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Results of Reirradiation with Stereotactic Radiotherapy in Recurrent Head and Neck Cancer

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Purpose/Objective(s): Evaluation of treatment results and predictive factors for carotid blow-out syndrome (CBOS) in patients with recurrent head and neck cancer (RHNC) treated with stereotactic body radiotherapy (SBRT).

Materials/Methods: 162 patients with RHNC treated with SBRT between 2007 and 2018 were retrospectively evaluated. Median age was 56 years. The tumor was located in the nasopharynx in 73 (45%), larynx or hypopharynx in 31 (19%), oropharynx or oral cavity in 23 (14%), and other regions in 35 (22%) patients. Median dose of the first radiotherapy (RT) was 66 Gy (24-74 Gy). Median SBRT dose was 30 Gy (15-65 Gy). Median gross tumor volume (GTV) was 38 cm^3 and median duration between the first RT and reirradiation (DFR) was 36 months.

Results: Median follow-up was 13 months (1-130 months). The response rate was complete in 32 (20%), partial in 11 (7%), and stable in 21 (13%) patients, whereas the tumor progressed in 89 (55%). The last status of the tumor was not known in 9 patients. At the last follow-up, 24 (15%) patients were alive with no evidence of disease, 9 (5%) were alive with disease, 81 (50%) were succumbed to disease, 16 (10%) were succumbed to treatment-related complications, and 6 (4%) died due to other reasons. The reason of death is not known in 26 (16%) patients. The 1-, 2-, and 5-year rate of overall survival (OS) was 56%, 39%, and 18%; disease-free survival (DFS) 48%, 31%, and 12%; local recurrence-free survival (LRFS) 50%, 32%, and 13%; and distant metastasis-free survival (DMFS) 54%, 35%, and 15%, respectively. In univariate analysis, patients with smaller GTV size ($\leq$50 cm^3 vs. >50 cm^3) had significantly higher survival rates. Longer DFR (>40 months vs. $\leq$40 months) significantly increased the OS, DFS and DMFS rates; and nasopharynx location significantly increased the DFS, LRFS and DMFS rates. In multivariate analysis, GTV size and DFR for OS; tumor location, GTV size and DFR for DFS; tumor location and GTV size for LRFS; and GTV size and DFR for DMFS were statistically significant. CBOS developed in 24 (15%) patients and 10 were succumbed to this complication. In patients with CBOS, median maximum carotid dose (MCD) was 36 Gy (0-64 Gy) and the circumference of the carotid receiving at least 30 Gy was >180^0 in 16 patients. In patients without CBOS, median MCD was 33 Gy (0-65 Gy) and 44 patients received at least 30 Gy to >180^0 circumference of the carotid artery. The risk for the development of CBOS was significantly higher in patients whose MCD was >33 Gy, and the carotid circumference receiving at least 30 Gy was >180^0 ($p=0.02$, and $p=0.03$).

Conclusion: Survival and local control rates were significantly higher in patients with RHNC with GTV <50 cc and DFR >40 months. Best results were observed in patients with nasopharyngeal cancer. Extra caution should be applied to the carotid dose in patients undergoing reirradiation.

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A Pilot Study Using Intraoperative Placement of Cesium-131 Permanent Interstitial Brachytherapy in Resectable High Risk Recurrent Head and Neck Cancer

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Purpose/Objective(s): To determine the feasibility and safety of Cesium-131 implant in the management of recurrent head and neck cancer (HNC).

Materials/Methods: This is a prospective trial approved by institutional IRB. Eligibility includes patients with resectable, recurrent failures who had a prior history of radiation to the head and neck deemed high risk for a second failure by our multidisciplinary tumor board. The strength and numbers of the Cesium 131 seeds were estimated based on a preoperative treatment plan with diagnostic CT images. Immediately after tumor extirpation, the seeds were implanted in the surgical bed based on the preoperative treatment plan with intraoperative adjustment. The surgical bed and the seeds were covered with a regional flap or microvascular free flap. A CT of neck was obtained on postoperative day 1 to confirm the dose distribution of the implant. The patient followed up at 1 month and 3 months after surgery, then every 3 months in the first two years. PET/CT scans or CT neck and chest with contrast was obtained at 3 months and one year after surgery.

Results: From November 2016 to September 2018, 15 patients were recruited, and 12 patients received protocol treatment. Of the three patients who did not receive protocol treatment, one had disease progression before surgery and went hospice, and two were determined to be low risk intraoperatively. Ninety-two percent ($n=11$) of the patients were male with a median age of 74.5 years old (range: 52-86). Primary sites included 5 oropharynx, 3 larynx, 3 skin, and 1 oral cavity. Recurrent sites included 10 neck alone, 1 neck and larynx, and 1 neck/peristomal. The interval between recurrence and previous radiation ranged from 3.7 − 103.8 months. Cesium implant dose ranged from 60 to 70 Gy. After surgery, patients remained in the hospital 3 to 9 days (median 6 days). There were no significant toxicities, and only one patient developed superficial wound breakdown requiring local wound care. The median follow-up was 10.1 months (range: 2.6 to 23.9) after implant. At last follow up, 5 patients had recurrence: 1 local, 2 distant, and 2 with both local and distant recurrences. Of the 3 local recurrences, only 1 had in-field failure. One patient failed in the contralateral neck and one in ipsilateral neck distant from the implant. Three patients had died, 2 with recurrences and 1 died of other cause with no recurrence.

Conclusion: Intraoperative Cesium 131 implantation after surgical resection in recurrent HNC is feasible and safe. There were no unexpected