

Progression of Osteoradionecrosis of the Lower Jaw-Case Report

L. Videnova¹, P. Stanimirov², M. Petkova³, R. Ugrinov⁴

¹Department of Oral and Maxillofacial surgery, Faculty of Dental medicine, Medical University Sofia, Bulgaria
¹Maxillofacial Surgery Clinic, University Hospital "Aleksandrovska", Sofia, Bulgaria

²Department of Oral and Maxillofacial surgery, Faculty of Dental medicine, Medical University Sofia, Bulgaria
²Maxillofacial Surgery Clinic, University Hospital "Aleksandrovska", Sofia, Bulgaria

³Department of Oral and Maxillofacial surgery, Faculty of Dental medicine, Medical University Sofia, Bulgaria

⁴Department of Oral and Maxillofacial surgery, Faculty of Dental medicine, Medical University Sofia, Bulgaria
⁴Maxillofacial Surgery Clinic, University Hospital "Aleksandrovska", Sofia, Bulgaria

Abstract: *The osteoradionecrosis (ORN) is a severe, disabling complication caused by radiological exposure of vital bone in patients previously diagnosed with malignant tumors in the maxillofacial region. The main risk factors of its occurrence and progression are the type and the dose of irradiation followed up by dental extractions and surgical interventions in the exposed region. In addition to that we can add the poor oral hygiene and dental status, the tobacco use and the anatomical causes. The treatment of osteoradionecrosis is defined for every clinical stage. The question about the prognosis and the prediction of progression is still open, although there is a strict adherence to the therapy protocols. We present a clinical case of a patient with osteoradionecrosis of the mandible, caused by radiotherapy due to a tongue cancer. The aim of the study is to follow up the development of ORN and the results of the therapy. In spite of the great efforts, osteoradionecrosis stays one of the most difficult conditions to overcome. It is possible to temporarily stop the condition but the prognosis remains poor.*

Keywords: osteoradionecrosis, lower jaw, radiation-induced necrosis

1. Introduction

The Osteoradionecrosis is one of the most serious late complications of irradiation [1], [3], [9]. Marx defines it as a field, with size not less than 1 cm with exposed bone surface in the area of an irradiation, who does not show any symptoms of healing process for a minimum period of 6 months [6].

Marx describes osteoradionecrosis as an endarteritis induced by an irradiation, that leads to hypoxia, hypocellularity and hypovascularization [8], [9].

The combination of osteoblasts and osteoclasts loss, the impossibility of their repopulation and the extreme proliferation of myofibroblasts result in a reduction of bone matrix and its replacement by fibrous tissue [1], [4]. Marx proposes a staging system of the severity of osteoradionecrosis and its spread into the bone and determine the treatment methods [6]. This scale serves as a basis for later developed classification systems. The questions about the prediction of progression of radiation osteonecrosis and the tissue response to the performed treatment stay unresolved [12].

2. Risk factors associated with the emergence and dynamics of ORN

The poor oral hygiene is essential. Galle and Murray reported a correlation between ORN and active periodontal disease [1], [2], [5], [11].

Dental extractions, surgical treatment or other types of trauma are commonly associated with a radionecrosis [2], [12], [13].

The alcohol abuse and smoking are a major risk factor for osteoradionecrosis [6], [7].

The osteoradionecrosis depends on the planning of radiotherapy and the total radiation dose. The use of fractionated radiotherapy results from observations, who established better control of the tumor and less delayed reactions [14].

The particular sensitivity of the mandible to irradiation and the greatest incidence of osteoradionecrosis in it are explained by the anatomical and the physiological structure of its bone. It has dense bone with high mineralization, respectively the dose of absorption is greater [1]. In addition, the mandible has a poorer blood supply compared to the upper jaw [1], [2], [8].

3. Clinical Case

We present a 48 years old patient who sought medical diagnostic assistance in the Department of Maxillofacial Surgery.

