72 year-old male with mandibular discomfort

Alan Lurie, DDS, PhD

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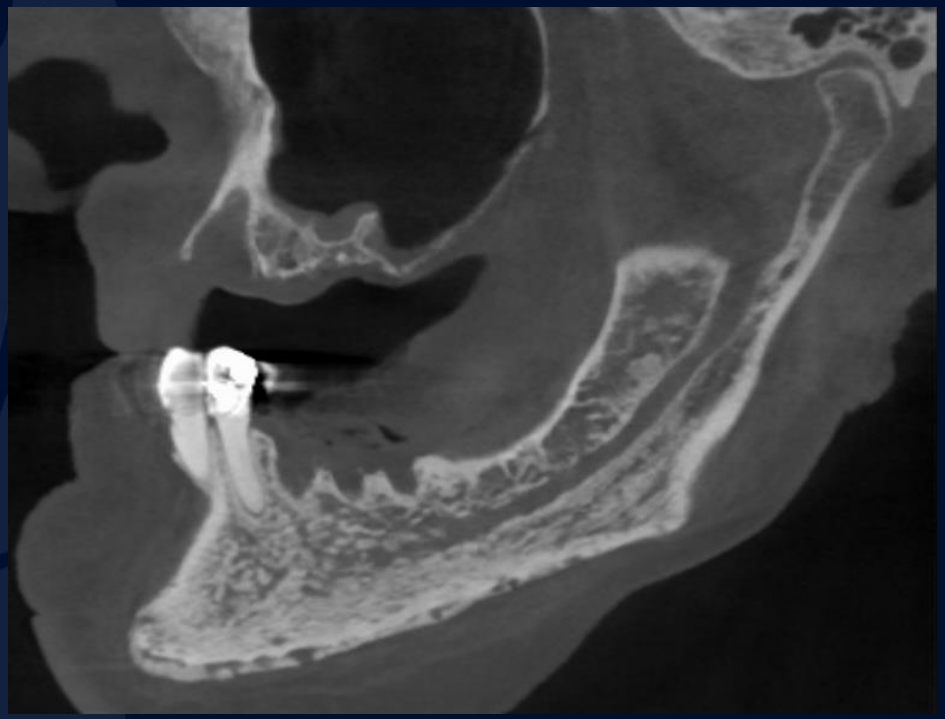

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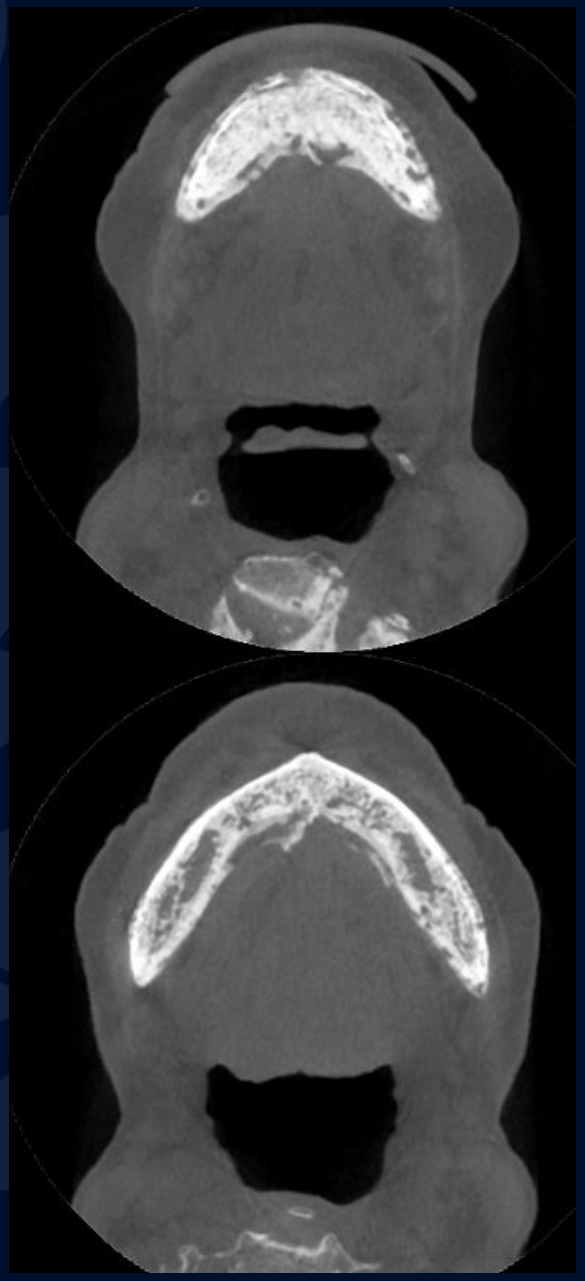

