



PATHOLOGICAL FRACTURE OF MANDIBLE SEQUALAE TO OSTEORADIONECROSIS - A CASE REPORT

Dr. Rahul VC Tiwari*	Fellow in Orthognathic Surgery, Department of Oral and Maxillofacial Surgery, Jubilee Mission Medical College Hospital and Research Institute, Thrissur, Kerala, India. *Corresponding Author
Dr. Salud Sadique	Clinical Observer, Department of Oral and Maxillofacial Surgery, Jubilee Mission Medical College Hospital and Research Institute, Thrissur, Kerala, India.
Dr. Raja Satish Prathigudupu	Professor, Department of Oral and Maxillofacial Surgery, Sibar Institute of Dental Sciences, Ntruhs, Guntur, A.P, India
Dr. Kritika Sehrawat	PG Student, Department of Oral and Maxillofacial Surgery, Sudha Rustagi Dental College and Research Centre, Faridabad, Haryana, India.
Dr. Kiruba Shankar K	Postgraduate Student, Department of Oral and Maxillofacial Surgery, KVG Dental College and Hospital, Sullia, D.K, Karnataka, India.
Dr. Philip Mathew	HOD, Department of Oral and Maxillofacial Surgery, Jubilee Mission Medical College Hospital and Research Institute, Thrissur, Kerala, India.

ABSTRACT Osteoradionecrosis is a severe tortuous complex condition detected post radiation in malignancies. Pathological fracture of bone followed by osteoradionecrosis is an uncertain common complication noted worldwide. This case report presents a pathological fracture of body of mandible which occurred a year after extraction and sequestrectomy of the area which was followed by protocols post radiation due to squamous cell carcinoma of alveolus and retro molar trigon six years back. It should always be taken on to consideration that post radiation patients due to cancer must be instructed to maintain good oral health and perform oral hygiene measures and get their frequent dental checkups done. Prevention and treatment is prior to cure. Establishing protocols and new strategies to be followed regarding such composite situations are highly recommended. Better understanding of the risk factors are needed.

KEYWORDS : Osteoradionecrosis, Pathological Fractures, Radiotherapy, Necrosis, Complications

BACKGROUND:

ORN is clinically defined as exposed and necrotic bone associated with ulcerated or necrotic surrounding soft tissue, which persists for more than three months in an area that had been previously irradiated.¹² Marx has stated that it is not a primary infection often irradiated bone but a metabolic and tissue hemostatic deficiency created by radiation induced cellular injury, characterized by the sequence of radiation, formation of hypoxia, hypo vascular and hypo cellular tissue, followed by tissue breakdown and resulting in a chronic, non healing wound.³ The most common clinical signs and symptoms of ORN are pain, swelling, bone exposure, secondary infection, and fistula and bone loss. It is classified in three stages. First stage includes patients with ORN limited to dentoalveolar segment, second stage is limited to dentoalveolar bone not crossing any mandibular canal and third is the most complicate stage which involves mandibular canal or it is presented with pathological fracture or skin fistulae.⁴ The radiation dose between sixty to seventy grays has an effect on the endothelial lining of blood vessels causing vasculitis and end arteritis which lead to ischemia and hypoxia due to hypo vascularity.^{3,5} Hypo cellular and fibro atrophic component is also suggested.^{6,7} It occurs predominantly in the lower jaw with most common site as buccal cortices of lateral side.^{8,9} The most common etiologic factor is surgical trauma, dental extraction, mechanical injuries or poor dental status.¹⁰⁻¹² The incidence of ORN in mandible following radiation treatment ranges from 2.6 to 15 percent.¹³⁻¹⁵ The prevalence of ORN in those with Carcinoma of head and neck is around 7.4 percent after conventional radiotherapy, 5.1 percent after intensity modulated radiotherapy and 6.8 percent after chemo radiotherapy.¹⁶ It is suggested that on necessary tooth extractions should be done three weeks before radiotherapy to prevent ORN.¹⁰

CASE PRESENTATION:

A 65 year old male patient reported to department of Oral and Maxillofacial surgery, Jubilee mission medical college and hospital with a chief complaint of pain in the lower left back region of jaw and difficulty in opening mouth to a wide extent. The intensity of pain was dull aching type which was aggravating on mastication and was also associated with a diffuse swelling present extra orally in the body

