

THESIS ABSTRACT

TITLE:

The role of diffusion weighted magnetic resonance imaging and apparent diffusion coefficient quantification in the evaluation of pulmonary lesions which are indeterminate on contrast enhanced computed tomography.

NAME OF THE CANDIDATE : Dr. Shweta Singh

DEGREE AND SUBJECT : M.D. Radiodiagnosis

NAME OF THE GUIDE : Dr. Binita Riya Chacko

OBJECTIVES:

To assess the value of absolute signal intensity, lesion to spinal cord ratio (LSR) and apparent diffusion coefficient (ADC) values obtained from the solid and necrotic components of indeterminate pulmonary lesions in differentiating benign from malignant lesions.

MATERIALS AND METHODS:

47 patients with indeterminate pulmonary lesions detected on contrast enhanced CT of the thorax (diagnosis confirmed by histopathology/ sputum culture/ short term follow up after antibiotics), underwent MRI with T2WI and DWI ($b = 0, 500, 1000 \text{ s/mm}^2$). On DWI, the absolute signal intensity (SI), SI of the lesion as compared subjectively to that of the thoracic skeletal muscles (hypointense, isointense or hyperintense) and the LSRs were obtained following which ADC values of the solid and necrotic parts of the lesion were assessed. The values for benign and malignant lesions and were compared using the independent samples

T- test. Receiver operating characteristic curves (ROC) were plotted to obtain diagnostic cut-off values.

RESULTS:

Qualitative analysis comparing SI of the lesion on DWI (b=500 and 1000 s/mm²) to that of the thoracic skeletal muscle showed that most benign (N=27) and malignant lesions (N=20) were hyperintense on DWI with no significant difference between the two groups (p value = 0.590). A significant difference was seen between the absolute SI values of benign and malignant lesions on DWI (b=1000 s/mm²; p value =0.002), LSR (b=500 s/mm²; p value=0.002) and b=1000 s/mm²; p value= 0.001) and ADC of the solid component (p value= 0.006) with no significant difference between absolute SI of the two groups on b=500 s/mm² images (p value= 0.059).

ROC curves for LSR on DWI b=500 s/mm² yielded a cut-off value of 1.234 with 70.0% sensitivity and 74.1% specificity (AUC= 0.761) and on DWI b=1000 s/mm² yielded a cut-off value of 1.141 with 70% sensitivity and 85.2% specificity (AUC = 0.765). ADC values of the solid component yielded a cut-off value of $1.248 \times 10^{-3} \text{ mm}^2/\text{s}$ with 80% sensitivity and 74.1% specificity (AUC= 0.735) with no significant difference in the ADC of the necrotic components (p value= 0.132). Higher LSR values and lower ADC values were suggestive of malignancy.

Thus, DWI is a useful, safe, non-invasive tool for evaluation of pulmonary lesions which are indeterminate on CT. In patients with high risk of complications associated with lung biopsy, these methods can help assess the likelihood of malignancy and help direct further management.

Keywords: diffusion weighted magnetic resonance imaging, b factor, absolute signal intensity, lesion to spinal cord ratio, apparent diffusion coefficient, indeterminate pulmonary lesions