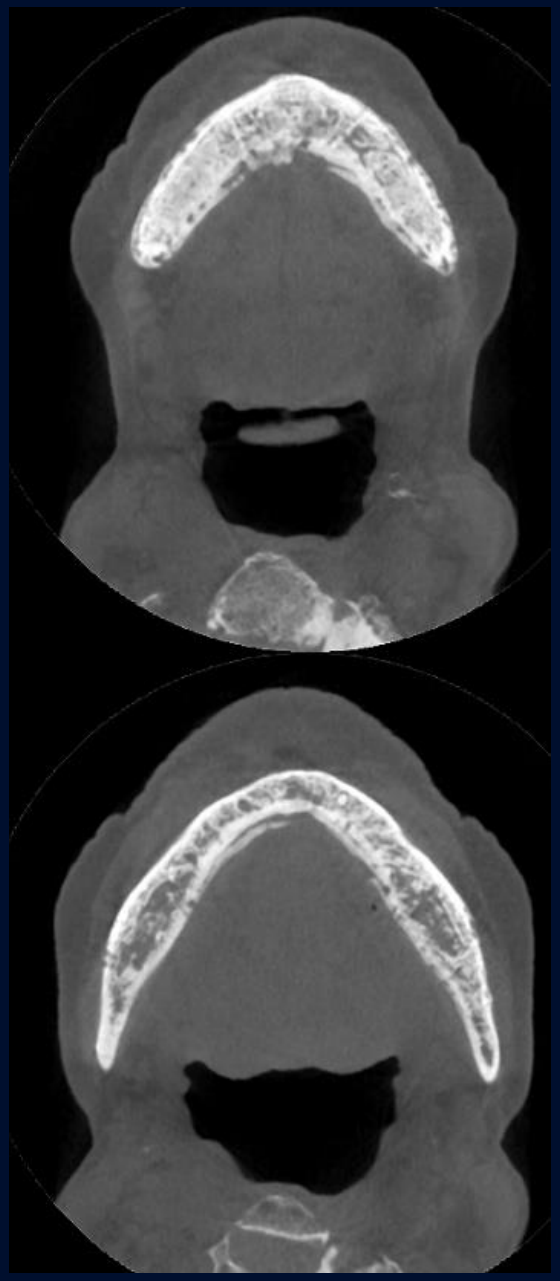

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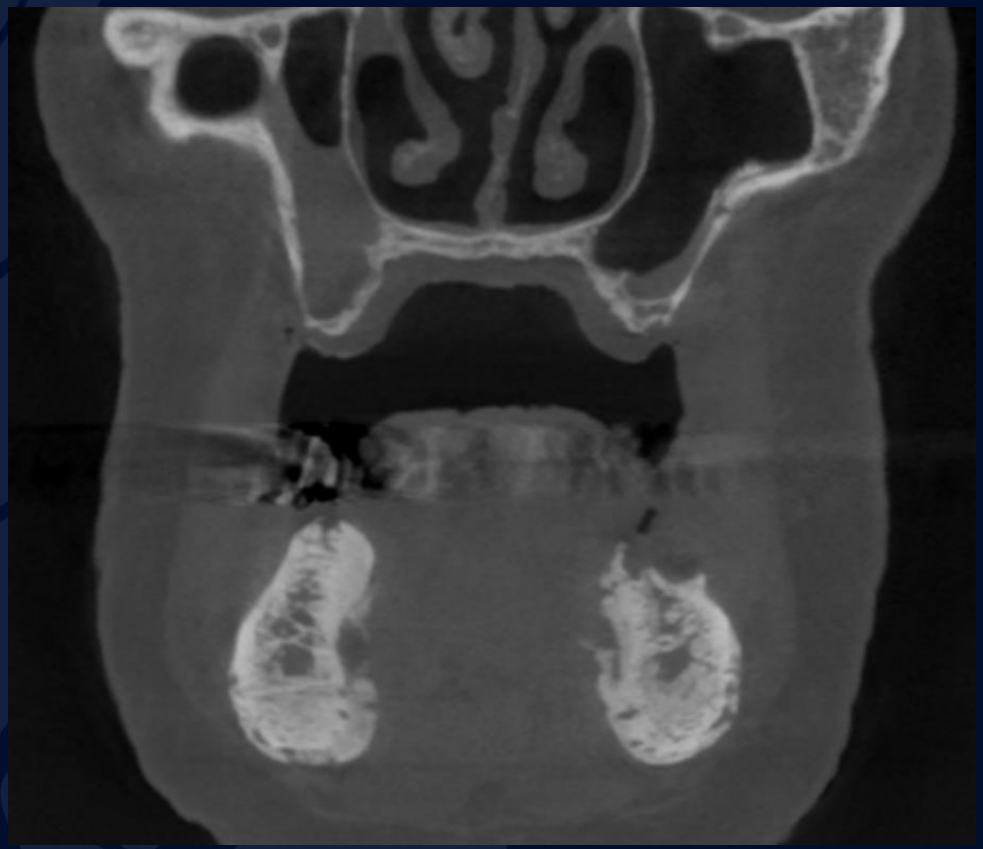

