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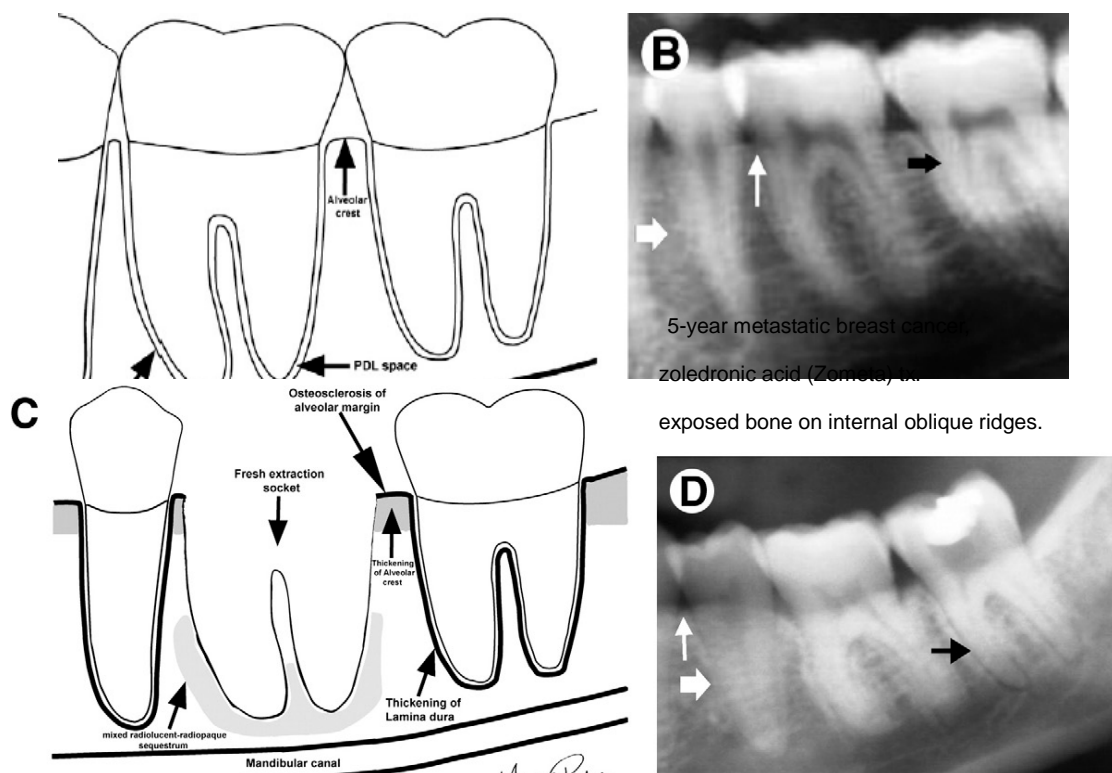
- 內文：

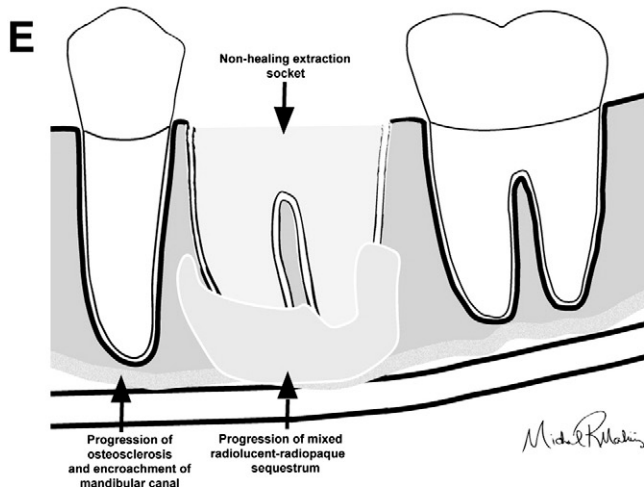
Abstract

- Purpose: clinical and radiographic findings → diagnostic, prognostic, and therapeutic information.
- Materials and Methods: plain films, intraoral films, orthopantograph, CT, MRI, nuclear bone scans.
- Results: radiographic findings : osteosclerosis, osteolysis, dense woven bone, thickened lamina dura, subperiosteal bone deposition, failure of postsurgical remodeling.
- Conclusions: Imaging is essential part of clinical assessment and can track progression of disease.

