

Definition -

- The variety of definitions used in the literature for the clinical assessment of alveolar osteitis,
- A descriptive definition that could be used universally as a standardized definition for AO:

postoperative pain in and around the extraction site, which increases in

severity at any time between 1 and 3 days after the extraction

accompanied by a partially or totally disintegrated blood clot within

the alveolar socket with or without halitosis.

Incidence

3–4% following routine dental extractions .

1% to 45% after the removal of mandibular third molars . (**BARCLAY JK**. Metronidazole and dry socket: prophylactic use in mandibular third molar removal complicated by nonacute pericoronitis. *New Zealand Dent J* 1987; **7**: 71–75.)

25–30% after the removal of impacted mandibular third molars .

FRIDRICH KL, OLSON RAJ. Alveolar osteitis following removal of mandibular third molars. *Anaesth Prog* 1990; **37**: 32–41.

- AO occurs approximately 10 times more frequently following the removal of 3rd molars than from all other locations.

AETIOLOGY:

- ❑ Smoking.
- ❑ Traumatic extraction.
- ❑ Poor oral hygiene.
- ❑ Patients with history of dry sockets.
- ❑ Surgical extraction of wisdom teeth.
- ❑ Oral contraceptives.
- ❑ Pre-existing infection: (pericoronitis)



SIGNS AND SYMPTOMS:

○ Symptoms

- Severe pain.
- Onset : 2 – 3 days after extraction.
- Radiation: Pain radiates to the jaws, ears ,eyes and neck of the affected tooth.
- Intra-oral Odor (Halitosis)
- Bad taste in the mouth.
- Regional Lymphadenopathy (Rare).

SIGNS:

- **Empty socket:-**That partially or totally lacks blood clot.
- **Exposed bone:-** Visible and sensitive to touch
- **Inflammation of the soft tissue around.**
- **Food debris trapped in the socket.**

DRY SOCKET Following Tooth Extraction



Formation of blood clot at the site of tooth extraction to protect the bone and nerve endings.

Dry socket occurs when this blood clot gets dislodged or dissolves before the wound has healed.

