### Disease/Medical Condition

**BISPHOSPHONATE-RELATED OSTEONECROSIS OF THE JAW**

(also known as “BRONJ”, “bisphosphonate-associated osteonecrosis of the jaw”, “BON”, “BONJ”, “BON of the jaw”, bisphosphonate-induced osteonecrosis of the jaw”, “BIONJ”, “medication-related osteonecrosis of the jaw”, “MRONJ”, “antiresorptive agent-induced osteonecrosis of the jaw”, and “ARONJ”)

### Date of Publication: July 7, 2016

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#### Is the initiation of non-invasive dental hygiene procedures* contra-indicated? Possibly, depending on severity of BRONJ and procedure being contemplated.

- **Is medical consult advised?** Yes, for the patient/client taking a bisphosphonate (either orally or by injection), the patient/client’s physician should be consulted to determine medical diagnosis and types of drugs taken. Furthermore, the patient/client should be referred to a dentist pre-bisphosphonate use (particularly for high potency injectable formulations) for consideration of selective teeth extraction (for nonrestorable or questionable teeth). Appropriate dental hygiene procedures, either non-invasive or invasive, should be informed by medical consultation.

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#### Is the initiation of invasive dental hygiene procedures contra-indicated?** Yes. This is an unstable (often progressive) oral health condition, which may affect appropriateness or safety (and be exacerbated by invasive procedures), and scaling of teeth and root planing, including curetting of surrounding tissue, are contraindicated until the patient/client is medically cleared. BRONJ is a much more common complication of injected (high dose) bisphosphonates (occurring in 0.8% to 12% of recipient cancer patients/clients), and it only rarely occurs with oral administration.

- **Is medical consult advised?** Yes; see above.
- **Is medical clearance required?** Yes, if BRONJ exists or is suspected.
- **Is antibiotic prophylaxis required?** No
- **Is postponing treatment advised?** Potentially. Ideally, all necessary invasive dental and dental hygiene treatments should be performed before administration of injectable bisphosphonate drugs (similar to approach indicated for patients/clients undergoing head and neck radiation therapy). Cessation of at-risk medications prior to invasive procedures may or may not be indicated, and should be informed by medical consultation. Informed by medical/dental consultation, routine scaling is often indicated during bisphosphonate therapy to optimize oral health and reduce risk of BRONJ development. All procedures should be performed asatraumatically as possible, minimizing tissue damage, bleeding, and risk for post-procedural infection.

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### Oral management implications

- In patients/clients who have received drug treatment for cancer or its sequelae, the dental hygienist should enquire if intravenous bisphosphonate therapy (e.g., etidronate, pamidronate, clodronate, or zoledronic acid) was used. Patients/clients at increased risk of BRONJ include those with diabetes mellitus, immunosuppressive drug use, any periodontal or other oral infection, and a history of radiation to the jaws.
- Prevention of BRONJ is very important so patients/clients can receive required cancer treatments. Caries should be eliminated, and oral health should be optimized during cancer and bisphosphonate therapy. During such therapy, patients/clients should practise good oral hygiene including daily brushing, flossing, and use of antibacterial oral rinses, and as well as undergo recommended dental/dental hygiene appointments, and denture fittings. This can reduce the number of bacteria-related pathologies in the oral cavity, thereby lowering the risk of developing BRONJ.

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1 In addition to bisphosphonates, other antiresorptive (e.g., denosumab) and antiangiogenic (e.g., bevacizumab and tyrosine kinase inhibitor) treatments have been linked to mandibular and maxillary osteonecrosis.
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Oral management implications (cont’d)

- In patients/clients who have been treated for osteoporosis or Paget’s disease, the dental hygienist should enquire if oral bisphosphonate therapy (e.g., alendronate, risedronate, or ibandronate) was used.
- The dental hygienist should be alert for evidence of BRONJ ulcers during intraoral and extraoral examinations.
- Other than palliative management, BRONJ is very difficult to treat. Surgical debridement, bone curettage, local irrigation with antibiotics, and hyperbaric oxygen therapy often prove disappointing. Antimicrobial rinses (e.g., chlorhexidine 0.12%) may provide benefit, and oral infection should be treated aggressively with systemic antibiotics. Cessation of bisphosphonate therapy may or may not be indicated, depending on the systemic condition.
- The inability to manage BRONJ compromises oral care of affected patients/clients.

