control, overall survival, leptomeningeal dissemination and symptomatic radiation necrosis. We have experienced 4 cases of resected brain metastases within 1–7 days after Gamma-knife surgery (median margin dose:22Gy) and have been following their clinical course. We will show the repressive cases.

MLTI-16. SYSTEMIC THERAPY FOLLOWING CRANIOTOMY IN PATIENTS WITH A SOLITARY BREAST CANCER BRAIN METASTASIS

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INTRODUCTION: Between 15–50% of patients with metastatic breast cancer will develop brain metastases, with the frequency more common in patients with HER2-positive or triple-negative subtypes. Surgical resection is often indicated for diagnostic and/or therapeutic intent for patients presenting with a solitary lesion and/or symptomatic lesion(s) with mass effect. Practice patterns and patient outcomes with respect to the use of postoperative systemic therapy (ST) after resection of a solitary breast cancer brain metastasis (BCBM) have not been previously well-described, particularly in the modern era. METHODS: A multi-institutional retrospective review of 44 patients was performed to assess the impact of types of ST on site of recurrence, progression-free survival (PFS) and overall survival (OS) after resection of solitary BCBM. RESULTS: Stratified estimated survival was 15, 24 and 23 months for patients with triple negative, estrogen receptor positive (ER+), and human epidermal growth factor receptor 2 positive (HER2+) BCBMs. Patients receiving postoperative ST had a longer median PFS (8 versus 4 months) and OS (32 versus 15 months). Nine patients (20%) had extracranial progression, 23 (52%) had intracranial progression, three (8%) had both, and nine (20%) did not experience progression at last follow-up. Multivariate analysis showed that postoperative hormonal therapy was associated with longer OS in estrogen receptor (ER) positive patients (HR = 0.26; CI = 0.08 – 0.89; p = 0.03), but not with longer PFS. Postoperative human epidermal growth factor receptor 2 (HER2)-targeted therapy was not associated with longer PFS or OS in HER2+ patients. CONCLUSIONS: Disease progression occurred intracranially more often than extracranially following resection of a solitary BCBM. In ER+ patients, postoperative hormonal therapy was associated with longer OS. Postoperative HER2-targeted therapy did not show survival benefits in HER2+ patients. These results should be validated in larger cohorts.

MLTI-17. DIFFERENTIATION OF RADIATION INJURY FROM RECURRENT BRAIN METASTASIS USING COMBINED FET PET/MRI RADIOMICS

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BACKGROUND: The aim of this study was to investigate the potential of combined radiomics textural feature analysis of contrast-enhanced MRI (CE MRI) and static O-(2-[^{18}F]fluoroethyl)-L-tyrosine(FET) PET for the differentiation of recurrent brain metastasis from radiation injury. PATIENTS AND METHODS: Fifty-two patients with newly diagnosed or progressive contrast-enhancing brain lesions on MRI after radiotherapy (predominantly radiosurgery, 84% of patients) of brain metastases were additionally investigated using FET PET. Based on histology (n=19) or clinicoradiological follow-up (n=33), local recurrent brain metastases were diagnosed in 21 patients (40%) and radiation injury in 31 patients (60%). Forty-two features (shape-based, first and second order features) were calculated on both unfiltered and filtered CE MRI and summed FET PET images (20–40 min p.i). After feature selection, logistic regression models using a maximum of five features to avoid overfitting were calculated for each imaging modality separately and for the combined FET PET/MRI features. The resulting models were validated using cross-validation. Diagnostic accuracies were calculated for each imaging modality separately as well as for the combined model. RESULTS: For differentiation between radiation injury and brain metastasis recurrence, textural features extracted from CE MRI had a diagnostic accuracy of 81%. FET PET textural features revealed a slightly higher diagnostic accuracy of 83%. However, the highest diagnostic accuracy was obtained when combining CE MRI and FET PET features (accuracy, 89%). CONCLUSION: Our findings suggest that combined FET PET/MRI radiomics using textural feature analysis offers a great potential to contribute significantly to the management of patients with brain metastases. SUPPORT: This work was supported by the Wilhelm-Sander Stiftung, Germany

MLTI-18. PRECISION IMAGING OF METASTATIC AND PRIMARY BRAIN TUMORS AFTER RADIATION WITH ^{18}F-FDOPA PET-MRI IS FEASIBLE AND COST EFFECT