Dry Socket Symptoms

Bad breath

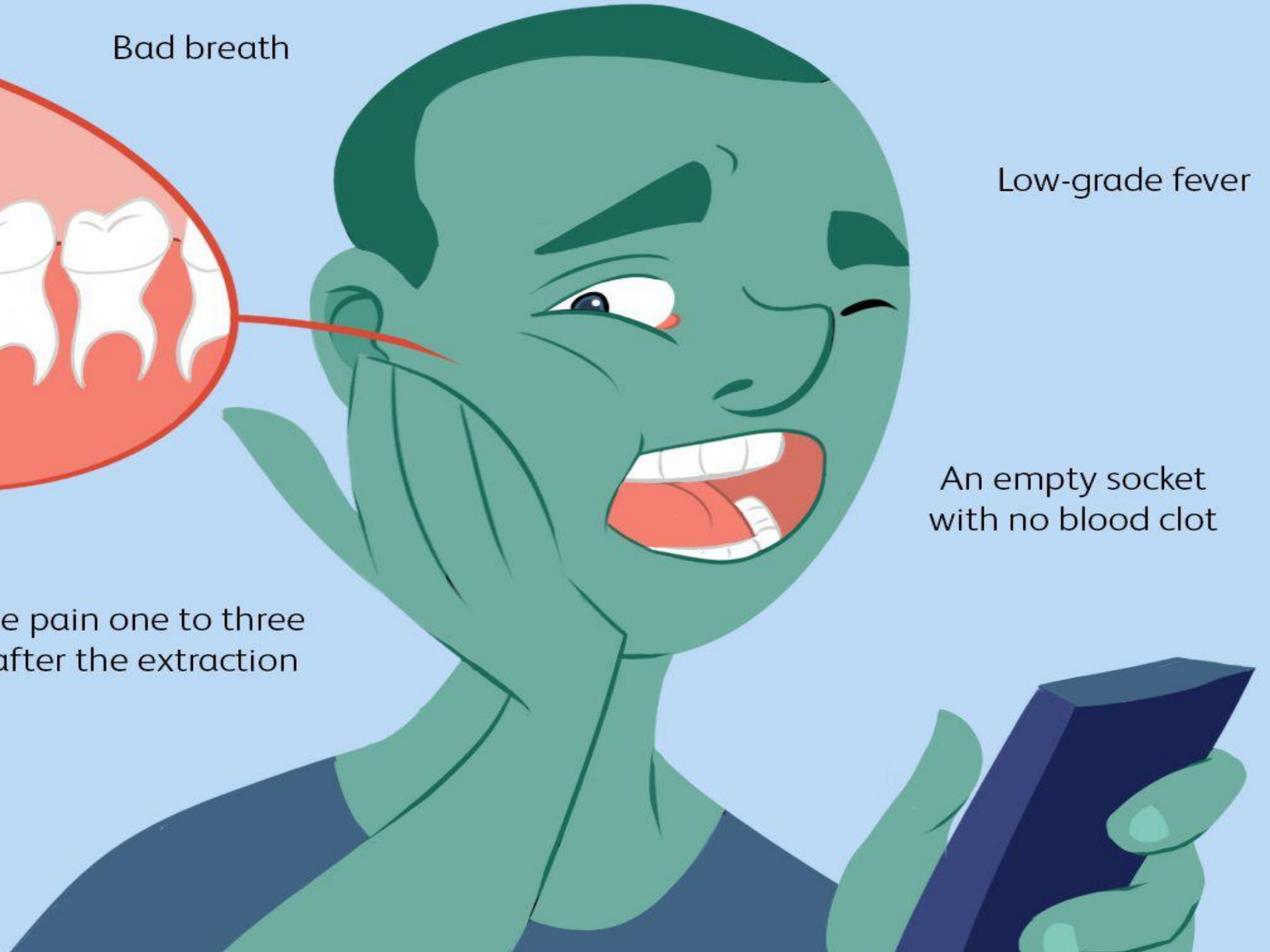
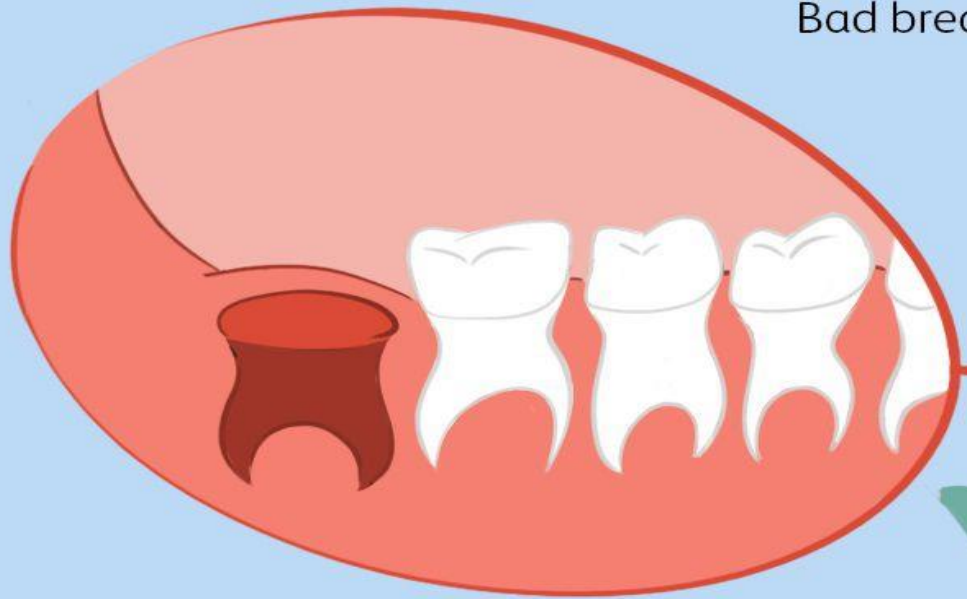
Low-grade fever

An empty socket with no blood clot

A foul taste in mouth

Intense pain one to three days after the extraction

Radiating pain on the side of removed tooth



Onset and duration

- Mostly 1–3 days after tooth extraction .

(FRIDRICH KL, OLSON RAJ. Alveolar osteitis following removal of mandibular third molars. Anaesth Prog 1990: 37: 32–41.)

- Within a week - In 95% and 100% of all cases of AO.

(FIELD EA, SPEECLY JA, ROTTER E, SCOTT J. Dry socket incidence compared after a 12 year interval. Br J Oral Maxillofac Surg 1988: 23: 419–427.)

- Unlikely - before the first postoperative day.
because the blood clot contains anti-plasmin that must be consumed by plasmin before clot disintegration can take place.
- The **duration** of AO varies to some degree, depending on the severity of the disease, but it usually ranges from 5–10 days.



