

原文題目(出處)：	Dental extractions and radiotherapy in head and neck oncology: review of the literature
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內文：

Introduction

- Radiotherapy is largely used for treatment of head and neck cancer

1. primary therapy
2. adjuvant to surgery
3. conjunction with concurrent chemotherapy
4. palliative treatment for late stage and unresectable head and neck malignancies
- Although the radiotherapy can increase cure rates

the irradiated patient is susceptible to secondary effects	
1.mucositis	2.xerostomia
3.xerostomia	4.loss of taste
5.dental caries	6.microvascular alteration
7.soft tissue necrosis	8. progressive periodontal attachment loss
9. osteoradionecrosis (ORN)	
- This latter being considered the most severe sequelae .

The main causative factors of ORN	
1.bone biopsies	
2.salvage surgery	
3.trauma by prosthesis	
4.dental or periodontal diseases	
5.extractions performed before and after radiotherapy	
- Some potential complications following radiationtherapy for head and neck cancer are **unavoidable**, mainly **mucositis, loss of taste, xerostomia and microvascular alterations.**
- But dental caries and ORN can be avoided by dental extractions of unrestorable tooth or those with advanced periodontal disease.
- However, the decision to extract tooth before or after radiotherapy has traditionally been based on clinical experience and empirically designed protocols. The literature data regarding dental evaluation and extraction are confusing and indeterminate, showing conflicting results when comparing extractions before and after radiation therapy

Extractions and radiotherapy

- Unrepairable teeth due to caries, periodontal disease or root lesions can cause infection of the bone and progression to ORN because of low vascular patency and the inability of the mechanisms of repair in irradiated tissues
- The irradiated patients present alterations in the salivary glands and in the dental structure, which predispose to progressive periodontal attachment loss, rampant caries and fungal and bacterial infections. These patients can also present fibrosis, resulting in trismus and consequently difficulties in adequate oral care

must receive exodontias before radiation therapy
1.non-collaborative patients
2.those presenting decayed and non-restorable teeth
3.periodontally compromised teeth both partially erupted or without antagonist tooth

- Knowledge of radiation dose, volume, modality, urgency, general state and prognosis plays an important role in the decision of teeth removal

Dose		
Morrish et al (1981)	22 cases of ORN /100 case	all of them had been irradiated with doses over 6500 cGy.
Thorn et al (2000)	80 cases of ORN	93% of these cases the radiation doses were>6400 cGy.
The authors concluded that patients who receive high doses of radiation therapy should be submitted to dental extractions of all unrestorable teeth before radiotherapy.		

- Analysis of the field of radiation avoids unnecessary procedures, as extractions performed outside the area of radiation do not constitute a risk factor to the development of ORN.
- Tumor prognosis is subjectively weighted as a priority in the decision making. Extractions of unrestorable, but asymptomatic teeth in pre-radiation visits or in the post-radiation period in patients with advanced or end-stage diseases, are not advocated.
- The irradiated tissues present low reparative ability and a major risk for ORN occurrence after surgical procedures compared to those in non-irradiated areas. However, the literature shows indeterminate results about exodontias performed before and after irradiation or in both.
- Most authors have demonstrated **higher rates of ORN when teeth are removed after radiotherapy**

Horiot et al (1981)	0% and 4.5% ORN rates after extractions in nonirradiated and irradiated fields
Morrish et al (1983)	100 irradiated patients and observed 22 cases of ORN, with 11 related to extractions performed within and three to extractions performed outside irradiation areas
Marx and Johnson (1987)	536 cases of ORN, with 274 related to dental extractions. Of these, 207 occurred in association with teeth removal after, 57 before and 10 during radiation treatment.
Thorn et al (2000)	In 80 cases of ORN Thorn et al (2000) attributed 36 (45%) to extractions after radiotherapy and 8 (10%) to extractions before radiotherapy.

- few studies have shown increased **risk for ORN development** when exodontias were executed **before radiation treatment**

Regezi et al (1976)	2% vs 0% after 311 dental extractions performed in 49 patients before irradiation and 23 extractions in 10 irradiated patients
Sulaiman et al (2003)	77 patients prior to radiotherapy with 197 teeth being extracted, and 107 irradiated patients in which were performed 330 exodontias 2.6% and 1.8% of the ORN in non-irradiated and

irradiated sites, respectively.

- others show **similar results** when dental extractions were compared before and after radiotherapy

Epstein et al (1987)	5.4% and 7.1% ORN rates after extractions in nonirradiated and irradiated fields
Reuther et al (2003)	68 cases of ORN in 830 irradiated patients, 16 (24%) out of 68 ORN cases being related to exodontias previously and 18 (26%) to extractions after radiotherapy.

- Although there is a risk of ORN development related to dental extractions in irradiated fields, often these procedures are unavoidable because of dental infections. Usually, these exodontias are indicated due to fault or absence of previous radiotherapy evaluation by dentist and patient collaboration after oncological treatment.
- Despite the conflicting results and discussion about the most appropriate moment for extractions, there is growing consensus that multidisciplinary teams can reduce the irradiation sequelae and that it is also mandatory that before radiation therapy for head and neck cancer all patients undergo meticulous dental evaluation and rigorous follow-up during and after radiotherapy
- An important point when considering dental extractions before radiotherapy is the time interval between dental extractions and the beginning of radiation therapy.
- This time must be sufficient for initial healing and to allow that tissues support radiation delivered; however, the repairing time should not be extended for a long period that compromises oncologic treatment and prognosis.

