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POSTER

Fractionated Stereotactic Radiotherapy (FSRT) for Craniopharyngiomas – Clinical and Radiological Control

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Background: Management of craniopharyngioma remains a challenge because of its relationship with surrounding eloquent structures. Surgical resection is the first-line treatment for craniopharyngioma. However, total removal is difficult and often associated severe morbidity. It has long been established that radiation therapy is effective against craniopharyngiomas. Adverse effects should be minimized as patients are usually young and their life expectancy long. The purpose of this study is to describe results and toxicity of fractionated stereotactic radiotherapy (FSRT) in 14 patients (13 adults) with craniopharyngioma.

Material and Methods: 14 patients with a median age of 40 years (range 15–60 years) were treated by FSRT from January 2001 through March 2011. Surgical resection was done prior to FSRT in all the patients, twice in 6 patients and three times in 2 of them. At the time of FSRT, complete hypopituitarism was present in 8 patients, 9 had diabetes insipidus and 3 had hypothalamic disorders, 4 had neurologic symptoms and 12 had impaired vision, including blindness in one of them. FSRT was delivered through a LINAC with BrainLAB[®] system using a micro-multileaf collimator. Noncoplanar fixed five- or seven-beam arrangement, with or without intensity modulation, was used. Total dose of 50–53 Gy in 1.8 Gy/day fractions (median 50.7 Gy) was delivered to the target volume.

Results: All patients underwent magnetic resonance imaging (MRI) and visual and neuroendocrine assessment at regular intervals from three to six months after radiotherapy. Tumour shrinkage was noticed in eleven patients at a median of 8 months (range 5–22 months). Tumor remained stable. At a median follow-up of 34 months (range 5–105 months) tumour control was 100%. After radiotherapy one patient experienced visual improvement, neurologic symptoms improved in three patients and pituitary function improved in another patient. No serious complications due to FSRT were found. One patient developed visual worsening immediately after radiotherapy secondary to cystic enlargement.

Conclusion: FSRT as a high-precision technique of localized irradiation achieves good tumour control with low morbidity. Limited surgery followed by radiotherapy is a safe and effective option for patients with craniopharyngioma and may reduce the morbidity of radical surgery. Nevertheless, longer follow-up is required to assess long-term efficacy and toxicity, particularly in terms of potential reduction in treatment related late toxicity.

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POSTER

Salvage Robotic Stereotactic Radiosurgery in Patients With Recurrent Medulloblastoma

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Background: To assess the efficacy of salvage robotic stereotactic radiosurgery (SRS) in patients with recurrent medulloblastoma.

Material and Methods: We treated 9 patients with recurrent medulloblastoma using SRS in our department between June 2007 and September 2010. Four patients were male, and 5 were female. Median age was 30 years (range= 8–45). All patients were treated with surgery and craniospinal radiotherapy as primary treatment. Two patients received 50.4 Gy and 7 received 54 Gy to the primary site. SRS was delivered with CyberKnife (Accuray Inc., Sunnyvale, CA). The median interval between the primary treatment and RSR was 22 months (range, 10–122 months) Median tumour volume was 30 cc (1.5–113 cc). Total dose of 21–30 Gy (median 30 Gy) was delivered in median 5 fractions (3–5 fractions). The gross tumour volume was described as the clinical target volume. Median homogeneity and conformality indices were 1.29 (1.18–1.43) and 1.92 (1.31–2.65) respectively. Biologic equivalent dose of 2 Gy (BED₂) was calculated for the total doses, and applied for all patients to evaluate dose-response and dose-toxicity relationship analyses.

Results: Median follow-up was 15 months (range, 6–28 months). Lesions were stable in 3 patients (33.3%), and complete response was observed in 1 patient (11.1%). Partial response was seen in three patients (33.3%). Progression was observed in two patients (22.2%). At the time of reporting one patient was alive without evidence of disease, and four with evidence of disease. Four patients died. Three of deaths were due to tumour progression, and one was due to chemotherapy toxicity. The symptoms either regressed or were stable in 67% of patients. Median BED₂ was 213 Gy (122.5–222.5 Gy). Local control without increasing the toxicity was achieved in patients treated with a total dose of BED₂ ≥210 Gy.

