

Dental Needs in Brazilian Patients Subjected to Head and Neck Radiotherapy

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In spite of its recognized benefits in the treatment of malignant tumors, radiation therapy have several side effects in the head and neck region. The evaluation of oral conditions by a dentist is important to prevent or minimize these problems. The aim of this retrospective review was to analyze the dental needs in 357 patients who received radiotherapy in the head and neck region and were treated at Orocentro/FOP/UNICAMP, between January 1990 and December 2004. Review of patient files showed that dental examination before radiotherapy was not performed in 148 patients (41.5%) and was done in 209 patients (58.5%). From the total of examined patients, 94 (45%) did not require dental procedures at the moment of examination, while 115 (55%) presented some sort of dental need. Following the patients after the radiotherapy, it was observed that the group of patients that was evaluated before radiation presented less need of restorations, root canal filling and dental extractions than those who were not evaluated. The results of this study confirm that the evaluation of oral conditions prior to radiotherapy is essential to minimize the dental needs, emphasizing the importance of the dentist in the multidisciplinary team that treats cancer patients.

Key Words: oral cavity, cancer, radiotherapy, oral complications.

INTRODUCTION

Radiation therapy may be either an effective alternative to surgery or a valuable adjuvant therapy to surgery and/or chemotherapy in the treatment and loco-regional control of malignant head and neck tumors (1). However, in addition to acting in tumor cells, ionizing radiation causes damage in normal tissues located in the radiation field. Direct cell damage combined with regional loss of vascular perfusion result in xerostomia and decrease in the healing capabilities of some tissues (1). In addition, irradiated patients are at significant risk of potentially debilitating dental complications, such as aggressive caries activity (2,3). Oral alterations can be prevented or at least more properly managed if dental and medical health care providers work together. Dental evaluation and treatment with a long-term oral care regimen is recognized as an important aspect to

be considered before, during and after radiotherapy (4,5). Pre-radiation and post-radiation dental treatment in patients with head and neck cancer is often a clinical challenge (6). However, for these treatments to be effective, good patient compliance with close professional supervision is required for an indefinite period after radiation. Therefore, the aim of this study was to evaluate the dental needs in patients subjected to radiotherapy in the head and neck region.

MATERIAL AND METHODS

The basis of this study was a retrospective review of the files of the Department of Oral Diagnosis of the Dental School of Piracicaba, University of Campinas, Brazil, where 357 patients with history of radiation therapy in the head and neck region were treated between January 1990 and December 2004. Data including

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age, gender, tobacco smoking and alcohol consumption history, tumor location, histological type, clinical stage, treatment were obtained from the patient's charts. Indications of dental treatment, such as restorations, root canal filling, dental extractions and prosthesis, before and after radiotherapy were assessed. The study was conducted after approval of the Human Research Ethics Committee of the Dental School of Piracicaba, University of Campinas, Brazil.

RESULTS

Table 1 shows the distribution of the 357 irradiated patients with head and neck cancer according to demographic, lifestyle, clinical and treatment variables.

The age of the patients ranged from 12 to 87 years (mean age = 54.9 years) and most individuals were male (85.4%). Tobacco smoking and alcohol consumption were reported by 74.4% and 54.5% of the patients, respectively.

The most common site of the primary tumors was the oral cavity corresponding to 70% of the cases. Squamous cell carcinoma was the histopathological diagnosis of 89.1% of the tumors. Advanced clinical stages were more frequent, stages III and IV being detected in 64.9% of the patients. Consequently, exclusive radiotherapy was the treatment option for 43.1% of the patients followed by surgery plus radiotherapy in 34.2%.

Dental examination before radiotherapy was performed in 209 patients (58.5%), while 148 patients (41.5%) were not examined prior to radiation and sought dental treatment only afterwards. From the total of examined patients, 94 (45%) did not require dental procedures at the moment of examination, while 115 (55%) presented some sort of dental need.

Patients that were evaluated before radiotherapy required less dental procedures after radiation than those that were not previously evaluated. Needs of restorations were observed in 52% of the patients that were not previously evaluated *versus* 16.5% of the patients that were examined by a dentist before head and neck radiation. Root canal filling was required in 41% of the non-examined patients and in only 10.8% of the patients examined for dental conditions. Dental extractions were also more indicated in patients that were not examined (34.7%) than in those that were seen by a dentist before radiotherapy (8.9%). On the other hand, the need of complete dentures was more frequent in patients

that were examined before radiotherapy (77.2%) compared to the patients that were not previously examined (43.3%) (Table 2).

Table 1. Distribution of 357 cases of head and neck irradiated patients according to demographic, lifestyle, clinical and treatment variables.

