MRI DIFFUSION IN MEDIASTINAL MASSES

Thesis
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بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

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List of Abbreviations

ADC	apparent diffusion coefficient
AP	aorto-pulmonary
CR	computed radiography
CT	computed tomography
DWI	diffusion weighted images
ECG	electraocardiogram
FDG	fluorodeoxyglucose
FIESTA	fast imaging with steady state acquisition
GCT	germ cell tumour
HD	Hodgkin disease
IASLC	International Association for the Study of Lung Cancer
IVC	inferior vena cava
mm^2 /s	square millimeters per second
MPGs	motion-probing gradients
MRI	magnetic resonance imaging
NaF	sodium fluoride
NHD	non-Hodgkin disease
NSCLC	non small cell lung cancer
PET	Positron emission tomography
ROC	Receiver operator characteristic
ROI	region of interest
Sec /mm^2	second per millimeter squared
SCLC	small cell lung cancer

SD standard deviation

SVC superior vena cava

TFE turbo field echo

TNM tumor-node-metastasis

TSE turbo spin echo

WHO world health organization

WI weighted images

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Abstract

Diffusion-weighted imaging may be useful besides other modalities in differentiating lymphoma from sarcoidosis in mediastinal and hilar lymphadenopathy. MRI can detect and stage lung cancer, and this method could be an excellent alternative to CT or PET/CT in the investigation of lung malignancies and other diseases. Potential future applications of diffusion MRI in malignancies include monitoring the treatment response and detecting recurrent cancer.

Keywords: (magnetic resonance imagimg – diffusion – sarcoidosis – lymphoma– bronchogenic carcinoma)

Introduction

MRI of the chest using fast acquisition sequences with a high temporal resolution has become feasible with the recent developments in gradient technology and multichannel coils. Experience with thoracic applications of diffusion weighted imaging (DWI) techniques is still growing, and preliminary studies have reported promising results **(Biederer et al, 2012).**

DWI involves the acquisition of a magnetic resonance signal related to random thermal motion (Brownian motion) or the “diffusion” of water protons in tissue **(Türkbey et al, 2012).**

Diffusion-weighted imaging may be useful beside other modalities in differentiating lymphoma from sarcoidosis in mediastinal and hilar lymphadenopathy. The ADC value in the lymphoma group was lower than in the sarcoidosis group **(Gümüşta et al, 2013).**

DWI is also recently used to characterize lung lesions, to predict tumor invasiveness in early-stage lung cancer, to detect tumors in collapsed lungs, and for nodal staging of lung cancer **(Türkbey et al, 2012).**

MRI can detect and stage lung cancer, and this method could be an excellent alternative to CT or PET/CT in the investigation of lung malignancies and other diseases **(Hochhegger et al, 2011).**

Recent studies concluded that lung cancers were easily visualised by DWI, and that differentiating central lung cancer from post-obstructive lobar collapse by DWI is feasible. Quantitative analysis of DWI also enables differentiation of lymph nodes with and without metastasis **(Nakayama et al, 2010).**

Potential future applications of DWI in malignancies include monitoring the treatment response after chemotherapy or radiation, discriminating post-therapeutic changes from residual tumors, and detecting recurrent cancer **(Türkbey et al, 2012).**

MRI is emerging as a valuable lung imaging modality, together with x-ray and CT. It offers a unique combination of morphological and functional information in a single examination without any radiation burden to the patient. New users are advised to make themselves familiar with the particular advantages and limitations of the technique and its diagnostic scope to appreciate its potential benefits **(Biederer et al, 2012).**