

The extent of unnecessary tooth loss due to extractions prior to radiotherapy based on radiation field and dose in patients with head and neck cancer.

Doke J.M. Buurman, Caroline M. Speksnijder, Marlies E. Granzier, Veronique C.M.L. Timmer, Frank J.P. Hoebbers, Peter Kessler; Maastricht University Medical Center, Department of Cranio-Maxillofacial Surgery, GROW School for Oncology and Reproduction, Maastricht, The Netherlands

Purpose

Prior to radiotherapy (RT), teeth with poor prognosis that pose a risk for post-RT osteoradionecrosis (ORN) are removed. To allow enough time for adequate wound healing prior to RT, decisions are made based on the estimated radiation dose. This study aimed to gain insight into (1) the overall number of teeth extracted and (2) the patient and tumor characteristics associated with the number of redundantly extracted teeth.

Methods

Patients with head and neck cancer (HNC), treated with RT between 2015 and 2019, were included in this cross-sectional study. For each extracted tooth the radiation dose was calculated retrospectively. The cut-off point for valid extraction was set at ≥ 40 Gy in accordance with the national protocol. Potential factors for doses ≥ 40 Gy were identified, including age, sex, tumor location, tumor (T) and nodal stage (N), overall tumor stage and number of teeth extracted.

Results

A total of 1759 teeth were removed from 358 patients. Of these 1759 teeth, 1274 (74%) appeared to have been removed redundantly, based on the mean dose (D_{mean}) of < 40 Gy. Using the maximum dose (D_{max}) of < 40 Gy, 1080 teeth (61%) appeared to have been removed redundantly. Tumor location and N-classification emerged as the most important associative variables in the multivariable regression analysis.

Conclusions

To our knowledge this is the first study to provide insight into the amount of teeth redundantly extracted prior to RT and represents a step forward in de-escalating the damage to the masticatory system prior to RT.

	n = 358
Age (years)	
mean \pm SD	63.6 \pm 11.3
median (IQR)	60.0 (16)
Sex (n; %)	
Female	109 (30.4)
Male	249 (69.6)
Anatomical region of the expected radiation fields (n; %)	
Larynx	60 (16.8)
Hypopharynx	37 (10.3)
Parotid region	35 (9.8)
Oropharynx	117 (32.9)
Oral cavity	51 (14.2)
Maxillary complex	22 (6.1)
Nasopharynx	11 (3.1)
Other	25 (7.0)
Tumor stage (n; %)	
T0	6 (2)
T1	63 (18)
T2	93 (27)
T3	106 (30)
T4	81 (23)
Missing	9
Node stage (n; %)	
N0	148 (42)
N1	76 (22)
N2	87 (25)
N3	42 (12)
Missing	5
Tumor stage group (n; %)	
Stage 0 (cis)	1 (0)
Stage I	62 (18)
Stage II	63 (18)
Stage III	91 (26)
Stage IV	134 (38)
Missing	7
Type of tumor (n; %)	
Mucosal	289 (81)
Salivary gland	35 (10)
Skin, incl. Melanoma	22 (6)
Other types of tumor	12 (3)

Baseline characteristics of the 358 patients
SD, standard deviation; IQR, interquartile range; TNM-classification: T, tumor; N, node; M, metastasis classification according to the 8th edition