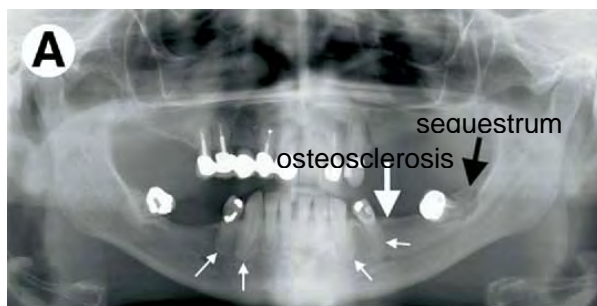
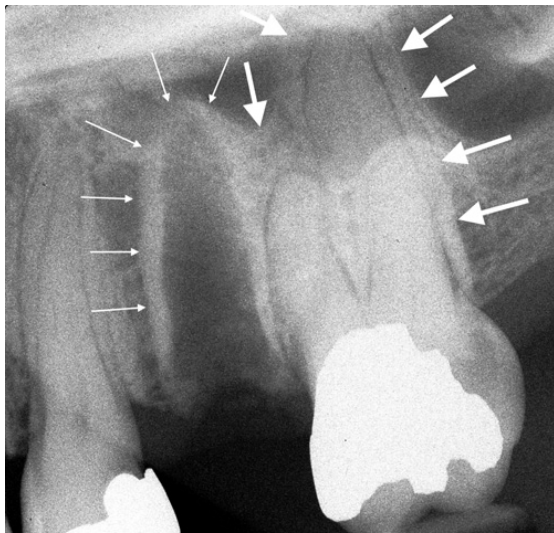
(1).Plain Film Radiography

- lag time present between bone changes and radiographic findings could be 2 weeks.
- Orthopantographs : initial screening of p'ts who present for evaluation of BRONJ.
- underestimate extent and miss small sequestra





7-year multiple myeloma p't received
5 cycles of pamidronate/Zometa → tooth extraction
→ BRONJ radiographic features