Conclusions: SRS seems to be a promising treatment modality for patients with recurrent medulloblastoma. We observed that SRS is more effective in terms of local control when BED₂ doses over 210 Gy were applied.

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POSTER

Relationship Between Relative Dose at the Periphery and Local Control in Brain Metastases Treated With Radiosurgery

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Background: For brain metastases treated with radiosurgery, the relationship between local control (LC) and relative dose coverage at the periphery is not well known. This study evaluates the relationship between local control and relative dose delivered to the planning target volume (PTV).

Material and Methods: We retrospectively analysed data from patients treated by LINAC radiosurgery with 1 to 4 brain metastases with a diameter of 4 cm or less. A PTV margin of 1 mm was generated. Volume receiving 100% of the prescribed dose (V100) for this PTV was plotted and classified in <90% and ≥90% sub-groups. The primary endpoint was local progression free survival (PFS). Follow up MRIs done at 3-month intervals were reviewed. Local progression was defined as the first progression in the size of the lesions. Overall survival (OS) was evaluated as a secondary endpoint. OS and PFS were determined using the Kaplan–Meier method. The log-rank analysis was used for comparison.

Results: We identified 103 lesions in 56 patients treated in one Canadian center between June 2008 and August 2010. Median follow-up was 15.6 months. For LC, we reviewed MRIs for 80 lesions having radiological follow-up. Lesions were predominantly lung cancer metastases (75%). Prescription doses were as suggested in the RTOG 9005 protocol. Median time to local brain metastases progression was 8.9 months. PFS at 3, 6, 9 and 12 months were respectively 91.3%, 72.7%, 45.8% and 37.0%. PFS at 3, 6 and 9 months for V100≥90% were respectively 89.3%, 63.7%, 25.5% compared to 93.5%, 84.5% and 74.0% for V100 <90% (p = 0.003). 88.2% of lesions having a PTV V100 <90% were treated with doses of 21 or 24 Gy while 56.5% of lesions having a V100≥90% were treated with doses of 15 or 18 Gy. Prescription dose was significantly (p = 0.008) associated with PFS in favor of the higher doses. Sub-group analysis regarding PTV coverage was done for each prescription dose trying to isolate the metastasis size effect on PFS. No statistically significant difference in PFS was seen in the 15, 18 and 24 Gy sub-groups for PTV V100≥90% compared to V100 <90%. In the 21 Gy sub-group, PTV V100≥90% was associated with poorer PFS (p = 0.031) but there were only two LC failure events in this sub-category. Median survival was 15.7 months. A significant factor associated with OS was control of primary disease with a median survival of 23.3 vs. 12.5 months in the absence of control (p = 0.003).

Conclusions: Consideration of the relative dose delivered at a 1 mm PTV in brain metastases treated with radiosurgery does not seem to be correlated with a better LC. However, in our cohort, lesions with lower PTV coverage were those with higher prescription doses, thus of smaller size. Those seemed to have a better LC compared with lesions with higher PTV coverage. This suggests an outweighing effect of the prescription dose and the lesion size over the PTV coverage. Sub-group analysis for each prescription dose failed to show a LC advantage for better PTV coverage.

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POSTER

Robotic Stereotactic Radiation Therapy Alone in the Management of Oligometastases of the Brain – Analysis of 56 Patients Treated at the Alexis Vautrin Cancer Center

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Background: Randomized trials suggest the combination of radiosurgery with whole brain irradiation as a standard to treat oligometastases of the brain. Radiosurgery is sometimes used alone in selected cases, but frequent follow up is highly recommended to detect recurrences for salvage therapy.

Purpose: To report the analysis of patients presenting with oligometastases of the brain and treated with robotic stereotactic radiotherapy alone at the Alexis Vautrin Cancer Center.

Materials and Methods: 56 patients with 65 brain metastases received robotic stereotactic radiotherapy between December 2007 and September 2010. Forty seven patients presented with a single brain metastases and 9 with 2 metastases. Twenty three patients (41.07%) had adenocarcinoma of the lung, 10 patients (17.85%) had other Non Small Cell Lung Cancer, 7 patients (12.5%) had infiltrating ductal carcinoma of the breast, and 16 (28.57%) had miscellaneous histologic diagnoses. All patients had a Karnofsky performance status index of 70 or more at diagnosis of the