2016 to February 2019, for a total of 178 lesions. The average volume was 9,2cc (0,01-73,2). Total dose ranged 18-30Gy delivered in 1–5 fractions. The average nCI was 1,23 (0,19-1,69). Tumor coverage of at least 95% was obtained by prescribing the therapeutic dose to isodose lines ranging from 69–90%. Whole brain tissue was outlined as a critical structure. The average volume of 14Gy (single fraction) and 23Gy (multiple fractions) for normal brain tissue was 6,35cc and 12,4cc, respectively. The treatment was well tolerated, with improvement or resolution of the initial neurological symptoms. Among all radiosurgical platforms the CK offers the advantage of delivering with stereotactic precision high doses of radiation without the invasive attachment of a localizing frame. As a result, in many cases, became the method of choice for treating multiple brain metastases. The attractive therapeutic profile of CK radiosurgery is reflected by a high tumor control and low toxicity allowing retreatment for recurrent metastases.

RADI-31. MULTI-INSTITUTIONAL VALIDATION OF BRAIN METASTASIS VELOCITY, A RECENTLY DEFINED PREDICTOR OF OUTCOMES FOLLOWING STEREOTACTIC RADIOSURGERY

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INTRODUCTION: Brain metastasis velocity (BMV) is a prognostic metric that describes the recurrence rate of new brain metastases after initial treatment with radiosurgery (SRS). We have previously risk stratified patients into high, intermediate, and low-risk BMV groups, which correlates with overall survival (OS). We sought to externally validate BMV in a multi-institutional setting. METHODS: Patients from nine academic centers were treated with upfront SRS; the validation cohort consisted of data from eight institutions not previously used to define BMV. Patients were classified by BMV into low (< 4 BMV), intermediate (4–13 BMV), and high-risk groups (>13 BMV). Time-to-event outcomes were estimated using the Kaplan-Meier method. Cox proportional hazards methods were used to estimate the effect of BMV and salvage modality on OS. RESULTS: Of 2829 patients, 2092 patients were included in the validation dataset. Of these, 921 (44.0%) experienced distant brain failure (DBF). Median OS from initial SRS was 11.2 mo. Median OS for BMV < 4, BMV 4–13, and BMV > 13 were 12.5 mo, 7.0 mo, and 4.6 mo ($p < 0.0001$). Compared to initial salvage with WBRT, salvage SRS was associated with improved OS following DBF for BMV < 4 ($p = 0.05$), BMV 4–13 ($p = 0.002$) and BMV > 13 ($p = 0.0001$). CONCLUSIONS: This multi-institutional dataset validates BMV as a predictor of OS following initial SRS. BMV is being utilized in upcoming multi-institutional randomized controlled trials as a stratification variable for salvage whole brain radiation vs salvage SRS after DBF.

RADI-32. INTRACRANIAL CONTROL AND RADIONECROSIS IN MELANOMA PATIENTS WITH BRAIN METASTASES TREATED WITH STEREOTACTIC RADIOSURGERY

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PURPOSE/OBJECTIVE(S): Melanoma commonly metastasizes to the brain and is radioresistant. Stereotactic radiosurgery (SRS) confers durable local control of brain metastases (BM) while maintaining neurocognitive function. These advantages are increasingly important as survival among these patients improves secondary to advances in systemic therapies. This study investigated the local control (LC), intracranial PFS (iPFS), freedom from radionecrosis (FFRN), and overall survival (OS) among melanoma patients receiving SRS for BM. MATERIALS/METHODS: We retrospectively reviewed clinical outcomes of melanoma patients with brain metastases treated with SRS between October 2008 and January 2017 in a large academic centre. Post-SRS, patients were followed in a multidisciplinary clinic with clinical examination and brain MRI every 3 months. Survival outcomes were estimated using the Kaplan-Meier method. RESULTS: In total, 97 patients with 283 brain metastases (including 12 surgical cavities) treated with SRS were identified. Median age was 60.5 (24.4–90.7). Median follow-up was 9.6 (2.2–74.7) months after first SRS. Median prescription dose was 21 (10–24) Gy delivered in a single fraction. Thirty (30.9%) patients had WBRT post-SRS, 36 (37.1%) patients had BRAF-positive disease. Per lesion (N=283), 1-year LC and FFRN were 84.4%, and 90.1%, respectively; medians were not achieved for either LC or FFRN. Radionecrosis (RN) occurred in 20 (7.1%) lesions. Per patient (N=97), median OS and iPFS were 16.0 and 5.3 months, respectively; 1-year OS and iPFS rates were 62.0%, and 30.1%, respectively. CONCLUSION: SRS resulted in excellent rates of LC, with a low risk of RN. However, most patients developed intracranial progression within 1 year. Further analyses to establish correlates (lesion size, SRS dose, and molecular status) to LC, FFRN, OS, and iPFS will be performed prior to the final presentation.