region of mandible on left side. The history elicits that patient underwent radiotherapy 7 years back as he was diagnosed with moderately differentiated squamous cell carcinoma of left alveolus and retro molar trigon region and the TNM staging was T2N1M0. A year back patient developed pain on the lower left back region of the jaw for which he underwent extraction of lower left second premolar and 1st molar followed by sequestrectomy. At the present situation, on clinical examination patient was unable to wide open his mouth. An intraoral sinus fistula was present on the extracted site with vestibular swelling and tenderness on palpation. (Figure 1) Extra orally, palpation evoked pain on the lower border of mandible with the same region. Poor oral hygiene was present. Patient also elicited drug history, sensitive to penicillin and erythromycin. So, Augmentin 625mg, Clindamycin 300mg and metrogyl 400mg are the preferred antibiotics. OPG showing unhealed socket i.r.t 35, 36, 37 region. Radiopaque and radiolucent flakes present within the socket giving a clear indication of moth eaten appearance extending inferiorly towards the base of the mandible. Clear pathological fracture is noted. (Figure 2) Step present w.r.t. lower border of mandible, minute bony spicules present in the lesion area. Perinueral involvement with inferior alveolar nerve and mental nerve was present. Correlating clinicoradiographic picture ORN with pathologic fracture was confirmed. As per the condition, a hyperbaric oxygen therapy was planned primarily.

DISCUSSION:

The management of ORN continues to be a debated topic. The symptoms can resolve even with conservative management sometimes and some cases needs resection too. Dental diseases has been implicated as an important factor in the initiation of ORN.¹⁷ An aggressive policy of removal of diseased teeth during the radiotherapy course might minimize the incidence of ORN.¹⁸ Occurrence of ORN in hard tissue depends on anatomic variations.¹⁹ In head and neck region mandible is the most commonly involved bone that too premolar, molar and retro molar region are commonly involved.²⁰ Pathophysiology of osteoradionecrosis has also evolved as the time passed. Reguade in 1922 first described the pathophysiology of osteoradionecrosis which came across many controversies.²¹ Many experimental studies were also performed to understand the

pathophysiology. Previously, microorganisms were considered to play an important role in occurrence of osteoradionecrosis in irradiated bone. This was because of the Meyer's theory of a classic triad of radiation, trauma, and infection²². According to Meyer, trauma to the irradiated bone creates path for the entry of microorganisms in the underlying bone which then creates infection of bone due to lack of resistance offered by irradiated bone. But this theory of Meyer was opposed by Marx on the basis of the fact that many cases of osteoradionecrosis do not contain clinical signs of infection and do not continue as sepsis. Some cases of osteoradionecrosis were also reported in cases without trauma. Marx proposed the theory of hypoxia, hypo cellularity, and hypovascularity.³ Medical is conservative which includes meticulous oral hygiene, local debridement, and ultrasonography and HBO therapy. A new adjunctive treatment Pentoxifylline–Tocopherol–Clodronate combination is used in the treatment of osteoradionecrosis but is under trial.²³ Long-term PENTOCLO treatment is effective, safe, and curative for refractory ORN and induces mucosal and bone healing with significant symptom improvement.^{24,25} Treatment can be based on the stage of the disease, rather than determining the stage of disease based on patients response towards standardized protocol. Surgical approaches such as small sequestrum removal and debridement of superficial bone until bleeding occurs are regarded in many studies as conservative management. In advanced or refractory cases of ORN, surgical treatment, including microvascular reconstructive techniques for bone and soft tissue, remains the only option available.²⁶

CONCLUSION:

The case report presented in this article elicits the severe complications which can occur post radiation. Proper care must be taken while handling such cases. It is not only clinic-radiographic features but also local and systemic condition which must be examined and kept in control. The treatment plan followed by proper diagnosis should be accentuated according to the protocol in the given literature. Great attention should be paid to the patients after several years of radiotherapy as our patient developed pathologic fracture 7 years post radiation. So, it is important to formulate a correct diagnosis before initiating the treatment plan. A better understanding of the risk factor for the development of ORN and of the underlying pathophysiology may increase our ability to prevent this complication and help to improve the prognosis in a better way.

Figure 1: Intra Oral Picture showing Sinus Tract Opening.



Figure 2: OPG showing Pathological Fracture



REFERENCES:

1. Beumer J, Harrison R, Sanders B, Kurrsch M. Osteoradionecrosis: predisposing factors and outcomes of therapy. *Head Neck Surg*, 1984; 6:819-827.

