Purpose/Objective(s): To review the safety and efficacy of linear accelerator-based stereotactic radiosurgery (SRS) for single brainstem metastases.

Materials/Methods: We reviewed all patients with brain metastases treated with SRS at DF/BWCC from 2001-2009 to identify patients who had SRS to a single brainstem metastasis. Overall survival and freedom-from-local-failure rates were calculated from the date of SRS using the Kaplan-Meier method. Prognostic factors were evaluated using the log-rank test and Cox proportional hazards model.

Results: A total of 24 consecutive patients with brainstem metastases had SRS. All had single lesions in the brainstem (10 midbrain, 13 pons and 1 medulla). At the time of SRS, 21/24 had metastatic lesions elsewhere within the brain. 23/24 had undergone previous whole-brain radiotherapy. Primary diagnoses included 8 NSCLC, 8 breast cancer, 3 melanoma, 3 renal cell carcinoma and 2 others. Median dose was 13 Gy (range, 8 - 16). One patient had fractionated SRS 5 Gy x 5. Median target volume was 0.2 cc (range, 0.02 - 2.39). At least 98% of the target was covered by the prescription dose in all cases. Median normalization was 73% (range, 52 - 90). Median conformity index (prescription isodose volume/PTV) and homogeneity index (maximum dose/prescribed dose) were 1.81 (range, 1.36 - 2.60) and 1.39 (range, 1.22 - 1.92), respectively. Fourteen patients were female (58%). The median age was 57 years (range, 42-92). Follow-up information was available in 22/24 cases. At the time of analysis, 18/22 patients (82%) had died. The median overall survival was 5.3 months (range, 0.8-21.1 months). The 4 surviving patients have been followed for 5, 8, 14, and 21 months. The only prognostic factor that trended toward statistical significance for overall survival was the absence of synchronous brain metastasis at the time of SRS (1-year overall survival 31% with vs 67% without synchronous brain metastasis, log rank p=0.11). Non-significant factors included primary tumor histology and status of extracranial disease (progressing vs stable/absent). Local failure occurred in 4/22 cases. Actuarial freedom-from local failure for all cases was 78.6% at 1 year. RTOG grade 3 toxicities were recorded in two patients (ataxia, confusion). Both patients progressed at distant sites within the brain.

Conclusions: Linac-based SRS for small-volume brainstem metastases using a median dose of 13 Gy is associated with acceptable local control and low morbidity.

Author Disclosure: P.J. Kelly, None; Y.B. Lin, None; A.Y.C. Yu, None; A.E. Ropper, None; P.L. Nguyen, None; K.J. Marcus, None; F.L. Hacker, None; S.E. Weiss, None.