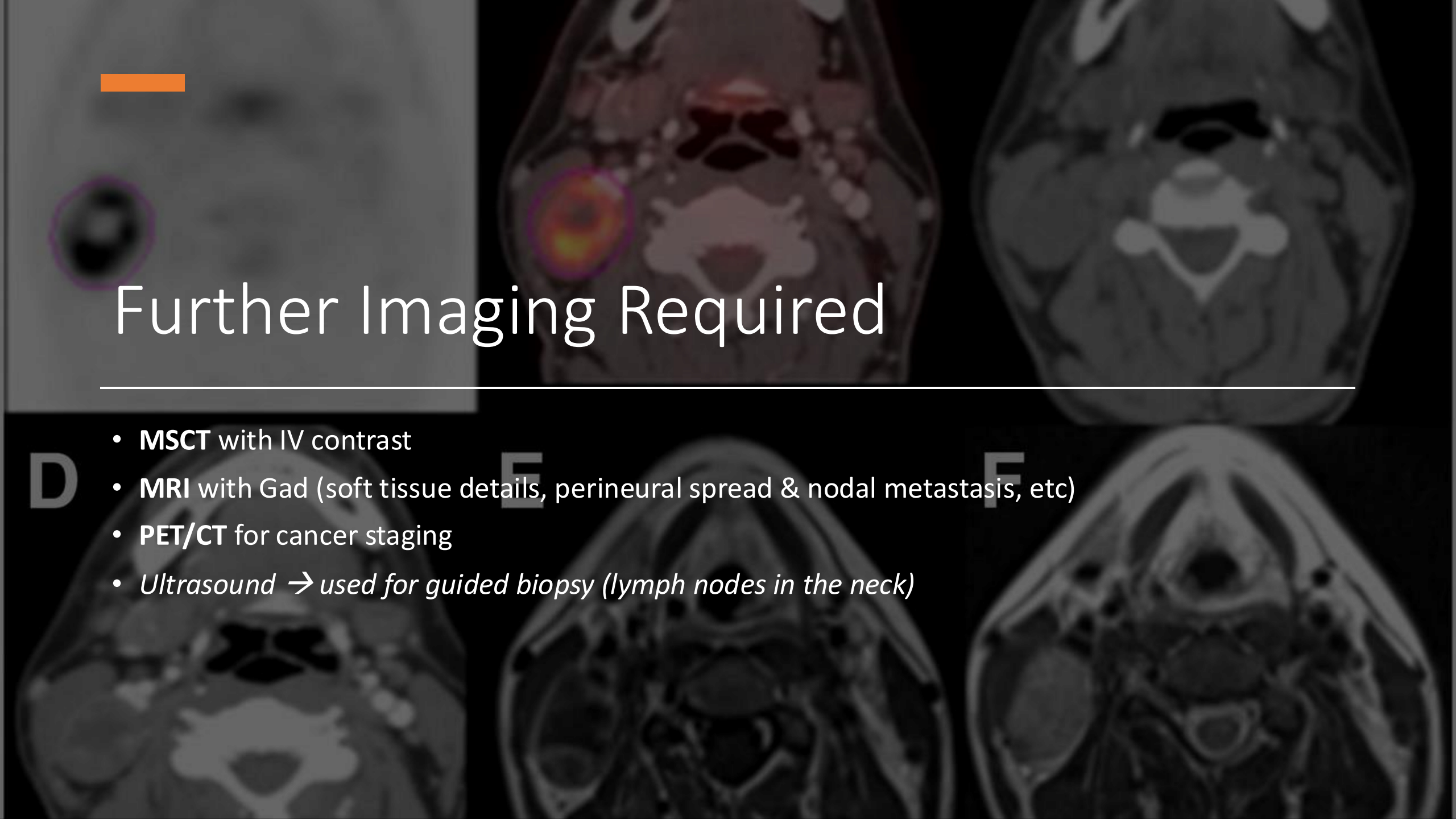


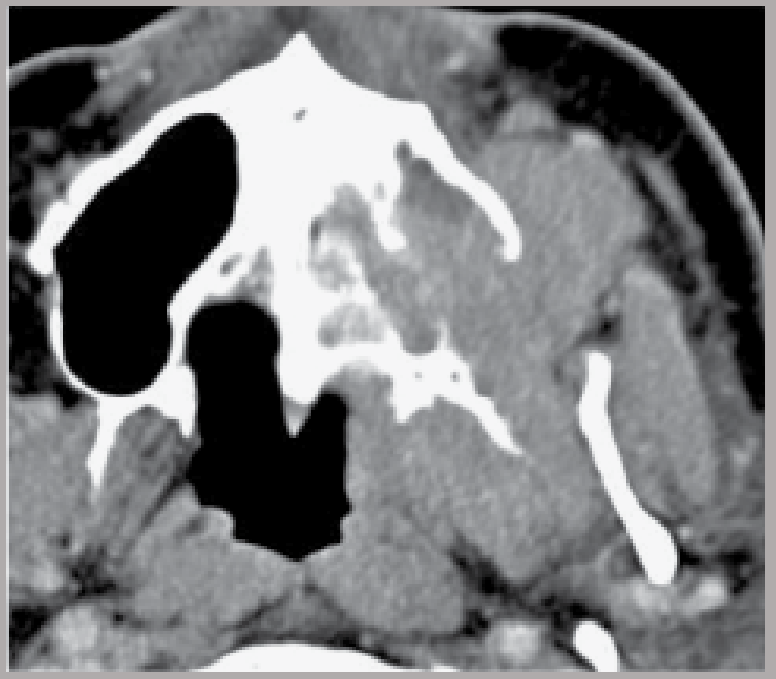
FIG. **23-6** The multilocular radiolucency in this radiograph is characteristic of central mucoepidermoid carcinoma; this lesion has displaced the mandibular canal and destroyed the superior crest of the alveolar process and the distal supporting bone of the second molar.

