ABSTRACT

Objective: Radiation therapy (RT) for head and neck cancer (HNC) may be associated with vestibular dysfunction (VD). The goal of this study is to examine the post-RT incidence of VD in HNC patients and its association with patient and treatment related factors, such as chemotherapy (chemo).

Methods: Pre- and post-RT records of 376 HNC patients were retrospectively assessed for the presence of possible VD. Dose received by vestibular apparatus was estimated using the CT-based treatment plan for the patient. Uni- and multivariate analyses evaluated the association between various variables and incidence of VD.

Results: Subjective vertigo or dizziness was reported in 53 (14.5%) patients over a median time of 16 months (range, 0 to 36 months). Abnormal electronystagmography was observed in 41 of 49 (83.6%) tested patients, 24 (48.9%) bithermal caloric stimulation, 8 (16.3%) sinusoidal tracking, and 5 (10.2%) with both. Doses received by vestibular apparatus varied between 45 to 80 Gy. Vestibular RT dose received by vestibular labyrinth was determined by generating 3-dimensional reconstruction of the treatment plan using patient’s CT. For patients before CT-based treatment planning, CTs of Alderson-Rando anthropomorphic phantom, scaled to match patient dimensions, were used as proxy phantom. Mean dose received by the labyrinth was used for analysis. The criteria for diagnosis of toxicity after RT included subjective vertigo or disequilibrium and a documented diagnosis from otologic follow up examinations. SAS software (SAS Institute INC, Cary, NC) was used for all statistical analysis. The Kaplan-Meier product–limit method was used to estimate freedom from OME.

RESULTS

- A total of 375 patients (750 ears) were included in analysis.
- Median follow up was 5.8 years (range, 0.5 to 30.6 years).
- 301 patients were treated with RT alone
- 74 patients were treated with adjuvant chemo and RT
- Doses received by the labyrinth were 25 to 80 Gy.
- Estimated volume of the vestibular labyrinth from the treatment planning CT was 0.49 ml (Range: 0.27-0.67 ml)
- 23 (6.1%) of the patients were diagnosed with labyrinthitis.

CONCLUSIONS

Post-RT VD increases with RT dose received by vestibular labyrinth. Adjuvant chemo therapy may be associated with increased incidence of VD. Future studies are necessary to further understand the effects of radiation dose to vestibular labyrinth and adjuvant therapy on RT-induced VD.