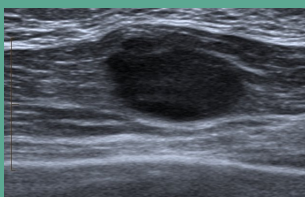
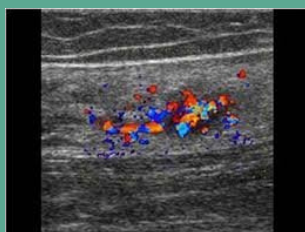


ADVANCING MUSCULOSKELETAL DIAGNOSTICS: THE ROLE OF ULTRASOUND IN IMAGING AND CLINICAL DECISION-MAKING

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Benign and malignant muscle masses



Soft tissue tumors including muscle tumors are difficult to classify into benign or malignant as they can exhibit a variety of pathological features

MRI is typically used to classify but is not always readily available.

US is a simpler, safer and low-cost modality with low invasiveness and can often help supplement MRI findings to improve diagnostic accuracy .

Evaluation of vascularity using Doppler and power Doppler is useful and can help classify tumors based on scoring systems like Giovagnorio

Solid malignant tumors often exhibit high degrees of vascularity.

Malignant tumors have irregular margins, are bigger in size and are deeper seated

Strain elasticity can also be used to classify tumors based on the strain on the tissue on application of probe pressure . Malignant tumors demonstrate increased strain elasticity

Introduction

MRI and CT are the gold standard for advanced MSK diagnostics ; however, they may not be freely available. At Queen Elizabeth, London we run a rapid access Ultrasound MSK diagnostic clinic , saving time and the need for advanced imaging. We present a pictorial review of a week of cases from the clinic demonstrating the anatomy and pathology.

Septic arthritis and joint effusions in children

Cause-

Hematogenous seeding often in the pretext of existing joint disease or immunosuppressed , or secondary to trauma.

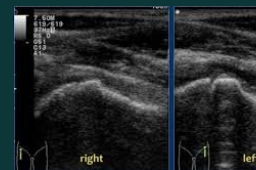
Clinical relevance -

A quick diagnosis with USG prevents potential complications such as joint destruction and avascular necrosis

Ultrasound is the first line investigation performed in a young limping child , an age group where rapid diagnosis and treatment is crucial.

US can detect fluids as little as 1 -2 ml .

It is however understood that US cannot distinguish between the infective and non-infective collections of fluids but can aid guided aspiration that can be helpful in diagnosis .



Bone fracture,tumor,osteomyelitis

Cause-

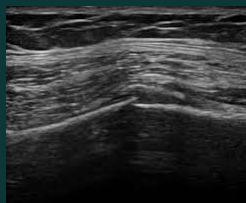
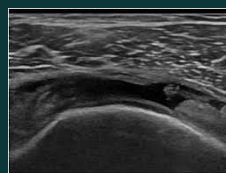
In a pediatric population haematogenous seeding is most common while contiguous spread from adjacent infected tissue is more common in adults .

Clinical relevance -

Ultrasound is a readily available tool to help supplement MRI findings in making a diagnosis of osteomyelitis.

It is useful to detect soft tissue collections and periosteal elevation which may further evolve into subperiosteal collections or abscesses

Ultrasound helps in real time monitoring of osteomyelitis without the need for repeated radiation . Also helps in guided aspiration of collections if any.



Acute shoulder

Incidence -

Acute shoulder affects 14.7 /1000 per year.

Causes -

More commonly ,adhesive capsulitis ,rotator cuff tear

Clinical relevance -

-With the exception of shoulder fractures and dislocations ,radiographs have limited benefit in diagnosis of acute shoulder pain and patients often get discharged with outpatient imaging without treating or diagnosing the pathology .

-US in a stepwise shoulder protocol manner covering the acromioclavicular joint , biceps tendon, subscapularis, impingement, and supraspinatus (ABSIS) helps to diagnose for rotator cuff injuries as well as bony deformities .

-The simplicity of the protocol delineates a scope of being used in point of care imaging in the emergency setting .

Ankle ligament rupture

Incidence-

Ankle sprains form 25% of all sports injuries with a high rate of ankle instability and re-injury if not treated appropriately with repair or reconstruction .

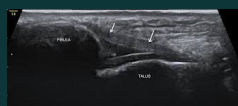
Clinical relevance-

MRI is an expensive, time consuming modality which neither allows dynamic imaging of the ankle joint nor real time imaging

Ultrasound overcomes these limitations and is able to detect multiple joints at the same time with high degree of specificity and sensitivity in diagnosing ligament injuries .

Ultrasound helps in comprehensively reviewing ligament complexes which are most commonly involved in injuries

Special attention needs to be paid to the Anterior talofibular ligament and calcaneofibular ligaments ,syndesmosis and midtarsal joints during imaging as these are most involved in acute ankle injuries .



Muscle injuries

Muscle injuries can be direct (lacerations ,contusions ,rupture) or indirect (muscle strain) .

Clinical relevance -

Ultrasound helps distinguish direct muscle injuries by highlighting interruption of muscle fibres(anechoic zone) often accompanied by a haematoma .A haematoma would appear hyperechoic in the acute phase (24 -48 hours)and gradually turn hypo-isoechoic in nature as it undergoes resorption . As the granulation tissue forms there is vascularity which develops, visible on Doppler .A scar tissue may be formed as the muscle heals and per fascial fluid is observed .

A muscle strain of grade 1 and 2 muscle injury shows partial interruption of muscle fibres and all the above signs in varying degrees .

Conclusion

Ultrasound has become increasingly popular in musculoskeletal imaging because of its low cost, easy availability and lack of ionizing radiation . Ultrasound has both diagnostic and therapeutic implications in MSK imaging .

In the presence of a core group of radiologists and ultra sonographers, it is possible to run rapid diagnostic clinics while maintaining quality and accuracy of diagnoses .

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