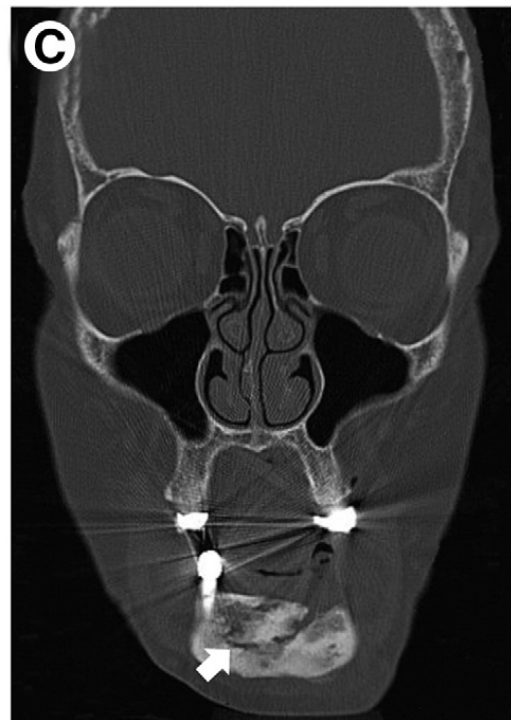


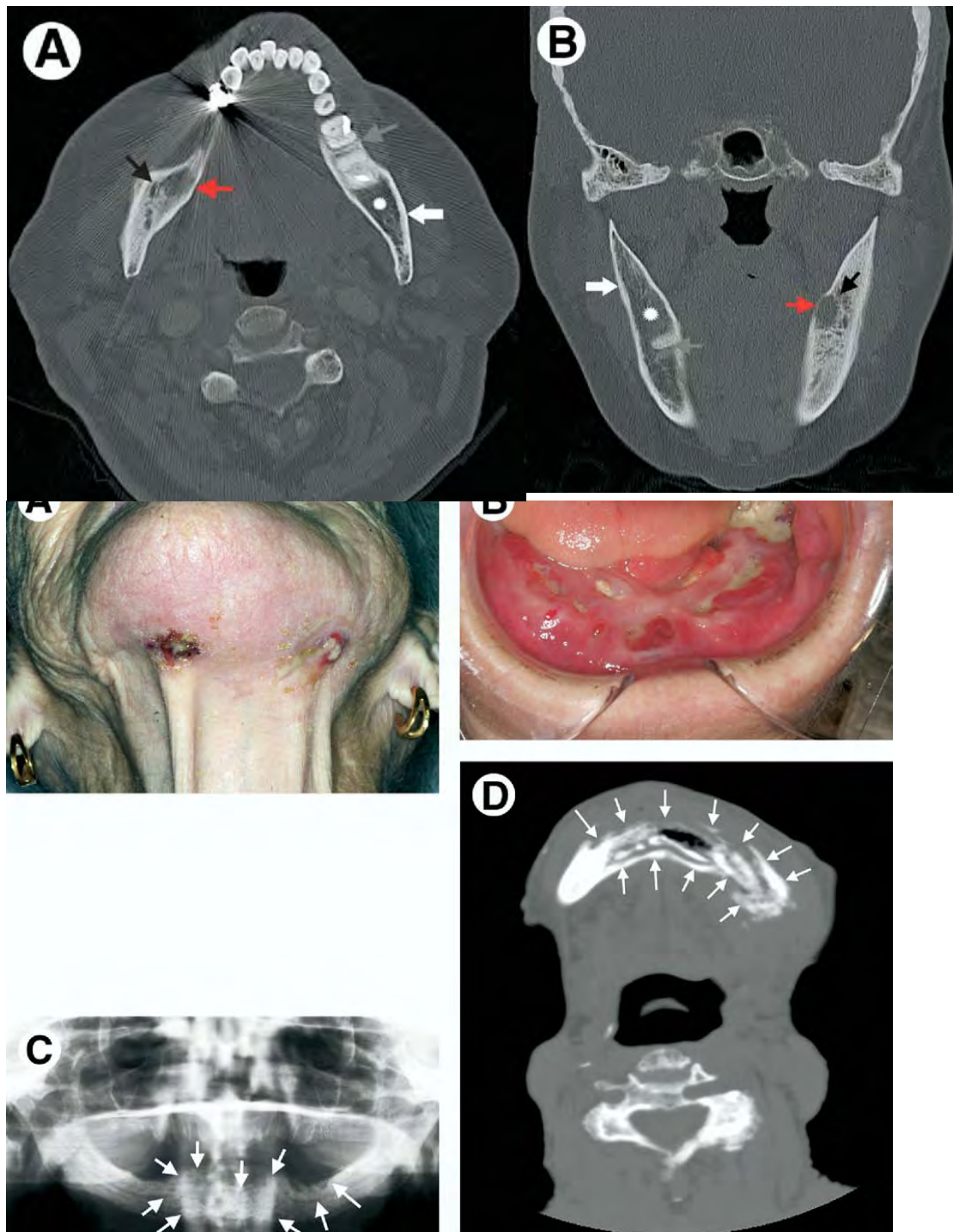
- poor healing or nonhealing of extraction sites.

- degree of sclerosis↑as clinical severity of disease progresses.
- narrowing of mandibular canal, paresthesia

(2).Computed Tomography

- Identify findings difficult to discern, 3-D
- early disease : focal sclerosis, disorganized, trabecular pattern and poor corticomedullary differentiation.
- disease advances : periosteal reaction and sequestra.
- cervical lymphadenopathy.
- prominent, thickening of muscles of mastication could be present and could resemble a tumor.
- maxillary sinus : mucoperiosteal thickening, air-fluid levels, and fistula formation.





- Bianchi et al :
 - 1) trabecular alteration with changes in thickness and mineral content, microlacunae form
 - 2) cortical bone erosion
 - 3) Osteosclerosis
 - 4) sequestrum less than 15 mm in size
 - 5) sequestrum greater than 15 mm
 - 6) periosteal new bone
- (3).Magnetic Resonance Imaging
 - bone marrow changes associated with edema or inflammation (water content replaces fatty marrow).