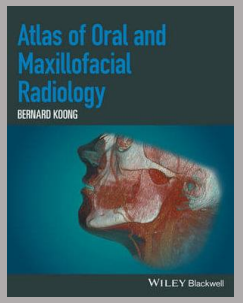




Further Imaging Required

- **MSCT** with IV contrast
- **MRI** with Gad (soft tissue details, perineural spread & nodal metastasis, etc)
- **PET/CT** for cancer staging
- *Ultrasound → used for guided biopsy (lymph nodes in the neck)*

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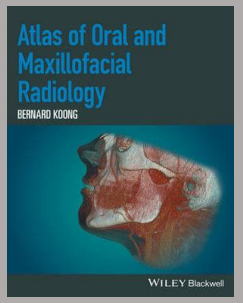
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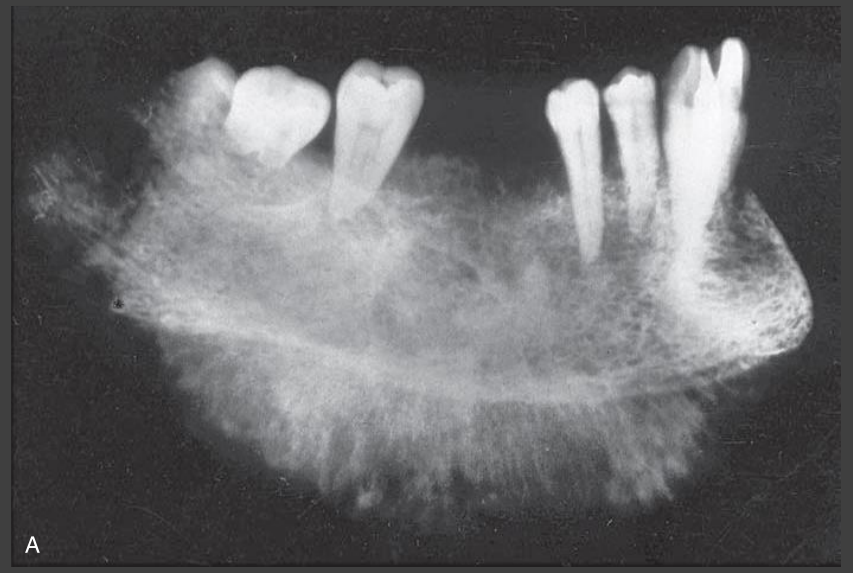
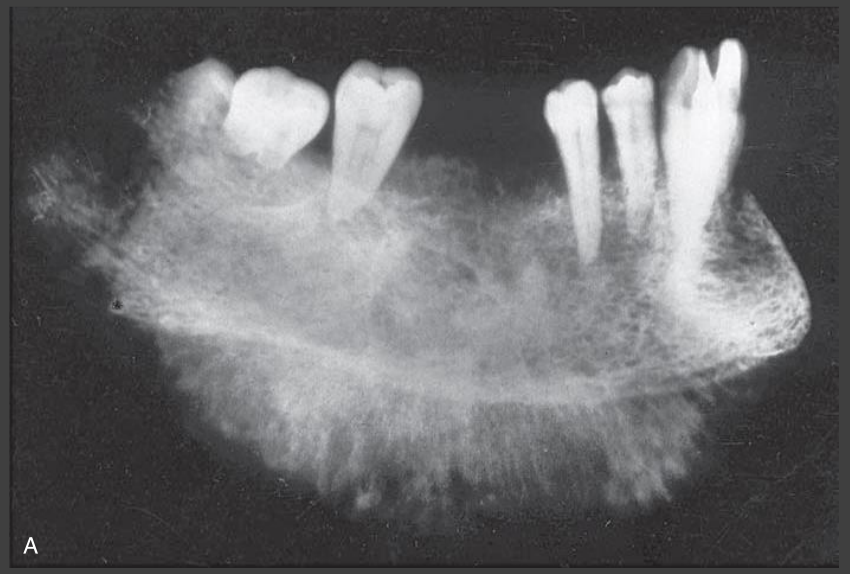
Sarcomas

