Purpose/Objective(s): We conducted a retrospective study of patients treated with radiation therapy (RT) to the oropharynx to determine if an association exists between radiation dose delivered to the mandible and occurrence of osteoradionecrosis (ORN).

Materials/Methods: Clinical records of 393 oropharyngeal cancer patients treated between Jan. 1, 2000 and Oct. 23, 2007 were reviewed. ORN was graded for each patient using the following scale: 0- no symptom; 1- bone exposed; 2- received minor debridement; 3- hyperbaric oxygen needed; 4- major surgery required. The ORN group refers to patients with ORN grade greater than 0. A comparison group of equal size was selected by identifying the patient without ORN (grade 0) who had the RT start date closest to each patient in the ORN group to minimize the impact of differences across treatment era. Radiation treatment plans for both groups were collected; the mandible was contoured for each plan and relative dose-volume histograms were computed. The presence/absence of dental artifact was recorded. The Mann-Whitney statistical test was used to compare the ORN and comparison groups in terms of the relative volumes of mandible exposed to doses ranging from 5 Gy to 80 Gy in increments of 5 Gy.

Results: 32 patients in the database (8.1% of the treated patients) were found to have ORN (grade >=1) in the mandible; 5 of these patients underwent major surgery (grade 4). The median time to develop ORN was 7.8 months (range: 0 - 71). A comparison group of 32 patients was selected based on matched RT start dates, as described above. 29 (91%) patients of the ORN group and 30 (96%) of the comparison group were men (p=1.00). The median age at diagnosis was 55.5 for patients of the ORN group and 55.0 for those of the comparison group (p=0.67). There was a statistically significant difference (p<0.05) between the volumes of mandible in the ORN group and the comparison group receiving doses between 35 Gy (V35) and 70 Gy (V70). The most notable difference was seen near V50 (p<0.001). The Median (range) percentage of the mandible receiving 50 Gy in the comparison and ORN groups was 31.1(2.7 - 61.3)% and 44.6(16.5 - 71.3)%, respectively. Dental (CT) artifacts were found in 20/32 cases (63%) in the ORN group and 15/32 (47%) in the comparison group. There was no difference between the ORN and comparison groups with respect to maximum dose to 0.1cc of mandible (p=0.58). The time to development of ORN was not correlated with the ORN grade (p=0.44).

Conclusions: We found that ORN occurrence was relatively low among patients receiving RT to the oropharynx. Using an association study that matched patients by treatment date, V50 was the dose-volume factor most significantly different between the ORN group and the comparison group, suggesting that minimizing volume exposed to the mandible above 50 Gy may reduce the occurrence of ORN.

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