Variables	Number (%) of patients
Age	
≤ 40	38 (10.6)
> 40	319 (89.4)
Gender	
Male	305 (85.4)
Female	52 (14.6)
Tobacco smoking ^a	
Yes	262 (74.4)
No	90 (25.6)
Alcohol consumption ^a	
Yes	189 (54.5)
No	158 (45.5)
Clinical stage ^a	
I + II	98 (35.1)
III + IV	181 (64.9)
Treatment	
RT exclusive	154 (43.1)
Surg + RT	122 (34.2)
RT + CT	61 (17.1)
Surg + RT + CT	20 (5.6)
Histological Type	
SCC	318 (89.1)
No SCC	39 (10.9)
Primary tumor location	
Oral cavity	250 (70.0)
Oropharynx	76 (21.3)
Others	31 (8.7)
Pre-RT dental evaluation	
Yes	209 (58.5)
No	148 (41.5)

^a:Excludes cases with missing information; RT: radiotherapy; Surg.: surgery; CT: chemotherapy; SCC: squamous cell carcinoma.

DISCUSSION

Head and neck cancer is a serious, debilitating, and potentially life-threatening disease. However, advances in its management have resulted in significant improvements in survival and functional outcome (1,7). The use of radiotherapy has proven to be an effective technique in the control and cure of the malignant tumors (1,7). Unfortunately, radiotherapy also has a significant negative impact on the oral health increasing morbidity (8). In this study, the majority of patients that underwent radiotherapy were male, over 40 years of age, reported tobacco and alcohol consumption and had advanced oral squamous cell carcinoma, confirming the findings in the literature (1,3,5,9-11).

Oral complications following radiation therapy for head and neck cancer are common and affect quality of life (8). The importance of adequate pre-radiotherapy dental screening is well documented (6,12,13). In the present study, dental examination was performed in 58.5% of the sample while 41.5% were not previously evaluated. It was observed that fewer dental procedures were needed in patients evaluated prior to radiation exposure.

The initial dental evaluation should include assessment and elimination of all existing oral conditions that are likely to precipitate complications, such as extensive carious lesions, periapical pathology and advanced periodontal disease (3,6,14,15). Poor dental condition frequently requires multiple extractions prior to initiation of radiotherapy (3,5). An adequate time for healing of extraction sites before radiation exposure is considered mandatory (5). A minimum period of 2 weeks between extraction and the onset of radiation therapy is recommended in order to avoid the occurrence of osteoradionecrosis (14). In the present study, 89.5% of

the patients evaluated before radiotherapy needed dental extractions and this was the most common performed procedure.

It is important for the patients to understand that therapeutic irradiation of head and neck can lead to an increased rate of dental caries and its management can prove to be extremely difficult and frustrating (3). In the present case series, 52% of the patients who were not evaluated prior to radiotherapy needed some type of restorative dental procedure at the post-radiation period, in contrast to only 16.5% of the individuals that were examined by a dentist before radiation of the head and neck region. This finding emphasizes the importance of oral hygiene and dietary counseling to prevent potential complications (12).

As much as 41% of the patients who were not evaluated for dental conditions before radiation therapy needed endodontic treatment. In contrast, only 10.8% of the evaluated ones needed root canal treatment at the post-radiation period. This finding may be explained by large number of prophylactic dental extractions performed in this group of individuals allied to the improvement, to some extent, of the patients' oral hygiene. Whenever possible, endodontic treatment should be the option for pain control, preservation of function and mainly prevention of osteoradionecrosis by avoiding dental extractions (16). However, endodontic treatment in irradiated patients may be time-consuming and requires optimal patient compliance to be concluded. In a significant number of cases, cervical caries may lead to amputation of dental crown, which, in turn, makes endodontic therapy more complicated. Teeth that are partial or totally destroyed by deep carious lesion can be treated endodontically to preserve bone and periodontal ligament integrity to support a removable complete denture that will be more comfortable and will improve the life quality of these patients. Trismus is a potential complication of radiation therapy, impairing the proper mouth opening and hence limiting adequate restorative and endodontic dental care (17).

This study revealed that 34.7% of patients who were not evaluated for the dental conditions before radiation therapy required dental extractions against only 8.9% in the evaluated group. These results are in agreement with the findings of previous studies, confirming that dental extractions represent a common dental need in post-irradiated patients who did not have previous access to appropriate dental care (11).

Table 2. Comparative analysis between patients without and with dental examination before radiotherapy regarding dental needs.

Dental needs	Patients without previous examination (%)	Patients with previous examination (%)
Restorations	66 (52.0)	26 (16.5)
Root canal filling	52 (41.0)	17 (10.8)
Dental extractions	44 (34.7)	14 (8.9)
Complete dentures	55 (43.3)	122 (77.2)

Studies regarding quality of life demonstrate that patients unable to have appropriate function in swallowing and speech frequently become depressed. Consequently, most patients can obtain significant benefit from oral rehabilitation, which, in some instances, may be achieved by constructing functional removal dentures (18-20). In the present study, a large number of patients needed complete dentures (77.2%), which may be explained in part by the multiple prophylactic pre-radiation dental extractions.

In conclusion, the findings of this study reinforce that: 1. a multidisciplinary approach is ideal for the management of patients scheduled to receive radiation therapy, particularly in the head and neck region; 2. dental examination before radiation therapy may prevent or minimize complications in the post-radiation period and provide better oral health conditions to the patients.

