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3B-2

Pathology Question:

What is osteonecrosis?

Report:

Osteonecrosis is the disease characterized by bone tissue death in response to ischemia, even being described as a “coronary disease” of the bone. While the exact mechanism of pathogenesis is not well understood, professionals agree that the final common pathway involves some form of disruption to the bone’s blood supply and its surrounding tissues. Abnormalities in lipid metabolism, bone homeostasis and turnover, coagulopathies, immunosupression and oxidative stress likely also play some role in the pathogensiss of this disease. The femoral head is the most common site documented with infarct followed by osteonecrosis; however when presented in the mouth, osteonecrosis manifests itself as one or more necrotic lesions of the jaw bone. These necrotic jaw lesions are usually in response to some form of oral surgery or trauma (e.g. tooth extraction, implant placement or even aberrant denture pressure ulcerations). Oral lesions generally perforate the mucosa and are exposed to the oral cavity, persisting for at least 8 weeks. Some patients are asymptomatic, while others experience pain, inflammation, purulent exudate production and/or even tooth loss in more acute cases.

Prolonged use of long-acting parenteral corticosteroids have been linked to osteonecrosis in general, most likely due to their broad immunosuppressive effects that can also disrupt normal bone turnover. However other medications (e.g. bisphosphnates, antiangionenics and other immunomodulators) and even radiation therapy have been particularly linked to osteonecrosis of the jaw (ONJ) in osteoporosis and cancer patients receiving these treatments. ONJ has a peculiar incidence two times greater in the mandible when compared to the maxilla; a commonly-held reason for this mandibular susceptibility may be the potential for a greater load-dependent alveolar bone remodeling rate in the mandible in response to biting forces four to seven times greater than those subject to the maxilla. No matter the reason, it appears as though the aforementioned medications interfere with normal bone homeostasis and osteoclast activity in a setting often following dental trauma as a risk factor.

Bisphosphonates are the first choice antiresorptive medication for patients with osteoporosis and even used in high doeses intraveniously with certain cancers. They directly integrate into the bone matrix itself to then inactivate and/or induce apoptosis of osteoclasts. While this class of drugs works great to prevent osteoporotic fractures, they are highly associated with ONJ following invasive dental work as a risk factor. Interestingly, bisphosphonates appear to desposit more in craniofacial bones rather than other skeletal tissues. Their direct effects related to the disruption of bone homeostasis via osteoclast inhibition are thought to play a primarily role in the pathogenesis of ONJ within the jaw, with the mandible especially thought to have intrinsically higher turnover rates.

There currently is no effective treatment for ONJ, making prevention of utmost importance for dental practitioners. While these guidelines certainly may change with time, the current attitude is that routine dental work is perfectly safe on patients having received oral bisphosphonates (or other antiresorptive agents) for less than four years. Oral therapies lasting over four years have allowed sufficient time however for drug levels to deposit within bone tissue itself, so ideally antiresorptive medications are discontinued two months prior to major oral surgeries in these patients and restarted after the surgical site heals with mature mucosal coverage. High doses of bisphosphonates administered intraveniously are difficult to discontinue however when used to treat solid tumor bone metastases; dental work should therefore be done prior to initiating medical treatment in order to elminiate any active oral disease that could complicate matters with the need more extensive dental treatments down the road. Care is also taken to control other systemic pathologies, like diabetes or inflammatory joint diseases, before proceeding with extensive or prolonged bisphosphonate treatment.

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