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Original Article

Upper aerodigestive tract cancer and oral health status before radiotherapy: A cross-sectional study of 154 patients

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ABSTRACT

Objectives: We aimed to determine primarily the oral health status of patients with upper aerodigestive tract cancer before radiotherapy, and secondarily the prevalence of risk factors for poor oral status.
Methods: A cross-sectional study was conducted in Marseille University hospital. Assessment criteria were the Decay, Missing and Filled (DMF) Index and periodontal status.
Results: One hundred and fifty-four patients, mean age 60.9 years, were included. The most common sites of primary tumors were the larynx (28.6%) and oral cavity (26.6%). Current or past smokers accounted for 80.5% of patients and 67% were alcohol abusers. Most patients (83.8%) did not have xerostomia. They ate three meals a day (61%), with sugar consumption in 40%. The median number of daily tooth brushings was 2, with a manual toothbrush (81.2%). Few patients used dental floss or interproximal brushes. Individual DMF index was 17.6 ($D = 2.3$, $M = 9.3$, $F = 6.0$) and was higher in patients with xerostomia and alcohol abusers ($P = 0.01$). Osseous level was 62.3% and 57.8% of patients had osseous infections, which were more common with poor hygiene ($P = 0.04$). Most patients (85.7%) had periodontal disease, but incidence did not significantly differ according to risk factors.
Discussion: The DMF index was higher in presence of periodontal disease and osseous infections. Alcohol and xerostomia were associated with a high individual DMF index and osseous infections were more frequent in patients with poor hygiene. Patients with upper aerodigestive tract cancer are at high risk of osteoradionecrosis if they do not receive dental treatment before radiotherapy.

1. Introduction

Upper aerodigestive tract cancer (UATC) is the fifth cancer in order of frequency in France, after prostate, breast, lung and bowel cancer [1]. France is the country with the highest oral cancer mortality rate in Europe (5000 patients a year). The main risk factors are tobacco and alcohol. The oral cavity is the most frequent cancer site [1].

The great majority of these cancers are treated by surgery and/or radiotherapy (RT) [1]. These treatments have facial, oral and dental side effects whose functional consequences (which affect chewing, swallowing, eating and speaking) and aesthetic, psychological and social impact significantly decrease the quality of life of these patients [2]. Furthermore, patients who have buccal lesions and/or undergo surgery are at increased risk of osteoradionecrosis (ORN) [3,4].

Xerostomia and high-dose radiation (> 60 Gy) [5] are responsible for deterioration of teeth and oral health status. After

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radiotherapy, if precautionary measures are not taken, caries significantly increase, a condition known as radiation caries [6]. These caries do not result from a direct action of radiation on teeth but from unfavourable conditions created by xerostomia. They progress very quickly and teeth need to be extracted within a few months. However, tooth extraction is not recommended in tissue affected by radiation. At present, there is no consensus on the attitude to be adopted regarding the patient's dental future before undertaking radiotherapy. The first and most drastic approach consists of almost systematic avulsion of all teeth that are healthy or which do not lie in the field of irradiation, a solution which in theory better guarantees against the risk of ORN. However, this is mutilating, especially in view of the knowledge that prosthetic restoration will always be delayed, long and difficult, and that, if injury occurs, this may also encourage the development of ORN. The second approach, less extreme, favors the conservation of the greatest possible number of teeth, but it remains much less reassuring. Since the advent of caries-preventive fluoride regimens [7], a more conservative attitude is proposed when the patient has good oral hygiene [8].

Consequently, patients' initial oral status should be assessed so as to eliminate any source of infection. Poor initial oral status increases the risk of further deterioration and the development of ORN. However, few epidemiological data are currently available [9–11]. Published studies of the oral status of patients with upper aerodigestive tract cancer are all retrospective and the populations were South American or Asian.

It would be interesting to discover if we are currently, in France, in presence of a population whose oral status is poorer than that of the general population and who require more intensive preventive or curative treatment independently of their cancer. Furthermore, in patients who undergo RT the postoperative therapeutic possibilities are greatly restricted, leaving only the more drastic options available.