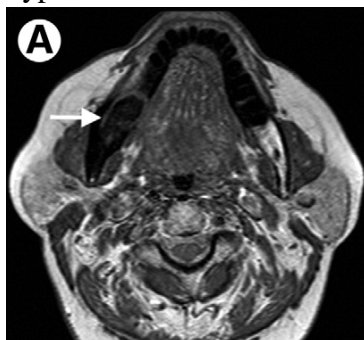
- also be seen in noninfectious inflammatory conditions of bone, healing of fractures, and metastases.

bone response to the ischemic necrosis :

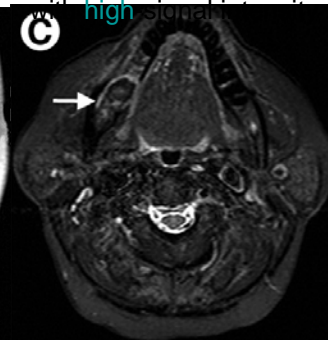
1. a central zone of avascular, necrosis
2. surrounding ischemic marrow becomes hyperemic, and appears as osteoporosis of viable bone.
3. reactive fibrotic margin.
4. Support↓ → compensatory osteoblastic reinforcement of adjacent viable bone → peripheral rim of sclerosis

Viable area, unexposed bone	Necrotic areas, exposed bone
low-signal intensity on T1 high-signal intensity on T2 weighted image	hypointense areas on both T1- and T2-weighted
high water content, inflammation	low water content

A and B : T2-weighted MRI scans with hypointense bone marrow



C : T1-weighted MRI scan

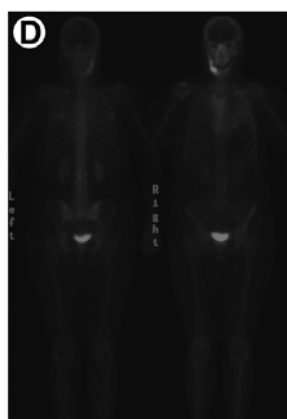
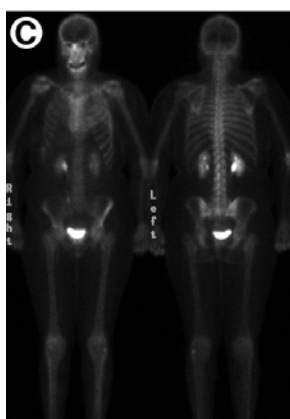
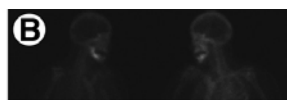
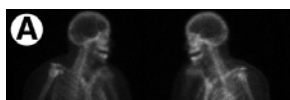


(4).Nuclear Bone Scanning (Scintigraphy)

- Technetium-99m (Tc99m), 1971, standard 3-phase bone scans.
- Tc99m uptake in bone is dependent on osteoblastic activity and skeletal vascularity. Bone scans can show abnormal radionuclide uptake 10 to 14 days before bone mineral loss significant for conventional films can detect.

Chiandussi et al :

1. during early stages of BRONJ, uptake is↓
(lack of vascularity and activity in necrotic region)
2. disease progresses, uptake is↑
(consistent with increased osteoblastic activity)



radiotracer uptake
in hemimandible
corresponding to
area of sclerosis.

- functional imaging with oncotropic tracers, such as Tc99m-sestamibi, distinguish lesions of BRONJ from tumor infiltration associated with multiple myeloma.

(Methoxy-isobutyl-isonitrile coupled with

radiolabeled technetium, supporting differential diagnosis of BRONJ with multiple myeloma)

- benefit of biopsy does not outweigh risk of bone damage.
- 18F-Fluorodeoxyglucose-positron emission tomography (FDG-PET)/CT
- F-18 sodium fluoride (NaF)-PET/CT

* Conclusion

- periapical radiographs, panoramic x-rays : initial screening
- CT, MRI : 3-D, delineate margins of disease → important in surgical treatment planning
- MRI (compared to CT) : cost↑, bone details↓
- Scintigraphy : sensitive test, screening of p'ts receiving bisphosphonate therapy for evidence of subclinical disease

題號	題目
1	What following statement is wrong comparing conventional CT and Cone Beam CT ? (A) CBCT equipment is less expensive than conventional CT. (B) Radiation dose of CBCT delivered to p't is higher than that of conventional CT. (C) CBCT is more efficient than conventional CT. (D) They all have more identifying margin than panorex.
答案(B)	出處 : Oral Radiology 5 th (Principle and interpretation) by White Pharoah p.255
題號	題目
2	What following statement is true about MRI and CT ? (A) CT is more sensitive in identifying soft tissue. (B) MRI is more expensive than CT. (C) T1-weighted image are call water image. (D) If we want to focus on bony tissue, we would rather choose MRI than CT.
答案(B)	出處 : Oral Radiology 5 th (Principle and interpretation) by White Pharoah p.255~259