OTHER

OTHR-01. USING COGNITION TO PREDICT RISK OF MEDICAL DECISION-MAKING IMPAIRMENT IN BRAIN CANCER

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BACKGROUND: Medical decision-making capacity refers to the ability to make informed decisions about medical treatment. Understanding is the most cognitively demanding aspect of medical decision-making and requires the ability to comprehend medically-related information and then use that information to make decisions about diagnosis, prognosis, and treatment options. In previous papers, we have shown that knowledge about specific cognitive abilities that affect understanding in brain cancer could be used to construct actuarial equations designed to help clinicians identify persons with brain cancer or brain metastases at risk of understanding impairment. METHODS: In total, 184 participants (67 with brain metastasis, 41 with non-brain metastasis, 29 with malignant glioma, and 47 healthy controls) were recruited. All participants were administered a neuropsychological battery that included a performance-based measure of medical decision-making capacity. Impairment cutoffs were calculated from control group performance. Using the cognitive scores that were most highly associated with understanding, logistic and linear regression models were used to construct actuarial equations designed to predict intact/impaired understanding and understanding scores, respectively. RESULTS: As expected, both brain cancer groups had poorer understanding than controls and approximately 50% of both brain cancer groups exhibited impaired understanding. Over 24% of the non-brain metastasis group exhibited impaired understanding. Significant associations were found between understanding and all administered cognitive variables, with the strongest correlations noted as between understanding and measures of executive function, verbal memory, and verbal fluency. Using these cognitive variables, we were able to construct predictive equations that showed strong psychometric properties. CONCLUSIONS: These data demonstrate how cognitive measures can estimate medical understanding in persons with cancer. Clinically, these findings suggest that poor verbal memory, executive function, and/or phonemic fluency function could serve as "red flags" for reduced consent capacity in this patient population, and thus signal that a more comprehensive medical decision-making capacity evaluation is warranted.

OTHR-03. ENHANCEMENT OF T1W-GAD MRI IS ASSOCIATED WITH POST-SRS LOCAL CONTROL OF NSCLC BRAIN METASTASES

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BACKGROUND: Local control (LC) of brain metastasis (BM) is an important clinical endpoint. To date predictors of LC have been limited to patient and treatment related factors. Quantitative imaging features predictive of LC have not been well described for BMs treated by stereotactic radiosurgery (SRS). This study aimed primarily at assessing quantitative imaging predictors of LC that may be used for tailored SRS treatment of BM patients. METHODS: A cohort of non-small cell lung cancer (NSCLC) treated with SRS alone were identified. Post-operative SRS, radiosurgical boost, or prior WBRT cases were excluded. All patients underwent pre-SRS and follow-up T1-Gad MR imaging (termed here T1-SRS and T1-FWU). BM regions were outlined using T1-SRS during treatment planning. LC was assessed for each treated lesion by a Radiation Oncologist. Intensity histograms were normalized to account for inter-individual brain signal heterogeneity. For each BM, computed predictor factors were derived from established LC markers (volume), features associated with tumor shape (compactness, eccentricity), and signal intensity distribution in BM region (percentiles, standard deviation). RESULTS: A total of 106 NSCLC BMs in 82 participants (41 female) were examined. Mean follow-up time was 9±9 months (median 6.5 months). Kaplan-Meier (KM) curves for LC were split by the predictor factors, with split threshold ranging between -0.5 and 0.5 of sample standard deviation, optimized to maximize the difference between lower and upper curves. KM curves for lower volume ($p=0.02$), lower eccentricity ($p=0.004$), higher intensity standard deviation ($p=0.02$), and higher 95th intensity percentile ($p=0.05$) resulted in significantly higher LC. CONCLUSION: Volume, eccentricity, intensity standard deviation, and 95th intensity percentile were found to predict LC. Intensity standard deviation and intensity percentile as predictors of LC merit validation in larger, independent datasets or in future prospective studies.

