Osteoradionecrosis of mandible: Case report with review of literature

Ravindran Rathy, S. Sunil, M. Nivia

Abstract

Osteoradionecrosis (ORN) of the jaws, particularly of the mandible, is a long-term and serious complication of therapeutic radiotherapy for head and neck cancer. The mandible is affected more commonly than any other bones of the head and neck region. The incidence of ORN of mandible is reported to be between 2% and 22%. With the older radiation techniques, the rate of ORN was reported to be between 5% and 15%, whereas with newer techniques such as 3D conformal therapy and intensity modulated radiotherapy the rate of ORN has decreased to 6% or less. We here report a case of mandibular ORN and the literature review discusses the clinical features, pathogenesis, preventive measures, and management of ORN.

Keywords: Mandible, osteoradionecrosis, radiotherapy

Introduction

Osteoradionecrosis (ORN) describes the process where irradiated bone undergoes necrosis and becomes exposed through soft-tissue. The first report of ORN of the jaws after radiation therapy was published in 1992 by Regaurd.[1] Ewing in 1926 first recognized and reported the bone changes associated with RT and described this disease state as radiation osteitis.

Radiation therapy in the head and neck cancer has a 20% chance of mandibular ORN. ORN is a late effect of radiotherapy.[2] Early presentation within 2 years, is thought to be related to high dose of Radiation therapy (>70 gray), whereas late presentation is usually secondary to trauma and delayed wound healing with in compromised tissue.[3]

Case Report

A 65-year-old male patient reported to the dental out-patient department with a chief complaint of sharp bony projection in the mouth. The patient gave a history of exposed bony fragments since 7 months and history of pus discharge from the right side of check 2 months back. The patient finds difficulty in talking and eating since 1 week. He gives a history of a non-healing ulcer on right buccal mucosa diagnosed as squamous cell carcinoms 4 years back and had undergone surgery and radio therapy.

On extra oral examination, skin on lower right side of cheek showed scar of a healed sinus [Figure 1]. Intra oral examination was difficult due to limited mouth opening. There was depapillation of tongue and generalized mucositis. Exposed necrotic bone found from right lower retromolar area extending toward midline [Figure 2]. Provisional diagnosis of ORN was made and patient instituted conservative measures of antibiotics and the sequestrectomy was undertaken.

Discussion

ORN is late effect of radiation therapy that results in irreversible tissue death, which is clinically observed as bony exposure for more than 3 months duration.[2] The mandible is affected more often than the maxilla or any other bones of head and neck region. The incidence of ORN in the mandible is reported to be between 2% and 22% and most often affects the body of the mandible.[1]

The risk factors for the development of ORN involve size and site of the tumor, dose of radiation and type of mandibular resection, injury or dental extraction, infection, immune deficiencies, and malnutrition. The incidence of ORN after dental extraction is about 5% and the incidence is 3 times higher in the dentate than in edentulous patients, mainly as a result of injury from extraction and infection from periodontal disease.

ORN in early stages may be asymptomatic. Its main feature is exposed devitalized bone seen through ulcerated mucosa or skin. Pain is a common symptom and some patients have intractable pain. Other symptoms include dysesthesia, halitosis, dysgeusia and food impaction. In severe cases, patients can

Department of Oral and Maxillofacial Pathology, Azeezia College of Dental Sciences and Research, Meeyannoor, Kerala, India

Correspondence: Dr. Rathy Ravindran,
Department of Oral and Maxillofacial, Azeezia College of Dental Sciences and Research, Meeyannoor, Kerala, India.
E-mail: aswathysundaran1@yahoo.co.in

Access this article online	
Quick Response Code:	Website: www.contempclindent.org
	DOI: 10.4103/0976-237X.114882

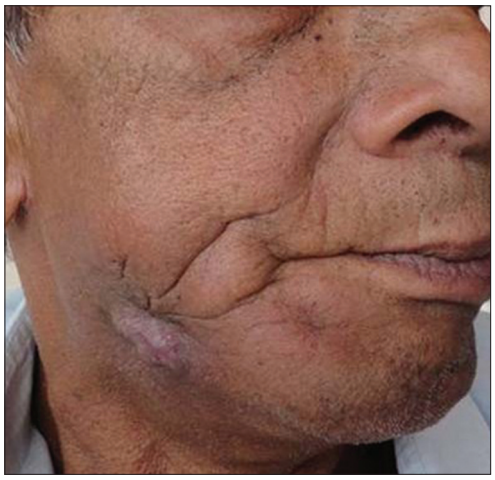

Figure 1: Extraoral examnation revealed scar of a healed sinus

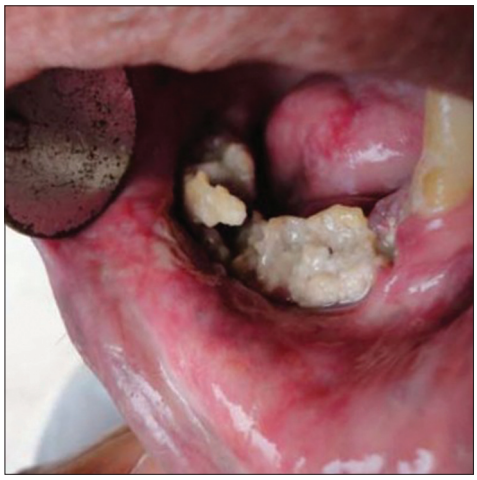

Figure 2: Exposed necrotic bone found from right lower retromolar area extending towards the midline

present with fistulation from the oral mucosa or skin, complete devitalization of bone and pathological fractures.[1]

The interval between RT and onset of ORN can vary, but most often occur between 4 months and 2 years. ORN develops during first 6-12 months after RT; however, risk remains for life although to a lesser degree.

