Case Report

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Usual Complication after Radiotherapy of Jaws for Carcinoma: Osteoradionecrosis

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ABSTRACT

Background: Osteoradionecrosis (ORN) is the death of bone due to radiation. The bone dies because of damage to its blood vessels caused by the radiation. Radiation provides high cure rates, but has also called increasing attention to its side effects. Osteoradionecrosis (ORN) is one of the most severe and serious complications of head and neck cancer treatment. A new theory for the pathogenesis of ORN has proposed that damage to bone is caused by radiation-induced fibrosis. Here there is a case which was operated conservatively and after 8 months of follow up no recurrence was observed.

Keywords: Osteoradionecrosis, maxilla, mandible, radiotherapy, Pentoxiphylline.

INTRODUCTION

In cancer of head and neck region, surgical therapy with radiation is very common oncologic treatment modality. As it gives high cure rates, the side effects are also very common. After the malignancy, osteoradionecrosis (ORN) is most usual complication[1-7].

In 1922, regaud was first person to notice ORN of jaws after radiotherapy[8]. In 2% to 22% cases after radiotherapy to head and neck, ORN develops. Basically ORN is an ischemic necrosis of bone[15]. Obliterative endarteritis, hyperaemia, hyalinisation, cellular loss, hypovascularisation, thrombosis, and fibrosis are common histological findings[18]. Due to acute inflammation, free radicals and chronic activation of fibroblasts bone cells are damaged and ORN develops.

Factors Responcible For ORN

In head and neck region, ORN affects mandible more often than maxilla or any other bone. In mandible the incidence is 2% to 22%. In most often cases it affects body region of mandible. If we used hyperfractionated radiotherapy at 72-80 Gy or moderately accelerated fractioned radiotherapy together with a boost of 64-72 Gy than the incidence of ORN is thought to be less common. According to some recent articles, when chemotherapy is added to radiotherapy the incidence of ORN may be increased. If we use intensity-modulated radiotherapy than it may reduce the incidence of ORN[9-11].

Factors which are responsible for development of ORN are dose of radiation, type of mandibular resection, size and site of the tumor, injury or dental extractions, infection malnutrition or immune deficiencies. Sometimes some patients also have long term history of alcohol and tobacco misuse[12]. These, combined with poor nutrition and unsatisfactory oral hygiene, place such patients at high risk of developing ORN.

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In dentistry, Dentoalveolar surgery mainly dental extractions after radiotherapy is thought to be main predisposing factor to ORN. According to some documentation, the incidence of ORN after dental extraction is about 5%. This incidence rate is three times higher in dentulous patients than edentulous patients[13-16]. The risk of developing ORN is higher in traumatic extractions like extraction of mandibular posterior teeth where the roots lie below the mylohyoid line[17].

How to prevent:

The average time for onset of trauma induced ORN was 18 months after radiation which is ranged from 15 days to 192 months. According to Marx and Johnson's study, there are two peaks of trauma induced ORN. The first peak is within the first 12 months and the second peak is from 24 to 60 months after end of the radiation therapy.

In the first peak, there wasn't any marked difference between the patients who received radiation and those who did not received radiation in relation to the risk factors of trauma induced ORN. Any type of irritation like tumor surgery or tumor necrosis were the main predisposing factors in development of ORN. During the first peak, factors originating from oral or dental infections were associated to ORN in only 16% of cases.

In the second peak, factors of oral and dental infections were correlated in 60% of cases of ORN and that was the main difference in first peak and the second peak in trauma induced ORN. The main predisposing factor was dental extractions. In the second peak, oral care before the therapy played important role in prevention of trauma induced ORN.

To prevent the trauma induced ORN, pentoxifylline 400 mg twice daily with tocopherol 1000 IU for eight week, starting a week before the procedure. And if ORN developed then it should be continued for 6 months. If still there is no any response than start clodronate after 3 months.

Patients who would have been given HBO before and after curettage or sequestrectomy should be given pentoxifylline and tocopherol. These treatments are based on retrospective data in reports by Delanian et al[19].

The effect of pentoxyfylline with tocopherol is successful but still it is recommended to give a short course of oral antibiotics for any dental extraction. Antibiotics are always advised in case of infection and frank pus, including discharging sinuses or collections of pus[20].

TREATMENT MODALITIES

Mainly, ORN requires treatment only if there is active infection, pain or impared function. In cases of small areas of ORN, pentoxyfylline and vitamin E are used to resolve the visual and symptomatic conditions. Where as in large area, this treatment is not enough[23]. In absence of HBO, the only option for treatment is surgical therapy which is potentially problematic[22].

Clinically, fibroatrophic bone is present and irradiated soft tissues which are not able to cover the fibroatrophic bone. According to the Harris, at that time if we perform debridement of inflamed tissue and fragile bone than it may worsen the condition and convert relatively stable ORN into a progressive type. When the site is larger than 2.5 cm but not covered by mucosa, a conservative surgical treatment to cover the bone with new tissue from outside the radiation field is recommended[24].

When the site is extensive and symptomatic, various type of free tissue transfer may be optimum but not always the best option[24].

CASE REPORT

A known case of carcinoma of esophagus had undergone radiotherapy and chemotherapy before 3 years. He came to Department of Oral and Maxillofacial Surgery with complain of pain in lower left back tooth region since 1 week and difficulty in mouth opening since 5 days.

He had undergone extraction of mandibular left second molar before 6 months. Then he noticed unhealed socket at that region. Since last 1 week he had severe throbbing, continuous pain in same region. Since 5 days patient had difficulty in mouth opening and also had complain of foul smell from mouth.

On examination, left side submandibular lymph nodes were palpable and mouth opening

from Interincisal distance is 15 mm. In clinical examination exposed necrotic bone was present in mandibular left posterior region.

In orthopantomogram (OPG), mixed radiolucency and opacity was present in affected region (Figure 1).

Fig 1: Pre operative OPG.

Patient was prepared for general anesthesia and fiber-optic intubation was done. The necrotic bone was removed with help of Bone rounger, Bone nibbler and curette. While removing the necrotic bone lingual nerve and roof of Inferior alveolar nerve was preserved. Saucerization was done with slow speed micromotor bur with saline irrigation. All the necrotic bone was removed until the healthy bone was felt. The operating area was closed with sutures (Figure 2, 3). On the 3rd post-operative day patient had given obturator as a healing plate. Which was discontinued after one month. After 8 month follow up, patient was stable without any complain. No evidence of recurrence was seen (Figure 4).

Fig 2: Exposure of Dead Bone.

Fig 3: Necrotic Bone Was Removed.

Fig 4: Post operative OPG.

DISCUSSION

Osteoradionecrosis is one of the worst scenario after head and neck cancer treatment. Marx described the pathophysiology of ORN. After that Delanian et al. published the fibroatrophic theory in 1993[25].

According to the fibroatrophic theory, changes of bone in ORN are very similar to those changes that occur after physical injuries affects other tissues in the body like liver and lungs[25].

The aim of all professionals involved in this treatment should be its prevention and recurrence. Rehabilitation of the patient with ORN already present is extremely difficult and unpredictable.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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