



Role of ultrasound and color Doppler in evaluation of musculoskeletal soft tissue masses

Essay

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

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صدق الله العظيم

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List of abbreviations:

<i>Abbreviation</i>	
<i>US</i>	<i>Ultrasound</i>
<i>RI</i>	<i>resistive index</i>
<i>SD</i>	<i>standard deviation</i>
<i>CD</i>	<i>Color Doppler</i>
<i>HRUS</i>	<i>High resolution ultrasound</i>
<i>CDUS</i>	<i>Color Doppler ultrasound</i>
<i>PDUS</i>	<i>Power Doppler US</i>
<i>GCTTS</i>	<i>Giant cell tumor of tendon sheath</i>
<i>DFSP</i>	<i>Dermato-fibrosarcoma protuberance</i>
<i>MHZ</i>	<i>Mega hertz</i>
<i>CT</i>	<i>Computerized tomography</i>
<i>NF1</i>	<i>Neurofibromatosis type 1</i>
<i>MRI</i>	<i>Magnetic resonance images</i>

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ABSTRACT

Musculoskeletal sonography is a rapidly growing technique that is gaining popularity for the evaluation and treatment of joint and soft tissue diseases . It can be intimidating due to the vast array of anatomy that is present and the different techniques and dynamic maneuvers required for a complete study. It is reliable, expedient and readily accessible alternative to other more costly techniques such as MR imaging.

In the detection of musculo-skeletal masses especially soft tissue masses , ultrasonography is a readily available , inexpensive and non invasive modality,color Doppler can be also used in assessment of lesion vascularity and detection of neurovascular bundle involvement.

INTRODUCTION

Introduction

Soft tissue masses in the extremities and trunk are common presentations to physicians and surgeons. These growths range from benign neoplasms and cystic structures based in the epidermis and dermis to malignant neoplasms arising within the structures below the deep fascia. *(Frassica et al . , 1996).*

There are a number of useful applications and advantages of diagnostic ultrasound in the assessment of musculoskeletal pathology. Ultrasonography (U/S) may be used to assess superficial tendons and ligaments that traverse a joint. It can demonstrate the presence and characteristics of joint effusions, bursae, or cysts, and it also can detect loose bodies in joints. The advantages lie in the cost-efficiency, shorter examination time, *(Kelvin Chew et al . , 2008)*

Ultrasound is generally unaffected by metallic artifacts (eg, metatarsal plate in the foot, suture anchors) and delivers no radiation to the patient or the user, an important consideration when evaluating females of child-bearing age. Unlike radiographs, CT, and MRI, ultrasound can be readily used to complete a comparative examination of the contralateral extremity when clinically indicated. Finally, ultrasound can provide precise, real-time guidance for interventional procedures. Compared with radiographs and CT scans, ultrasound can demonstrate soft tissues with great detail, enabling safe and accurate needle guidance for interventional procedures. Similar to ultrasound, MRI provides excellent soft tissue visualization, but the requirement for nonferromagnetic instrumentation coupled equipment size and expense currently limit MRI use for real-time interventional procedures. *(Smith et al . , 2009)*

Dynamic assessment during contraction and relaxation of the structure of interest is essential. This helps in establishing the exact relationship of the mass with the muscle and or the tendon. Soft tissue masses in the anterior abdominal wall should also be evaluated during deep inspiration and

expiration to define the relationship of the mass with the peritoneum .
(Kinare et al . , 2007)

Physicians should recognize several clinically relevant limitations of musculoskeletal ultrasound. Perhaps the most important limitations pertain to field of view and penetration. Ultrasound provides a very high quality picture of a relatively small area. Clinicians should use ultrasound to confirm or characterize pathological changes within a defined body region. ultrasound's limited resolution at greater depths and inability to penetrate bone limit its ability to adequately image deep body regions, morbidly obese patients, areas deep to bones, and central intra-articular regions. Finally, as an interactive and technologically intensive examination, musculoskeletal ultrasound is also limited by both the ultrasound machine and the skill of the examiner using it. *(Smith et al . , 2009)*

Combining grayscale ultrasound with Doppler imaging allows unique real-time evaluation of regional blood flow, which may be altered in a variety of disease processes. The presence of Doppler signal can also help differentiate solid from cystic lesions. *(James . , 2006).*

US have a high sensitivity when detecting tumors, but it has not proven to be useful in differentiating benign from malignant conditions. Power Doppler US (PDUS) or color Doppler US (CDUS) and spectral analysis can depict the vascular irregularities in malignant tumor, but the reported criteria for malignancy vary widely. *(Chiou et al . , 2009).*

HRUS does have a high sensitivity in detecting tumors. Recent advances in ultrasound technology have enabled the echotexture of soft tissue tumors to be presented in greater detail. *(Chiou et al . , 2007).*

Using split-screen technology (which basically allows combining two images from two adjacent areas) the field of view can be doubled to 12 cm. Extended field of view enable panoramic imaging with real time probes.

AIM OF WORK

Aim of the work:

To evaluate the usefulness and high light the indications, advantages and disadvantages of high-resolution grayscale and color Doppler ultrasound evaluation in musculo-skeletal soft tissue masses and to differentiate benign from malignant masses.