

Local Control and Overall Survival Outcomes for MR-Guided Stereotactic Body Radiation Therapy for Hepatocellular Carcinoma Without Macrovascular Involvement at a New Treatment Center

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Abstract

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Abstract

Objectives:

Online MR-guided radiation allows radiation therapy with continuous visualization of the tumor and precise adjustment of radiation delivery to account for respiratory motion. This enables easier treatment of upper abdominal malignancies like hepatocellular cancer (HCC). We aimed to determine local control (LC) and overall survival (OS) outcomes after stereotactic body radiation therapy (SBRT) treatment of primary liver cancers using MR-guided online adaptive radiation therapy in patients who are unfit for other liver-directed treatments like ablations or arterially directed therapies.

Methods:

HCC patients treated at our institution between 2017 to 2022 using 5 fractions stereotactic MR-guided online adaptive radiation therapy were analyzed. Patients were recommended for radiation therapy at a hepatologist-led multi-disciplinary tumor board and were generally unsuitable for ablative therapies or radioembolization. Outcome analyses excluded patients with nodal or distant metastasis, macrovascular invasion, and stereotactic body radiation therapy (SBRT) used as a bridge therapy to liver transplant. Patients' demographics, pre and post-treatment Child-Pugh (CP) and BCLC stage, ALBI grade, local failure (LF), distant liver progression (DLP), freedom from subsequent liver treatment, 90-day hospitalization, and OS along with their predictors were studied. Using the log-rank test, Kaplan-Meier curves for LF, DLP, and OS were generated.

Results:

210 consecutive patients treated with MR-guided radiation were studied. Out of these, 101 patients with 125 liver SBRT courses met the criteria for outcome analysis. The median age was 71 years. 97/125 (78%) treatment courses used a biologically effective dose (BED) ≥ 100 Gy ($\alpha/\beta = 10$ Gy) and the most common regimen was 50 Gy in 5 fractions delivered every day. At presentation, 66/101 (65%) patients were CP A, 28/101 (28%) were CP B, 4/101 (4%) were CP C, and 3/101 (3%) were unknown. According to the BCLC classification, 1 (1%) patient was BCLC 0, 31 (31%) were BCLC A, 26 (26%) were BCLC B, and 43 (42%) were BCLC C (based on performance status). The median PTV contour volume was 55.7 cc (range, 3.6- 1771.7 cc). The median follow-up was 16 months. The one-year LF rate was 5.4% and the two-year LF rate was 7.0%. One and two-year DLP were 37.9% and 60.1% respectively. One and two-year OS were 73.5% and 51.6% respectively.

Conclusion(s):

Better online tumor localization results in excellent local control using MR-guided SBRT for primary liver tumors. This compares favorably to contemporary large series with experienced North American centers. Distant liver progression and overall survival are also similar to previously reported outcomes.