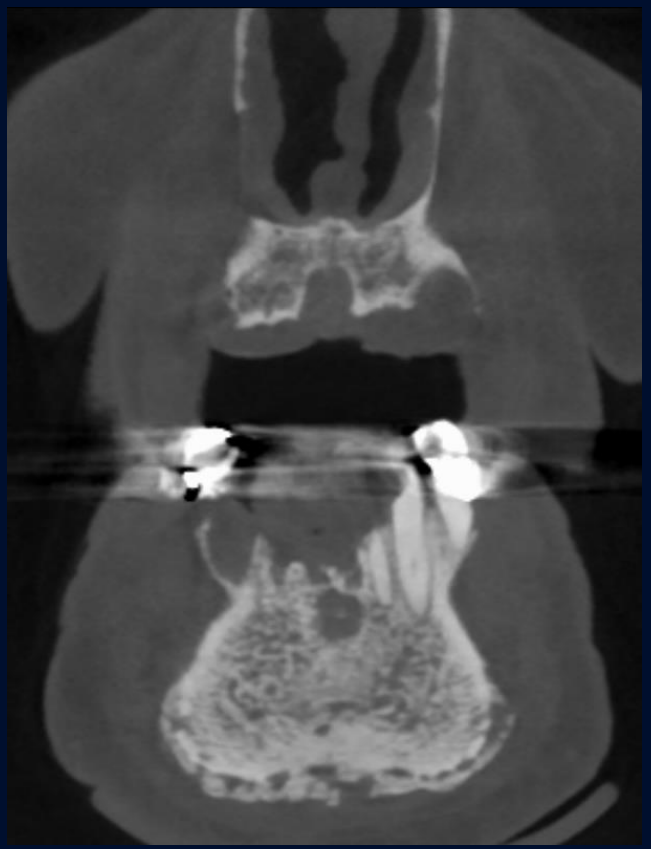

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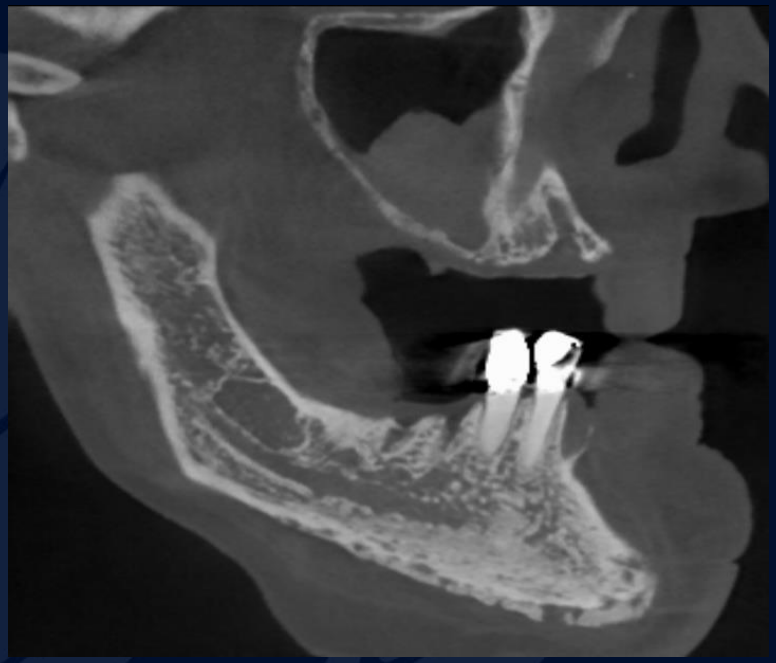

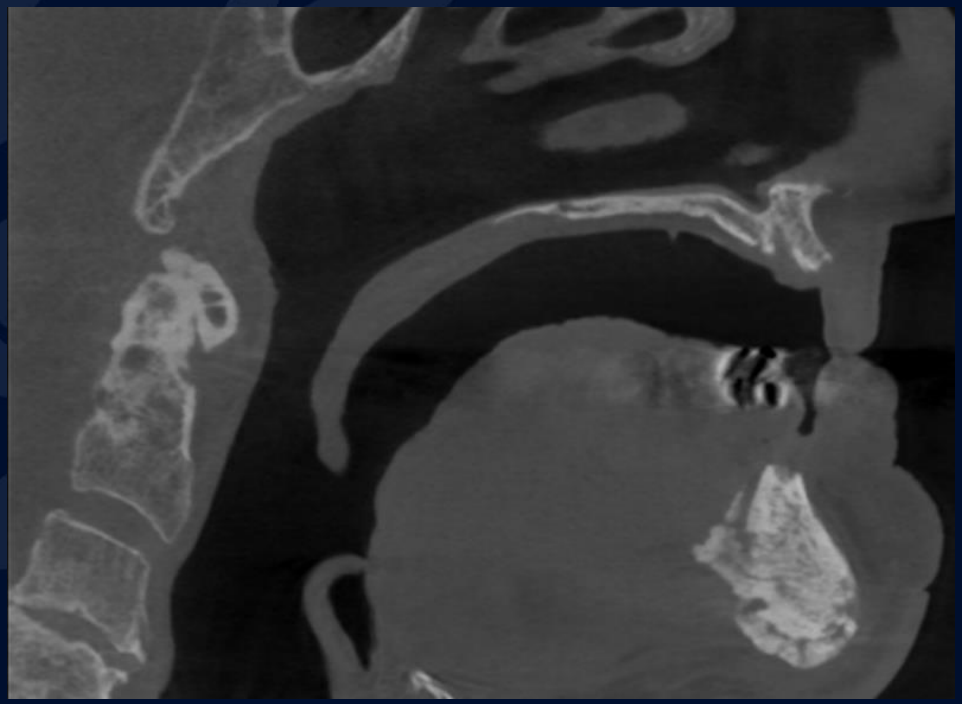

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Osteonecrosis of the mandible

(Medication-Related ONJ)

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Major Image Features:

- Heterogeneous, primarily sclerotic, cancellous bone in mandible
- Massive periosteal new bone formation which in many areas “envelopes” most of the mandible
- Anterior, lingual mandibular cortex is separating from the bone in the area of the genial tubercles
- Frank or likely sequestra

