Acute Toxicity Profile in Head and Neck Cancer Patients Treated with Re-Irradiation using Proton Therapy versus Intensity Modulated Radiotherapy

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OBJECTIVES

Proton therapy (IMPT) may represent a superior option compared to photon therapy (IMRT) for preserving the balance between treatment-related toxicities and local control for curative head and neck re-irradiation (re-RT).

MATERIALS AND METHODS

We conducted a retrospective analysis of prospectively collected toxicity data for head-and-neck cancer (HNC) patients treated with re-RT using IMPT and IMRT. All patients had at least one prior curative radiation course to the head-and-neck region. Acute toxicity within 3-months of re-RT was recorded using CTCAE version 4.3. Statistical analysis was performed using Fisher Exact and Wilcoxon rank sum tests.

RESULTS

Our cohort included 31 HNC patients treated with re-RT between April 2013 and December 2018 using IMPT (n=14) and IMRT (n=17). Average follow-up was 16 months. 77% (n=24) received definitive intent re-RT, while 23% (n=7) received adjuvant re-RT. Median re-RT dose was 66 Gy whereas median total dose was 130 Gy. IMPT used conventional fractionation and stereotactic body radiotherapy (SBRT) in 7 patients each (50%). IMRT used hyperfractionation in 76% (n=13) and conventional in 18% (n=3) and one SBRT.

IMPT had lower rates of grade-3 acute toxicity for any given outcome when compared to IMRT (36% vs 71%, p=0.05), this effect was also seen in conventional IMPT compared to IMRT hyperfractionation (43% vs 69%), although statistically not significant (p=0.25). Some of the toxicities assessed included dysphagia (7.1% vs 41.2%, p=0.03), mucositis (14.3% vs 35.3%, p=0.01), and dermatitis (14.3% vs 29.4%, p=0.02). Breakdown of these toxicities is shown in Figure 1 below.

CONCLUSIONS

IMPT reduced rates of grade ≥3 toxicity in HNC re-irradiation compared to IMRT, despite differences in fractionation schedules. These encouraging results warrant further exploration through larger prospective studies.