The precautions to be taken included adopting new protocol such as 3D conformational radiation therapy and intensity modulated radio therapy that are able maximize delivery to the affected area and minimize dose to the surrounding normal tissue. All patients should undergo prophylactic oral care prior to, during and completion of RT. During early post-treatment period, patient should visit the dentist every 4 months.[3,4]

Pathophysiology

Since, the first description of ORN was published in 1922 several hypothetical pathologic models have been proposed. In 1926, Ewing first recognized and reported bone changes associated with radiation therapy and described this disease state "radiation osteitis."[2,4]

In 1938, Watson and Scarborough described radiation osteitis as being caused by radiation, trauma and infection. In 1972, Daly challenged the role trauma in ORN. It has become clear that micro-organisms only play a surface contaminant role and are not true etiological cause of ORN.[2,4]

In early 1980s, Marx redefined the pathophysiology of ORN by proposing that RT induces endarteritis that results in tissue hypoxia, hypocellularity, which in turn causes tissue breakdown and chronic non-healing wounds.[5]

Later, it was theorized that suppression of osteoclast related bone turnover is the initial event in development of ORN. Bisphosphonate induced osteonecrosis of mandible support this theory.[6]

Recently, the fibroatrophic theory described by Delanian and Lefaix, which was proposes that radiation induced fibroatrophic process as a late, local, and sometimes unavoidable sequela to high dose RT, and proposes that fibroblast proliferation not only undergo total cellular depletion in response to radiation exposure, but also show reduced ability to produce and secrete collagen into the surrounding tissue.

Radiation induced fibrosis (RIF) occurs when volume – irradiated, total dose, and/or fractionated doses of radiation are large. Patient related facts (age, obesity), comorbidities (hypertension, diabetes), surgery in irradiated site, and chemotherapy and concomitant RT may intensify the acute and delayed reaction to RIF.[7]

Treatment

Conventionally consists of various conservative measures, including use of long-term antibiotics, local wound irrigation, debridement, sequestrectomy and hyperbaric oxygen therapy.[2,4] Recently, reported treatment regimen for established ORN has focused on vascular directed therapy using the pentoxifylline and antioxidant therapy alpha – tocopherol (vitamin E) pentoxyfilline (PENTO).[2] The PENTO regimen was reported to be successful in healing superficial cases of radiation induced fibrosis, but was found to be insufficient for use alone in long standing ORN by Kahenasa *et al*., Delanin *et al*., found that combination of Clodronate to PENTO was beneficial in severe cases of radiation induced fibroatrophic process inducing mandibular ORN,[8,9] but clodronate carries risk of biphosphonate related osteonecrosis. Kahenasa *et al*., suggested that further controlled and randomized clinical trials using the PENTO are necessary to confirm the effectiveness of PENTO regimen in treatment of ORN.

References

1. Lyons A, Ghazali N. Osteoradionecrosis of the jaws: Current understanding of its pathophysiology and treatment. Br J Oral Maxillofac Surg 2008;46:653-60.
2. Kahenasa N, Sung EC, Nabili V, Kelly J, Garrett N, Nishimura I. Resolution of pain and complete healing of mandibular osteoradionecrosis using pentoxifylline and tocopherol: A case report. Oral Surg Oral Med Oral Pathol Oral Radiol 2012;113:e18-23.
3. Rayatt SS, Mureau MA, Hofer SO. Osteoradionecrosis of mandible: Etiology, prevention, diagnosis and treatment. Indian J Plast Surg 2007;40:s65-71.
4. Jacobson AS, Buchbinder D, Hu K, Urken ML. Paradigm shifts in the management of osteoradionecrosis of the mandible. Oral Oncol 2010;46:795-801.
5. Bras J, de Jonge HK, van Merkesteyn JP. Osteoradionecrosis of the mandible: Pathogenesis. Am J Otolaryngol 1990;11:244-50.
6. Ruggiero SL, Mehrotra B, Rosenberg TJ, Engroff SL. Osteonecrosis of the jaws associated with the use of bisphosphonates: A review of 63 cases. J Oral Maxillofac Surg 2004;62:527-34.
7. Delanian S, Lefaix JL. The radiation-induced fibroatrophic process: Therapeutic perspective via the antioxidant pathway. Radiother Oncol 2004;73:119-31.
8. Delanian S, Depondt J, Lefaix JL. Major healing of refractory mandible osteoradionecrosis after treatment combining pentoxifylline and tocopherol: A phase II trial. Head Neck 2005;27:114-23.
9. Delanin S, Chatel C, Porcher R, Despondt J, Lefaix JL. Complete restoration of refractory mand ORN. Prolonged treatment with pentoxifylline-tocophenol-clodronate combination: A phase II trial. Int J Radiat Oncol Biol Phy 2010:76;1-8.

How to cite this article: Rathy R, Sunil S, Nivia M. Osteoradionecrosis of mandible: Case report with review of literature. Contemp Clin Dent 2013;4:251-3.

Source of Support: Nil. **Conflict of Interest:** None declared.