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PURPOSE: Post-radiation changes in the brain can mimic tumor recurrence on MRI, requiring multiple short term follow-ups to differentiate tumor progression from radiation necrosis. We propose combining functional and anatomic imaging with FDOPA PET tracer in hybrid PET-MRI to improve detection of tumor recurrence. MATERIALS AND METHODS: Seventeen adult patients treated with radiation therapy were identified - four with metastatic disease from breast and lung cancer and thirteen with primary brain glioma (11 IDH wildtype glioblastoma and 2 astrocytoma). Patients were scanned on hybrid PET-MRI (GE Healthcare) with clinical MRI brain sequences and dynamic FDOPA uptake. Dynamic FDOPA uptake within these tumors over 45 minutes after tracer injection was analyzed and compared to ADC histogram analysis. RESULTS: For each of the patients, clinical multi sequence gadolinium enhanced MRI and dynamic PET imaging for up to 45 minutes with ^{18}F-FDOPA amino acid tracer was obtained. The total cost savings of scanning 17 patients in groups was 51.4% ($28,321), as opposed to the cost of individual radiosynthesis performed for each study. Quantitative analysis of tracer uptake in striatum, internal carotid artery, and superior sagittal sinus were performed with appropriate accumulation and subsequent washout of tracer respectively. Successful dynamic FDOPA uptake within the tumor was seen in all patients and ratio of tumor to contralateral ROI were found to range from 1.8–4.5. While raw SUV values did not differentiate between recurrent tumor and radiation changes, T/C SUVmax ratios were elevated to 4.5 in recurrent glioblastoma, 2.5 in hypoxic treated glioblastoma, and 1.8 in non-recurrent metastatic breast cancer after gamma knife treatment. CONCLUSION: Batch imaging of patients with [^{18}F]FDOPA PET-MRI is feasible and cost effective. Understanding radionuclide synthesis process is critical for increasing accessibility of novel PET tracers to patients and results in significant cost savings.

MLTI-19. VENOUS THROMBOEMBOLIC EVENTS IN PATIENTS WITH BRAIN METASTASES: THE PICOS SCORE

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BACKGROUND: Venous thromboembolic events are significant complications in patients and possibly associated with an unfavorable outcome. Thrombosis risk is poorly defined for patients with brain metastasis, and available risk calculation scores are not validated for these patients. METHODS: We identified 811 patients with brain metastasis followed at our institution and screened electronic charts retrospectively for the occurrence of venous thromboembolic events, along with candidate risk factors. Risk factors were tested in uni- and multivariate analyses and finally integrated in a score model for risk prediction. RESULTS: Venous thromboembolic events were documented in 97 of 811 patients (12.0%). Primary tumors with high thrombogenicity (p=0.02, odds ratio 1.7, 95% CI 1.1–2.8), dexamethasone (p=0.011, odds ratio 2.27, 95% CI 1.5–4.5), chemotherapy (p=0.005, odds ratio 3.4, 95% CI 1.6–7.5), BMI > 35 kg/m^2 (p=0.002, odds ratio 3.4, 95% CI 1.6–7.5) and immobilization (p=0.003, odds ratio 2.4, 95% CI 1.3–4.3) were confirmed as independent predictors of VTE. We derived a score model for venous thromboembolic event prediction, the **PICOS** (thrombogenic **P**rimary, **I**mmobilization, **C**hemotherapy, **O**besity, **S**teroids) score (0–7 points). Receiver Operating Characteristic Curve Analysis demonstrated its prognostic accuracy (AUC=0.71, 95% CI 0.64–0.77), and its predictive capability was superior to that of other scores proposed for the evaluation of venous thromboembolic event risk such as the Khorana (AUC=0.51) or CONKO (AUC=0.52) scores. CONCLUSIONS: We report a rate of venous thrombotic events of 12.0% in our cohort of 811 patients with brain metastasis. We define a risk model for prediction in of venous thrombotic events in patients with BM, the PICOS score. It may become a valuable tool for the identification of brain metastasis patients at high risk for venous thromboembolic events and be helpful for guidance of clinicians towards decision whether to start thrombosis prophylaxis. Further, the PICOS score might be used for stratification in controlled studies.