Role of MRI in the Diagnosis of Different Bone Marrow Lesions in Pediatric Patients with Hematological Malignancies

Thesis

Submitted for Partial Fulfillment of MD Degree in Radiodiagnosis

Presented By

Tamer Farouk El Naggar

Supervised By

Prof. Dr. Hanan Mohammed Eisa

Professor of Radiodiagnosis
Faculty of Medicine, Ain Shams University

Prof.Dr. Mostafa Mahmoud Gamal El Deen

Professor of Radiodiagnosis
Faculty of Medicine, Ain Shams University

A.Prof. Dr.Yosra Abdelzaher Abdullah

Assistant Professor of Radiodiagnosis
Faculty of Medicine, Ain Shams University

Dr. Ayda Aly Youssef

Lecturer of Radiodiagnosis
National Cancer Institute, Cairo University

Faculty of Medicine
Ain Shams University
2017


بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ
(وَعَلَّمَكَ مَا لَمْ تَكُنْ
تَعْلَمُ وَكَانَ فَضْلُ اللهِ
عَلَيْكَ عَظِيمًا)
صدق الله العظيم

Acknowledgment

First thanks to **ALLAH** *to whom I relate any success in achieving any work in my life.*

I wish to express my deepest thanks, gratitude and appreciation to ***Prof. Dr. Hanan Mohammed Eisa,*** *Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University for his meticulous supervision, kind guidance, valuable instructions and generous help.*

Special thanks are due to ***Prof.Dr. Mostafa Mahmoud Gamal El Deen,*** *Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University for his sincere efforts, fruitful encouragement.*

I am deeply thankful to ***A.Prof. Dr.Yosra Abdelzaher Abdullah,*** *Assistant Professor of Radiodiagnosis, Faculty of Medicine, Ain Shams University for her great help, outstanding support, active participation and guidance.*

Really I can hardly find the words to express my gratitude to ***Dr. Ayda Aly Youssef,*** *Lecturer of Radiodiagnosis, National Cancer Institute, Cairo University for her continuous directions and meticulous revision throughout the whole work. I really appreciate his patience and support.*

Tamer Farouk El Naggar

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List of Abbreviations

Abb.	Full term
ADC	*Apparent Diffusion Coefficient*
ALL	*Acute Lymphoblastic Leukemia*
AML	*Acute Myelogenous Leukemia*
AVN	*Avascular Necrosis*
BME	*Bone Marrow Edema*
BMI	*Body Mass Index*
BMN	*Bone Marrow Necrosis*
BMT	*Bone Marrow Transplantation*
CLL	*Chronic Lymphocytic Leukemia*
CML	*Chronic Myelocytic Leukemia*
CNS	*Central Nervous System*
DCE	*Dynamic Contrast-Enhanced*
DWI	*Diffusion Weighted Image*
FOPE	*Focal Periphyseal Edema*
FOV	*Field of Vision*
FSE	*Fast Spin Echo*
GRE	*Gradient Echo*
HL	*Hodgkin Lymphoma*
MRI	*Magnetic Resonance Imaging*
MRS	*Magnetic Resonance Spectroscopy*
NHL	*Non-Hodgkin Lymphomas*
ON	*Osteonecrosis*
ROI	*Region of Interest*
SI	*Signal Intensity*
SNR	*Signal to Noise Ratio*
STIR	*Short TI Inversion Recovery*
TE	*Time to Echo*
TI	*Inversion Time*
TIC	*Time-Intensity Curves*
TR	*Time to Repeat*
TrueFISP	*Technique True Fast Imaging with Steady-State Precession*

INTRODUCTION

Malignant tumors in marrow can arise from the myeloid elements of marrow (resulting in leukemia, lymphoma and myeloma), from the mesenchymal elements of marrow (resulting in primary sarcoma of bone), or from metastases to marrow ***(Hwang et al., 2007).***

Leukemia is the most common of pediatric cancers accounting for about 30% of diagnoses ***(Puumala et al., 2013).***

Lymphoma is the third most common childhood malignancy, and NHL accounts for approximately 7% of cancers in children younger than 20 years ***(Sandlund et al., 1996).***

Lymphomas, Hodgkin's and non-Hodgkin's lymphoma, represent 3%–5% of all malignancies worldwide. By statistics, bone marrow involvement found in 5%-15% of patients with Hodgkin's lymphoma and in 20%-40% of non-Hodgkin's lymphoma patients ***(Silva et al., 2013).***

The ability of CT to demonstrate enlarged lymph nodes throughout the body and detect associated pathology in soft tissue structures,, has contributed to CT becoming the modality of choice for the staging and follow-up of lymphoma ***(Vinnicombe et al., 2010).***