Independent t-test was used for correlations between groups. RESULTS: 29 patients (31 lesions) were identified; 13 patients (15 lesions) underwent SF-SRS and 16 patients (16 lesions) underwent MF-SRS. Median follow-up was 6.8 months (1–80.8 months). Post-SRS MRI was available for 78% of patients. Median dose was 16Gy (12–18 Gy) for SF-SRS and 24 Gy (18–30 Gy) for MF-SRS. MF-SRS was delivered in a median of 3 fractions (3–5). There was a trend toward larger mean tumor volume with MF-SRS (1.297 vs 0.302mL, p=0.055). OS was 64.8% at 6 months and 49.3% at 12 months. LC was 90.9% at 6 months and 69.9% at 12 months. LC was similar between SF-SRS and MF-SRS at 6 months (100% vs 79.5%, p=0.143) and 12 months (50.0% vs 79.5%, p=0.812). Among the 4 patients who experienced local recurrence, 3 received salvage whole brain radiation and median OS was 8.1 months after LF. Distant CNS failures occurred in 40.3% of patients at 6 months and 72.4% at 12 months. Tumor volume >0.5 mL was associated with worse LC at 6 months (64.3% vs 100%, p=0.022). One patient developed symptomatic radiation necrosis (1/29 lesions, 3.4%) after MF-SRS. CONCLUSION: SRS is a safe and effective treatment for small BSM. Outcomes were not different between SF-SRS and MF-SRS but analysis is limited by small sample size.

RADI-41. CLINICAL OUTCOMES FOLLOWING RAPID DELIVERY SINGLE ISOCENTER RADIOSURGERY FOR FIVE OR MORE BRAIN METASTASES: VOLUMETRIC MODULATED ARC THERAPY VS. DYNAMIC CONFORMAL ARC

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BACKGROUND: Recent advances in the delivery of stereotactic radiosurgery (SRS) has led to wider availability and use of this technology. The ability to rapidly delivery radiosurgery to multiple targets utilizing single-isocenter techniques represents an additional step forward for these otherwise time-consuming therapies. The current retrospective study measures and compares clinical outcomes in patients with 5 or more brain metastases treated using a single-isocenter RapidArc (RA) volumetric-modulated arc therapy (VMAT) approach, with those treated using a single-isocenter dynamic conformal arc (DCA) approach. METHODS: We queried retrospectively a radiosurgery database registry of 680 patients from 11/2012-3/2019. We included patients with 5 or more brain metastases who had documented SRS treatment plans utilizing a single-isocenter approach, either VMAT or DCA. Radiosurgery was delivered using a linac-based platform capable of delivering radiotherapy to multiple simultaneous targets. We obtained information on patient gender, age, number of lesions, primary cancer histology. Patients were separated by collimation plan (VMAT vs DCA); overall survival (OS) was estimated using Kaplan-Meier method. RESULTS: We found 49 patients that met our criteria for inclusion. Median age was 57 yrs. with a majority being females (n=28, 57.2%). Number of targets was between 5 and 20; median number of targets was 7. Most common primary site histology was non-small cell lung (51.0%), followed by breast (14.2%). For DCA collimation group, median OS was 20.5 weeks (95% CI: 12.4, 34.5), with a 6 month OS of 36.0% (95% CI: 19.2%, 54.9%). For VMAT collimation group, median OS was 20.0 weeks (95% CI: 10.8, 46.1), with a 6 month OS of 39.1% (95% CI: 11.3%, N/A). CONCLUSIONS: For patients with 5 or more brain metastases treated with rapid delivery single-isocenter radiosurgery, no significant difference in survival outcomes were demonstrated between DCA and VMAT collimation techniques.

