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Role of diffusion-weighted MRI in evaluation of pediatric musculoskeletal soft tissue masses

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Abstract

Background: In pediatric patients, soft tissue masses encompass a wide heterogeneous group of benign and malignant lesions. MRI is a powerful diagnostic tool in the workup of soft tissue tumors in children, and it helps in characterization of lesion and evaluation of the extent of the lesion. However, conventional MRI techniques are not specific in differentiating benign from malignant lesions. So to improve characterization of tumors, DWI was added to MRI techniques as it increases sensitivity and specificity by detecting the micro-diffusion changes of water into intra- and extracellular spaces. The aim of this work was to highlight the diagnostic value of DWI in detection and characterization of different musculoskeletal soft tissue masses in pediatrics.

Results: There was a statistically significant difference regarding the mean ADC value of benign and malignant masses (P value = 0.001*). The mean ADC value for all benign masses ($n = 41$) was $1.495 \pm 0.55 \text{ SD} \times 10^{-3} \text{ mm}^2/\text{s}$, while the mean ADC value for all malignant masses ($n = 21$) was $0.449 \pm 0.27 \text{ SD} \times 10^{-3} \text{ mm}^2/\text{s}$. The cutoff ADC value between benign and malignant masses was $0.88 \times 10^{-3} \text{ mm}^2/\text{s}$. This cutoff ADC value has sensitivity of 100.0%, specificity of 92.3%, PPV of 66.7%, NPV of 100.0% and diagnostic accuracy of 93.3%.

Conclusion: In pediatric patients, DWI is an innovative valuable noninvasive imaging technique for characterization of musculoskeletal soft tissue masses and discrimination between benign and malignant masses.

Keywords: MRI, DWI, Soft tissue, Masses, Benign, Malignant, Pediatrics

Background

Soft tissue masses and osseous lesions are commonly encountered in pediatric patients. Musculoskeletal soft tissue masses encompass a wide heterogeneous group of benign and malignant lesions that developed from connective tissue other than bone. Although benign in most cases, a significant proportion of pediatric musculoskeletal soft tissue masses constitutes malignant tumors [1]. Patients who have a soft tissue tumor or tumor-like mass usually presented with non-specific clinical findings such as soft tissue swelling or pain. In many cases, a detailed history and physical examination are sufficient to make a diagnosis, but in circumstances when the diagnosis is

uncertain, imaging can be very helpful to characterize the mass [2].

MRI is a powerful diagnostic tool in the workup of soft tissue tumors in children due to its high spatial and contrast resolution [3]. However, there is often an overlap in the MRI appearance of benign and malignant soft tissue tumors, resulting in decreasing the diagnostic confidence. The specificity of conventional MRI in differentiating benign from malignant soft tissue tumors was variable among previous studies, presumably because benign and malignant soft tissue tumors may share the same morphologic features regarding the size, margin, location, signal intensities and contrast enhancement [4, 5].

So to improve characterization of tumors, DWI was added to MRI techniques as it increases sensitivity and specificity by detecting the micro-diffusion changes of water into intra- and extracellular spaces [4]. DWI is a

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Mri Of Musculoskeletal Masses

Puja Mehta

A decorative red circular graphic with a gradient, appearing as a partial circle or a stylized 'C' shape, located to the right of the author's name.

Mri Of Musculoskeletal Masses:

This book delves into Mri Of Musculoskeletal Masses. Mri Of Musculoskeletal Masses is a vital topic that must be grasped by everyone, ranging from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Mri Of Musculoskeletal Masses, encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:
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- The book is crafted in an easy-to-understand language and is complemented by engaging illustrations. This book is highly recommended for anyone seeking to gain a comprehensive understanding of Mri Of Musculoskeletal Masses.

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Mri Of Musculoskeletal Masses Introduction

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