

brain metastases. The dose delivered was 23.1 Gy in 3 fractions over 3 to 8 days, calculated on the 70% isodose line.

**Results:** Median follow up was 9.7 months (2.2 to 36.0 months). Twenty four patients (42.8%) needed salvage treatment of whom 5 (20.8%) had another stereotactic radiotherapy and 19 (79.2%) had other modalities of salvage therapy, mainly whole brain irradiation. The survival rates at 6, 12 and 24 months were 88.8%, 78.1% and 69.1% respectively.

**Conclusion:** Survival results are encouraging. Rigorous selection of patients is needed when using robotic stereotactic radiotherapy alone for the treatment of oligometastases of the brain. Close follow up allows salvage therapy in such cases.

8728

POSTER

# **Role of Surgery and Postoperative Radiotherapy for Patients RPA I or II With 1 or 2 Brain Metastases**

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**Purpose:** To evaluate the role of surgery and postoperative radiotherapy in the management of brain metastases (BM). A retrospective analysis for overall survival of a series of 282 patients with recursive partitioning analysis (RPA) I or II with 1 to 2 resectable BM treated with different schedules in single institution.

**Methods:** Patients with median age 61.5 at diagnosis were treated either with surgical resection followed by whole brain radiotherapy (WBRT) or with WBRT alone in 94 (33.3%) and 188 cases (66.7%) respectively. Dose of irradiation varied from 30 to 40 Gy in fractions of 2 to 3 Gy. Eighty-five patients who underwent surgery and 125 who benefited from WBRT alone received a WBRT boost to the metastatic site (from 9 to 17.5 Gy in 2 to 3 Gy per fraction). Diagnosis has been established by contrast CT scan or MRI or both. BM were located in the cerebral hemispheres (76.6%), in the cerebellum (16.3%) or in these two sites (7.1%). Primary tumours were lung (61.4%), breast (11.4%), melanoma (6%), gastrointestinal (7.4%), kidney (4.6%) and other sites (9.2%). In the surgical group, patients were RPA I and II in 43 and 51 cases, respectively and had 1 or 2 BM in 86 and 8 cases, respectively. In the group of definitive WBRT, patients were RPA I and II in 19 and 169 cases, respectively and had 1 or 2 BM in 115 and 73 cases, respectively. Survival probabilities were calculated using the Kaplan-Meier method.

**Results:** Median overall survival was higher in RPA I group compared to RPA II group: 34.5 months (n=62) and 8.6 months (n=220), respectively (p<0.0001). There was a significant improvement of overall survival in the surgical group compared to definitive WBRT group: 20.9 months vs 7.8 months (p<0.0001), also 6-month and 1-year overall survival were significantly better: 87.5% vs 63.4% and 68.2% vs 32.8%, respectively. Patients who underwent a WBRT boost had an improved outcome but the difference was not statistically significant: 22 months vs 19.1 months for the surgical group and 8.7 months vs 6.6 months for the second group. In multivariate analysis, presence of extracranial metastases and control of primary tumour were significant prognostic factors for the two groups (p=0.002 and p=0.008 respectively for the surgical group; p=0.04 and p=0.01 respectively for the definitive WBRT group). In the definitive WBRT group type of primary tumour was also significant (p=0.0008).

**Conclusion:** Surgical resection followed by WBRT lead to a better outcome compared to WBRT alone for patients with 1 or 2 BM, and for RPA I or II. An additional WBRT boost did not improve significantly the overall survival, whatever the treatment schedule.

8729

POSTER

# **Post-Operative Irradiation Volume and Survival of Patients With High-Grade Malignant Gliomas**

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**Background:** According to recent recommendations, initial post-operative volume of irradiation (RT) in high-grade malignant gliomas (HGMG) has been shrunken from whole brain to tumour bed with margins. Probable sequences of that change are still unclear. We conducted retrospective trial to compare outcomes of the treatment focusing on mentioned radiation treatment characteristic.

