

RADI-26. DOSIMETRIC EVALUATION OF 6 MV VERSUS 10 MV PHOTONS FOR HIPPOCAMPAL AVOIDANCE WHOLE BRAIN RADIOTHERAPY

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OBJECTIVE: Whole brain radiotherapy (WBRT) causes neurocognitive decline. Hippocampal avoidance WBRT (HA-WBRT) reduces hippocampal irradiation, potentially mitigating neurocognitive sequelae. We compared hippocampal and brain dosimetry with HA-WBRT with 6 megavoltage (MV) versus 10 MV photon energies. **METHODS:** Twenty consecutive patients treated with WBRT were retrospectively replanned with HA-WBRT techniques using 6 MV and 10 MV photons. Coplanar volumetric modulated arc therapy was employed, with a prescription dose of 3000 cGy in 10 fractions. Planning was done with Eclipse version 13.6 or 15.6. Nine patients were planned with 2.5 mm multileaf collimator leaves, with the remainder planned with 5 mm leaves. The hippocampi were contoured and a HA structure was generated using a uniform 5 mm expansion. A planning target volume (PTV) was defined as the brain parenchyma minus the HA structure. NRG-CC001 dose constraints were used. For each variable, descriptive statistics were calculated. Comparisons were made using two-tailed Wilcoxon signed rank tests or paired t-tests. **RESULTS:** The minimum hippocampal dose (D100%) was improved with 6 MV plans, 841 cGy compared to 914 cGy with 10 MV ($p < 0.005$). The maximum hippocampal dose (D0.03cc) was reduced with 6 MV planning, 1614 cGy versus 1676 cGy for 10 MV ($p < 0.0001$). With 6 MV photons, a greater number of plans met NRG-CC001 constraints without deviations. 6 MV photons improved PTV coverage by the 95% isodose line, 96.6% compared to 95.9% for 10 MV ($p=0.021$). 6 MV photon plans decreased the volume of PTV receiving $\geq 105\%$ of the prescription, 84.2% versus 87.9% for 10 MV ($p=0.006$). The mean dose, hot spots, and cold spots did not differ by photon energy. PTV dose constraints were always met. **CONCLUSION:** 6 MV photon HA-WBRT plans are dosimetrically superior to 10 MV, reducing hippocampal radiation dose, without compromise in brain coverage and improved target dose homogeneity.

RADI-27. ROLE OF STEREOTACTIC RADIOSURGERY IN THE CARE OF PATIENTS WITH ≥ 25 CUMULATIVE BRAIN METASTASES

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INTRODUCTION: Stereotactic radiosurgery (SRS) is an accepted treatment for multiple brain metastases. However, the upper limit of the number of brain metastases over the course of care suitable for this approach is controversial. **METHODS:** From a review of our prospective registry, 48 patients treated with SRS for > 25 brain metastases in either single or multiple sessions between 2013 and 2019 were identified. Patient, tumor, and treatments characteristics were evaluated. Clinical outcomes and overall survival (OS) were analyzed. **RESULTS:** Thirty-one females (64.6%) and 17 males (35.4%) with a median age of 56 years (25–91) were included. Primary diagnoses included lung ($n=23$, 47.9%), breast ($n=13$, 27.1%), melanoma ($n=8$, 16.7%), and other ($n=4$, 8.33%). Initial median GPA index was 2 (0.5–3). Nine patients (18.8%) had received whole brain radiation therapy (WBRT) prior to first SRS treatment, with a median dose of 35Gy (30–40.5Gy). Ten patients (20.8%) received WBRT after initial SRS, with a median dose of 30Gy (20–30Gy). Thus, only 19 patients (40%) ever received WBRT. Median number of radiosurgeries per patient was 3 (1–12). Median number of cumulative tumors irradiated was 31 (25–110). Median number of tumors irradiated at first SRS was 10 (1–35). Median marginal dose for the largest tumor per session was 16Gy (10–21Gy). Median SRS total tumor volume was 6.8cc (0.8–23.4). Median follow-up since initial SRS was 16 months (1–71). At present, 21 (43.7%) are alive. Median OS from the diagnosis of brain metastases was 31 months (2–97), and OS from the time of first SRS, 22 months (1–70). Median KPS at first SRS and last follow-up was the same (90). Sixty-three percent did not require a corticosteroid course. **CONCLUSION:** In selected patients with a large number of cumulative brain metastases (> 25), SRS is effective and safe. Therefore, WBRT may not be required in this population.