Alveolar osteitis. Note exposed bone as marked by the arrow

PATHOPHYSIOLOGY:

- After tooth extraction, a blood clot forms on the socket of the extracted tooth, mainly to reduce blood loss due to the extraction and also to prevent the alveolar bone from getting exposed to the oral environment.
- When this blood clot fails to form or is physically lost from the socket, the alveolar bone gets exposed to the oral saliva, bacteria and food debris.
- This results in localized inflammation of the alveolar bone, leading to a severe throbbing pain that radiates to the jaws, ears and eyes of the affected side.



TREATMENT:

- Cleaning socket by removing food debris- use saline irrigation for better cleaning.
- Using medicated dressings e.g Alvogil
- Analgesics for pain relief.
- Antibiotics.



ALVOGYL PASTE

PREVENTION:

- No smoking before and after tooth extraction.
- No spitting, eating, washing or using straw for drinks .
- Good oral hygiene.
- Do not touch the extraction wound with your tongue, fingers e.t.c
- Eat cold soft food to avoid irritating the wound.



OSTEORADIONECCROSIS



Definition

- Osteoradionecrosis refers to an inflammatory condition of bone (osteomyelitis) that occurs after the bone has been exposed to therapeutic doses of radiation usually given for a malignancy of the head and neck region.

Osteoradionecrosis – predisposing factors (cont'd)

Postradiation extraction of teeth within the radiation treatment volume-Maxilla



In most patients, maxillary teeth in the radiation field can be extracted post radiation, with little risk of osteoradionecrosis. Even if an ORN develops as shown here, the nonvital areas of bone sequestrate naturally, leaving only small local bony deformities.



Definition

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Etiology

- Doses above **50 Gy** usually are required to cause this irreversible damage.
- Bone that has been irradiated is hypocellular and hypovascular.
- Dental extraction and denture trauma after radiation therapy.

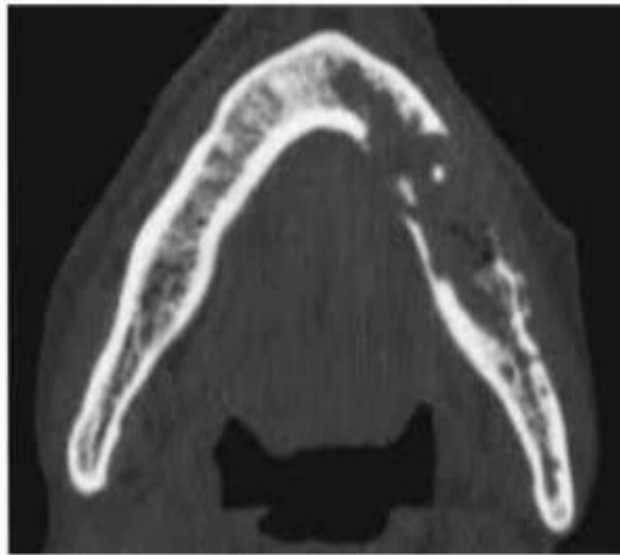
Clinical features

- Mandible is commonly affected than maxilla due to microanatomy & less vasculature.
- Posterior mandible is commonly affected than anterior portion because of radiation treatment for tumors in this region.

- *Loss of mucosal covering & exposed bone* are hallmark of Osteoradionecrosis.
- Pain may or may not be present with swelling and drainage extraorally..
- The exposed bone become necrotic as result of loss of vascularity from periosteum & sequestra.