(Incidental finding of osteoarthritic changes in the imaged elements of the C-spine)

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Differential Diagnosis:

- Chronic Osteomyelitis
- Osteonecrosis of the Jaws (ONJ) (aka Medication-Related ONJ)
- Osteoradionecrosis (ORN) (aka Radiation Osteomyelitis)

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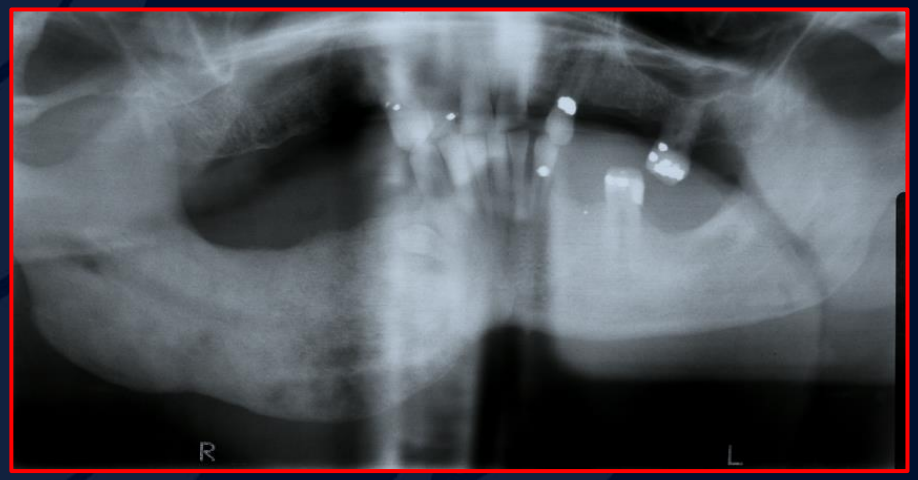
Chronic Osteomyelitis – primarily sclerosing type (3 different patients)



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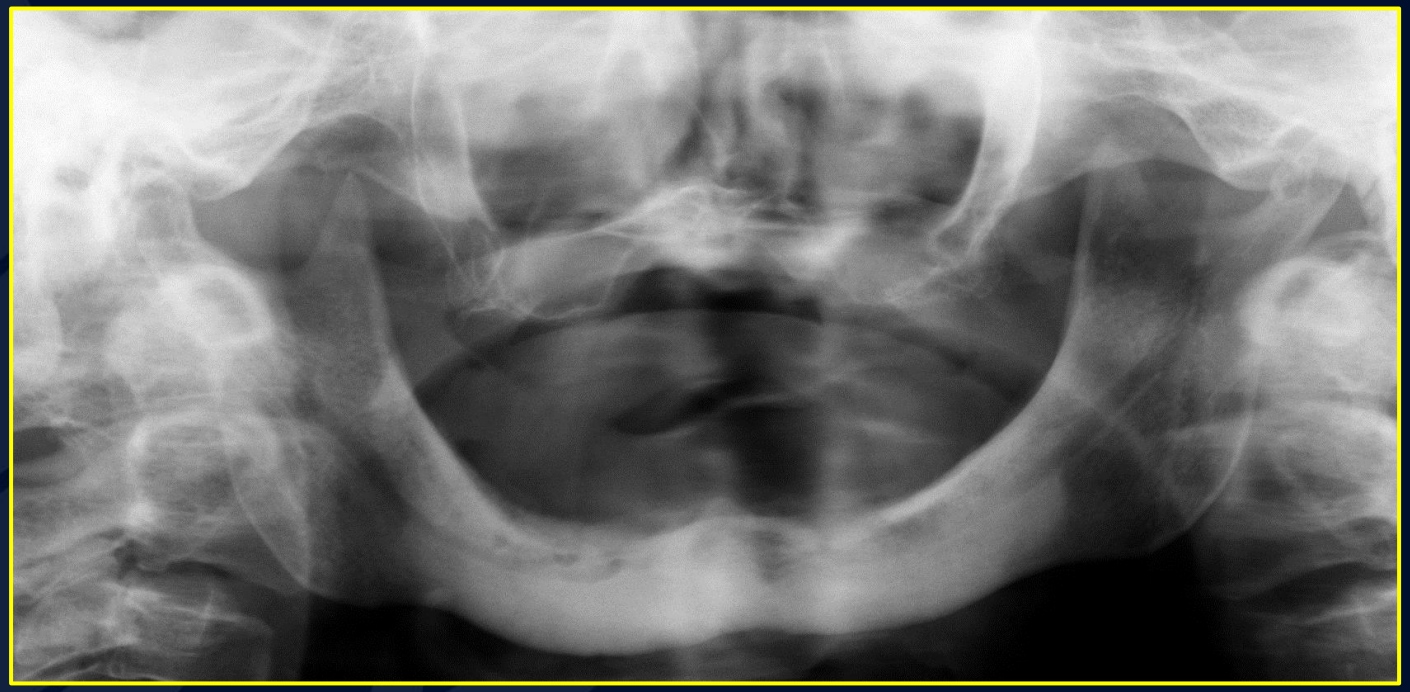

