

Stereotactic Body Radiotherapy for Liver Metastases - Overall Survival and Local Control from the RSSearch® Patient Registry

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Abstract

Objectives: Stereotactic body radiotherapy (SBRT) is an emerging treatment option for liver metastases in patients unsuitable for surgery. We investigated overall survival (OS) and local control (LC) of patients with liver metastases treated with SBRT from a multi-center, international patient registry.

Methods: Patients with liver metastases were identified in the RSSearch® Patient Registry. Patients were included irrespective of prior therapies. All patients were treated with CyberKnife® stereotactic radiosurgery. Descriptive statistics were used to assess patient, tumor and treatment characteristics. Dose was evaluated by converting the prescription dose to biologically effective dose using an alpha beta ratio of 10 (BED10). OS and LC were evaluated using Kaplan Meier analysis and log-rank test.

Results: From March 2005 to 2016, 328 patients with 352 liver metastases were treated with SBRT at 24 academic and community-based centers. Median age was 68 years (31-91 yrs). Colorectal adenocarcinoma (CRC) was the most common primary tumor type (46%), followed by lung (13%), breast (10%), gastrointestinal (7%), gynecologic (6%) and pancreatic (4%) tumors. Seventy-three percent of patients received prior chemotherapy, 17% had undergone surgery and 17% received no prior therapy. Median tumor volume was 40 cc (1.6 -877 cc), median SBRT dose was 45 Gy (12-60 Gy) delivered in a median of 3 fractions (1-5). Median follow up was 12 months (1-91 months). Median OS was 22 months. Median OS was greater in patients with primary CRC (27 mos), breast (22 mos) and gynecological (45 mos) tumors compared to lung (13 mos), GI (12 mos) and pancreatic (7 mos) primary tumor types ($p < 0.001$). Actuarial 1-year OS for primary CRC, breast, gynecologic, lung, GI and pancreatic tumor types was 75%, 71%, 73%, 52%, 48% and 23%, respectively. Smaller liver metastases (<40 cc) had median OS of 25 vs 15 months for volumes ≥ 40 cc ($p = 0.006$). Higher BED10 improved OS with median OS of 27

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months for BED10 \geq 100 Gy vs 12 months for BED10 < 100 Gy ($p < 0.0001$). LC was evaluated in 216 liver metastases from 208 patients. Median LC was 51 months. Median LC for BED \geq 100 Gy was 52 months compared to 19 months for BED10 < 100 Gy ($p < 0.0001$). Actuarial 1- and 2-year LC rates for BED10 \geq 100 Gy was 85.8% and 75.4%, respectively, compared to actuarial 1- and 2-year LC rates for BED10 < 100 Gy of 58.6% and 41.7%, respectively. Tumor volume and primary tumor type were not associated with LC.

Conclusions: SBRT provides good OS and LC for metastatic liver lesions, with higher SBRT doses (BED10 \geq 100 Gy) significantly improving both OS and LC. Patients with liver metastases from CRC, breast and gynecological primary tumors had improved OS compared to lung, GI and pancreatic primary tumor types. Future prospective trials on histology and dose are needed to help improve patient selection.