RADI-33. DISTRIBUTED FRAMELESS GAMMA KNIFE RADIOSURGERY: A NEW TREATMENT PARADIGM FOR PATIENTS WITH BRAIN METASTASES

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INTRODUCTION: Stereotactic radiosurgery (SRS) has excellent efficacy for patients with limited intracranial disease. Its use in patients with >10 brain metastases remains controversial. Nonetheless, cancer patients are living longer due to advancements in systemic therapeutics and avoiding the neurocognitive toxicities of whole brain radiation therapy is critical. Recent reports suggest that SRS may be effective in patients with ≥10 metastases. Treating large numbers of brain metastases in a single Gamma Knife radiosurgery (GKRS) treatment session poses several challenges. Treatment of metastases in close proximity to one another leads to an increased dose to normal brain, potentially increasing the risk of necrosis. Furthermore, single session treatment of multiple metastases may last several hours, causing significant patient discomfort. Here, we describe a novel treatment paradigm to address these issues: distributed frameless GKRS. Patients with ≥6 brain metastases undergo multi-session frameless GKRS with both temporal and spatial distribution over 2–5 sessions, decreasing treatment time per day and not treating adjacent metastases simultaneously. METHODS: We evaluated all patients with brain metastases who underwent distributed frameless SRS, using the Gamma Knife ICON, between January 2017 and November 2018. Fifty-one patients with 1097 unique lesions were included in this analysis. RESULTS: Mean patient age was 58.8 (range 29–89) years. Median follow-up was 4.1 (range: 0–20.4) months. The median number of metastases treated was 5 (range: 1–19) per treatment session and 11.5 (range: 3–82) per treatment course. The median number of treatment sessions per treatment course was 3 (range: 2–10). The median number of treatment courses, per patient, was 1 (range: 1–4). The median margin dose was 15 Gy. The median overall survival was 5.9 (range: 0.2–20.9) months. CONCLUSIONS: Distributed frameless Gamma Knife radiosurgery is technically feasible and should be considered in lieu of single session GKRS for patients with ≥6 brain metastases.

RADI-34. USE OF LOW-DOSE STEREOTACTIC RADIOSURGERY FOR ADVANCED BRAIN METASTASES

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BACKGROUND: Gamma knife stereotactic radiosurgery (GKSRS) is commonly used to treat brain metastases. However, treatment time significantly increases as a function of increasing dose and number of lesions treated. In patients with large number of brain metastases, advanced disease, and poor performance status, low-dose GKSRS may be better tolerated and allows for safer re-treatment with radiotherapy should tumors recur. METHODS: We queried our institutional GKSRS database and identified patients treated with low-dose GKSRS for brain metastases as defined by a prescription of 12–15 Gy margin dose. Overall survival was measured from time of initial low-dose GKSRS to death or study exit. A composite endpoint of time to additional GKSRS, whole brain radiotherapy (WBRT), craniotomy, or death was used to examine disease progression. RESULTS: We identified 30 patients treated with low-dose GKSRS at a single institution between 2008 to 2018. A total of 428 brain metastases were treated, with a median of 12 (IQR=4–20) brain metastases per patient. Thirteen patients received immunotherapy concurrent with low-dose GKSRS, and 23 patients received mutation-targeted therapy or immunotherapy. Median overall survival was 238 (IQR 91–580) days, and median composite time to disease progression was 121 (IQR = 33–371) days. The two longest survivors in our cohort are alive at over three years. One had testicular cancer, and the other had melanoma. The metastatic melanoma patient had a BRAF V600E tumor and received mutation-targeted systemic therapy. He received standard-dose GKSRS and WBRT prior to low-dose GKSRS, as well as immunotherapy prior to and concurrent with low-dose GKSRS. CONCLUSIONS: A heterogenous population with large number of brain metastases was treated with low-dose GKSRS, with acceptable but varied results in terms of survival and tumor control. Further study with larger cohorts is warranted to optimize selection criteria and timing of low-dose GKSRS with other radiotherapy and systemic agent.