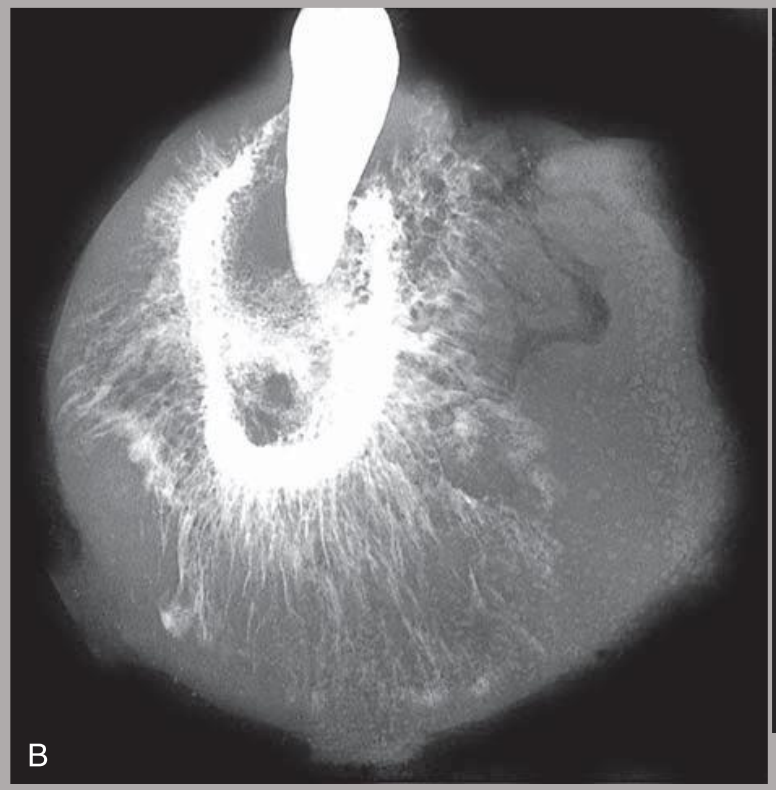
- **Osteosarcoma**
  - Osteoid is produced by the malignant stroma ie. Osteoblastic tumour
- Chondrosarcoma
  - Sarcoma of cartilaginous origin
- Ewing's Sarcoma
  - Arise in the medullary bone and spread to the endosteal and periosteal surfaces
- Fibrosarcoma, etc.

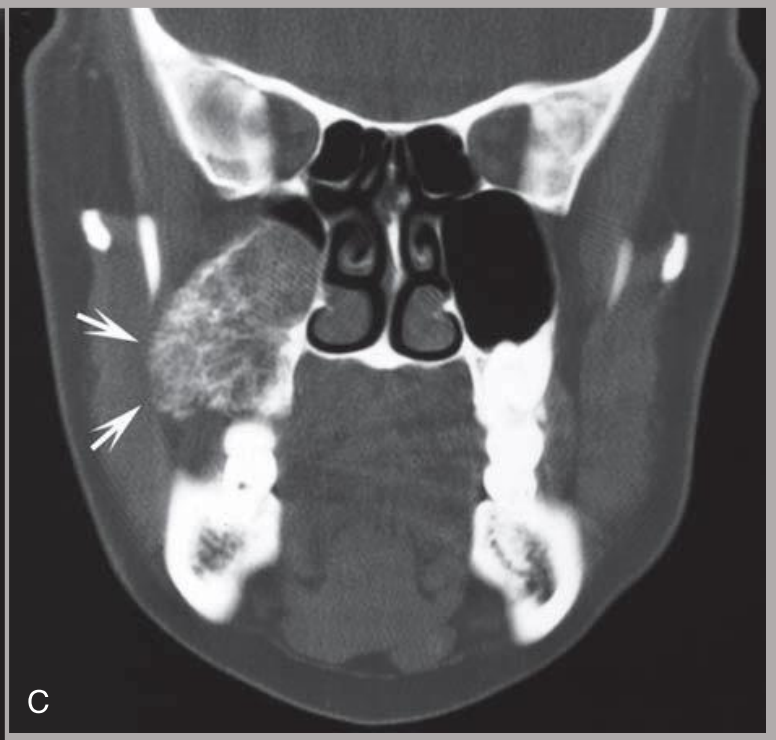


Osteosarcoma of the Jaws

- **Primary osteosarcoma:** typically occurs in young patients with 75% taking place before the age of 20
- **Secondary osteosarcoma**: occurs in the elderly, secondary to malignant degeneration of benign bone diseases eg. Paget disease, osteochondroma, etc
- **Radiographic features:**
  - Expansile & destructive mass with ill-defined borders
  - Destruction of cortex
  - Internal “Cloud-like” opacities cotton balls
  - **Sunburst & spiculated periosteal reaction**
  - Enlarged neurovascular canals
- MRI is used for local staging by assessing intraosseous tumour extension and soft tissue involvement.
- Bone scans for distant sites







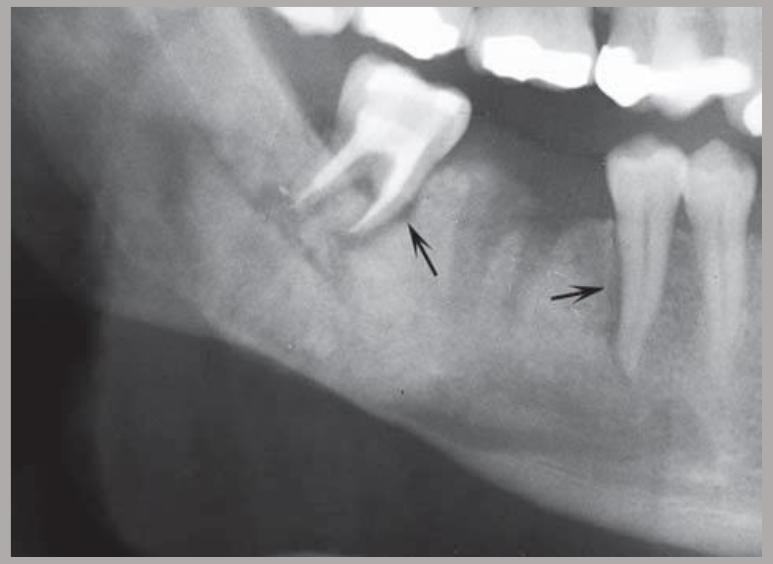


FIG. **23-10** Cropped panoramic image of an osteosarcoma occupying the body of the right mandible. Note the widened ligament spaces *(arrows)* and that the density of the mandible in the first molar region is greater than normal due to abnormal bone formation from the tumor.