Oral manifestations

- Due to bisphosphonate-induced reduction in bone remodeling, bone becomes brittle and unable to repair physiologic microfractures that occur with daily activity (e.g., common masticatory forces). In patients/clients taking bisphosphonates, microdamage to the jaw is not repaired, setting the stage for oral osteonecrosis to occur. This often painful oral (or extraoral) condition may resemble an osteoradionecrosis lesion.
- Posterior sites of the jaw are more frequently affected than anterior sites, and the mandible is more often affected than the maxilla.
- In the early stages of BRONJ, no radiographic changes can be seen. While patients/clients are usually asymptomatic, some persons develop severe pain because of necrotic bone becoming secondarily infected after exposure to oral bacteria and/or when surrounding soft tissues become inflamed.
- The most common initial complaint is the sudden presence of oral discomfort and the presence of roughness, which may traumatize the oral soft tissues surrounding the area of necrotic bone.
- Other early symptoms/signs may include:
  - odontalgia not explained by an odontogenic cause;
  - dull, aching bone pain in the body of the mandible, which may radiate to the temporomandibular joint region;
  - sinus pain;
  - poor gum healing;
  - loosening of teeth not explained by chronic periodontal disease; and
  - periodontal/periapical fistula not associated with pulpal necrosis due to caries
- Early radiographic findings may include:
  - alveolar bone loss/resorption;
  - thickening or obscuring of the periodontal ligament on radiography; and
  - inferior alveolar canal thickening.

2 The oral cavity is subjected to unique conditions of continual small traumas via mastication, sometimes exacerbated by poorly fitting dentures/prostheses or oral infection (e.g., apical abscesses and periodontitis).
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Oral manifestations (cont’d)

- The osteonecrosis is often progressive, leading to irregular ulceration of adjacent soft tissues and extensive areas of bone exposure and dehiscence. Osteonecrosis may appear as exposed yellow-white bone. When tissues are acutely infected, the patient/client may complain of swelling and drainage. Halitosis and trismus may be present. Severe pain or paresthesia (lack of sensory sensation) may indicate peripheral nerve compression.
- In advanced BRONJ, exposed and necrotic bone extends beyond the region of alveolar bone (i.e., inferior border and ramus in the mandible, maxillary sinus, and zygoma in the maxilla), resulting in pathologic fracture, oral-cutaneous fistula formation, and establishment of oral antral-oral nasal communication.
- Because bisphosphonates attach to the bone matrix, they may remain in the bone for several years. This prevents the jaw bones from undergoing the forming and reforming necessary for normal healing after trauma.
- Spontaneous BRONJ commonly appears in the mylohyoid ridge area of the mandible.

Related signs and symptoms

- Injectable bisphosphonates³ are used to treat various types of cancer, including primary bone lesions of multiple myeloma,⁴ as well as bony metastases of breast, prostate, lung, and thyroid cancer. The drugs are given to patients/clients with cancer to control bone loss, pain, hypercalcemia⁵, and fracture risk resulting from skeletal lesions. Oral bisphosphonates are used to treat osteoporosis and Paget’s disease⁶ of the bone; they act by increasing bone density. Risk of BRONJ development increases with the amount and duration of bisphosphonate use. The majority of reported BRONJ lesions follow invasive dental procedures (such as extraction or implant placement), or they are less commonly associated with dentures or exostoses. However, BRONJ can also occur spontaneously in limited cases.
- BRONJ, often superimposed upon a cancer diagnosis, can have profound quality of life and therapeutic implications. The inability to manage BRONJ compromises oncologic and nutritional management of affected patients/clients.

3 Bisphosphonates are synthetic analogues of inorganic pyrophosphate that have high affinity for calcium and which are also strong inhibitors of osteoclastic activity. Bisphosphonate compounds accumulate in the mineralized bone matrix and may remain in the body for years.
4 Multiple myeloma is a systemic, malignant proliferation of plasma cells that cause destructive bone lesions.
5 Hypercalcemia may manifest as “moans” (gastrointestinal conditions including constipation, nausea, and abdominal pain), “stones” (kidney-related conditions including renal stones, flank pain, and urinary frequency), “groans” (psychological conditions including confusion, memory loss, and depression), and “bones” (bone-related conditions including bone pain, fractures, curvature of the spine, and loss of height).
6 Paget’s disease is a chronic disorder that can result in enlarged, weakened, and misshapen bones. It is caused by excessive and disorganized bone remodeling.

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References and sources of more detailed information


- Medscape
  Bisphosphonate-Related Osteonecrosis of the Jaw

- UptoDate

- Dentistry IQ (Dentistry Network)

- MedicineNet

- HealthLinkBC, citing National Cancer Institute, National Institutes of Health: Oral Complications of Chemotherapy and Head/Neck Radiation (PDQ®): Supportive Care – Health Professional Information
  http://www.healthlinkbc.ca/healthtopics/content.asp?hwid=ncicdr0000062870


* Includes oral hygiene instruction, fitting a mouth guard, taking an impression, etc.

** Ontario Regulation 501/07 made under the Dental Hygiene Act, 1991. Invasive dental hygiene procedures are scaling teeth and root planing, including curetting surrounding tissue.

Date: March 30, 2016