High resolution ultrasound (HRUS) in Musculoskeletal (MSK) Infections: A low cost problem solving tool.

It has been noted that 1.98 million people get diagnosed with musculoskeletal infection annually. The growing population of intravenous drug users and Human Immunodeficiency Virus infected individuals has further contributed to this growth. Certain preexisting conditions predispose individuals towards MSK infections; these include diabetes, sickle cell disease, peripheral vascular disease and immune-compromised individuals.

This was the foremost reason that promoted World Health Organization (WHO) to declare 2000 to 2010 as the Bone and Joint decade. WHO aims at improving the quality of life of people afflicted by these disorders by promoting cost effective treatment and diagnostic options. It aims at improvising prevention and promoting research.

Musculoskeletal (MSK) system comprises of bones, cartilage, muscles, ligaments, and tendons. The main function of the musculoskeletal system comprises of providing support to the body, allow motion, and protect important organs. The skeletal system also comprises of important elements of the haematopoietic system. Diseases of the musculoskeletal system are plenty and they result in motion deficits or functional disorders. Skeletal and articular disorders are the most common. It has been noted that chronic musculoskeletal disorders cause significant morbidity, significant deterioration in the quality of life and extol a huge burden on the health system.

High Resolution ultrasound (HRU) is a safe, reliable, rapid technique of evaluating these patients. It is dynamic, real time and cost effective. It allows needle guidance for aspiration, drainage and biopsies. It can assess tissue vascularity and can be used as a tool for follow up of already diagnosed studies undergoing treatment. It can always be used along with other complementary imaging techniques like conventional radiography and cross sectional imaging like CT, MRI. It can be used in problematic settings like in-situ implants, which can significantly
degrade imaging quality of CT and MR studies. The presentation of MSK infections can be challenging as they can present as superficial cellulitis, necrotizing or non-necrotizing fasciitis, myositis, a soft-tissue abscess, osteomyelitis, or septic arthritis. The diagnosis in question can be complicated due to similarity in imaging appearances of infection mimics such as inflammatory processes, masses, vascular and developmental pathologies.

We have been able to satisfactorily use high resolution ultrasound in evaluating granulomatous lesions, pyogenic abscesses, parasitic conditions, infected hematomas, foreign body granulomas, soft tissue cellulitis, myositis, infective arthritis, post operative collection. Non-infective inflammatory lesions which can present as infection mimics such as vascular, developmental lesions, nonspecific inflammatory tenosynovitis, cysts, synovitis and rheumatoid arthritis, benign and malignant masses can also be excluded with a high degree of confidence.

Ultrasound is the appropriate and ideal extension of the clinician’s hands in diagnosis of infection and infections mimics. Ultrasound examination needs to be done by a well-trained operator, ultrasound delivers valuable information in the evaluation of superficial soft tissue masses. Ultrasound scores over CT due to inherently better soft tissue contrast resolution, no need for complex multiplanar reconstructions, is superior to CT for diagnosis of fine
calcifications and myositis and there is no radiation risk. Similarly ultrasound scores over MRI due to good intra-tissue contrast resolution while MRI has intermediate soft tissue contrast resolution, diseased structures are better demonstrated on HRUS due to edema, for superficial structures HRUS also has better spatial resolution.

Limitations of high-resolution ultrasound include its operator dependence, the restricted field of view, artifact such as anisotropy and inability to penetrate beyond bone and calcific densities. However, in majority of the situations, the soft tissues especially the most superficial soft tissues, which benefit from the remarkable resolution of very high frequency transducers, high-resolution ultrasound can provide information similar to that obtained with an MRI at a fraction of the cost for superficial soft tissue lesions. It can also be used for subsequent follow up of patients after the primary assessment has been done by CT/MRI to gauge response to treatment. It can be considered a good screening modality and a problem solving tools in the hand of the imagiologists.

Dr Amit Kharat conducts workshop on MSK US imaging for shoulder, knee, ankle and general MSK imaging and can be reached on amit@cyberteleradiology.com.

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