RADI-28. UP-FRONT SINGLE SESSION RADIOSURGERY FOR LARGE BRAIN METASTASES - VOLUMETRIC RESPONSES AND OUTCOMES

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OBJECTIVE: Patients presenting with large brain metastases (LBM), described in the literature as ≥ 2.5 cm in maximum diameter or $\geq 10\text{cm}^3$ in volume, pose a management challenge. For patients not compromised by mass effect, corticosteroid therapy followed by SRS allows for efficient, min-

imal access care that facilitates immediate institution of systemic therapy. **METHODS:** We performed a volumetric-based analysis in order to determine the efficacy of single-session SRS in the treatment of LBM in comparison to other treatment modalities. Thirty patients over the age of 18 with systemic cancer and brain metastases ($\geq 2.7\text{cm}$ in greatest diameter or $\geq 10\text{cm}^3$ in volume) who underwent single session SRS were included. Serial tumor volumes, clinical outcomes, and medication requirements were studied. **RESULTS:** Among 30 patients, 70% of patients had either lung, melanoma, or breast cancer. Median initial tumor size (maximum diameter) was 32mm (range 28–43) and median initial tumor volume was 9.32cm^3 (range 1.09–25.31). Median marginal dose was 16Gy (range 12–18). Average percent decrease in tumor volume was 50% on imaging at 4–8 weeks, 60% at 4–6 months, 48% at 6–8 months, and 67% at > 8 months compared to initial imaging. Only one patient required a subsequent craniotomy 4 years after SRS for an enlarging cyst which was granulation tissue consistent with radiation effects on pathology. There were no adverse events immediately following SRS. Median corticosteroid use after SRS was 21 days. There was no statistically significant difference in KPS score between treatment day and last follow up, suggesting relative safety and maintenance of function. **CONCLUSION:** Initial high dose corticosteroid therapy followed by prompt single session SRS is a safe and efficacious method of managing patients with large brain metastases (defined in our study as $\geq 2.7\text{cm}$ or $\geq 10\text{cm}^3$), if the clinical condition of the patient is acceptable at presentation.

RADI-29. BIOLOGIC SUBTYPES OF BREAST CANCER BRAIN METS AS A PREDICTOR OF LOCAL CONTROL AFTER STEREOTACTIC RADIOSURGERY

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INTRODUCTION: Brain metastases (BM) are diagnosed in approximately 15% of breast cancer (BC) patients. Biologic subtype is predictive of loco-regional recurrence following breast conserving therapy and/or mastectomy with the highest risk in the ER-/PR-/HER2- (TN) subtype. The aim of this study is to determine whether biologic subtype is predictive of local control (LC) in BC patients with BM treated with Stereotactic Radiosurgery (SRS). **MATERIALS/METHODS:** All patients underwent LINAC-based SRS at our institution. Patients were subdivided into three biologic subtypes: ER+/Her2- (Luminal), Her2+, and TN (Basal). Kaplan Meier method was used to estimate the overall survival (OS). Cox proportional hazard model was used to analyze association of local failure (LF) with biologic subtypes. This is an IRB-approved single center retrospective study. **RESULTS:** 108 BC BM in 50 consecutive patients were included in this study with a median follow up of 11.1 months. The median disease-specific GPA was 2.0, and all patients received systemic chemotherapy and/or hormonal therapy. The 12 month LC rates for the entire cohort were 85%, 87%, 49% for Luminal, Her2+ and Basal, respectively, with a significantly shorter LC for the basal sub-type ($p=0.014$). The 12 month OS rates were 83%, 88%, 80% for Luminal, Her2+ and Basal, respectively with a no significant difference in OS among the subgroups. 24% of the lesions were treated with salvage whole brain radiation therapy. **CONCLUSIONS:** This study shows that in BC patients with BM treated with SRS, biologic subtype impacts LC but not OS. Consideration of radiation treatment intensification or altered fractionation to improve LC may be indicated for the TN subtype. Further multi-center studies are necessary to corroborate our results.

RADI-30. TREATMENT OF MULTIPLE BRAIN METASTASES WITH CYBERKNIFE® (CK) INITIAL EXPERIENCE AT THE RADIONCOLOGY DEPARTMENT JÚLIO TEIXEIRA SA - PORTO - PORTUGAL

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Brain metastases (BM) represent an important cause of morbidity and mortality being the most common intracranial tumors in adults. Their incidence is rising for several reasons: an aging population, better systemic treatment and better diagnostic imaging techniques allowing the detection of smaller metastases in asymptomatic patients. Traditionally, the most widely used treatment for patients with multiple BM is whole brain radiation therapy (WBRT), which remains a source of debate because, although distant brain control rates have been shown to be greater with WBRT, it has no impact on overall survival and the negative effects on cognition and quality of life are higher. Radiosurgery plays a significant role in the modern management of BM. We analyzed 38 patients with multiple BM (13 with more than one treatment, totalizing 61 cases) treated with CyberKnife® (CK) in the Radioncology Department Júlio Teixeira SA, from August