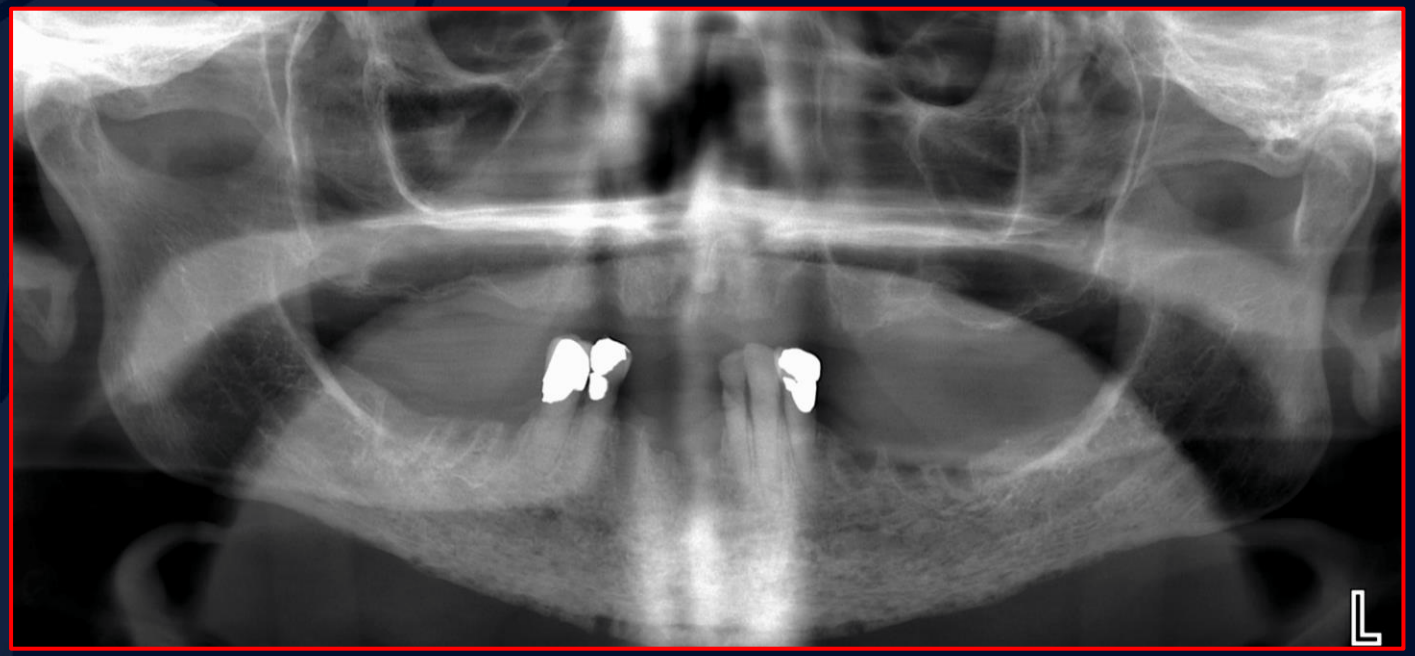

Osteonecrosis of the Jaws (ONJ)