RADI-42. ASSOCIATION BETWEEN TUMOR LOCATION AND TOXICITY OUTCOMES AFTER STEREOTACTIC RADIOSURGERY FOR BRAIN METASTASES

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OBJECTIVE: The toxicities associated with stereotactic radiosurgery (SRS) are important factors when considering treatment options and supportive management for patients with brain metastases. We assessed the association between brain metastasis location and rates of toxicity after SRS. METHODS: We conducted a retrospective single-institution review of 170 patients treated with SRS for brain metastases from 2008–2016 with median follow-up of 8.6 months. Typical SRS doses were 18-20Gy in 1 fraction (lesions < 2cm), 18-21Gy in 3 fractions (lesions 2-3cm), and 25-30Gy in 5 fractions (lesions >3cm). Toxicity measures evaluated included radiation necrosis, seizure, and dexamethasone requirement. RESULTS: A total of 221 lesions were treated among frontal (29%), cerebellar (23%), parietal (16%), temporal (15%), occipital (14%), and other (brainstem, thalamus, basal ganglia) (4%) regions. The rate of SRS-related radionecrosis was 4% for all patients and significantly correlated with metastasis volume (increasing from 1% to 7% for lesions ≤1cm^3 to >3cm^3) and prior whole brain radiotherapy (WBRT) but not with metastasis location or prior resection on multi-variable analysis (P< 0.05). Post-SRS seizure occurred in 9% of all patients but was significantly higher for primary motor cortex and sensory cortex lesions, associated with 52% and 33% seizure rates, respectively (P< 0.05). Of patients who initially presented with seizure and were on anti-epileptic medication during SRS, 53% had no further seizures, while 47% did have post-SRS seizures, nearly all with motor cortex lesions. Only 5% of patients had new-onset seizure after SRS, related to lesion hemorrhage or motor cortex location. Dexamethasone use >3 months post-SRS was higher for motor strip lesions. CONCLUSION: Brain metastasis location in the primary motor cortex was associated with higher rates of post-SRS seizure, including new-onset seizures and breakthrough seizures on anti-epileptic medication during SRS. Rates of radionecrosis were associated with lesion volume and prior WBRT but not with metastasis location.

RADI-43. ARTERIAL SPIN LABELING PERFUSION MR IMAGING FOR DIFFERENTIATION BETWEEN TUMOR RECURRENCE AND PSEUDOPROGRESSION IN INTRACRANIAL METASTASES FOLLOWING STEREOTACTIC RADIOSURGERY

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Stereotactic radiosurgery (SRS) is a standard adjuvant treatment for patients with limited intracranial metastatic disease. Transient growth, increased peritumoral edema, and inflammation can be seen in up to a third of these cases following SRS. Unfortunately, this pseudoprogression is often indistinguishable from true progression by morphologic MR imaging thereby complicating patient management. The purpose of this study was to evaluate whether arterial spin labeling (ASL) perfusion can differentiate tumor recurrence from pseudoprogression after SRS. We reviewed patients treated between 2013 and 2018 and identified 24 patients with 43 intracranial metastases who had imaging suggesting progression following SRS and also had ASL perfusion acquired at time of MR imaging. Median imaging follow-up was 11 months (range 3–64 months). Outcome of tumor recurrence or pseudoprogression was confirmed in each case by pathology or subsequent MR imaging. 25 (58%) lesions were classified as tumor recurrence (13, 52% by pathology), while 18 (42%) were classified as pseudoprogression (3, 18% by pathology). ASL perfusion values (normalized cerebral blood flow) were higher in patients with tumor progression (2.1 vs 1.1 ml/min/100g, p=0.003). No significant difference was observed between histology, time from radiotherapy, marginal dose, volume of lesion, or instances of repeat SRS treatments between groups. In conclusion, elevated blood flow by ASL perfusion was closely associated with the diagnosis of tumor recurrence after SRS. Patients with intracranial metastases undergoing SRS may benefit from this short non-contrast sequence at time of follow-up MR imaging.

RADI-44. MANAGEMENT OF MULTIPLE BRAIN METASTASES BY STAGED SRS FOCUSING ON UTMOST RISK LESIONS

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BACKGROUND: Patients with multiple large brain metastases (LBMs) are subject to cause intracranial hypertension, which remains a clinical difficulty so far. The present study is to investigate whether staged stereotactic radiosurgery (SRS) is a feasible solution to improve clinical symptoms and life quality in palliative management. METHODS: Patients with brain metastases treated between 1 January 2016 and 30 March 2019 were retrospectively studied. The patients inclusion criteria included were: 1) metastatic lesions ≥ 3; 2) tumor lesions with a supratentorial invasion ≥ 3 cm or a subtentorial invasion ≥ 2 cm; 3) with neurological impairment or with a high risk for intracranial hypertension. The first stage of SRS dose regimens for utmost risk supratentorial lesions were 20-24Gy within 2-fractions (fx); whereas 24Gy/3-fx for subtentorial lesions. For the 2nd stage, the rest metastatic lesions with relatively lower risk were treated with 16-18Gy/1-fx one week after that. RESULTS: A total of 30 patients were enrolled included in this study. The neurological symptoms were significantly relieved following 1st stage of SRS, with a median period of 3 days (2–14 days). 13 out of 30 patients were randomly selected for MR imaging two weeks after SRS. It suggested that 84.6% (11/13) of the patients were observed with a clear reduction of tumor volume. The median reduced diameter was 0.38 (0.17–0.83) cm and a median volume reduction was 3.22 (0.01–9.08) mm3. According to RANO-BM, the objective remission rate of utmost risk lesions was 100%, whereas the less critical lesions was 95.16% (59/62). One patient (3.33%) was identified with acute adverse reaction (> grade 3). CONCLUSIONS: Staged SRS with a priority for utmost risk lesions was indicated to be an effective approach for multiple large brain metastases. Further prospective study is highly warranted.