



Osteoradionecrosis in Maxilla Following Tooth Extraction in a Chemotherapy-Treated Patient: A Case Report and Point of View

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Abstract

This case report details the occurrence of osteoradionecrosis in a patient undergoing chemotherapy following a routine tooth extraction. The patient's medical history, treatment protocols, and the subsequent development of osteoradionecrosis are discussed. Emphasis is placed on the importance of interdisciplinary collaboration between oncologists, dentists, and oral surgeons to mitigate risks and enhance patient care.

This case report serves as a reminder of the intricate challenges involved in managing oral health in patients concurrently undergoing chemotherapy and radiation therapy. Clinicians must exercise heightened vigilance, employ preventive strategies, and foster collaboration between oncology and dental teams to minimize the occurrence and severity of osteoradionecrosis.

Keywords: Osteoradionecrosis, chemotherapy, tooth extraction, cancer treatment, interdisciplinary collaboration, oral health.

Introduction

Cancer treatments, particularly radiation therapy and chemotherapy, have significantly advanced over the years, improving patient outcomes and survival rates. [1] However, these therapeutic modalities are not without complications, and their impact extends beyond the targeted tumor cells. Osteoradionecrosis, a rare but potentially debilitating complication, has gained attention in the context of cancer patients undergoing dental procedures during treatment.[2] This case report delves into the intricate interplay of chemotherapy and osteoradionecrosis, elucidating a unique scenario where this complication emerged following a routine tooth extraction.

Background

Radiation therapy is a cornerstone in cancer management, employed either as a primary treatment or in combination with surgery and chemotherapy. While its efficacy in controlling tumor growth is well-established, radiation's collateral effects on adjacent normal tissues pose challenges for clinicians. [3] Osteoradionecrosis, characterized by non-healing exposed bone in previously irradiated areas, is a recognized late complication that predominantly affects the jawbones. The combination of radiation-induced vascular damage, compromised wound healing,

and decreased tissue resilience creates an environment conducive to osteoradionecrosis development [4].

Chemotherapy, a systemic treatment targeting rapidly dividing cancer cells, further complicates the landscape of oral health in cancer patients. Beyond its intended anti-neoplastic effects, chemotherapy can induce immunosuppression, affecting the oral mucosa and increasing susceptibility to infections [5]. The compromised immune response amplifies the risk of complications arising from dental procedures, demanding a meticulous approach to oral care in this patient population.

This case report is motivated by the need to shed light on the intricate relationship between chemotherapy and osteoradionecrosis, a less-explored aspect in the literature. Existing research primarily focuses on radiation-induced complications, often overlooking the synergistic impact of concurrent chemotherapy. By presenting a detailed case study, we aim to contribute valuable insights into the multifaceted challenges faced by clinicians when managing the oral health of cancer patients receiving combination therapies.

The primary objectives of this case report are to document the occurrence of osteoradionecrosis following a routine tooth extraction in a patient undergoing chemotherapy, delineate the clinical course, and

discuss the complexities involved in managing such cases. Furthermore, the report aims to underscore the critical role of interdisciplinary collaboration between oncologists and dental professionals to mitigate risks and optimize patient outcomes.

Case Presentation

The case a 44-year-old male, was diagnosed with Osteosarcoma and initiated a comprehensive cancer treatment plan, which included both chemotherapy and radiation therapy. As part of his ongoing chemotherapy regimen, the patient underwent routine dental assessments to address potential sources of infection and ensure optimal oral health during treatment. The patient's medical history revealed a meticulous adherence to prescribed treatments, with no significant deviations or adverse events reported. The patients gave informed consent for treatment and gave permission to use their information data.

During one of the routine dental visits, the patient presented with a symptomatic right upper molar requiring extraction. The dental team, cognizant of the patient's cancer treatment and its potential impact on oral health, proceeded with caution, employing strict infection control measures. The tooth extraction was performed using a minimally traumatic approach, and post-operative instructions included meticulous oral hygiene and a course of prophylactic antibiotics.

Approximately three weeks post-extraction, the patient reported persistent discomfort and localized pain at the extraction site. Clinical examination revealed exposed bone and non-healing mucosal tissue, indicative of a potential complication. (Fig.1) Radio graphic imaging confirmed the diagnosis of osteoradionecrosis, manifesting as a distinct area of bone necrosis in the maxillary region adjacent to the extracted tooth. (Fig.2)



Figure 1: Show exposed bone and non-healing tissue in upper right second molar area.

