ROLE OF MRI DIFFUSION IN MEDIASTINAL MASSES

Essay

Submitted for partial fulfillment of
Master Degree of Radiodiagnosis

By:

Mahmoud Sayed Abou Bakr
M.B.B.Ch
Faculty of Medicine
Ain Shams University

Supervised by

Prof. Dr. Mohamed El Gharib Abo El Maaty
Professor of Radiodiagnosis
Ain Shams University

Dr. Mohamed Gamal El Din Abdel Mutaleb
Lecturer of Radiodiagnosis
Ain Shams University

[وقُلْ ربِّ زِدْنِي عِلْماً]

سورة طه الآيه رقم114

Acknowledgement

*First of all, all gratitude is due to **God** almighty for blessing this work, until it has reached its end, as a part of his generous help, throughout my life.*

*Really I can hardly find the words to express my gratitude to **Prof. Dr. Mohamed El Gharib Abo El Maaty** Professor of Radiodiagnosis, faculty of medicine, Ain Shams University, for his supervision, continuous help, encouragement throughout this work and tremendous effort he has done in the meticulous revision of the whole work. It is a great honor to work under his guidance and supervision.*

*Really I can hardly find the words to express my gratitude to **Dr. Mohamed Gamal El Din Abdel Mutaleb** Lecturer of Radiodiagnosis, Faculty of Medicine, Ain Shams University for his continuous directions and meticulous revision throughout the whole work. I really appreciate their patience and support.*

Last but not least, I dedicate this work to my family, whom without their sincere emotional support, pushing me forward this work would not have ever been completed.

Mahmoud Sayed Abou Bakr

Contents

List of Abbreviations

ADC	:	Apparent diffusion coefficient
CT	:	Computed tomography
DWI	:	Diffusion weighted imaging
DWI	:	Diffusion-weighted magnetic resonance imaging
DW-MRI	:	Diffusion weighted-magnetic resonance imaging
HD	:	Hodgkin disease
IASLC	:	Study of Lung Cancer
IVC	:	Inferior vena cava
NHD	:	Non-Hodgkin disease
NSCLC	:	Non small cell lung cancer
PET/CT	:	Positron emission tomography/computed tomography
SCLC	:	Small cell lung cancer
SVC	:	Superior vena cava

List of tables

List of Figures

List of Figures (Cont.)

List of Figures (Cont.)

List of Figures (Cont.)

List of Figures (Cont.)

List of Figures (Cont.)

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-magnetic resonance imaging (DW-MRI) of the abdomen and thoracic cavity has become possible with fast imaging time that minimizes the effect of gross physiological motion from respiration and cardiac movement. There is growing interest in the application of diffusion weighted imaging (DWI) in the evaluation of patients with cancer ***(Nasr et al., 2016).***

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 visualized 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. ***(Biederer et al., 2012).***

Differentiation of malignant mediastinal tumors from benign lesions is essential for treatment planning as well as for prediction of prognosis ***(Nasr et al., 2016).***