Ultrasonography Applications in Diagnosis and Management of Early Rheumatoid Arthritis

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KEYWORDS

• Early-onset rheumatoid arthritis • Synovitis • Power Doppler
• Ultrasonography • Ultrasound

Key Points

- High-frequency ultrasonography allows detailed assessment of superficial structures including tendons, tendon sheaths, joint capsule, cartilage, and cortical surface of bone.
- Gray-scale ultrasonography can visualize proliferative synovial tissue, fluid collections in tendon sheaths or joints, and bony erosions.
- Doppler ultrasonography can visualize synovial hyperemia, the strongest predictor of future joint damage in rheumatoid arthritis.
- Change in synovial thickening and hyperemia in response to treatment can be documented with serial ultrasonography.

As arthritis is so common, new imaging modalities have often been used for its assessment shortly after they have become available. Only a few months after Konrad Roentgen began lecturing on his "X-rays," the first articles on imaging features of arthritis were published in 1896.[1] The first articles on the use of ultrasonography in rheumatoid arthritis (RA) came from the University of California at Los Angeles, and were published in 1975.[2] It was not until the 1980s and 1990s that the potential of ultrasonography to assess typical changes of RA became apparent. At that time, ultrasound equipment with higher frequencies became more readily available. Higher ultrasound

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frequencies allow better resolution of structures at shallow locations. These probes were initially developed for the assessment of thyroid glands, but were soon used by providers in musculoskeletal medicine. Since then, annual numbers of publications on musculoskeletal ultrasonography have increased almost exponentially (**Fig. 1**).

Ultrasonography can now be a point-of-care modality: The provider performs the examination in the office, with no referral needed. Findings can be addressed immediately, and necessary adjustments of treatment can be made at the same visit. If a fluid collection is detected and an aspiration is indicated, ultrasound guidance can help improve the accuracy of the aspiration and injection.[3]

RATIONALE FOR USING ULTRASONOGRAPHY IN THE ASSESSMENT OF EARLY RHEUMATOID ARTHRITIS

Without imaging of soft tissues, providers in rheumatology have to rely on surrogate markers of joint inflammation. It is assumed that tenderness and swelling over joints are due to synovitis. If serologic markers of inflammation are abnormal, this is taken as an additional indicator of joint inflammation. However, fullness and pain on examination may have causes other than synovitis, and elevated sedimentation rates or levels of C-reactive protein may not always be due to RA. Even fibromyalgia patients may complain about morning stiffness and swollen hands.

Assessment of Early Rheumatoid Arthritis: Ultrasonography Versus Clinical Scores

Clinical scores remain the mainstay of assessment of disease activity. These scores, alone or in combination with measurement of acute-phase reactants, give no actual information about presence or absence of features of RA such as synovitis,

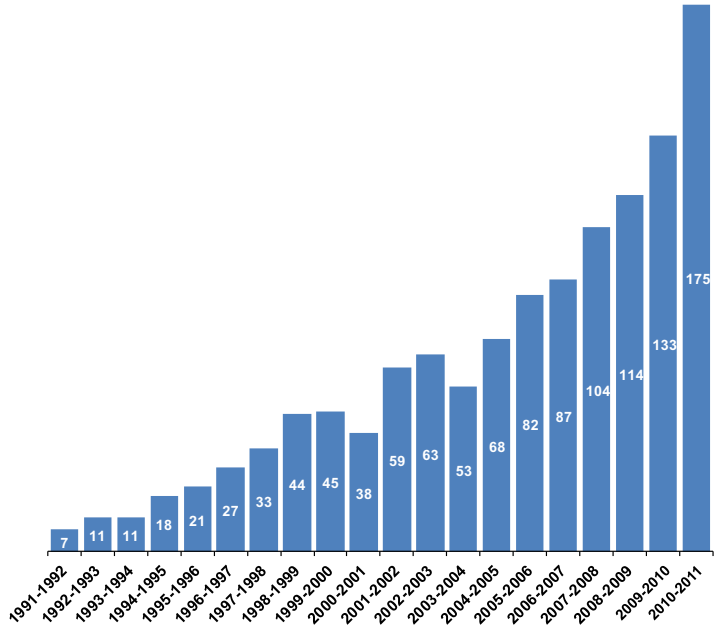

Fig. 1. Publications on musculoskeletal ultrasonography, 1991 to 2011. OVID search terms "musculoskeletal" and "ultrasound."