

MUSCULOSKELETAL ULTRASOUND

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Preface **xi**

Jon A. Jacobson

Introduction to Musculoskeletal Ultrasound **569**

Jon A. Jacobson

This article reviews basic concepts of musculoskeletal ultrasound as an introduction. Basic information with regard to ultrasound equipment, transducer selection, scanning technique, and image optimization are reviewed. Examples of normal structures as seen at ultrasound are shown. Ultrasound artifacts and advanced ultrasound techniques, such as color and power Doppler imaging, also are discussed briefly.

Common Tendon and Muscle Injuries: Upper Extremities **577**

Karen Finlay and Lawrence Friedman

Ultrasonography is a useful diagnostic tool for the assessment of various soft tissue disorders. This article reviews a number of common muscle and tendon injuries affecting the upper extremity, discussing and illustrating their ultrasound imaging appearance. Important regional anatomy and imaging techniques and tips are discussed in the context of ultrasound assessment of these upper extremity disorders.

Common Tendon and Muscle Injuries: Lower Extremity **595**

Theodore T. Miller

The lower extremity is well suited to sonographic evaluation because the muscles and tendons are large and superficial and thus easily shown. Sonography is a focused examination, concentrating on the area of pain and clinical suspicion. Its advantages over MR imaging are better spatial resolution, capability of dynamic evaluation, and real-time guidance for percutaneous procedures. In addition, the advent of extended field of view imaging allows the entire length or cross-section of an area of interest to be

shown, matching MR imaging's ability to display a large anatomic region. This article reviews the sonographic appearances of disorders of the muscles and tendons of the lower extremity.

Ultrasound of Ligaments and Bone

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Joseph G. Craig

The development of high-frequency transducers allows excellent visualization of ligaments. Normal ligaments are hyperechoic and are 2 to 3 mm in width. Ligamentous tear may occur acutely or chronically. Tear is characterized by swelling of the ligament, discontinuity, redundancy, and retraction. Ultrasound evaluation of bone is rarely requested, but the radiologist should be aware of incidental findings in bone, particularly fracture. In the setting of biopsy and osteomyelitis, ultrasound can be very useful.

Musculoskeletal Infection

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Mahmud Mossa-Basha and Marnix van Holsbeeck

This article discusses the use of ultrasound to evaluate musculoskeletal infection. Throughout the text, a general description of the types of infections, including stages and classification, and the inciting organisms, is presented. Typical sonographic appearances of infection are visualized. Advantages and disadvantages of the use of ultrasound in the assessment of infectious processes and its ability to discriminate sepsis from inflammatory processes are discussed.

Peripheral Nerve Abnormalities

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Carlo Martinoli, Alberto Tagliafico, Stefano Bianchi, Gerd Bodner, Luca Padua, Angelo Schenone, and Moshe Graif

As experience is gained, ultrasound (US) continues to identify an increasing number of nerves and related pathologic conditions. High-resolution US provides cost-effective, accurate morphologic information regarding a variety of nerve abnormalities including inherited disorders and developmental anomalies, nerve involvement in medical diseases, entrapment syndromes, traumatic injuries, and neurogenic masses. In many of these conditions, US can significantly enhance clinical decision making regarding conservative or surgical treatment. In clinical practice, US can be considered an ideal complement to clinical and electrophysiologic testing for the diagnostic work-up of patients who have peripheral neuropathies.

Soft Tissue Foreign Bodies: Sonographic Diagnosis and Therapeutic Management

669

William E. Shiels II

With the advent of meticulous sonographic techniques, high-resolution sonography is the main imaging tool used for the detection and localization of non-radiopaque foreign bodies in soft tissue. Written in the context of the author's clinical experience over 15 years with identification, localization, and removal of more than 400 foreign bodies in the soft tissues, bones, joints, tendons, facial structures, and the orbit, this article focuses on the management of soft tissue foreign bodies, including those in muscle, tendon, and intra-articular spaces and structures.

Sonographic Evaluation of the Musculoskeletal Soft Tissue Masses**683***Ronald S. Adler and Sinchun Hwang*

This article describes the sonographic appearance of a variety of soft tissue masses. The authors review the current indications of musculoskeletal sonography as a screening and diagnostic imaging modality and its therapeutic role in the management of soft tissue masses.

Dynamic Sonography of Joints and Soft Tissues**699***Viviane Khoury and Étienne Cardinal*

This article reviews the wide variety of joint and soft-tissue disorders that can be diagnosed using dynamic sonography. The authors discuss dynamic maneuvers that enhance its diagnostic power and that can be easily incorporated into the sonographic examination. Many of these disorders cannot be diagnosed by any other imaging method. Sonography is a useful and rapidly evolving technique for the investigation of many joint and soft-tissue disorders. Sonography is well suited for examinations of the musculoskeletal system because structures are often superficial, examinations may be done in a position that is comfortable for the patient, and comparisons with the contralateral side are possible. In addition, the real-time imaging capability of sonography is a particularly advantageous feature, permitting dynamic evaluation of a system of movement. Sonography is increasingly recognized as complementary to cross-sectional modalities. Some disorders of muscles, tendons, nerves, and joints can best be observed—and some can only be observed—when demonstrated dynamically during motion of the extremity, muscle contraction, probe compression, or position change of the patient. In this review, we discuss dynamic maneuvers that can be incorporated into the sonographic examination of each peripheral joint and of extra-articular soft tissues.

Inguinal Region Hernias**711***David A. Jamadar and Michael G. Franz*

Inguinal hernias are a common cause of groin discomfort, and when small they may be difficult to diagnose clinically. Sonography is a useful imaging modality aiding in the diagnosis of inguinal hernias and their complications both before and following surgery. Inguinal anatomy is discussed briefly, but this article emphasizes scanning technique and pitfalls that may be encountered when using sonography to diagnose small and often clinically occult inguinal hernias.

Rheumatoid Arthritis: Ultrasound Assessment of Synovitis and Erosions**727***Robert Lopez-Ben*

Rheumatoid arthritis is a chronic, frequently progressive autoimmune disease that can at times be difficult to diagnosis radiographically at its earlier stages. Early treatment with disease-modifying antirheumatic drugs can decrease the extent of joint damage; therefore early, accurate diagnosis is essential. Ultrasound can directly evaluate the synovium, and can assess for erosive changes that may be radiographically occult. This article reviews the role of ultrasound in evaluating synovitis and bone erosions of the hands and feet in the diagnosis and management of these patients.

Ultrasound Guided Musculoskeletal Procedures**737***David Fessell and Marnix van Holsbeeck*

This article reviews several ultrasound (US)-guided procedures, including aspiration of joint, bursal, and periarticular fluid collections; aspiration of calcific tendinitis; injection of joints and bursa; tenotomy; and biopsy of soft tissue masses. Imaging guidance ensures that procedures are done safely and successfully. US has several advantages over CT guidance and other methods of performing these.

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