OTHR-04. INCIDENCE AND SURVIVAL OUTCOMES IN UROTHELIAL CARCINOMA BRAIN METASTASES

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INTRODUCTION: Urothelial carcinoma is a common malignancy with ~79,000 new cases diagnosed annually. However, urothelial brain metastases (UBM) are encountered uncommonly. Herein we evaluate their national prevalence, predictors, and treatment outcomes in the contemporary era. METHODS: The characteristics, management, and overall survival (OS) of UBM patients (2010–2015) were evaluated using the National Cancer Database, which comprises >70% of all newly diagnosed cancers in the U.S. OS was analyzed with Kaplan-Meier methods and log-rank tests. National outcomes were compared to our institutional cohort of UBMs. RESULTS: Out of 208,600 patients diagnosed with urothelial carcinoma, 8.4% presented with stage IV disease--of these only 216 (1.2%) had BMs at the time of diagnosis. Patients presenting with bone, liver, or lung metastases were more likely to present with synchronous BMs. Brain involvement demonstrated significantly worse median OS (3.9mos, 95%CI: 3.1–4.9) than non-BM stage IV disease (10.9mos, 95%CI: 10.6–11.2, $p< 0.001$). Compared to non-BM stage IV disease, UBMs were more likely to have surgery for metastatic disease and receive radiotherapy ($p< 0.001$); but were less likely to have primary resection or chemotherapy. In multivariable analysis of stage IV urothelial cancer, BMs demonstrated significantly worse OS (HR 1.43, 95%CI: 1.20–1.72, $p< 0.001$). In our institutional data, 10 urothelial cancer patients developed BMs; of which 7 were male, median age and KPS at diagnosis were 64.9yo (IQR 56.4–72.0) and 85 (IQR 75–100). Four patients had synchronous metastases; the median number of BM lesions was 2 (IQR 1–2), with a median size of 2.6cm (IQR 1.6–3.3). All 10 underwent GTR, 3 also with SRS and 7 with WBRT, associated with a median OS of 16.5mos. CONCLUSION: Our results confirm the rarity of UBMs and suggest that BM screening may only be indicated in stage IV patients with neurological symptoms. Systemic therapies demonstrate improved OS in these patients.

OTHR-05. THE ABILITY TO MAKE INFORMED TREATMENT DECISIONS IS COMPROMISED IN ADULTS WITH ADVANCED STAGE CANCER

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OBJECTIVE: To investigate medical decision-making capacity (MDC) in patients with advanced stage cancer. METHODS: Participants were 113 newly diagnosed adults with brain metastases and 41 adults with metastatic cancer without brain metastases who were recruited from an academic medical center and 40 demographically-matched healthy controls recruited from the community. We evaluated MDC using the Capacity to Consent to Treatment Instrument (CCTI) Vignette B and its four clinically relevant consent standards (expressing a treatment choice, appreciation, reasoning, and understanding). Capacity impairment ratings (no impairment, mild/moderate impairment, and severe impairment) on the consent standards were also assigned to each participant using cutoff scores derived statistically from the performance of the control group. RESULTS: Both of the metastatic cancer groups (with and without brain metastasis) performed significantly below controls on consent standards of understanding and reasoning. The brain metastasis group performed below the non-metastatic cancer group on understanding. Capacity compromise was defined as performance ≤1.5 standard deviations (SD) below the control group mean. Using this definition, approximately 65% of the participants with brain metastases and 51% of participants with metastatic cancer without brain metastases were impaired on at least one MDC standard. CONCLUSION: Over half of participants with metastatic cancer regardless of whether they have brain disease have reduced capacity to make treatment decisions. The finding of impaired MDC in patients without brain metastases is surprising and suggests this group likely exhibits cognitive deficits that impact their ability to understand and reason about different treatment options. The reasons underlying this impairment will be investigated. This highlights the importance of routine clinical assessment of MDC in all patients with metastatic cancer when important treatment decisions are being discussed. These results also indicate a need for the development and investigation of interventions to support or improve MDC in this patient population.

OTHR-06. ANALYSIS OF GENOMIC ALTERATIONS IN 154 BRAIN METASTASES

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Brain Metastases (BM) are associated with poor prognosis. Understanding the genomic alterations (GA) that drive tumor metastasis to the brain will increase our ability to identify patients at risk for BM, and provide better opportunities to implement targeted therapies. We performed a retrospective review of genomic alterations in 154 patients with BM from various primary sites (80 Lung, 22 Breast, 16 Melanoma, 5 Kidney, 4 Colorectal, 4 Prostate, and 23 carcinomas from unknown primary (UP). All cases were analyzed by a next generation sequencing assay the detects mutations in the coding region of 327 genes and rearrangements involving 37 genes.