

Diagnostic value of PET / CT combined with HRCT for the pure ground-glass nodules

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BACKGROUND: Several studies showed that early adenocarcinoma present as ground-glass nodules (GGNs) on CT images. Although clinical experience has demonstrated that some common imaging features of lung cancer, because of lighter density, atypical morphological features and positive biopsy low rates for pGGN, it's difficult to differentiate between benign and malignant lesions. Thus, the differential diagnosis of benign and malignant pGGO is a difficult clinical problem that has been plagued by respiratory physicians and radiologists.

HYPOTHESIS: To explore the diagnostic value of PET/CT combined with HRCT in the benign and malignant pGGNs.

METHODS: Retrospective analysis from November 2010 to August 2015 in our center underwent PET / CT and HRCT examination of 51 pGGNs, 14 males and 37 females, aged 33-70 years, mean age (57.80 ± 7.98) years. All patients were confirmed by pathology and clinical follow-up diagnosis (the shortest period for 13 months). Malignant lesions 32 cases: 14 cases invasive adenocarcinoma, 8 cases micro invasive adenocarcinoma, 10 cases adenocarcinoma in situ; benign lesions 19 cases: 2 cases chronic pneumonia, 1 case tuberculosis, 16 cases with appropriate follow-up or treatment significantly reduced or completely disappear. The lesions location on PET / CT and HRCT image were observed and measured lesion size (the longest diameter and its perpendicular relative to the mean of the shortest diameter of the lesion at the level of the maximum axial images), three-dimensional ratio (the longest diameter measuring lesion on axial, coronal, sagittal images, the ratio of the longest diameter and the shortest is three-dimensional ratio). The lesion edge pattern (lobulation, spiculation), internal characteristics (air bronchogram, air space), adjacent structure (pleural indentation, vascular convergence sign) and FDG metabolism (SUVmax) were analyzed on images. The quality was measured on AW4.6 workstation (automatic measurement software of the nodule volume and average CT value, applying the formula $m = \rho * V / 1000$ calculated). Statistical analysis was performed by using the t test, chi-square test and receiver operating characteristic (ROC) curve was calculated cut-off point, $P < 0.05$ was considered statistically significant.

RESULTS: Clinical data (age, male and female incidence rates), location, three-dimensional ratio, spiculation, air bronchogram in benign and malignant lesions had no significant difference. The frequency of lobulation ($P=0.002$), air space ($P=0.038$), pleural indentation ($P=0.008$), vascular convergence sign ($P=0.000$) was significantly higher in malignant lesions than in benign lesions. Lesion size, SUVmax and quality between two groups were statistically significant ($P < 0.05$), ROC curve showed the optimal cut-off point of size, SUVmax and quality was respectively 10mm, 0.85 and 0.16g. Their sensitivity and specificity was respectively 90%, 74%, 69%, 79% and 81%, 84%. Area under the curve (AUC) displayed quality (AUC=0.862) in three groups, significantly higher compared to the size (AUC=0.838) or SUVmax (AUC= 0.789) alone, with better diagnostic performance. PET / CT combined with HRCT play an important role for differential diagnosis of benign and malignant pGGN. The quality is a better differential sign, and when the quality of pGGO $> 0.16g$, to be vigilant about malignant potential.