Radiographic Features

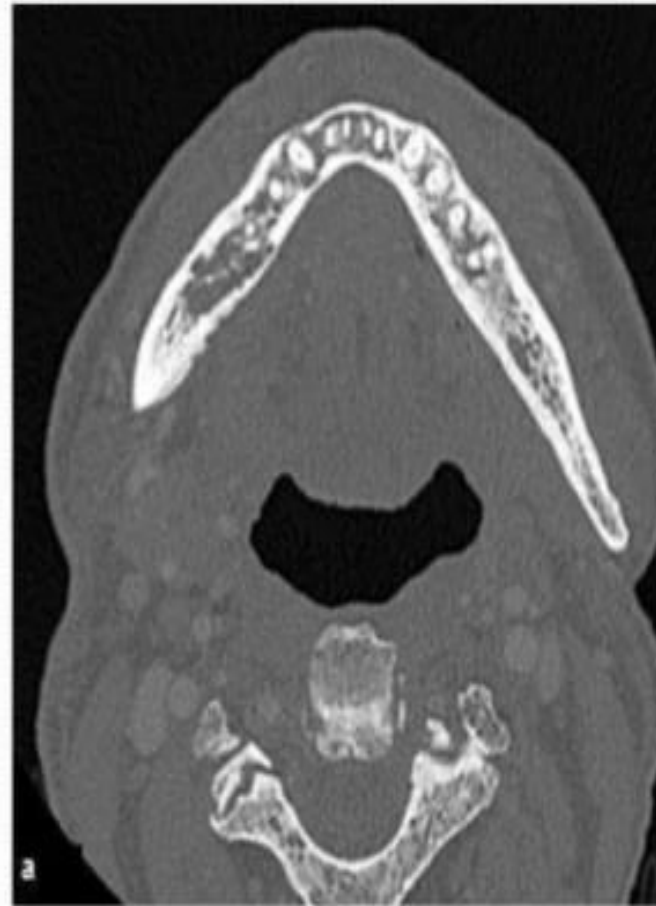
- CT imaging is modality of choice.
- Early changes in bone: is well defined area of bone resorption within the outer cortical plate of mandible.



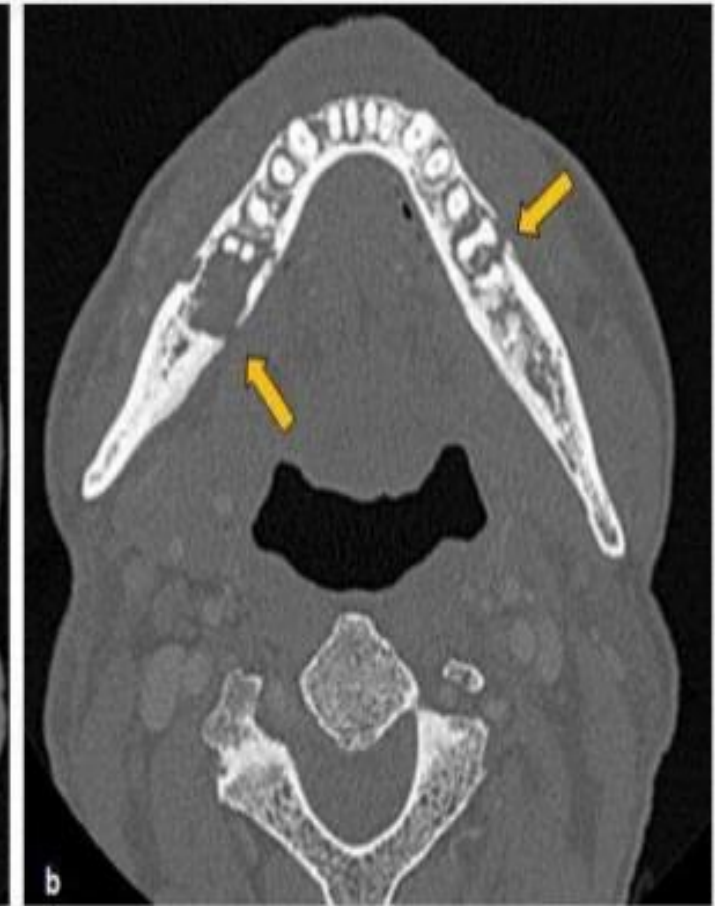
- **Later changes:** lytic or sclerotic or mixture
- **Location :** Commonly posterior mandible
- **Periphery :** ill defined
- **Internal structure :** A range of bone formation and resorption occur. The bone pattern is granular.

- Effects on surrounding structures : in rare cases stimulated periosteal bone formation resulting in bone formation on outer cortex.
- In the alveolar processes of maxilla and mandible there is irregular widening of periodontal membrane space.

EARLY



LATER





Differential diagnosis

- Bone resorption stimulated by high level irradiation : Differentiated by absence of exposed bone.
- Chronic osteomyelitis : history of radiation therapy.

Management

1. Conservative approach to maintain the integrity of inferior border of mandible, keeping the site free of infection , and patient free of pain is more successful.
 - Administration of Antibiotics , rinsing
 - Sequestrectomy, local debridement
 - Use of narcotic analgesics , hydration, nutrition
 - Ultrasound therapy can be used.

2. Radical method

- HBO therapy
- Local debridement , sequestrectomy
- Mouth rinsing

3. **Hyperbaric O₂ therapy** : breathing 100 % oxygen through facemask at 2.4 absolute atmospheric pressure for 90 minutes 5 days week.

