

Compliance with fluoride custom trays in irradiated head and neck cancer patients

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Abstract

Purpose The purpose of this study is to assess compliance with fluoride gel custom trays in irradiated head and neck cancer patients.

Methods and materials One hundred fifty-five consecutive patients on remission following radiation therapy of head and neck cancers were assessed retrospectively for dental care practices prior to radiation and prospectively for long-term compliance with custom trays from November 2009 to January 2010. A five-item questionnaire was filled in by patients in the

waiting room, and a 15-item questionnaire by the physician in charge during the corresponding follow-up visit.

Results Ten percent of patients were edentulous at inclusion. Among dentate patients, 17% had total extractions. With a mean follow-up of 24 months, 19% of patients used custom trays for over a year. Primary stage, age, and tobacco consumption were correlated with compliance with custom trays. More than half of dentate patients developed carious lesions, and 8% had stage 1–3 osteoradionecrosis of the whole population of edentulous and dentate patients.

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Conclusion Compliance with custom trays was poor in this series. Specific postirradiation dental care follow-up visits and education have demonstrated their utility in the era of 2D irradiation. We currently advocate an 18-month compliance with custom trays in IMRT patients on the basis of the Parsport trial, after which we assess the quality of salivary recovery before recommending prolonged use or interruption. Data with innovative irradiation techniques are however required.

Keywords Dental care · Compliance · Custom trays · Radiotherapy · Head and neck · Tooth extractions · Osteoradionecrosis

Introduction

Patients with head and neck malignancies are treated with radiation therapy in over 50% of cases. Dental management prior to irradiation should be examined according to Daly's classification and expected patient compliance [1]. Irradiated patients develop 50 times as many dental carious lesions as they did prior to radiation therapy at a rate of 2.5 per month [2–4]. Postradiation caries are often highly destructive and lead to extractions and to osteoradionecrosis in 1–15% of irradiated head and neck cancer patients [1, 3, 5–9]. Dental deterioration often affects chewing, swallowing, nutritional status, and speech and can result in social disability and altered quality of life [3]. Fluoride gel applied for 5 min per day in custom trays reduces caries by 92% in irradiated head and neck cancer patients [10] provided that compliance exceeds 70% [11]. Compliance with custom trays was well assessed in the 1980s, but updated data are lacking. The aim of this study was to assess the compliance with custom trays with fluoride gel in irradiated head and neck cancer patients.

Material and methods

All consecutive patients on remission following irradiation (RT) of head and neck cancers from 1994 to 2009 underwent an institutional review board-approved questionnaire on their compliance to fluorides from November 2009 to January 2010. Dental care and extractions prior to irradiation were left to the discretion of the dentist. Dental visits were recommended twice yearly following irradiation. Compliance with custom trays was assessed prospectively during routine posttreatment follow-up visits. A five-item questionnaire was filled in by patients in the waiting room. A 15-item questionnaire was filled in by the physician in charge during follow-up visits. A cutoff of 6 months follow-up (time at which most carious lesions

appear) was chosen to estimate factors associated with better compliance. Compliance was dichotomized by duration with a cutoff at 6 months. Statistics including chi-square tests, uni- and multivariate analyses were performed using the SPSS v12 software.

Results

The study was performed on 155 consecutive patients (Table 1). Intensity-modulated radiation therapy (IMRT) was used in 8% of patients. Mean doses to the primary tumor and parotids were 66 and 50 Gy, respectively. At irradiation onset, 26% of the patients were edentulous: 16 patients were edentulous prior to RT, and 24 became edentulous for RT. Among the remaining 115 dentate patients, 50 (43%) underwent extractions (from one tooth to subtotal extractions). Among the 115 dentate patients, 84 patients (73%) applied custom trays. With a mean follow-up of 24 months (1–194), custom trays were used for more than 6 months in 45 of the 84 dentate patients (52%). Only 16 patients (19% of dentate patients) were continuing their custom tray applications 1 year following RT and 10 (12%) 2 years following RT.