Chondrosarcoma - left condyle

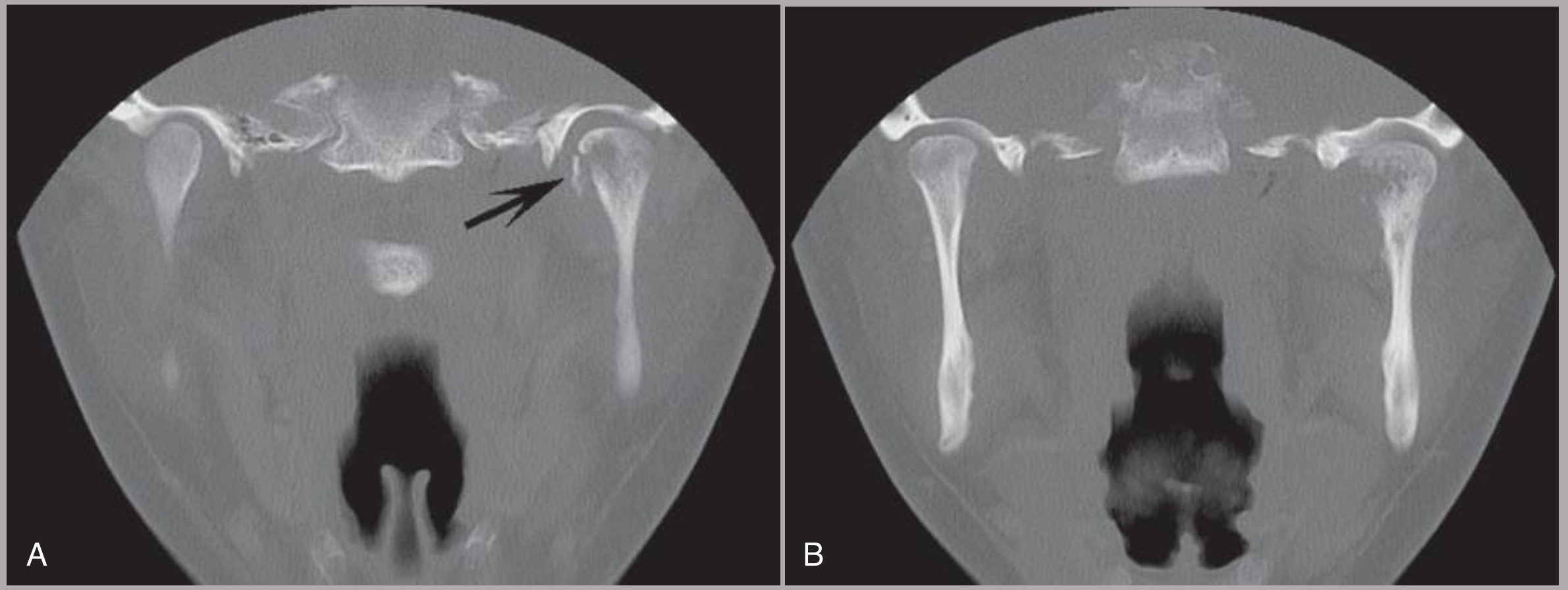
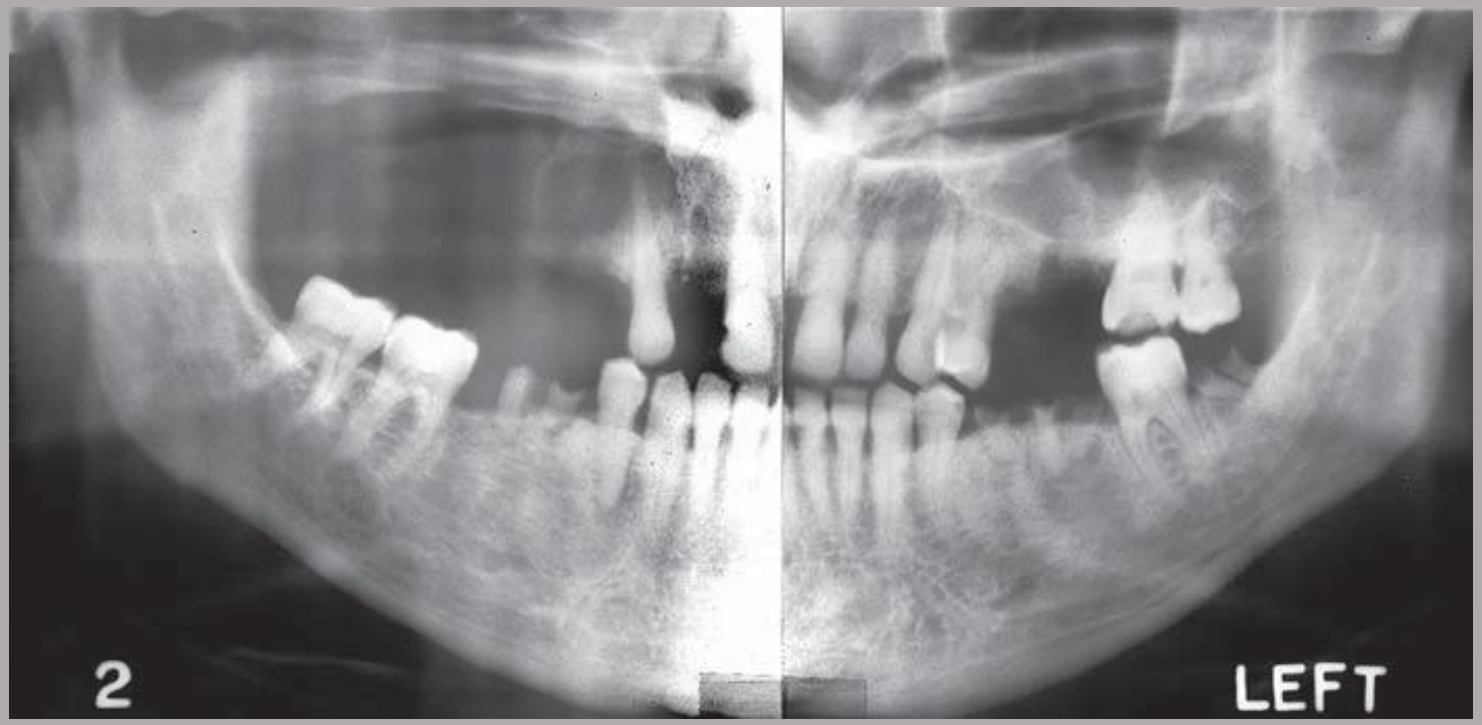


