retrospective IRB-approved review was completed of 75 breast cancer patients treated with SRS for 271 brain metastases with median follow up of 40 months. Tumor dimensions, brain failure events, corticosteroid use, and clinical status were analyzed utilizing RANO-BM, bidimensional product (BDP), and bidimensional sum (BDS) techniques. 46/75 patients were eligible for RANO-BM assessment. Response at each post-treatment assessment were scored as PD, SD, PR, or CR, and the concordance between techniques was determined. A scoring system-based outcome metric labelled 'average state' was derived to estimate fractional time/response state by each assessment method. Interactive timeline displays of outcome states were generated. RESULTS: The concordance of patient response states was determined using either RANO-BM, BDP or BDS among the 46 eligible patients. The overall mean and median concordance between techniques were 0.82 and 0.83, (range 0.52 – 1). The average state for the patient population post-treatment was 1.98 by RANO-BM, 2.29 by BDP, and 2.19 by BDS. For patients excluded from RANO-BM secondary to lack of measurable disease, the average state was determined to be 2.44 by BDP and 2.35 by BDS. The average state for HER2+ vs. HER2- patients was 2.21 vs. 1.75 by RANO-BM, 2.58 vs. 2 by BDP, and 2.39 vs. 1.99 by BDS. An interactive timeline view was generated to display outcome states utilizing the 3 response assessment techniques, and the impact of inclusion of non-target lesions and variable response parameters was assessed graphically. CONCLUSIONS: These results characterize the concordance and the limitations of multiple outcome assessment methodologies in a post-SRS cohort with long median follow-up. The utility of a novel 'average state' outcome metric is demonstrated in this cohort.

NCOG-09. EFFICACY OF HER2-TARGETED ANTIBODY THERAPY IN HER2-POSITIVE BREAST CANCER BRAIN METASTASES: A NATIONAL ANALYSIS

Alexander Hulsbergen[1], Marike Broekman[2], Timothy Smith[3], Ayal A. Aizer[4], and Bryan Iorgulescu[1]; [1]Brigham and Women's Hospital, Boston, MA, USA, [2]Haaglanden Medical Center, The Hague, Netherlands, [3]Department of Neurosurgery, Brigham and Women's Hospital, Boston, MA, USA, [4]Department of Radiation Oncology, Dana-Farber/Brigham and Women's Cancer Center, Harvard Medical School, Boston, MA, USA

BACKGROUND: Breast cancer brain metastases (BCBM) commonly develop in human epidermal growth factor 2-positive (HER2+) breast cancer, but BCBM patients are underrepresented in clinical trials, leading to a lack of knowledge on the efficacy of HER2-targeted therapy in this population. METHODS: We analyzed clinical characteristics and outcomes of HER2+BCBM patients from the National Cancer Database 2010–2016, comprising 70% of newly-diagnosed cancers in the U.S, to assess overall survival (OS) associated with HER2-targeted monoclonal antibody therapy (HER2-mab; i.e. trastuzumab, pertuzumab, and trastuzumab emtansine; encoded as of 2013). Survival was estimated with Kaplan-Meier techniques and compared with landmark analysis and Cox regression. The landmark timepoint was selected at which 75% of HER2-mab patients received HER2-mab, which was within 58 days of diagnosis. RESULTS: 1,059 HER2+BCBM patients were identified, 717 (67.7%) patients were estrogen receptor negative (ER-) and 342 (32.3%) were ER+. Median follow-up was 12.0 months, at the end of which 73.8% of patients were deceased. Median OS was 12.2 and 22.1 months for ER- and ER+ patients, respectively. Following FDA approvals of pertuzumab (2012) and ado-trastuzumab emtansine (2013), HER2-mab usage for HER2+BCBM patients rose from 53.6% in 2013 to 71.7% in 2016. 420 BCBM patients had complete data for landmark analyses: 70.0% (n=294) received HER2-mab and 30.0% (n=126) did not, in which HER2-mab was associated with significantly improved OS in both ER- (median 22.2 months, 95%CI: 18.2-25.4; vs. 9.5 mos, 95%CI: 6.3-10.7; p=0.0001) and ER+ (median 25.7 months, 95%CI: 21.4-not reached; vs. 19.6 months, 95%CI: 11.1-35.2; p=0.02) patients. In multivariable Cox landmark analysis adjusted for ER status, age at diagnosis, extracranial disease, chemotherapy, radiotherapy, and metastasectomy; HER2-mab demonstrated significantly improved OS (hazard ratio 0.59 vs. no HER2-mab, 95%CI: 0.44-0.77; p< 0.001). CONCLUSIONS: In this large national study, HER2-mab was associated with substantially improved overall survival in HER2+ BCBM patients.

