

volume ratio (TVR) (0.80 vs. 0.72) were significantly associated with development of edema after SRS ( $p < 0.05$ , power  $> 0.8$ ). Conclusion: Volume-based reporting of SRS outcomes for meningiomas is more accurate for reporting tumor control. Conformity index and TVR were identified as predictors of edema following radiosurgery.

C4 – Session5 1115-1130

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#### **Adjuvant radiosurgery to the tumor bed of resected metastases: A series of 130 patients**

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**OBJECTIVE** Optimal management following surgical removal of brain metastasis remains controversial. To assess the effectiveness and safety profile of tumor bed SRS following surgical resection of brain metastasis, we performed a retrospective analysis of 130 patients who received such treatment at our center. **METHODS** Patients treated at our center between 2004 and 2013 were included if they had one or more brain metastasis surgically removed, their tumor bed treated by SRS and at least 6 months of available follow-up. Average age at first SRS treatment was 59. At the time of SRS, gross total resection of the brain metastasis had been achieved in 80% of cases and systemic disease was inactive in 59% of patients. Tumor bed SRS was performed on average 3.7 weeks following surgery. Mean cavity volume was 12 cc with an average maximal and marginal dose of 36 Gy and 18 Gy respectively. **RESULTS** Results for the full cohort will be presented at the meeting. Preliminary analysis of 56 of the 130 patients reveals local control at the tumor bed was achieved in 86% of cases (average follow-up of 13 months). New brain metastases following SRS were identified in 63% of patients. Median survival was 8 months, with 67% of patients dying from a systemic rather than neurological cause. **CONCLUSION** SRS is a safe and effective adjuvant modality following surgical resection of brain metastasis. Pending completion of randomized control trials, our results support the use of SRS for local control of brain disease.

C5 – Session5 1130-1145

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#### **Assessing Bimanual Performance in Brain Tumor Resection using a Novel Virtual Reality Simulator NeuroTouch**

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**Introduction:** Validity assessment of NeuroTouch is important in the goal of using it in neurosurgical training, assessment and curriculum development. **Methods:** This study was conducted to assess bimanual performance of junior, senior resident and consultant resecting simulated brain tumors. Novel metrics were assessed including: total distance travelled by the tip of the ultrasonic aspirator and sucker (TPL), the maximum and sum of forces generated by instruments, blood loss, efficiency and coordination indexes and total brain tissue removed (BTR). **Hypotheses:** The complexity of tumor will influence neurosurgical performance and this influence will be greater in residents compare to consultants. Novel metrics will differentiate between groups. **Results:** All groups showed significant difference in 1) the amount of BTR comparing vague to clear boarder 2) simulated ultrasonic aspirator maximum and sum of forces on hard compare to soft tumors. Junior and senior residents showed more differences including 1) significantly more blood loss operating on hard versus soft tumors. 2) Higher ultrasonic aspirator TPL when operating on hard versus soft tumors. Junior resident also showed applied more sum of forces by the suction on the hard compare to the soft tumors.

Significant difference between the consultant, senior, and junior residents efficiency index observed (75.6%, 63.4%, 60.3% respectively  $P=0.001$ ). **Discussion:** This study is the first to demonstrate significant differences in neurosurgical performance based on the complexity of tumor. Increasing tumor complexity influenced the junior resident group most was less of an influence on the senior and was least on the consultant group performance.

C6 – Session5 1145-1200

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#### **Predictors of survival after second surgery for recurrent glioblastoma multiforme tumours**

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**Background and Purpose:** Glioblastoma multiforme (GBM) tumours are the most common brain tumours among adults. Although numerous treatment modalities exist, GBM has a mean recurrence period of less than seven months and a mean survival period of less than fifteen months. The impact of second surgery on recurrence remains unclear, with few definitive studies to date.