FIG. **23-12** **A** and **B,** Coronal CT images with bone algorithm demonstrating Ewing's sarcoma involving the left mandibular condyle; note the irregular margins, destruction of the medial cortex of the condyle, and a small pathologic fracture *(arrow).*

FIG. **23-13** A fibrosarcoma involving the right maxillary sinus has destroyed the cortical boundaries of the sinus, zygomatic process, hard palate and posterior maxilla, and the alveolar process in this panoramic film.



High-grade Fibrosarcoma of the MD
With Mets

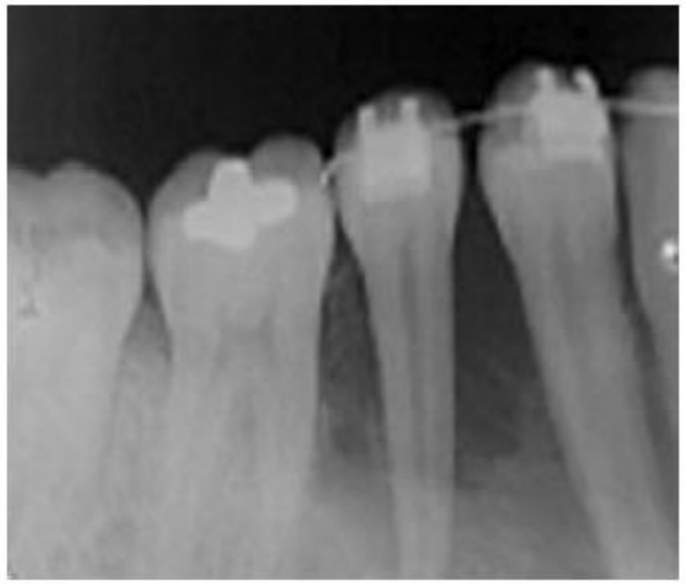


Fig. 1. Initial orthopantomography examination (June, 2001). The radiograph displayed a mild radiolucent lesion involving the right madibular second premolar.

Fig. 2. Clinical appearance of intraosseous fibrosarcoma (august, 01, 2001) with extensive swelling from region of the right mandibular lateral incisor to the right mandibular second premolar.

Fig. 3. Subsequent orthopantomography examination (august, 01, 2001). The radiograph showed a radiolucency undefined lesion extending from region of the left mandibular central incisor to the right mandibular first molar.

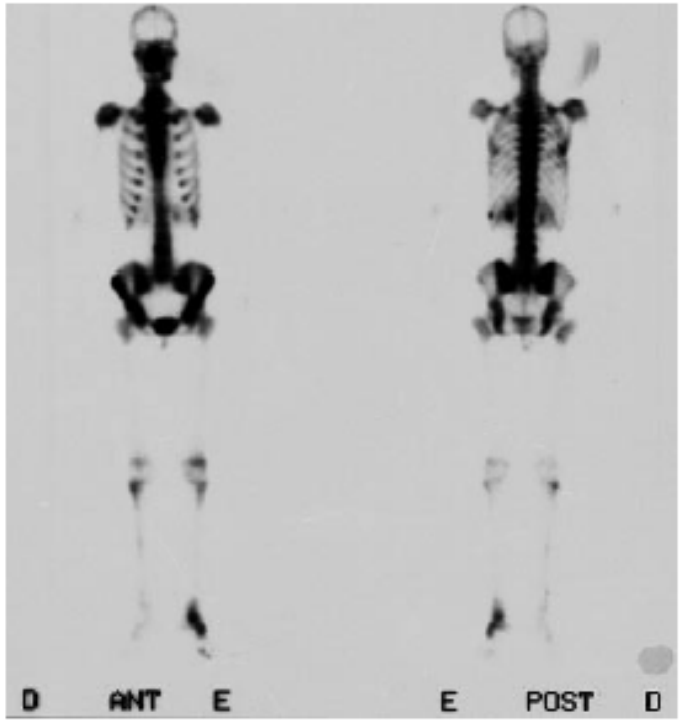
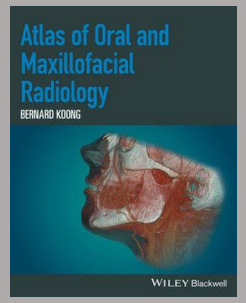


Fig. 7. Scintigraphy exhibiting metastases in articulations.