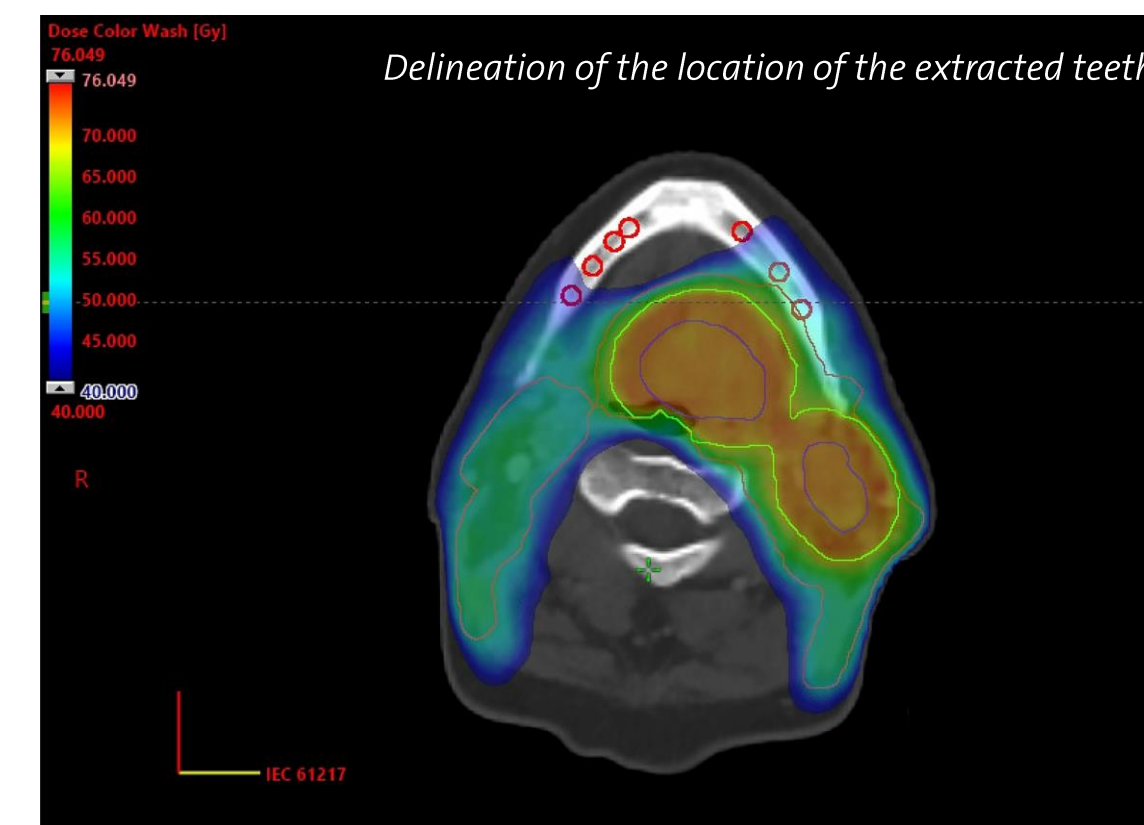
Published in

Radiotherapy and Oncology (The Green Journal). August 2023; doi: 10.1016/j.radonc.2023.109847

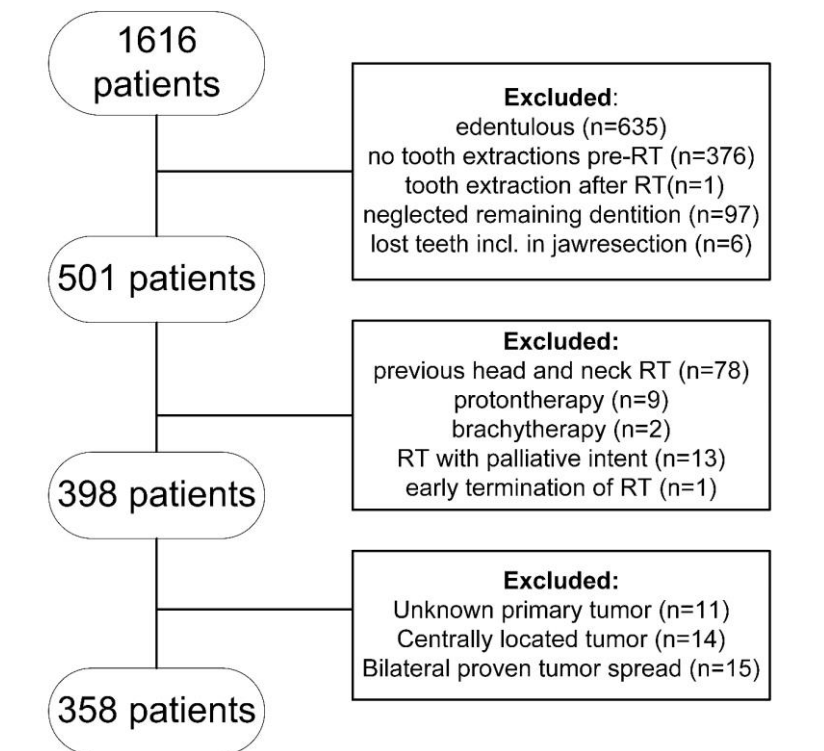
Radiotherapy and Oncology (The Green Journal). January 2024; doi: 10.1016/j.radonc.2023.110026.

Region	No. of extracted teeth	$D_{mean} < 40$ Gy n (%)	$D_{mean} \geq 40$ Gy n (%)	$D_{max} < 40$ Gy n (%)	$D_{max} \geq 40$ Gy n (%)
Larynx	217	209 (96)	8 (4)	204 (94)	13 (6)
Hypopharynx	163	145 (89)	18 (11)	127 (78)	36 (22)
Parotid region	94	81 (86)	13 (14)	72 (77)	22 (23)
Oropharynx	667	480 (72)	187 (28)	383 (57)	284 (43)
Oral cavity	378	177 (47)	201 (53)	139 (37)	239 (63)
Maxillary complex	87	52 (60)	35 (40)	43 (49)	44 (51)
Nasopharynx	72	62 (86)	10 (14)	54 (75)	18 (25)
Other	81	68 (84)	13 (16)	58 (72)	23 (28)
Total	1759	1274 (72)	485 (28)	1080 (61)	679 (39)

Number of removed teeth per location
n, number; D_{max} , max. dose; D_{mean} , mean dose



Exclusion criteria:



Factors potentially contributing to RT dose ≥ 40 Gy

