INTRODUCTION

Patients with metastatic disease are living longer and may be confronted with locally or regionally recurrent brain metastases (BM) after prior stereotactic radiosurgery (SRS) or fractionated stereotactic radiotherapy (FSRT). This study analyzes outcomes in patients treated with a second course of SRS/FSRT for locally (previously treated) or regionally (new intracranial) recurrent BM.

METHODS

From 2006-2018, we identified 122 patients at our institution who received a second course of SRS/FSRT for BM delivered to a total of 32 targets (median 2 targets/patient). All treatments were delivered by Helical TomoTherapy with a TARGIT cranial fixation system (Figure 1). The most frequently used dose schedules were 15 Gy by SRS and 24 Gy in 4 fractions by FSRT. No patient received whole brain radiation therapy (WBRT) before initial SRS/FSRT or between first and second SRS/FSRT. Control rates and survival were calculated using Kaplan-Meier analysis and multivariate proportional hazards model. Patient (Table 1) and treatment (Table 2) characteristics are summarized below.

RESULTS

Median time from first to second SRS/FSRT was 5.8 months (2.5-26.8 months). Local control at 12 months was 72% for all targets treated by the second course of SRS/FSRT compared to 80% by the first course (Figure 2). In the second course, 8% of the targets were resection failures and 10% were local recurrences from an initial course of SRS/FSRT. On multivariate analysis only reformation of a local recurrence was associated with an increased risk of failure (HR 3.1, p=0.02). Treatment of a resection cavity (p=0.05) or a second treatment course for a new regional recurrence (p=0.07) did not result in increased risk of failure. At the time of analysis, 2 patients were alive, 76.6 and 9.1 months after the first course of SRS/FSRT.

None of the surviving patients received WBRT. Median overall survival was 6.0 months (3.7-11.1 months) after the first SRS/FSRT course and 5.8 months (0.64.1 months) after the second. Forty-one percent of the patients received WBRT after the second SRS/FSRT course (Figure 3). Median time to WBRT was 3.7 months (0.6-18 months) with a median survival of 3.5 months (0.16-13 months) following WBRT. Five patients developed biopsy-proven recurrence associated with success. One patient had suspected radioresistance after the first course and another patient after the second course of SRS/FSRT based on imaging findings.

CONCLUSION

A second course of SRS/FSRT for BM is successful in the first course with similar toxicity. Local control and overall survival compare favorably with published studies (Table 3). Patients with locally recurrent BM after initial SRS/FSRT should not receive repeat SRS/FSRT of the same target given increased risk to local failure. For patients with regionally recurrent BM after initial SRS/FSRT, strong consideration should be made for salvage WBRT in lieu of WBRT.

REFERENCES