3.1. History

He had surgery in 2011, because of a histologically diagnosed squamous cell carcinoma of the tongue. A hemiglossectomy was carried out in 2012, followed by postoperative radiotherapy with a total dose of 60 Gy. The

patient did not reported to have any general disease or to take any medications, and denied allergies and smoking. Two years after the irradiation the patient felt severe pain in the left side of the mandibular body. He showed the first left mandibular premolar as a source of pain and after visiting a dental office, a root canal treatment was initiated. The treatment outcome was not as expected and a swelling in mental area appeared.

Our clinical examination revealed a localized extraoral edema in the mental region, skin hyperemia and submental fistula.

We observed poor oral hygiene. The lower left premolars and molars were mobile and painful. The first left mandibular premolar had an open pulp cavity.

The radiographic image showed bone loss between the roots of the first left mandibular premolar and first left mandibular molar, with peripheral osteoporotic changes. No detectable sequestration were present.



Figure 1: X-ray image of the jaw in first visit



Figure 2: Skin fistula in mental region

3.2. Treatment.

A decision was made to perform an extra oral incision in the mental area, extraction of the mandibular first and second left premolars and first left molar combined with alveolectomy in order to reduce the height of the alveolar ridge. The wound was closed primarily. The result of microbiological examination showed development of *Staphylococcus haemolyticus*. Antibiotic therapy with Zinnat 2x500mg for seven days and oral irrigations with chlorhexidine solution were started.

In January 2015 we observed an extra oral hyperemia and edema in the mental area again. The intraoral examination

showed an exteriorized, necrotic bone area of the alveolar ridge and suppuration. The X-ray revealed a bone sequester and osteolysis in the body of the jaw reaching the mandibular canal without lysis of the base of the mandibula.



Figure 3: 3 months after the first surgical intervention the wound shows no signs of healing.

3.3. Operation

Extraction of the left mandibular canine, excision of necrotic soft tissue, and debridement of the non-vital bone were performed. The bone sequestrum was carefully removed and the overlying gingiva sutured. An antioxidant therapy with pentoxifylline 2 x 400mg and α -tocopherol 3 x 200mg was recommended. The microbiology of the patient showed actinomycosis. Treatment with Ciprofloxacin 2x500 for 10 days, oral irrigations with braunol and chlorhexidine solution and improvement of the oral hygiene were recommended. The patient was clinically monitored throughout the healing process. Six months after taking antifibrotic and antioxidant therapy, necrosis was stationary. The mucosa was healed without evidence of inflammation.



Figure 4: 6 months after the second phase, the wound healing is present

After three months the patient suffered from a swelling and pain in the incisive teeth and in the right side of the mandibular body. He was followed a course of antibiotic therapy and 15 procedures of hyperbaric oxygenation. The condition was strictly monitored and despite the efforts that

were made, the checkup in April 2016 showed the presence of a pathological fracture of the lower jaw. A resection of the jaw in the area of necrosis was indicated.



Figure 6: Pathological fracture of the lower jaw with skin fistula.

4. Conclusions

From the literature and from our clinical observations, it is clear that the main risk factors for the development of osteoradionecrosis are the presence of teeth in the field of radiation, odontogenic infection and poor oral hygiene. This case report shows that an endodontic infection may be a cause of ORN, because the microflora penetrates directly into the medulla of the bone by dental roots.

The treatment of the osteoradionecrosis is a real challenge, despite the strict enforcement of surgical and antimicrobial therapy.

The application of pentoxifylline and tocopherol may be argued by the good results, the stationing or the complete healing of the bone and mucosal lesions.

The fighting with the fibrotic and the necrotic changes by an antioxidant therapy requires long and constant intake of drugs. The treatment result can be expected after a minimum period of 6 months.

Despite the huge efforts made by the treating team and the patient's compliance, osteoradionecrosis remains one of the most difficult complications to overcome. There is a possibility to stop the progression temporarily, but the prognosis stays poor.

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Author Profile

Liubika Videnova, Assistant of the professor in Department of Dental Oral and Maxillofacial Surgery, Faculty of Dental Medicine, Medical University – Sofia, Bulgaria since 2011. Since 2016 she has worked as doctor in Maxillofacial Surgery Clinic, University Hospital “Aleksandrovska”, Sofia, Bulgaria.