(2 patients)

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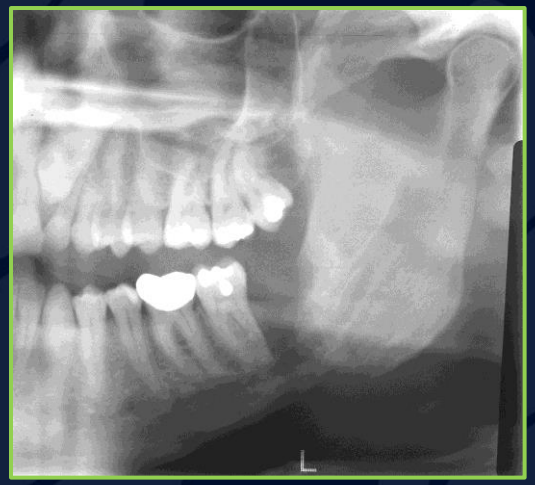
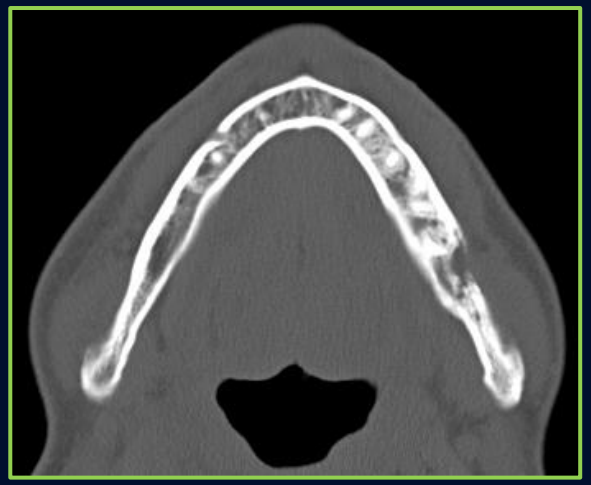
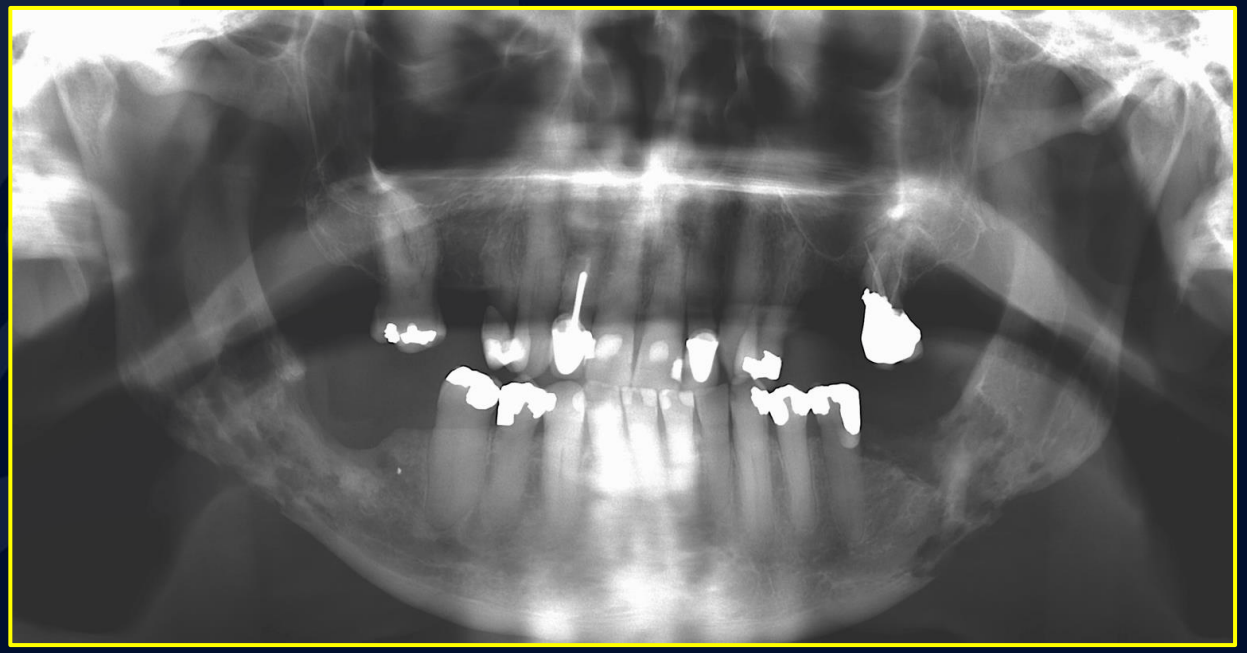
Osteoradionecrosis (ORN) (aka Radiation Osteomyelitis) (2 patients)