This study sought to identify major predictors of survival after second surgery. Methods: We collected clinical, pathological and radiographic data through a retrospective review of charts of 21 patients who underwent elective surgery for GBM recurrence at our institution in the past 6 years. Kaplan-Meier survival analysis and Cox proportional-hazards regression were employed to determine which variables significantly impacted survival time. Results Among variables examined, age, less than or equal to 50 (P equals 0.04), and chemotherapy treatment after second surgery (P equals 0.00057), were significant. Patients younger than 50, had a mean length of survival period of 14.7 months, while patients, age 50 or older, survived an average of 7.6 months. Patients who underwent chemotherapy after second resection survived an average of 12.6 months. Comparatively, mean survival period of patients who did not undergo chemotherapy was 3.7 months. The cumulative prognostic significance of age and post-reoperative chemotherapy treatment was determined to be 0.038 using Cox proportional-hazards regression modelling. Conclusion: The results confirm that younger patients survive longer after second surgery and that a second round of chemotherapy can prolong survival. Data from larger cohorts of patients is required to identify other important predictors.

**C7 – Session5 1300-1315**

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**NovoTTF-100A alternating electric fields therapy for recurrent glioblastoma: An analysis of patient registry data**

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Background: The NovoTTF-100A is a first-of-a-kind anticancer device, approved by the Food and Drug Administration in 2011, for the treatment of recurrent glioblastomas. It emits alternating electric fields, at an intensity of 1 V/cm and a frequency of 200 kHz, that mimic the cytotoxic effect of chemotherapy by disrupting charged cytoplasmic proteins involved in the tightly orchestrated process of mitosis. Past phase III trial demonstrated equivalent efficacy when the device was compared to conventional cytotoxic chemotherapies and bevacizumab, but without their systemic side effects. Methods: The NovoTTF-100A device has been available by prescription at 91 oncology centers in the United States since November 2011. We retrospectively analyzed the outcome and toxicity data from patients who were prescribed the device from October 2011 to November 2013 as treatment for their recurrent glioblastomas. Results: There were 147 female and 310 male patients (n=457) who were treated with this device. The median age was 55 (range 18 to 86) years. The

Kaplan-Meier median OS was 9.6 (95% confidence interval [CI] 8.0 to 13.7) months and the median treatment duration was 4.1 (95% CI 3.5 to 4.8) months. The most common device-related adverse events include skin reaction (24.3%), neurological disorders (10.4%), heat sensation (8.9%), electric sensation (7.7%) and headache (5.7%). Conclusion: Treatment with NovoTTF-100A, as prescribed in the general clinical setting to patients with recurrent glioblastomas, offers favorable outcomes compared to historical patient data. The adverse event profile of the device remains benign with no new unexpected toxicities.

**C8 – Session5 1315-1330**

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**A longitudinal prospective study investigating cognitive function in patients with high grade glioma**

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Forty-one high grade glioma patients were enrolled in this prospective study prior to initial treatment with radiotherapy, chemotherapy or combination therapy. The study participants were assessed prior to treatment and subsequently every 2, 6, 9 and 12 months using self reports of quality of life (FACT-Br) and functional assessment (British Columbia Activity Checklist). In addition, a cognitive assessment (the Montreal Cognitive Assessment - MoCA) and semi-structured interview were performed at baseline and 6 months later. Only 16 patients remained progression free 12 months following treatment; 23 patients died or deteriorated clinically and 2 were lost to follow up. Over half (54%) of patients scored less than 26 on the MoCA at baseline, indicating cognitive impairment before treatment. MoCA scores did not change significantly over time. Similarly, quality of life and functional assessments as reported by patients did not alter significantly over time. Interviews reveal details of the effects of cognitive impairment on patients daily lives. Implications of these findings will be discussed.

**C9 – Session5 1330-1345**

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**Glioblastoma pattern of practice from two regional cancer centres in Canada**

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Background: Despite an evidence-base for glioblastoma management, treatment can vary and the pattern of practice in