**Materials and Methods:** Outcomes of HGMG patients treated with consecutive surgery, RT/chemoRT and chemotherapy were compared with reference to the volume of initial RT: whole (30 Gy/15 fr to whole brain than

local irradiation with margin to edema to total 54-64/27-32 fr Gy, WBI) versus local (LBI). Proportions were assessed using chi-square. Overall survival (OS) was chosen as endpoint. Kaplan-Meier plots with log-rank test were used for comparisons. Univariate and multivariate analyses were applied with proportional hazards Cox regression model.

**Results:** Total 427 patients with G3-4 gliomas were selected. Three hundred forty four (81%) were irradiated locally only, while 83 - with initial whole brain RT. Distribution according to basic initial characteristics between the two groups was similar except age >60 yrs (40% vs 25%, p=0.050) and Karnovsky performance score less than 70% (53% vs 80%, p=0.035) for LBI and WBI respectively. With median follow-up 2.6 (SD, 1.8) yrs of analysis 56 (16%) and 39 (47%) pts after LBI and WBI died. Median OS for LBI and WBI was 16 and 40 months respectively, log rank, p<0.0001. Volume of irradiation significantly influenced on OS both in univariate, HR=2.1, p=0.0005 and in multivariate analysis, HR=1.6, p=0.021.

**Conclusion:** Avoiding whole brain irradiation in HGMG leads to significant gain of survival.

8730

POSTER

# **Stereotactic Radiosurgery and Radiotherapy in Benign Intracranial Meningioma**

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**Background:** To investigate the role of stereotactic radio surgery (SRS) and hypofractionated stereotactic radiotherapy (SRT) in treatment of benign intracranial meningioma.

**Materials and Methods:** Between 2003-2010, 32 patients with a median age of 44 years (21-67 years) were treated with SRS (n=19), and hypo fractionated SRT (n=13) for intracranial meningioma. Of the 32 patients 14 underwent SRS or SRT as their primary treatment and 18 patients underwent post operative SRS or SRT (PORT). Progression free survival and overall survival, toxicity and symptomatology were evaluated.

**Results:** The median follow up was 39 months (6-72 months) and 5 year overall survival and Progression free survival were 90%±5 and 94%±4 after SRT/SRS respectively. The symptoms were improved or stable in 97% of patients. Acute toxicity was mild and seen in 41% of patients. Clinically significant late morbidity or new cranial nerve palsies did not occur.

**Conclusion:** Stereotactic radio surgery (SRS) and hypo fractionated stereotactic radiotherapy (SRT) are effective and safe treatment modality for local control of meningioma with low risk of significant late toxicity. In case of large tumour size and adjacent critical structures hypo fractionated SRT is highly recommended.

8731

POSTER

# **Cerebral Arteriovenous Malformations Treatment With Radiosurgery - Results From the CHUM**

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**Background:** Therapeutic modalities for arteriovenous malformations (AVM) are embolization, surgery and radiosurgery, and they are usually used in association. Factors influencing the choice of therapy are mainly localization and size of the AVM, with the ones located in eloquent locations and of large size representing a significant surgical risk. Radiosurgery is recognized to offer a high obliteration rate for small and medium size lesions, with mild morbidity. We expose the characteristics of patients treated at the Notre-Dame hospital with radiosurgery, with special attention to obliteration rates and radionecrosis.

**Materials and Methods:** A systematic review of all cerebral AVM patients treated in the Radiation Oncology Department at the Centre Hospitalier de l'Université de Montréal, Notre-Dame hospital, from 1998 to 2008 inclusively was performed. A total of 43 patients treated with a single dose varying between 21 and 25 Gy were included. Medical files were analysed in order to assess the following informations: the characteristics of patients and AVM, the treatments received prior to radiosurgery, the date and the dose of treatment, the date of obliteration (absence of flow within the lesion demonstrated by digital angiography) and toxicities, when applicable. Revision of angiographies was performed to complete the data. Also, telephone interviews were done in order to evaluate the degree of limitation in daily life activities of patients.

**Results:** Most patients are men, with a mean age of 37 years old (12-65). Over 75% presented with haemorrhage, and two patients had a fortuitous diagnosis. AVM of 3 cm or more in diameter was found in 20.9% of patients.