The main objective of this study was to determine the oral status of patients with UATC before radiotherapy. The assessment criteria were the Decayed Missing Filled index (DMF) and periodontal status. The secondary objective was to determine the distribution of risk factors for deterioration of oral status (oral hygiene, food habits, xerostomia, tobacco and alcohol consumption) in this population.

2. Methods

2.1. Study design

This observational cross-sectional study was conducted in the odontology department of La Timone hospital, Marseille, France, and was approved by the Marseille ethics committee (*Comité de protection des personnes* [CPP]) under ID RCB number 2011-A0181-40.

2.2. Inclusion criteria

All dentate patients with an untreated or only surgically treated UATC and who were scheduled for radiotherapy had a dental consultation and were considered for inclusion in the study. They had to be over 18 years old, dentate and with no intellectual disability. The patients were diagnosed in the otolaryngology or maxillofacial surgery departments of La Timone hospital. The patient's inclusion design is described in Fig. 1.

2.3. Data collection

All patients underwent oral assessment in the odontology department by two dental practitioners and radiographs were taken. The dental practitioners carried out the necessary treatment and entered data on the flowchart developed for this study. Data including age, gender, profession, history of tobacco and alcohol consumption, food habits and oral hygiene were recorded and scored. Tumor site, tumor staging, clinical stage and treatment were obtained from the patient's medical chart. Each patient was clinically and radiologically examined and the following information was recorded:

- xerostomia (scores 0 to 3) [12];
- number of decayed, missing and filled teeth for calculation of the DMF index [13];
- endodontic treatments and infections visible on radiographs;
- periodontal alterations [14] (crestal bone loss, gingival index [GI, index 0 to 3], plaque index [PI, index 0 to 3], pockets [P, mm], recession [R, mm] and furcation [F] [15]) to determine osseous level (%) and periodontal disease [14] presence of periodontal disease yes/no, disease score for gingivitis (I), chronic periodontitis (IIa), local periodontitis (IIb), chronic aggressive periodontitis (III).

Patients received oral care and advice on oral hygiene (tooth brushing, scaling, use of fluoride trays). Extractions, periodontal procedures and caries treatment were scheduled and performed before radiotherapy.

2.4. Statistical analysis

Continuous variables were presented as means and standard deviation, or as medians and range, as appropriate. Categorical

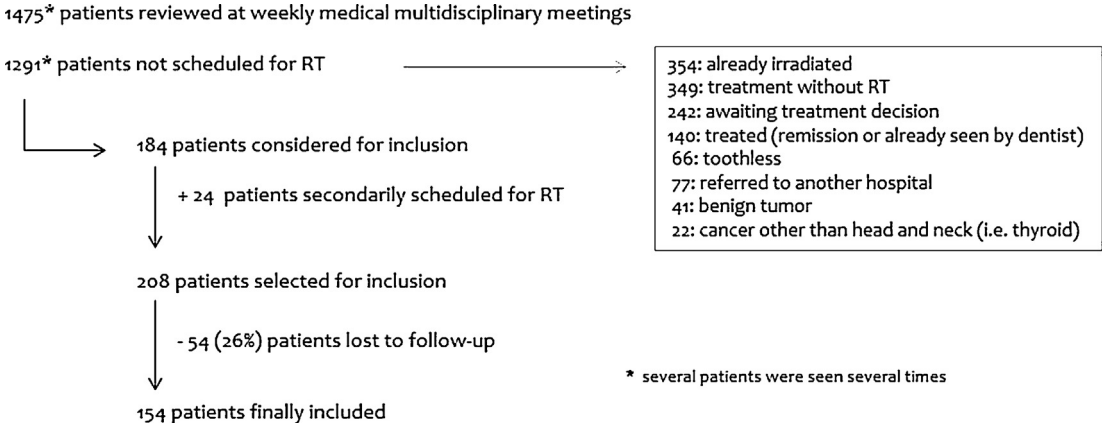

Fig. 1. Patient inclusion for study of oral status of patients with upper aerodigestive tract cancer (UATC) before radiotherapy (RT).

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