Hematopoietic Malignancies

- Multiple Myeloma
  - Most common adult primary malignant bone cancer
  - Classic radiographic feature: multiple ‘punched-out’ lytic lesions
- Lymphoma
  - **Non-Hodgkin** (most lymphomas involving the jaws) >>>> Hodgkin
  - Lytic, destructive & invasive/infiltrative
- Leukemia
  - ALL (most common leukemia in children), AML, CLL, CML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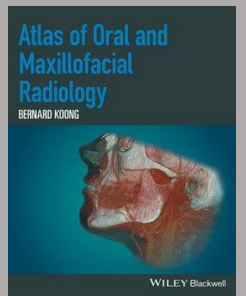
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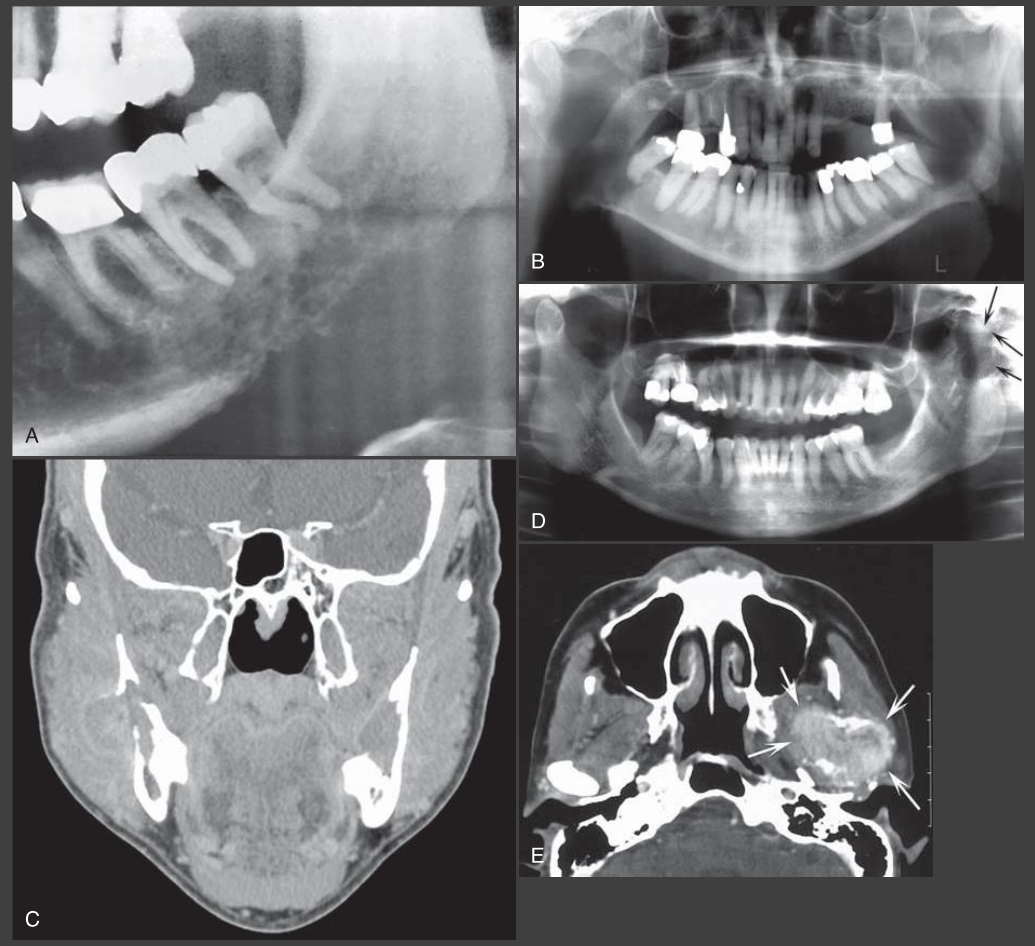
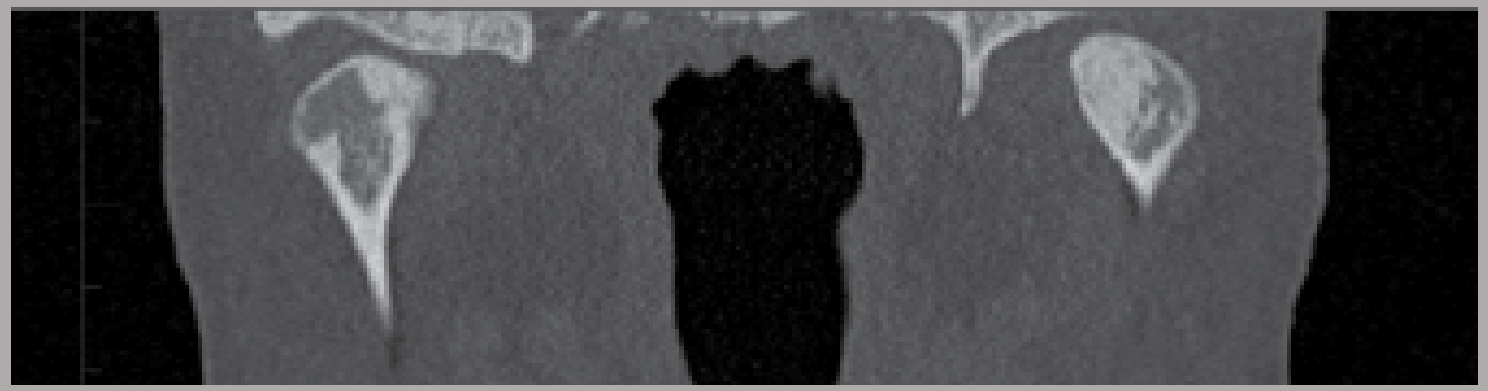
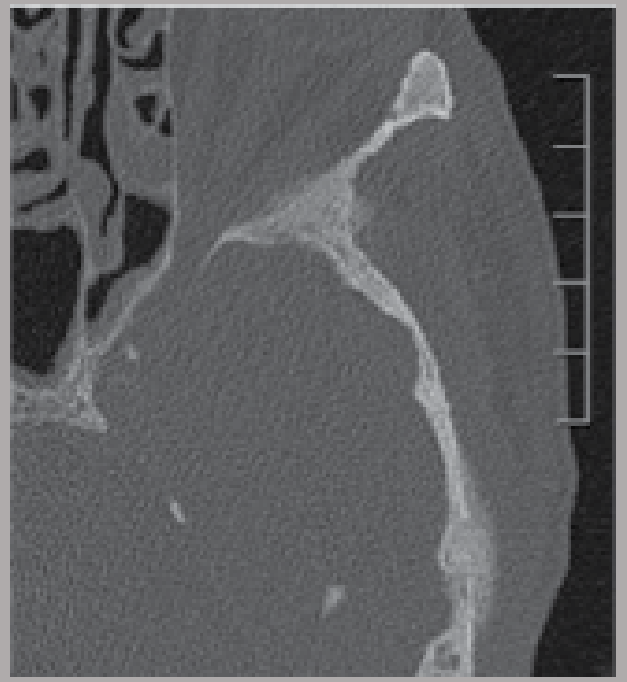
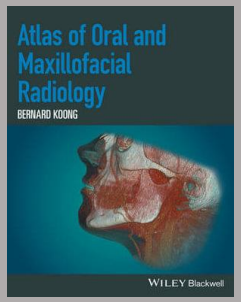
Metastatic Lesions in the Jaws

