

A RETROSPECTIVE REVIEW OF SBRT FOR LARGER BRAIN METASTASES OR POST-RESECTION CAVITIES

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Purpose/Objectives

Radiation treatment for brain metastases is typically delivered by whole brain radiation (WBRT), stereotactic radiosurgery (SRS), or a combination of these modalities. However, there are patients with solitary tumors or post-resection tumor cavities that are not candidates for SRS owing to a maximum target diameter larger than 3 cm, for which avoiding WBRT may provide a quality of life benefit. Here we summarize treatment data and outcomes of patients who underwent stereotactic hypofractionated radiation therapy for brain metastases or resection cavities ranging from 3 to 6 cm in maximum diameter (SBRT brain).

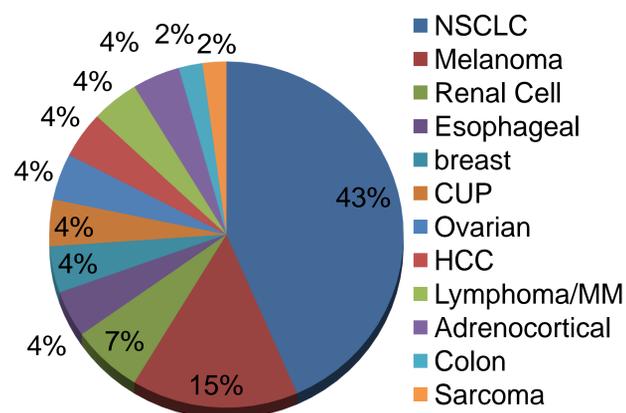


Figure 1. Pathology of treated tumors. NSCLC = Non-small cell lung cancer, CUP = carcinoma of unknown primary, HCC = hepatocellular carcinoma, MM = multiple myeloma.

Materials/Methods

We performed a single-institution retrospective analysis of treatment parameters and outcomes of 46 patients treated by SBRT brain between July 2007 and February 2012. The most common fractionation was 30 Gy in 5 fractions (n=21), followed by 35 Gy in 5 fractions (n=16), and 25 Gy in 5 fractions (n=4). Treatments were delivered using a BrainLab/Varian NovalisTx linear accelerator over 5 consecutive days for 30 patients, and every other day for 16 patients. Image-guidance employed daily stereotactic x-rays for 6D setup correction (ExacTrac, Brainlab), and subsequent cone-beam CT (OBI, Varian) for volumetric validation. Clinical and dosimetric data was obtained from patient charts.

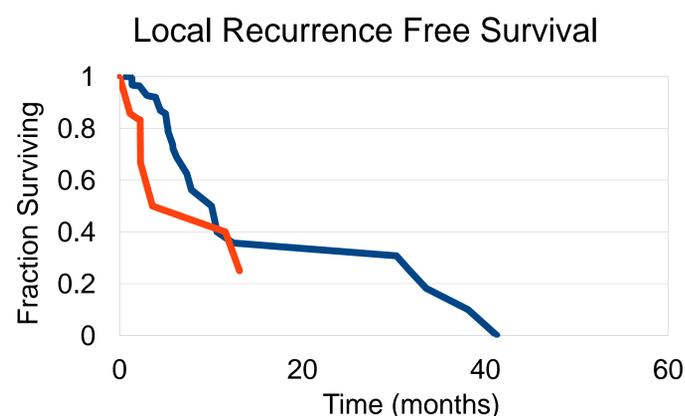


Figure 2. Local Recurrence in brain metastases treated by SBRT. Local recurrence by resection status. Median time to recurrence 3.6 months in intact tumors (red) versus 10.2 months in resected tumors (blue).

Results

Mean follow-up was 8.3 months (range 0 to 41 months). 43% of treated metastases were non-small cell lung cancer, 15% melanoma, and 7% renal cell carcinoma (Figure 1). 83% of patients underwent resection prior to radiation, 13% of tumors were intact. 6% of tumors recurred locally, with a median local recurrence free survival of 3.6 months in intact tumors versus 10.1 months in resected tumors (Figure 2). 58% of patients with local failure also failed elsewhere in the brain. Rate of local recurrence did not correlate with dose or histology. 30% of patients had non-local in-brain failure, with median non-local brain recurrence free survival of 7.4 months. Median overall survival was 6.3 months, 5.0 months in intact tumors versus 9.9 months in resected tumors.

Acute side effects were mild and included fatigue and focal hair loss. The incidence of radiologically evident radionecrosis was 8.7%, with average onset of 23 months. No cases showed clinical symptoms, or warranted therapeutic intervention. 15% of patients underwent additional radiation therapy, including WBRT (6.5%) and SRS or SBRT brain for new brain lesions (8.7%).

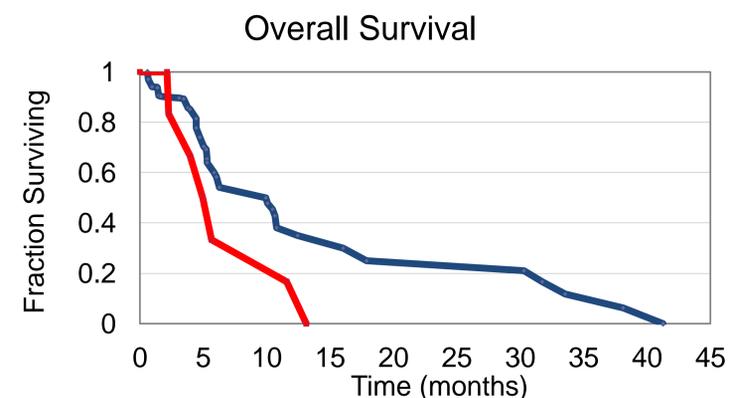


Figure 3. Overall Survival by resection status. Median overall survival for unresected tumors 5.3 months (red) versus 9.9 months in resected tumors (blue).

Conclusions

SBRT brain for larger brain metastases and post-resection cavities can be administered with a favorable side effect profile. Outcomes after SBRT for brain metastases compare favorably to historical data for WBRT. While longer-term survival was observed, in-brain failure and/or systemic disease progression are limiting overall survival. The observed local recurrence rate warrants a prospective study of dose escalation.