retrospective single-centre case series analysis of patients with a new diagnosis of LC (from 2015 to 2018) was performed. A total of 723 newly diagnosed LC patients were identified and only those with a brain imaging study were included. Non-parametric statistical tests were used to compare patients with or without metastases at diagnosis. Uni- and multivariate analysis was performed to identify risk factors associated with the presence of BM. Statistical significance was considered when p<0.05. RESULTS: 185 patients with newly diagnosed LC and brain imaging at diagnosis were included (mean age 64.69 years [SD= 10.34]; 71.9% male). 40% of patients had BM at diagnosis. No significant differences in clinical, histological and molecular variables were identified. In any case, survival analysis showed that BM at diagnosis was associated with worse overall survival (Log-Rank test, p<0.01). Univariate analysis showed that presenting neurological symptoms (OR=19.5, p<0.0001 CI [7.895-47.65]), adenocarcinoma (OR= 2.113, p<0.014 CI [1.160-3.849]), small cell carcinoma (OR=0.372, p<0.008 CI [0. 179-0.773]) and visceral metastases (OR= 14.444, p<0.0001 CI [6.161-33.86]) or metastases limited to the thorax (OR= 0.019, p<0.001 CI [0.003-0.146]) were associated with BM at diagnosis. However, only neurological symptoms (OR= 20.290, p<0.0001 CI [4.953-83.118]), visceral metastases (OR= 4.451, p<0.010 CI [1.458-13.777]) and/or metastases limited to the thorax (OR= 0.066, p<0.024 CI [0.006-0.010]) reached statistical significance in multivariate analysis. CONCLUSIONS: Neurological symptoms and the presence of visceral metastases are independent predictors of developing BM at diagnosis in LC patients. However, LC disease confined to the thorax is associated with a lower risk of developing BM.

FINAL CATEGORY: INNOVATIONS IN SPINAL TUMORS

SPIN-01

RADIATION THERAPY ALONE VERSUS RADIATION THERAPY PLUS RADIOFREQUENCY ABLATION/VERTEBRAL AUGMENTATION FOR SPINE METASTASIS: TRIAL IN PROGRESS

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BACKGROUND: Spine metastases are a common occurrence in cancer patients and result in pain, neurologic deficits, decline in performance status, disability, inferior quality of life (QOL), and reduction in ability to receive cancer-directed therapies. Conventional external beam radiation therapy (EBRT) is associated with modest rates of pain relief, high rates of disease recurrence, low response rates for those with radioresistant histologies, and limited improvement in neurologic deficits. The addition of radiofrequency ablation/percutaneous vertebral augmentation (RFA/PVA) to index sites together with EBRT may improve pain response rates and corresponding quality of life. METHODS/DESIGN: This is a single-center, prospective, randomized, controlled trial in patients with spine metastases from T5-L5, stratified according to tumor type (radioresistant vs. radiosensitive) in which patients in each stratum are randomized in a 2:1 ratio to either RFA/PVA and EBRT or EBRT alone. All patients are treated with EBRT to a dose of 20-30 Gy in 5-10 fractions. The target parameters are measured and recorded at the baseline clinic visit, and daily at home with collection of weekly measurements at 1, 2, and 3 weeks after treatment, and at 3, 6, 12, and 24 months following treatment with imaging and QOL assessments. DISCUSSION: The primary objective of this randomized trial is to determine whether RFA/PVA in addition to EBRT improves pain control compared to palliative EBRT alone for patients with spine metastases, defined as complete or partial pain relief (measured using the Numerical Rating Pain Scale [NRPS]) at 3 months. Secondary objectives include determining whether combined modality treatment improves the rapidity of pain response, duration of pain response, patient reported pain impact, health utility, and overall QOL. The results from this study will be used to allow for comparisons to alternative treatment approaches. This trial was activated 5/2020 and is open to accrual.