HBO reduced the hypoxia and increase healing by increase in arterial and venous O₂ tension.

Prevention of ORN

- Pre irradiation care :
Extraction of periodontally compromised tooth which is in direct beam of radiation.
- During therapy : mouth rinse with 0.2 % chlorhexidine.
- Post irradiation care :
Avoidance of denture use. Use of salivary substitutes.

Introduction

- This is inflammatory condition of bone.
- The high doses of radiation used in radiotherapy reduce drastically the vascularity and reparative powers of bone. The mandible is particularly susceptible.
- Subsequent trauma (e.g. tooth extraction) or infection may produce osteomyelitis with rapid destruction of the irradiated bone, sequestra formation and poor healing.

- It is characterized by presence of exposed bone for a period of at least 3 months occurring at any time after delivery of the radiation therapy.

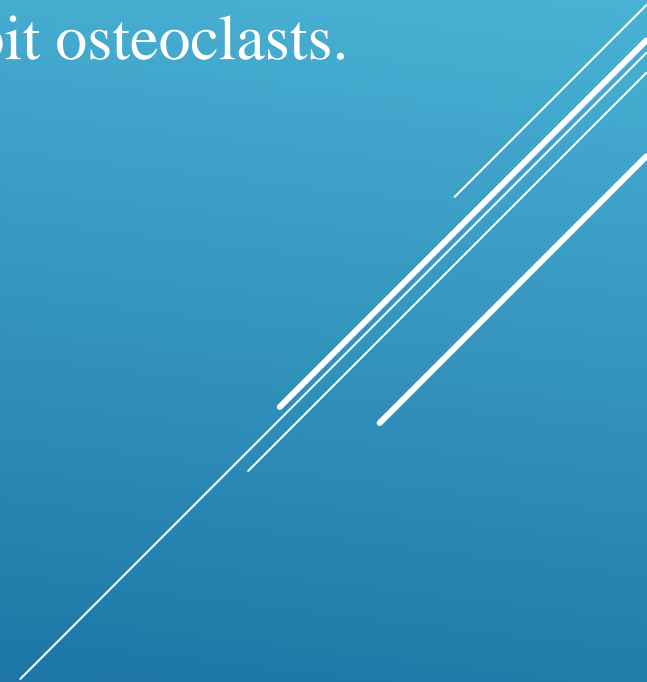
- ❑ The first report describing osteonecrosis of the jaw (ONJ) in patients receiving bisphosphonates came 2003 .
- ❑ Sometimes called BRONJ (bisphosphonate-related osteonecrosis of the jaw) .
- ❑ It is defined as an area of exposed bone in the maxillofacial region that does not heal within 8 weeks in a patient who is currently receiving bisphosphonate medication and has not had radiation to the head-neck region.
- ❑ The diagnosis is usually made clinically.
- ❑ It is believed mainly to be associated with high dose intravenous bisphosphonate therapy, but sometimes the condition occurs also in patients with low-dose osteoporotic treatment.

Structure and Bioactivity of Bisphosphonates

Bisphosphonates (BPs) are antiresorptive drugs that act specifically on osteoclasts, thereby maintaining bone density and strength.

The drug is used for many indications including prevention and treatment of primary and secondary osteoporosis, hypercalcaemia, multiple myeloma, and osteolysis due to bone metastases and Paget's disease.

BPs act on both osteoblast and osteoclasts. It has been shown *in vitro* that BPs promote proliferation and differentiation of human osteoblast-like cells and inhibit osteoclasts.



