



Cancer Survivorship Patient Education on Post-Treatment Care

Osteoradionecrosis (ORN)

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What is the condition?

Osteoradionecrosis (ORN) is non-healing, exposed bone in a previously radiated area of the body, usually the lower jaw in head and neck cancer patients treated with radiation, present for at least 6 months.

How common is it among head and neck cancer patients?

Mandibular ORN has decreased over the last decades from 20% to 4-8% likely because of improved understanding of the condition, and more selective radiation techniques. Patients treated with head and neck radiation are at increased risk for the development of ORN of the jaw if they have had surgical manipulation of the jaw (e.g. extraction of an infected tooth), particularly after radiation treatments. Patients are also at higher risk for development of ORN if they were treated with chemotherapy at the same time as their radiation, if the tissue-sparing (IMRT) technique of radiation was not used, and if patients smoked during or after radiation treatment.

ORN is best prevented by early removal of unsalvageable teeth at least 2 weeks before radiation is scheduled to begin. Thus, it is important that patients see their dentists as soon as possible after the diagnosis of head and neck cancer is confirmed for a thorough evaluation of the teeth. The appropriate follow up dental care (e.g. fluoride treatments, saliva substitutes) is also very important to prevent dental cavities. Dental cavities can lead to infection of the jaw bones, which can then lead to ORN. If a patient treated with head and neck radiation requires dental extraction, hyperbaric oxygen treatments before and after the dental extract are sometimes recommended to help prevent ORN (20 dives prior to extraction, 10 dives after extraction; 2.4 atm daily for 90 minutes, 5 days a week).

What are the signs/symptoms?

Patients develop an ulcer on the gum, with hard gray/white tissue seen in the depth of the ulcer. The ulcer is often associated with pain and swelling. Sometimes patients will notice that spicules of dead bone are shed from the ulcer.

How is it diagnosed?

A thorough history and physical examination of the head and neck in a patient who has had previous head and neck radiation can usually lead to a high level of suspicion for this condition. In order to determine the severity of ORN, providers will frequently order anatomic imaging studies of the jaws, such as CT and MRI, to evaluate for bone erosion and evidence of inflammation of the bone marrow, both of which can be seen in this condition. In the most severe of cases, fractures of the bone can occur with minimal trauma to the affected bone.

How is it treated?

A combination of hyperbaric oxygen treatment combined with surgical debridement of dead bone has traditionally been recommended in order to improve oxygenation of the affected bone, and thus promote healing. This consists of 30 pre-debridement sessions (“dives”), and then 10 post-debridement dives; 2-2.5 atm daily for 90-120 minutes, 5 days a week. Newer medical treatment has been used consisting of pentoxifylline (a methylxanthine derivative), and tocopherol (aka Vitamin E), sometimes combined with clodronate (a bisphosphonate). For severe cases of ORN, removal of the dead bone might need surgical removal of a large segment of the dead bone. Thankfully, recent advances in head and neck reconstructive surgery can allow a patient to get back to normal function and appearance within several weeks following surgical removal of dead bone by immediately replacing the removed bone with the patient’s own living tissues (bone and/or soft tissue along with their blood vessels).



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When should I call my doctor?

Call your doctor if you have had head and neck radiation and are not followed closely by a dentist for preventative care. Your doctor will be able to refer you to an appropriate dentist. Call your doctor if you develop a sore or ulcer on your gums that won't heal, or significant pain and swelling of the jaws. It could be a sign of ORN.

Call your radiation oncologist if you have been treated with head and neck radiation and you develop a toothache that your dentist feels should be treated with an extensive dental procedure (root canal) or tooth extraction. They will be able to advise whether preventative hyperbaric oxygen would be helpful in the time period around the dental procedure. Your doctor will be able to refer you to an appropriate dentist. Call your doctor if you develop a sore or ulcer on your gums that won't heal, or significant pain and swelling of the jaws. It could be a sign of ORN.

Where can I learn more?

<https://oralcancerfoundation.org/complications/osteoradionecrosis/>

Selected References:

- Lyons AJ, Brennon PA. Pentoxifylline – a review of its use in osteoradionecrosis. *British J Maxillofac Surg*, 2017 Apr 55(3):230-234.
- Osteoradionecrosis, Mandible. Treasure Island (FL): StatPearls Publishing, 2017 Jun
- Moon DH, Moon SH, Wang K, et al. Incidence of, and risk factors for, mandibular osteoradionecrosis inpatients with oral cavity and oropharynx cancers. *Oral Oncology*, 2017 Sept 72:98-103.