SPIN-02

LEVERAGING AN MRI-GUIDED LINEAR ACCELERATOR PLATFORM FOR POST-OPERATIVE STEREOTACTIC BODY RADIATION THERAPY (SBRT) OF SPINAL METASTASES

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PURPOSE/OBJECTIVE(S): Post-operative spine SBRT presents unique clinical challenges. Spinal hardware produces CT and high-field strength MRI artifacts that obscure visualization of the spinal cord and unresected disease. Existing workflows incorporate additional invasive procedures with CT myelogram and quality control for these procedures can introduce uncertainty into SBRT planning. Reducing metallic imaging artifact with a low-field strength (0.35 T) MRI integrated into a MR-Linac (MRL) may facilitate superior visualization of the spinal cord, improved target delineation and treatment localization. The primary objective is to determine the feasibility of MRL-based simulation workflow to facilitate MR-guided post-operative spine SBRT without the need for CT myelogram or CT-based target delineation. MATERIALS/METHODS: A single-institution, single-arm interventional feasibility study is planned. A total of 10 patients who underwent surgical resection of solid tumor spinal metastases with an indication for post-operative SBRT will be enrolled and undergo radiation planning and treatment on a MRL platform that combines a 6MV Linac and 0.35 T on-board MRI system. Enrolled subjects will undergo CT and MR simulation followed by standard-of-care post-operative spine SBRT and follow-up spine imaging every 3 months. RESULTS: The primary endpoint is feasibility of MR-guided post-operative spine SBRT without CT myelogram. Feasibility is defined as > 70% of participants with clinically acceptable visualization/delineation as determined by blinded dual neuroradiologist review for clinically acceptable visualization/delineation of organs-at-risk (OARs) and target volume(s). Exploratory endpoints involve radiation dosimetry analysis of OARs and target volumes as well as documenting the use of adaptive planning. Radiation site progression-free survival will be recorded at 6-months after SBRT. CONCLUSION: If feasible, an MRL-based workflow for post-operative spine SBRT represents a patient-centric approach to improve efficiency, minimize treatment delays, and avoid invasive procedures that may improve clinical management of solid tumor spinal metastases.

FINAL CATEGORY: LOCAL THERAPIES

LOCL-02

DOSIMETRIC AND CLINICAL ANALYSIS OF PSEUDO-PROGRESSION VS. RECURRENCE AFTER HYPER-FRACTIONATED RADIOTHERAPY FOR BRAIN METASTASES BASED ON ENHANCED MAGNETIC RESONANCE IMAGING

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PURPOSE: The main challenge in follow-up duration of patients with brain metastases after stereotactic radiotherapy is to distinguish between pseudo-progression and tumor recurrence. The objective of this study is to retrospectively analyze the predictive factors. METHODS: The study included 123 patients with enlarged brain metastases after hyper-fractionated radiotherapy in our center from 2009 to 2019, and the baseline clinical features, radiotherapy planning parameters, and enhanced magnetic resonance imaging before and after radiation therapy were analyzed. Logistic regression was performed to compare the differences between groups. independent risk factors with P < 0.05 and associated with recurrence was used to establish a predicting nomogram and validated by Bootstrap in internal cohort. RESULTS: The median volume of lesions was 8.4 cc. The median follow-up time was 68.4 months (interquartile range [IQR], 30.4 – 63.2 months). A total of 76 (61.8%) patients were evaluated as pseudo-progression, 47 patients (38.2%) were evaluated as tumor recurrence. The median time to tumor recurrence and pseudo-progression were 12.9 months (IQR, 8.7 – 19.6 months) and 18.3 months (IQR, 9.4 – 27.8 months) respectively. Variables associated with tumor recurrence included: gross tumor volume ≥ 6 cc, biological effective dose < 60 Gy, target coverage < 96% and no targeted therapy. The area under curve value was 0.730 and mean absolute error in calibration curve was 0.041. Sixty-one patients received salvage therapy, including re-irradiation (n = 32, 26.0%), surgical resection (n = 22, 17.9%) or systemic therapy (n = 22, 17.9%). The survival time in pseudo-progression and tumor recurrence groups were 66.3 months (95% CI, 56.8 – 75.9 months) and 39.6 months (95% CI, 29.2 – 50.0 months, respectively; P = 0.001). CONCLUSIONS: Clinical and dosimetry features of hyper-fractionated radiation therapy based on enhanced brain magnetic resonance can help distinguish pseudo-progression from tumor recurrence after hyper-fractionated radiotherapy for brain metastases. And the individual risk could be estimated by the nomogram effectively.