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The Role of Quantitative Metabolic Metrics on FDG-PET/CT in Predicting pathological Invasive Factors in cN0 Lung Adenocarcinoma

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【Background】 Growing evidence suggests that FDG-PET/CT has greatly contributed the preoperative investigation of early-stage lung cancer. The maximum standardized uptake values (SUVmax) of the primary lesion is widely reported to be associated with prognosis in NSCLC while other metabolic metrics, metabolic tumor volume (MTV) and total lesion glycolysis (TLG) have been explored as a measure of metabolic tumor burden in recent years. The purpose of this study is to investigate the role of quantitative metabolic metrics in predicting the incidence of pathological invasive factors including microscopic vascular invasion, pleural invasion, and lymph node metastasis in cN0 lung adenocarcinoma.

【Method】 We examined 265 patients with clinical stage 0-II (cN0) adenocarcinoma. Pre-operative PET/CT and subsequent complete resection was performed for all the patients during the period from August 2012 to July 2017. The maximum tumor and solid-part diameter on HRCT and the three metabolic metrics on PET/CT measured by the SYNAPSE VINCENT as the volume viewer software were observed. In the current study, MTV was defined as the total tumor volume with an SUV >2.5 while TLG was calculated as meanSUV × MTV. We assessed the relationship between these parameters and the incidence of pathological invasive factors.

【Result】 Among 265 patients, 18 (7%) patients were clinically staged as 0, 205 (77%) as IA, 32 (12%) as IB, and 10 (4%) as II, respectively. Pathological vascular

invasion, pleural invasion, and lymph node metastasis were found in 100 (38%), 53 (20%), and 45 (17%) patients, respectively. SUVmax, MTV, and TLG were dichotomized at cut-off level by the receiver operating characteristic (ROC) curves for pathological invasive factors. ROC curve yielded area under the curve values of 0.812, 0.915, and 0.882 for SUVmax, MTV, and TLG, respectively. Univariate analysis showed that SUVmax (Hazard Ratio (HR), 27.185; $p < 0.001$), MTV (HR, 24.580; $p < 0.001$), TLG (HR, 24.580; $p < 0.001$), maximum tumor size (HR, 2.495; $p < 0.001$), solid-tumor size (HR, 7.830; $p < 0.001$), c-stage (HR, 14.418; $p < 0.001$), and sex (HR, 1.882; $p = 0.013$) were significantly associated with the incidence of pathological invasive factors. Multivariate analysis showed that SUVmax was the independent predictor (HR, 7.006; $p = 0.001$). The frequency of pathological invasive factors of patients with SUVmax >4.4, MTV >0.75 mm³, and TLG >2.6 were 82%, 84%, and 84%, respectively.

【Conclusion】 In cN0 early-stage lung adenocarcinoma, the measurement of SUVmax, MTV, and TLG on FDG-PET/CT was beneficial for the prediction of pathological invasive factors.

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IMRT を施行された I 期非小細胞癌における肺臓炎の範囲の検討

(放射線医学)

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