There was neither influence of gender nor primary tumor site nor nodal stage on compliance at 6 months. T stage was correlated with compliance (66% in T0/1/2 versus 39% in T3/4 tumors; p 0.01). Median age [58 years old (yo)] was also correlated with compliance (64% in patients under 58 yo (median age) versus 41%, p < 0.01). Xerostomia grade

Table 1 Patient and treatment characteristics

Age	Median 58 years old (25–87)
Male/female	4/1
Primary tumor site	Oropharynx 38% Oral cavity 22% Larynx/hypopharynx 24% Parotid 5% Nasopharynx 5% Nodes (unknown primaries) 4% Sinus 2%
T stage	4% T0, 11% T1, 38% T2, 27% T3, 20% T4
N stage	56% N0, 14% N1, 11% N2a, 9% N2b, 5% N2c and 5% N3
Radiation therapy	Postoperative 51% Definitive 49% Bilateral 94% Unilateral in 6% IMRT 8% Concomitant chemotherapy 62% Targeted therapy 6%

0–2 (using the radiation therapy oncology group scale; grade 0 corresponding to no dryness and grade 2 to moderate dryness unresponsive to stimulation) was associated with compliance: the higher the grade was, the poorer the compliance was (grade 1: 57%, grade 2: 42%, grade 3: 9%; p 0.046). There was no influence of the period, gender, or primary site. Tobacco consumption was more frequent in noncompliant patients during RT and at last follow-up (p 0.037 and 0.025). Alcohol consumption on a regular basis before irradiation was reported in half the patients of both groups during RT and at last follow-up.

Cariou lesions occurred in 49 patients (58%). Stage 1–3 osteoradionecrosis was observed in seven and five patients with compliance inferior and superior to 6 months, respectively. The overall osteoradionecrosis rate was 8% in the whole population (12/155). The most severe cases of osteoradionecrosis occurred after postirradiation dental extractions in patients with oropharyngeal or oral cavity cancer.

The aim of the questionnaire was to assess compliance with dental care and was not originally designed for therapeutic education. However, in 12 patients who underwent the questionnaire twice at 3-month intervals, compliance with custom trays was improved.

Discussion

Compliance with custom trays was poor in this series: 19% of patients used their custom trays for more than 1 year and half less than 6 months. Tobacco consumption was associated with poor compliance. Despite the benefit of custom trays on teeth and quality of life [11–15], compliance usually decreases after a few months. In our study, main factors for noncompliance were xerostomia, burning sensation with fluorides, and the cost of fluoride gel. Epstein et al. studied the impact of reinforcement through the use of a structured verbal questionnaire in patients following completion of irradiation. Patients were divided into two groups: group 1 (30 patients) was seen regularly in the dental clinic, while group 2 (46 patients) was not. Overall, 43% of patients reported using fluoride gel regularly but compliance was significantly worse in group 2 (28%) [16]. This is in line with our results. Noteworthy, our patients were seen regularly by the radiation oncologist referee but not systematically by a dentist. As observed in 12 patients who had filled in the questionnaire twice in 3 months, reinforcement has a positive effect on patients' understanding of their cancer and compliance with treatment [17]. Fluoride delivery through a continuously worn intraoral fluoride releasing system may be another way to eliminate the compliance problem [18, 19].

More than half of the patients had some degree of dental deterioration, and 8% had stage 1–3 osteoradionecrosis. A clinical index for assessing postradiation dentition breakdown may be useful [20].

The benefit of new radiation techniques on dental structures is little known. In the sole phase 3 study comparing 2D–3D irradiation and IMRT [21], no detail was given on dental management and complications. Two IMRT studies showed rates of osteoradionecrosis between <1% and 6% with 60–72 Gy and 69–81 Gy, respectively [22, 23]. Volumes of the mandible exposed to high radiation doses can be minimized. Despite an expected benefit, Ben-David et al. [23] still emphasize daily fluoride. We currently advocate an 18-month compliance with custom trays and assess the quality of the salivary recovery [21] clinically before allowing patients to stop applying fluorides.

Conclusion

Compliance with custom trays remains poor in the absence of 6-month dedicated dentist follow-up visits [24, 25]. This requires a structured network with a good coordination between radiation oncologists, dentists, and head and neck surgeons. The impact of modern irradiation techniques on dental structures remains to be determined. Since the dose to the underlying jaws are hardly predictable with highly conformal irradiation techniques, the use of numerical dental atlases will likely help to rapidly estimate the dose received by each teeth for optimal dental care [26].

Conflict of interest notification The authors have no actual or potential conflicts of interest. The authors have no financial disclosure.

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