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What do you need to know?

- History of radiation therapy
- Clinical signs/symptoms of chronic infection
- History of antiresorptive therapy
  - Oral for osteoporosis or other systemic problem
  - IV as part of cancer chemotherapy, usually for multiple myeloma, prostate carcinoma or breast carcinoma

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Osteonecrosis of the mandible

History of multiple myeloma and intravenous anti-resorptive therapy.

vs osteomyelitis: almost total involvement of the mandible and the extensive “gloving” of the mandibular cortices with periosteal new bone. Separation of the lingual anterior cortex from muscle action of genioglossus and geniohyoid muscles. Primarily bone sclerosis – little bone resorption.

vs ORN: no history of radiotherapy, massive sclerosis and periosteal new bone formation

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What are the mechanism(s) of ONJ?

Presently unknown, but there are plenty of strong, working hypotheses. Healthy bone depends on an active balance of osteogenesis and osteoclasis. Anti-resorptive therapy either inhibits or kills osteoclasts. Half-lives of bisphosphonates are very long (years) while Denosumab is very short (weeks). Osteogenesis proceeds without the check of osteoclasis, resulting in the massive sclerosis characteristic of this condition. Diminished osseous vascular supply appears to play a strong role as well, as it does in ORN and osteomyelitis. Dental disease clearly initiates and/or exacerbates ONJ. Why this problem only occurs in the gnathic bones (?atypical femur fractures) is unclear.

Imaging ONJ:

This is a hard-tissue disease. Thus, Conebeam CT (CBCT) with its superior spatial resolution is the imaging of choice. In the absence of CBCT, MDCT functions almost as well.

Bone scans and PET are positive in regions of ONJ, but can be confused with persistent or recurrent malignant disease.

Panoramic imaging is frequently used as an initial imaging modality where ONJ is suspected. Sensitivity and specificity are low, but not much lower than CT, making it a good initial screening image for this condition.

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TL Aghaloo et al, Periodontal disease and bisphosphonates induce osteonecrosis of the jaws in the rat. JBMR, 2017; 26(8):1871-1882.

This is the only animal model of ONJ – it was developed at UCLA by a former OMFR/PhD student here at UCONN, Dr. Sotirios Tetradis, who is now Senior Associate Dean of the UCLA School of Dentistry. Dr. Aghaloo is the head of OMF Surgery and handles all of the ONJ cases.

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Other References:

HH Mawardi, NS Treister and S-B Woo, Bisphosphonate-associated osteonecrosis of the jaws. In: Primer on the Metabolic Bone Diseases and Disorders of Mineral Metabolism, 8th Ed. American Society for Bone and Mineral Research. Wiley-Blackwell, 2013: pp 929-940

G Subramanian et al, Identifying MRONJ-affected bone with digital fusion of functional imaging (FI) and cone-beam computed tomography (CBCT): case reports and hypothesis. Oral Surg Oral Med Oral Pathol Oral Radiol 2017;123:e106-e116.

AI Watters et al, Intravenous bisphosphonate-related osteonecrosis of the jaw: long-term follow-up of 109 patients. Oral Surg Oral Med Oral Pathol Oral Radiol 2013;115:192-200.

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