2. Chrcanovic BR, Reher P, Sousa AA, Harris M. Osteoradionecrosis of the jaws - a current overview. Part 1: Physiopathology and risk and predisposing factors. *Oral Maxillofac Surg*, 2010; 14(1):3-16
3. Marx RE. Osteoradionecrosis; a new concept of its pathophysiology. *J Oral Maxillofac Surg*, 1983; 41:283-288
4. Myers R, Marx RE. Use of hyperbaric oxygen in postirradiation head and neck surgery. *Natl Cancer Inst Monogr*, 1990; pp 151-157.
5. Marx RE. A new concept in the treatment of osteoradionecrosis. *J Oral Maxillofac Surg*, 1983; 41:351-357
6. Kluth EV, Jain PR, Stuchell RN, et al: A study of factors contributing to the development of osteoradionecrosis of the jaws. *J Prosthet Dent* 59:194, 1988
7. Teng MS, Futran ND. Osteoradionecrosis of the mandible. *Curr Opin Otolaryngol Head Neck Surg*, 2005; 13(4):217-221.
8. Curi MM, Dib LL. Osteoradionecrosis of the jaws: a retrospective study of the background factors and treatment in 104 cases. *J Oral Maxillofac Surg*, 1997; 55(6):540-544.
9. Tsai CJ, Hofstede TM, Sturgis EM, Garden AS, Lindberg ME, Wei Q, et al. Osteoradionecrosis and radiation dose to the mandible in patients with oropharyngeal cancer. *Int J Radiat Oncol Biol Phys*, 2013; 1:415-420.
10. Guimarães EP, Rafaelly de Oliveira Pedreira F, Correia Jham B, de Carli ML, Pereira AAC, Hanemann JAC. Clinical Management of Suppurative Osteomyelitis, Bisphosphonate-Related Osteonecrosis, and Osteoradionecrosis: Report of Three Cases and Review of the Literature. *Case Rep Dent*. ID 2013402096, 2013.
11. Goldwasser BR, Chuang SK, Kaban LB, August M. Risk factor assessment for the development of osteoradionecrosis. *J Oral Maxillofac Surg*, 2007; 65(11):2311-2316.
12. Oh HK, Chambers MS, Martin JW, Lim HJ, Park HJ. Osteoradionecrosis of the mandible: treatment outcomes and factors influencing the progress of osteoradionecrosis. *J Oral Maxillofac Surg*, 2009; 67(7):1378-1386.
13. Epstein JB, Wong FLW, Stevenson-Moore P (1987) Osteoradionecrosis: clinical experience and a proposal for classification. *J Oral Maxillofac Surg* 45(2):104-110
14. Reuther T, Schuster T, Mende U, Kubler A (2003) Osteoradionecrosis of the jaws as a side effect of radiotherapy of head and neck tumour patients—a report of a thirty year retrospective review. *Int J Oral Maxillofac Surg* 32(3):289-295
15. Dhanda J, Hall TJH, Wilkins A, Mason V, Catling J (2009) Patterns of treatment of osteoradionecrosis with hyperbaric oxygen therapy in the United Kingdom. *Br J Oral Maxillofac Surg* 47(3):210-213
16. Peterson DE, Doerr W, Hovan A, et al. Osteoradionecrosis in cancer patients: the evidence base for treatment dependent frequency, current management strategies, and future studies. *Support Care Cancer*, 2010; 18:1089-1098
17. Murray CG, Daly TE, Zimmerman SO: The relationship between dental disease and radiation necrosis of the mandible. *Oral Surg Oral Med Oral Pathol* 49:99, 1980
18. Beumer J, Harrison R, Sanders B, et al: Osteoradionecrosis: Predisposing factors and outcome of therapy. *Head Neck Surg* 6:819, 1984
19. Epstein J, Wong FL, Dickens A (1992) Bone and gallium scans in postradiotherapy osteonecrosis of the jaw. *Head Neck* 14:288-292
20. Morrish RB, Chan E, Silverman S (1981) Osteonecrosis in patients irradiated for head and neck carcinoma. *Cancer* 47:1980-1983
21. Regaude C (1922) Sur la necrose des os atteinte par un processus cancreux et traits par les radiations. *Compt Rend Soc Bio* 87:629
22. Meyer I (1970) Infectious diseases of the jaws. *J Oral Surg* 28:17-26
23. Delanian S, Depondt J, Lefaix JL (2005) Major healing of refractory mandible osteoradionecrosis after treatment combining pentoxifylline and tocopherol: a phase II trial. *Head Neck* 27(2):114-123
24. Delanian S, Chatel C, Porcher R, Depondt J, Lefaix JL (2011) Complete restoration of refractory mandibular osteoradionecrosis by prolonged treatment with a pentoxifylline-tocopherol-clodronate combination (PENTOCLO): a phase II trial. *Int J Radiat Oncol Biol Phys* 80(3):832-9
25. Delanian S, Lefaix JL (2002) Complete healing of severe osteoradionecrosis with treatment combining pentoxifylline, tocopherol and clodronate. *Br J Radiol* 75(893):467-469
26. Rice N, Polyzios I, Ekanayake K, Osama O, Stassen LFA. The management of osteoradionecrosis of the jaws. *A review the surgeon*. 2015; 13:101-109.