Pathogenesis

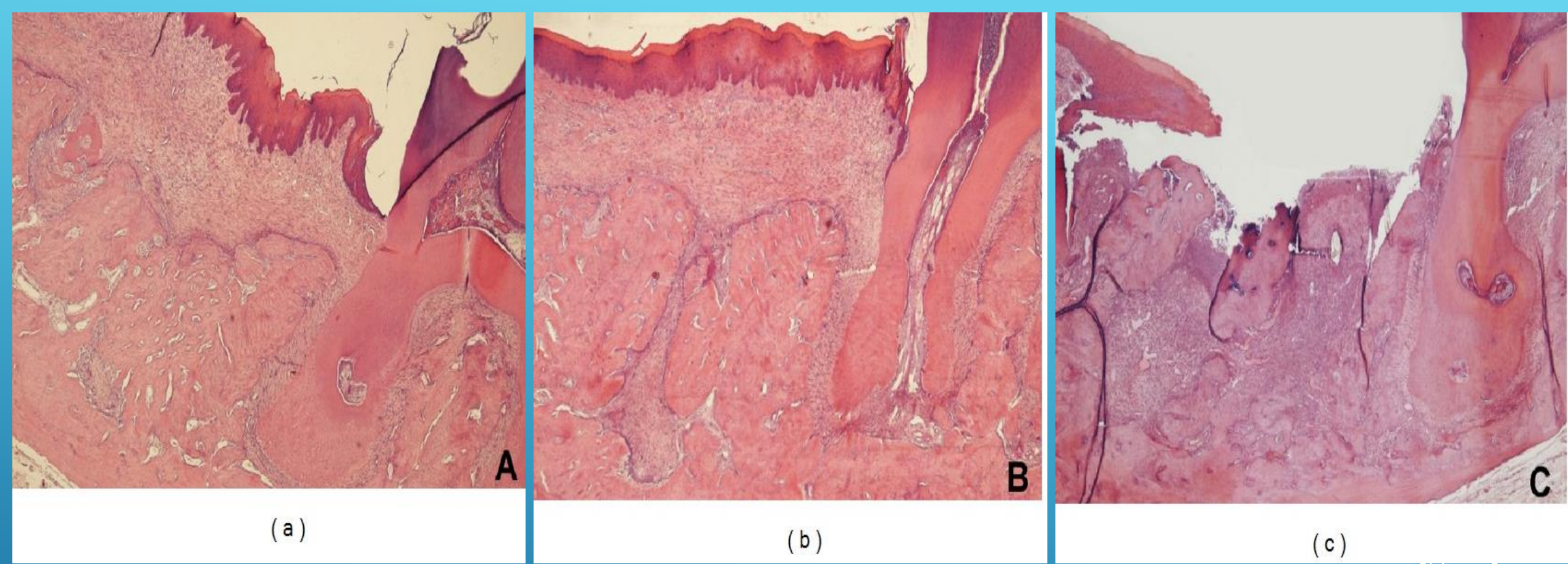
The etiology of ONJ remains uncertain. Initially, when the condition was called bisphosphonate-related osteonecrosis of the jaw (BRONJ) [48] its similarities with radiation-induced osteonecrosis led to the assumption that the condition started with sterile necrosis of the jaw bone. Therefore, the term osteonecrosis was used otherwise reserved for sterile bone death usually because of impaired blood supply. At that time, it was speculated that BPs could cause osteonecrosis through effects on blood vessels in bone, possibly by inhibition of vascular endothelial growth [51]. Later, it has been suggested that the condition does not begin as a form of classical osteonecrosis but in fact osteomyelitis from the start [

Clinical Characteristics

- ❖ Blood supply to the cortical bone is derived from the periosteum and exposed bone surface is indicating necrosis in the underlying bone layers.
- ❖ The condition can then progress into a more severe bony lesion with nerve disturbances, mobile teeth, fistulas, and in the end fracture .
- ❖ Pain is common and these signs and symptoms are often evident in patients with jaw bone osteomyelitis that are not on BP treatment.
- ❖ Radiographs may show sclerotic bone, sclerotic lamina dura around individual teeth, and widened periodontal ligaments but there are no report published indicating specific features for BP associated osteomyelitis.



Exposed necrotic bone after tooth extractions in a patient treated with i.v. zoledronic acid



Histological sections showing the region of the second molar 14 days after extraction in male Sprague-Dawley rat. (a) Control rat with no treatment, (b) BP treated with coverage, and (c) BP treated without coverage. Note necrotic tissue.

The optimal treatment strategy for ONJ is still to be established.

Cessation of BP treatment will not be sufficient.

A multidisciplinary team approach for evaluation and management of the conditions is recommended including a dentist, an oral-maxillofacial surgeon, and an oncologist.

In early stages, surgical debridement and coverage has been successful.

Hyperbaric oxygen (HBO) is an effective adjunctive therapy in situations in which normal wound healing is impaired and the effects of HBO therapy have been discussed by several investigators .

The authors showed that patients with ONJ, adjunctive HBO₂ therapy had remission or improvement in over 62.5% of patients.

Laser therapy at low intensity has been reported for treatment of ONJ by improving reparative process, increasing osteoblastic index, and stimulating lymphatic and blood capillaries growth