NCOG-10. ASSESSMENT OF SURVIVAL AND SAFETY FOLLOWING INTRATHECAL CHEMOTHERAPY VIA OMMAYA RESERVOIR FOR LEPTOMENINGEAL DISEASE

Shiv Shah[1], Richard Butterfield[1], Bernard Bendok[2], Mark Lyons[2], John Ariete[2], Eric Yancey[2], and Maciej Mrugala[2]; [1]Mayo Clinic Arizona, Scottsdale, AZ, USA, [2]Mayo Clinic Arizona, AZ, Phoenix, USA

INTRODUCTION: Leptomeningeal disease (LMD) is an aggressive, late-stage complication of systemic cancers that maintains a poor prognosis with an average survival of 3-6 months. Ommaya reservoirs (OR) are an accessible alternative to serial lumbar punctures for the delivery of intrathecal chemotherapy in the treatment of LMD. However, widespread use of OR has been limited by reports of complications, limited physicians trained in their use, and the stigma of brain surgery. Here, we assess survival and complication rates for patients who received intrathecal chemotherapy through OR for LMD treatment. METHODS: After IRB approval, chart review of patients who received at least one administration of intrathecal chemotherapy through OR for LMD treatment between 2017- 2020 at Mayo Clinic in Phoenix, Arizona was conducted. Charts were reviewed for demographics, treatment type, complications, and outcomes. RESULTS: A total of 10 patients were included. The median overall survival from date of first OR injection was 110.5 days (95% CI: 64 – not estimable). The median time to progression from the first injection was 55.5 days (95% CI: 45 – 753). A total of 82 OR injections were conducted for an average of approximately 8 injections per patient. Two patients (20%) experienced mild adverse events – grade 2 or lower by Common Terminology Criteria for Adverse Events with a single injection. The majority of injections involved no adverse events with the overall risk of any complication at 2.4%. None of the patients experienced infection, a commonly reported complication of OR use. CONCLUSIONS: Our results support the inclusion of intrathecal chemotherapy via OR into the treatment paradigm in patients with leptomeningeal malignancies. This approach is feasible, safe, and median survival is comparable with data reported in published series. The overall complication rate in patients receiving intrathecal chemotherapy through OR is very low including the risk of infection.

NCOG-11. POST-RADIOSURGICAL OUTCOMES OF CYSTIC VESTIBULAR SCHWANNOMAS, A SYSTEMATIC REVIEW AND META-ANALYSIS

Nima Hamidi[1], Elie Massaad[2], Jacalynn Goetz[3], and Alireza Mansouri[4]; [1]Midwestern University Arizona College of Osteopathic Medicine, Glendale, AZ, USA, [2]Harvard Medical School, Boston, MA, USA, [3]Arizona College of Osteopathic Medicine, Glendale, AZ, USA, [4]Penn State Health, Department of Neurosurgery, Hershey, PA, USA

INTRODUCTION: Vestibular schwannomas (VS) are benign neoplasms that present as cystic or solid variants. Cystic VS are associated with fast and unpredictable growth patterns, and their adherence to nearby structures can lead to poor surgical outcomes. While radiosurgery (RS) has gained popularity for VS, the heterogeneity of literature necessitates a systematic review. METHODS: Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), PubMed, EMBASE, Web of Science, and Cochrane were searched for observational studies reporting cystic and solid VS radiosurgical outcomes. Pooled estimates were calculated using random-effect models with generic inverse variance to compare tumor control rates between cystic and solid VS. Quality assessment was done using the Newcastle Ottawa Criteria (NOS). RESULTS: The search yielded 2,989 studies from which 680 were selected for full-text screening and 6 were included in this review and meta-analysis. The quality of studies ranged between good (3 studies, NOS 7/9), fair (2 studies, NOS 6/9), and poor (1 study, NOS 4/9). The patient pool included 1,070 solid and 347 cystic VS, all treated by gamma knife RS. No difference in tumor control was observed (RR: 1.02, 95%CI 0.91-1.16, p=0.7). 3 studies reported post-RS complications. Haseguawa reported hydrocephalus in 7 of 74 cystic cases. Ryu reported 1 case of hydrocephalus and 1 case of trigeminal pain in their 14 cystic cases. Shirato reported 5 transient trigeminal Neuralgia, 1 transient vertigo and 1 shunt operation in their 20 cystic cases. CONCLUSION: Evidence presented in this meta-analysis supports the safety and efficacy of radiosurgery in treating cystic VS.

NCOG-12. STEREOTACTIC RADIOSURGERY FOR VESTIBULAR SCHWANNOMAS IN NEUROFIBROMATOSIS TYPE 2 PATIENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

Umberto Tosi, Omri Maayan, Anjile An, Miguel Lavieri, Sergio Guadix, Antonio DeRosa, Paul Christos, Susan Pannullo, Philip Stieg, Andrew Brandmaier, Jonathan Knisely, and Rohan Ramakrishna; Weill Cornell Medicine, New York, NY, USA

BACKGROUND: One of the hallmarks of neurofibromatosis type 2 (NF2) is the presence of bilateral vestibular schwannomas (VSs) that result in progressive hearing loss and compression of nearby brainstem structures causing cranial nerve palsies. Treatment of these tumors remains challenging, as both surgical removal and expectant management can result in symptom progression. Stereotactic radiosurgery (SRS) has recently been investigated for the management of NF2-associated VSs; however, the role, promises, and pitfalls of this treatment modality remain unclear. METHODS: Ovid MEDLINE, EMBASE, Web of Science, and Cochrane Reviews were searched for studies assessing SRS outcome in NF2-associated VSs only. Primary endpoints included tumor control, serviceable hearing, presence of tinnitus, and cranial nerve V and VII symptoms. RESULTS: A total of 16 studies (589 patients harboring 750 tumors) was included in this analysis. Clinical tumor control was achieved in 88% of cases (95% CI: 80%-95%); salvage surgery was needed in 8% (95% CI: 4%-13%) of cases. Treatment