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Abstract: The current study was conducted to evaluate the long-term results of irradiation with carbon ions in a raster scanning technique in patients with skull base chordomas. Between 1998 and 2008, a total of 155 patients (76 men and 79 women) with a median age of 48 years (range, 15 years-85 years) were irradiated with carbon ions using a raster scan technique. The irradiation was performed at the Society for Heavy Ion Research in Darmstadt, Germany. The median total dose was 60 gray (relative biological effectiveness) at 3 gray (relative biological effectiveness) per fraction. The median boost planning target volume was 70 mL (range, 2 mL-294 mL). Local control (LC) and overall survival (OS) were evaluated using the Kaplan-Meier method, whereas long-term toxicity was evaluated via questionnaires. The median follow-up was 72 months (range, 12 months-165 months). All patients had residual macroscopic tumors at the initiation of radiotherapy. The authors observed 55 local recurrences during follow-up, as well as systemic disease progression in 4 patients. The resulting 3-year, 5-year, and 10-year LC rates were 82%, 72%, and 54%, respectively, whereas the 3-year, 5-year, and 10-year OS rates were 95%, 85%, and 75%, respectively. Age 75 mL were
associated with a significantly improved LC and OS. Primary treatment resulted in a significantly better OS probability. No higher late toxicity could be detected after carbon ion treatment. Carbon ion therapy appears to be a safe and effective treatment for patients with skull base chordoma, resulting in high LC and OS rates.

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