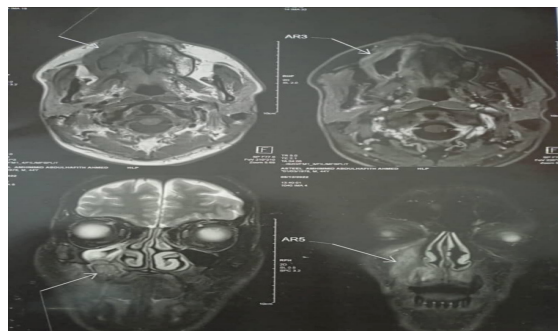


Figure 2: CT scan x ray show the defect in upper right second molar area.

The development of osteoradionecrosis in this case is attributed to the complex interplay between radiation therapy and concurrent chemotherapy. The compromised vascularity resulting from radiation-induced damage, coupled with the immunosuppressive effects of chemotherapy, created a milieu conducive to impaired wound healing and subsequent osteoradionecrosis.

Treatment Approach

Upon confirming the diagnosis, an interdisciplinary approach was adopted, involving both the oncology and dental teams. Conservative measures, including local wound care, antimicrobial therapy, and hyperbaric oxygen therapy, were initiated to promote tissue healing and mitigate the progression of osteoradionecrosis. Close monitoring of the patient's overall health, including adjustments to the chemotherapy regimen, was incorporated into the treatment strategy.

Follow-up and Outcome

Regular follow-up appointments were scheduled to assess the response to treatment and monitor for any signs of disease recurrence. Over the subsequent months, the patient exhibited not improvement in symptoms, with evidence of tissue still no healing observed on clinical and radiographic evaluations. The surgical management is recommended including partial bone resection and reconstruction by using local flap. (Fig.3)



Figure 3: show the area after partial bone resection in maxilla.

Discussion

The emergence of osteoradionecrosis in this case highlights the intricate interplay between radiation therapy and chemotherapy, underscoring the synergistic impact of these treatment modalities on oral health. While radiation-induced tissue damage is a well-recognized factor contributing to osteoradionecrosis [4], the additional challenge posed by chemotherapy-induced immunosuppression intensifies the risk associated with dental procedures [5]. This multifaceted interaction demands a nuanced understanding of the patient's treatment plan and necessitates a meticulous approach to oral care.

Preventive measures are paramount in minimizing the risk of osteoradionecrosis in patients undergoing chemo-radiation. The utilization of minimally traumatic dental extraction techniques, coupled with stringent infection control practices, serves as a fundamental preventive strategy [6]. Prophylactic antibiotic therapy, as employed in this case, aims to further mitigate infection risk. However, the delicate balance between infection prevention and antibiotic stewardship must be maintained, considering the potential implications of antibiotic resistance.

The successful management of osteoradionecrosis necessitates close collaboration between oncologists and dental professionals. The integration of dental care into the overall cancer treatment plan, as exemplified in this case, facilitates a comprehensive approach to patient well-being. [7] Regular communication between the oncology and dental teams ensures timely intervention and minimizes the risk of complications. [8] This interdisciplinary synergy is crucial in tailoring treatment strategies to the unique challenges presented by combined chemoradiation therapies.

The employed treatment modalities, including local wound care, antimicrobial therapy, and hyperbaric oxygen therapy, align with established approaches in managing osteoradionecrosis [9]. Hyperbaric oxygen therapy, in particular, promotes tissue oxygenation and accelerates wound healing in the context of compromised vascularity. The gradual improvement observed in the patient's symptoms underscores the efficacy of these interventions [10]. In case of advance and more serious osteoradionecrosis the surgical management is recommended [11]. the surgical procedures include local debridement, sequestrectomy, and, particularly in sever case, complete bone and soft tissue resection [7].

While this case contributes valuable insights into the complexities of osteoradionecrosis in chemotherapy-treated individuals, further research is warranted to delineate optimal preventive and therapeutic strategies. Prospective studies exploring the long-term outcomes of preventive measures and the efficacy of emerging treatment modalities could enhance our understanding of managing this challenging complication.

Conclusion

This case emphasizes the intricate challenges of managing osteoradionecrosis in patients undergoing concurrent chemotherapy. The integration of preventive measures, interdisciplinary collaboration, and tailored treatment strategies are paramount in optimizing patient outcomes and minimizing complications in this vulnerable population.