RESUMO

Apesar dos benefícios da radioterapia no tratamento de tumores malignos, vários são os seus efeitos colaterais na região de cabeça e pescoço. Sendo assim, a avaliação das condições bucais pelo cirurgião dentista é fundamental para prevenir e/ou minimizar estes danos. Este estudo retrospectivo teve como objetivo verificar as condições dentárias e as necessidades de tratamento odontológico dos 357 pacientes que receberam radioterapia na região de cabeça e pescoço, atendidos pelo Orocentro/ FOP/UNICAMP, no período de janeiro de 1990 a dezembro de 2004. Em 148 (41,5%) do total dos pacientes a avaliação odontológica não foi realizada previamente à radioterapia. A avaliação odontológica pré-radioterápica foi realizada em 209 pacientes (58,5%) dos quais 94 (45%) não tinham necessidades de tratamento odontológico no momento da avaliação, enquanto 115 (55%) apresentavam algum tipo de necessidade odontológica. O grupo de pacientes avaliados antes da radioterapia apresentou menores necessidades de restaurações, endodontias e exodontias que os pacientes não avaliados. Conclui-se que a avaliação das condições bucais previamente à radioterapia é essencial para diminuir as necessidades de tratamento odontológico enfatizando a importância da participação do cirurgião-dentista na equipe multidisciplinar que trata pacientes com câncer.

REFERENCES

- Boyle J, Patel S, Shah JP. Management of oral and oropharyngeal cancers. *Oral Dis* 2003;9:109-111.
- Andrews N, Griffiths C. Dental complications of head and neck radiotherapy: Part 1. *Aust Dent J* 2001;46:88-94.
- Bonan PR, Lopes MA, Pires FR, Almeida OP. Dental management of low socioeconomic level patients before radiotherapy of the head and neck with special emphasis on the prevention of osteoradionecrosis. *Braz Dent J* 2006;17:336-342.
- Cacchillo D, Barker GJ, Barker BF. Late effects of head and neck radiation therapy and patient/dentist compliance with recommended dental care. *Spec Care Dentist* 1993;13:159-162.
- Doerr TD, Marunick MT. Timing of edentulation and extraction in the management of oral cavity and oropharyngeal malignancies. *Head Neck* 1997;19:426-430.
- Bruins HH, Jolly DE, Koole R. Preradiation dental extraction decisions in patients with head and neck cancer. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1999;88:406-412.
- Syguła M, Skłodowski K, Pilecki B, Wygoda A, Hutnik M, Sasiadek W. Efficacy of primary and combined radiotherapy in locally advanced cancer of oropharynx and nasopharynx in III and IV stage. *Otolaryngol Pol* 2005;59:229-234.
- Epstein JB, Robertson M, Emerton S, Phillips N, Stevenson-Moore P. Quality of life and oral function in patients treated with radiation therapy for head and neck cancer. *Head Neck* 2001;23:389-398.
- Brugere J, Guenel P, Leclerc A, Rodrigues J. Differential effects of tobacco and alcohol in cancer of the larynx, pharynx and mouth. *Cancer* 1986;57:391-395.
- Kotz T, Costello R, Li Y, Posner MR. Swallowing dysfunction after chemoradiation for advanced squamous cell carcinoma of the head and neck. *Head Neck* 2004;26:365-372.
- Sulaiman F, Huryn JM, Zlotolow IM. Dental extractions in the irradiated head and neck patient: a retrospective analysis of Memorial Sloan-Kettering Cancer Center protocols, criteria, and end results. *J Oral Maxillofac Surg* 2003;61:1123-1131.
- Andrews N, Griffiths C. Dental complications of head and neck radiotherapy: Part 2. *Aust Dent J* 2001b;46:174-182.
- Koga DH, Salvajoli JV, Alves FA. Dental extractions and radiotherapy in head and neck oncology: review of the literature. *Oral Dis* 2008;14:40-44.
- Beumer J 3rd, Curtis T, Harrison RE. Radiation therapy of the oral cavity: sequelae and management, part 1. *Head Neck Surg* 1979;1:301-312.
- Hancock PJ, Epstein JB, Sadler GR. Oral and dental management related to radiation therapy for head and neck cancer. *J Can Dent Assoc* 2003;69:585-590.
- Seto BG, Beumer J 3rd, Kagawa T, Klokkevold P, Wolinsky L. Analysis of endodontic therapy in patients irradiated for head and neck cancer. *Oral Surg Oral Med Oral Pathol* 1985;60:540-545.
- Scully C, Epstein JB. Oral health care for the cancer patient. *Eur J Cancer B Oral Oncol* 1996;32B:281-292.
- Rogers SN, Lowe D, Fisher SE, Brown JS, Vaughan ED. Health-related quality of life and clinical function after primary surgery for oral cancer. *Br J Oral Maxillofac Surg* 2002;40:11-18.
- Rogers SN, McNally D, Mahmoud M, Chan MF, Humphris GM. Psychologic response of the edentulous patient after primary surgery for oral cancer: a cross-sectional study. *J Prosthet Dent* 1999;82:317-321.
- Shaw RJ, Sutton AF, Cawood JI, Howell RA, Lowe D, Brown JS, et al.. Oral rehabilitation after treatment for head and neck malignancy. *Head Neck* 2005;27:459-470.

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