Regezi et al (1976) found only one case of ORN in 311 extractions performed in 49 patients between 10 and 14 days before radiotherapy.
This healing period was similar to that recommended by Beumer et al (1983) who evaluated 120 individuals and found 13 episodes of ORN.
Starcke and Shannon (1977) studied 62 patients, where 515 teeth were removed with a median of 25.3 days before radiotherapy. Only one patient presented ORN occurring spontaneously.
Epstein et al (1987) presented five cases of ORN in 92 patients with 454 teeth extracted in a median of 26 days before commencement of radiotherapy.
Sulaiman et al (2003), the patients had teeth removed in a median of 26.2 days before commencement of irradiation therapy. Only two cases of ORN (2.6%) were associated with this group.
Oh et al (2004) studied 81 irradiated patients submitted to 99 third molars' extractions pre- and 7 third molars' extractions post-radiotherapy. There was only one case of ORN related to tooth extraction. The median time between extractions and irradiation was 32.4 days.

- A wound due to surgical procedure (dental extraction) requires **protein syntheses** that are obtained by cellular activity and vascular events.
- Ionizing radiation promotes irreversible cellular and vascular damage resulting in hypoxic, hypocellular and hypovascular tissue.
- Minimal trauma, alveolectomy with careful bone trimming, conservative flaps, primary closure without tension and removal of few teeth per session minimize postoperative complications and are associated with lower ORN rates

hyperbaric oxygenation (HBO) and prophylactic antibiotics have been used as adjuvant therapies in the surgical management of irradiated patients.

Adjunctive therapies

hyperbaric oxygenation (HBO)

- The use of HBO is well established in the treatment of ORN and has been employed as an adjuvant in extractions after radiotherapy

- tension and diffusion of oxygen in the irradiated tissues
- collagen synthesis
- vascular networking
- metabolism of bone

- It pointed to an increasing reparation of the irradiated tissues. Oxygen is inspired under pressure by individual (oneperson) or multiplace hyperbaric chambers. The protocols usually consist of 20–30 dives before and 10 after tooth removal, with humidified pure oxygen administered at 2.4 atmospheres absolute pressure for 90–120 min each session, once a day
- Serious effects resulting from HBO are rare. Toxic effects are usually observed in the central nervous system

- the main contraindications against the employment of HBO
- some drugs
- non-treated pneumothorax
- neuritis
- some forms of pulmonary disease
- active viral infections

prophylactic antibiotics

- Another adjuvant that has been used in post-radiation extractions is the use of antibiotics, however, there is no consensus about their employment
- The literature recommends antibiotics for exodontias associated with radiotherapy, especially in patients with risk of developing ORN.

Kanatas et al (2002) conducted a study in consultation with the heads of oral and maxillofacial surgery departments about the use of antibiotics in dental extractions related to radiotherapy.

- 86% of the professionals recommended prophylactic antibiotics
- 89% recommended the rapeutic use for a hypothetical extraction of a mandibular residual root in irradiated fields
- OHB was recommended by 34%.

Marx et al (1985) performed a randomized prospective study comparing HBO and antibiotics.

=>ORN occurred in 11 patients (29.9%) in the antibiotics group and in two

patients (5.4%) in the HBO group.

- This paper has been considered the 'conclusive study' to date on why HBO should be considered and prescribed routinely for extractions in the irradiated sites.
- In general, HBO and antibiotics have been considered favorable when used as adjuvants in dental extractions after radiotherapy, contributing to a low frequency of complications.

Conclusion

- Before making the decision to extract teeth before or after radiotherapy, the individual characteristics of the patients, tumor and oncological treatment must be considered.
- Oral evaluation before radiotherapy reduces the risk of complications and dental extractions should preferably be performed before commencement of irradiation.
- For that reason, a multidisciplinary team consisting of the radiotherapist, oral and maxillofacial surgeon, head and neck surgeon, and oncologist is mandatory. Once dental extractions become unavoidable after radiotherapy they can be performed by specialists with appropriated surgical techniques, adjuvant therapies and rigorous follow-up after the surgical procedures.

題號	題目
1	下列有關於接受頭頸部放射線治療患者的牙齒處理,何者正確 (A) 放射線治療前,對於預後較難預測得牙齒,以保守治療為原則 (B) 如需拔除牙齒,需在放射線治療開始前四周才有足夠時間癒合 (C) 放射線治療開始前施行拔牙手術,盡量做到傷口一次縫合(primary closure) (D) 如有未完全萌發的組生齒,仍需拔除以免日後感染
答案(C)	出處: Contemporary oral and maxillaofacial surgery 第四版p.407~10
題號	題目
2	接受頭頸部放射線治療的患者,關於可能出現的副作用,下列何者錯誤 (A) 照射後兩周,開始有黏膜炎(mucositis)的症狀 (B) 放射線治療所引起的口乾,是因為唾液腺細胞對放射線有較高的感受性所致 (C) 可以使用pilocarpine來改善口乾症狀 (D) 容易因為口內常在菌叢(normal flora)的改變而引起念珠菌感染(candida infection)
答案(B)	出處: Contemporary oral and maxillaofacial surgery 第四版p.406