Point of view of mistakes and recommendations

1. Lack of comprehensive risk assessment

The key mistake in this case revolves around the inadequate assessment of the patient's risk profile before proceeding with the dental extraction. A comprehensive evaluation, considering both the effects of radiation therapy and the immunosuppressive nature of chemotherapy, should have been conducted. The oversight in recognizing the heightened vulnerability of the patient to complications, such as osteoradionecrosis, underscores the importance of thorough risk assessment in individuals undergoing concurrent cancer treatments.

Recommendation

Implement a standardized risk assessment protocol for patients undergoing chemotherapy and radiation therapy. This should involve close collaboration between oncologists and dental professionals, ensuring a holistic understanding of the patient's medical history and treatment plan.

2. Minimally traumatic extraction techniques

The approach to dental extraction, though guided by the intention to minimize trauma, may not have been sufficiently cautious given the patient's compromised oral health status. Implementing minimally traumatic extraction techniques is crucial to mitigate the risk of osteoradionecrosis, especially in patients undergoing concurrent

chemotherapy, where compromised vascularity and immunosuppression heighten the susceptibility to complications.

Recommendation

Ensure that dental professionals are well-versed in and consistently apply minimally traumatic extraction techniques. This may involve additional training and awareness programs to enhance the skill set and awareness of potential complications in this specific patient population.

3. Communication gap between oncology and dentistry

Effective communication between oncologists and dentists is imperative in managing the complexities of cancer treatment-related oral health issues. The lack of communication might have contributed to the oversight, as the dental team may not have been fully informed about the patient's specific chemotherapy regimen and its implications.

Recommendation

Establish clear channels of communication between oncologists and dentists. Encourage regular interdisciplinary meetings to discuss patient cases, share relevant information, and ensure a unified approach to patient care.

4. Prophylactic antibiotic usage

While prophylactic antibiotics were prescribed in this case, their role and duration should be carefully considered to avoid unnecessary risks, such as antibiotic resistance. Striking the right balance between infection prevention and judicious antibiotic use is crucial, especially in cancer patients susceptible to infections.

Recommendation

Develop evidence-based guidelines for the prophylactic use of antibiotics in dental procedures for chemotherapy-treated patients. This should involve collaboration between infectious disease specialists, oncologists, and dental professionals to ensure optimal patient care.

Ethics Approval and Consent to Participate

The department's ethical committee approved the study

Consent for Publication

Informed consent was obtained from the patient.

References

1. Naidu, M. U. R, et al; (2004). "Chemotherapy-induced and/or radiation therapy-induced oral mucositis-complicating the treatment of cancer". *Neoplasia*, 6(5), pp423-431.]
2. Nabil S, Samman N. (2011) "Incidence and prevention of osteoradionecrosis after dental extraction in irradiated patients: A systematic review". *Int. J. Oral Maxillofac. Surg.*; 40: pp229-243.
3. Beumer J, et al; (1983) "Postradiation Dental Extractions: A Review of the Literature and A Report of 72 Episodes". *Head Neck Surg.* 6:581-586.
4. Marx R, Johnson R. (1987) "Studies in the radiobiology of osteoradionecrosis and their clinical significance". *Oral Surg. Oral Med. Oral Pathol*; 64:379-390.
5. Epstein J, et al; (1987) "Osteonecrosis: Study of the relationship of dental extractions in patients receiving radiotherapy". *Head Neck Surg.* 10:48-54.

6. Lajolo C, Gioco G et al; (2020) “Tooth extraction before radiotherapy is a risk factor for developing osteoradionecrosis of the jaws: A systematic review”. *Oral Dis.* ;27:1595–1605.
7. Brennan M, et al; (2008) “Dental treatment planning and management in the patient who has cancer”. *Dent. Clin. North Am*; 52:19–37.
8. Maxymiw W, et al; (1991) “Post-radiation dental extractions without hyperbaric oxygen”. *Oral Surg. Oral Med. Oral Pathol*;72:270–274.
9. Annane, D, Depondt, J, et al; (2004). “Hyperbaric oxygen therapy for radionecrosis of the jaw: a randomized, placebo-controlled, double-blind trial from the ORN96 study group”. *Journal of clinical oncology*, 22(24), 4893-4900.
10. Shaw R., Butterworth C. (2011) “Hyperbaric oxygen in the management of late radiation injury to the head and neck. Part II: Prevention”. *Br. J. Oral Maxillofac. Surg*; 49:9–13.
11. Al-Bazie S, et al; (2016) “Antibiotic protocol for the prevention of osteoradionecrosis following dental extractions in irradiated head and neck cancer patients: A 10 years prospective study”. *J. Cancer Res. Ther*;12:565–570.