- Metastatic tumours represent the establishment of new malignant disease from a distant malignant tumour
- Common primary sites include the breast, kidney, lung, prostate, thyroid, stomach
- Radiographic Features:
  - **Sclerotic (breast & prostate mets) or**
  - **Lytic (renal & thyroid mets)**
  - **Multiple foci**
  - **Most are ill-defined**





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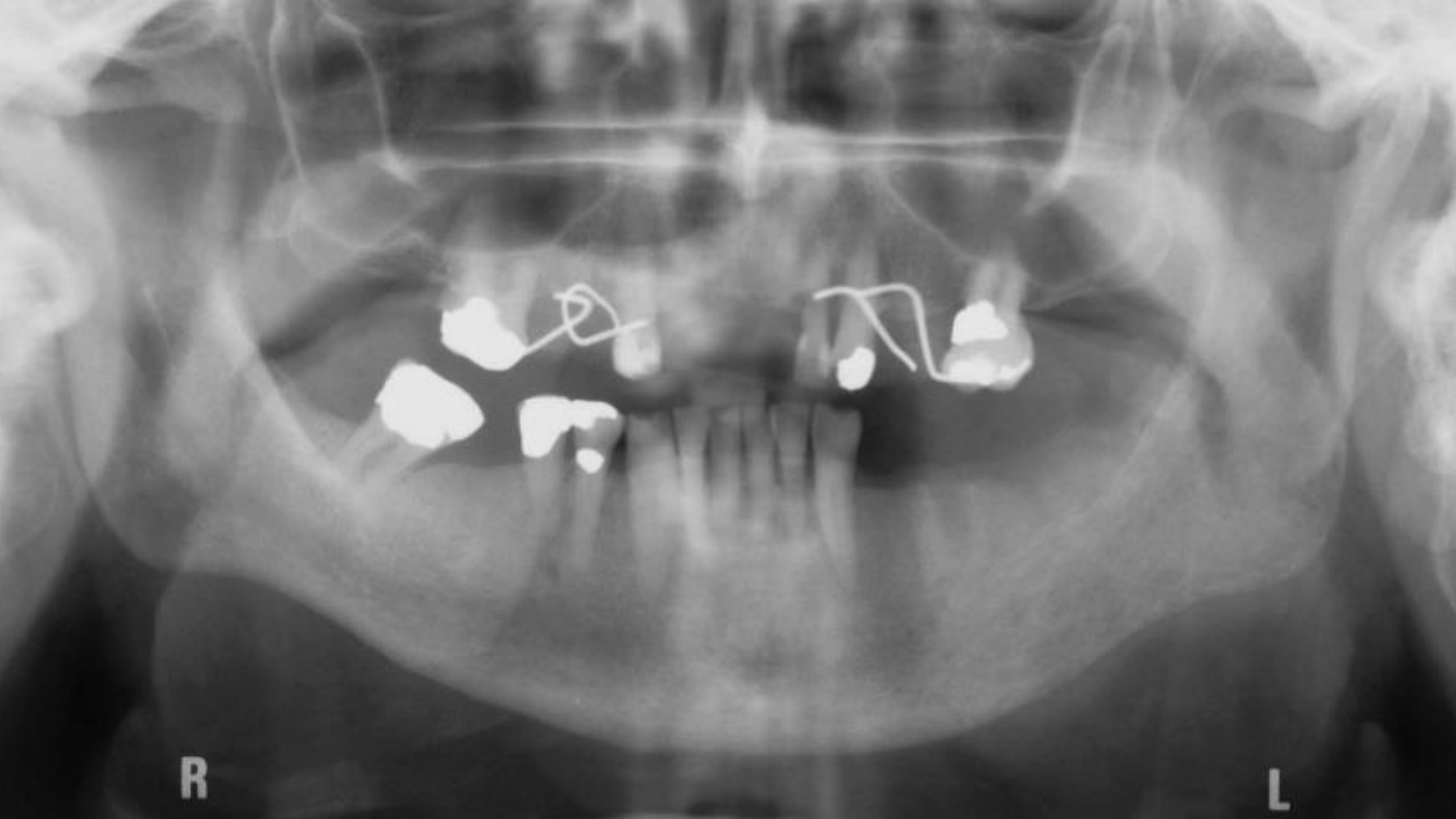
Cases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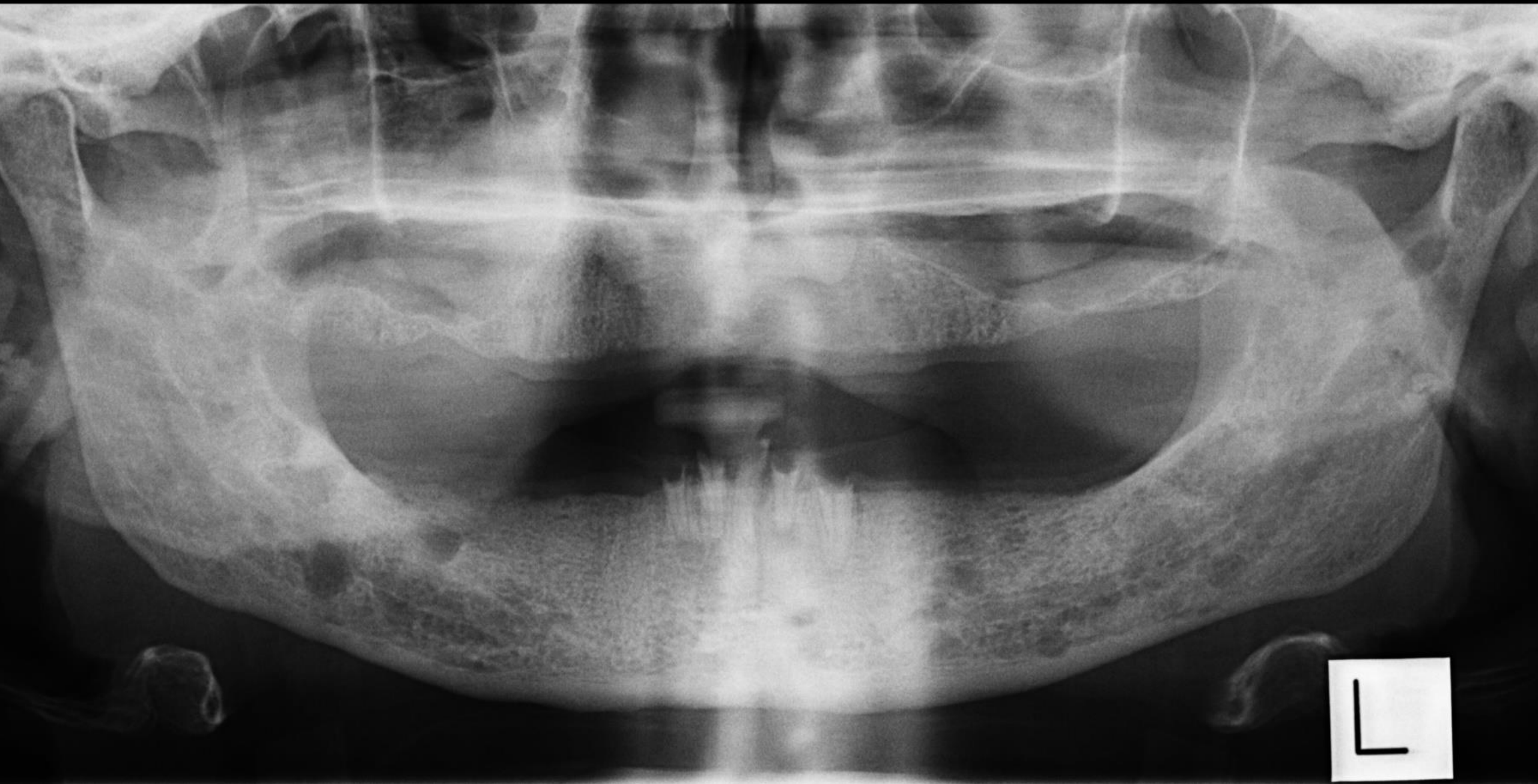
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