BACKGROUND: Patients with ≥ 15 brain metastases (BM) continue to be treated with whole brain radiation therapy (WBRT), despite poor neurocognitive outcomes. We analyzed our institutional experience of treating these patients with stereotactic radiosurgery (SRS), with the aim of evaluating safety, cognitive outcomes, and survival. METHODS: Patients who received SRS for ≥ 15 BMs in 1-5 fractions from 2014-2022 using the previously described single isocenter multi-target technique were included. Cognitive outcomes were objectively evaluated using serial Patient-Reported Outcome Measurement Information System (PROMIS) scores. RESULTS: A total of 124 patients treated with LINAC-based SRS were included. The mean and median number of lesions treated per patient was 24.8 and 20, respectively (range 15 – 94). Most common primary histologies were lung (47.6%), melanoma (21.0%), and breast (14.5%). The median SRS dose was 24 Gy (range 18 – 30 Gy). The rate of any grade radiation necrosis (RN) and ≥ grade 3 RN were 15.3% and 3.2% respectively. New onset seizures were seen in 2.4% and alopecia in 2.4%. Median follow-up was 5.1 months (m). When cognitive data were available, 25 of 31 patients had a stable or improved PROMIS score. The 12m local control was 97.6% while overall intracranial control was 20.8%. One-year freedom from...
neurological death, leptomeningeal disease, and salvage WBRT were 85.6%, 87.6% and 71.7% respectively. Median overall survival (OS) from brain metastases diagnosis was 11.3m (95% CI 7.2m – 15.3m). On univariate analysis, no prior WBRT (p = 0.038), higher KPS (p = 0.002) and systemic therapy after SRS (p < 0.001) predicted for improved OS. CONCLUSIONS: We present here the largest study evaluating SRS for patients with ≥ 15 BMs. We found that SRS was safe, had favorable cognitive outcomes, and comparable survival outcomes to contemporary studies evaluating WBRT in this patient population. Our study supports further randomized studies comparing SRS and memory avoidance WBRT approaches for patients with ≥ 15 BMs.