

Stereotactic MR-guided Online Adaptive Radiation Therapy (SMART) for the Treatment of Liver Metastases in Oligometastatic Patients

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Abstract

Objectives:

We aimed to present our clinical experience on the implementation of a stereotactic MR-guided online adaptive radiation therapy (SMART) for the treatment of liver metastases in oligometastatic disease.

Methods:

Between September 2018 and June 2022, forty-five patients (65 lesions) with liver metastasis treated with SMART were included in this retrospective study. Step-and-shoot IMRT technique was used with daily plan adaptation. During delivery, real-time imaging was used by acquiring planar MR images in sagittal plane for monitoring and gating. Acute and late toxicities were recorded both during treatment and follow-up visits.

Results:

The median follow-up time was 15.2 months (range, 3.1-47.6 months). The median age was 62 years (range, 21-86 years). Twenty-five (55.6%) patients were female and 20 patients (44.4%) were male. The median delivered total dose was 45 Gy (range, 20-60 Gy); with a median fraction number of 5 (range, 1-8 fractions) and the median fraction dose was 10 Gy (range, 7.5-20 Gy). No patients were lost to follow-up and 32 patients were alive at the time of analysis. Twenty-seven patients (60%) had complete, thirteen patients (28.9%) had partial response and five patients (11.1%) had progression at irradiated sites. Estimated 1-, and 2-year OS was 93.8% and 63.9%, respectively. Estimated 1-year local progression free survival was 84.9%. Intrahepatic progression free survival was 70.5% and 66.1% at 1- and 2-year, respectively. Extrahepatic progression free survival was 51.9% and 30.5% at 1- and 2-year, respectively. There was no grade 3 or higher acute or late toxicities experienced during the treatment and follow-up course.

Conclusion(s):

SMART represents a new, noninvasive and effective alternative to current ablative radiotherapy methods for treatment of liver metastases in oligometastatic disease with the advantages of better visualization of soft tissue, real-time tumor tracking and potentially reduced toxicity to organs at risk.