RHEUMATOID ARTHRITIS

Does ultrasonography reliably detect bone erosion in RA metacarpophalangeal joints?

Ultrasonography is increasingly used in clinical practice for the assessment of joint inflammation in patients with rheumatoid arthritis (RA). In the context of a growing emphasis on preventing RA-associated bone damage through early detection and treatment, a group of researchers from Copenhagen University Hospital, Denmark, has demonstrated that ultrasonography could also be useful in the diagnosis of erosive disease in metacarpophalangeal (MCP) joints, especially in areas of the joints readily accessible to evaluation by this imaging method.

Uffe Møller Døhn and co-workers first sought to determine the accuracy of high-resolution ultrasonography in different areas of MCP joints. “Because of the widespread use of ultrasonography for diagnosing and follow-up of patients with arthritis,” explains Møller Døhn, “it is crucial that the findings are reliable and valid.” They chose to compare the performance of ultrasonography with that of CT, as CT has been shown to be even more sensitive than MRI for the detection of bone erosion.

The 49 participants—who were part of an investigator-initiated longitudinal imaging study—had active RA and a minimum of two low-grade erosions (Larsen score 2–3) in a wrist or MCP joint. The 2nd–5th MCP joints of one hand of each patient were analysed by multislice CT and ultrasonography for the presence of erosions, and localization of erosions was recorded by quadrant (radial metacarpal head, ulnar metacarpal head, radial phalangeal base or ulnar phalangeal base). In total, erosions were detected by CT in 259 quadrants and by ultrasonography in 142 quadrants.

Using CT as the reference method, ultrasonography had a specificity of 95%, sensitivity of 44% and accuracy of 78% for erosion detection in the MCP joints. “A notable result of the study is the very high specificity of ultrasonography for erosion

CT image in the coronal plane (left panel) and corresponding ultrasonography image in longitudinal view (right panel) of the 2nd metacarpophalangeal joint of a patient with rheumatoid arthritis. An erosion at the radial aspect of the metacarpal head (arrow) is seen on both images. Courtesy of U. Møller Døhn

detection,” highlights Møller Døhn. Furthermore, the vast majority of the ultrasonography-detected erosions were confirmed by CT (115/142; 81%), which suggests that they are true erosions.

“Overall we found a moderate sensitivity of ultrasonography,” says Møller Døhn, “but when we looked at areas that were actually accessible for examination by ultrasonography, we found high sensitivities that are comparable to previous reports on the sensitivity of MRI compared with CT.” Indeed, when the analysis considered only those areas of the joints defined as having good accessibility—namely the dorsal and palmar aspects of all joints, the radial aspect of the 2nd MCP joint and the ulnar aspect of the 5th MCP joint—the sensitivity increased to 71% and the accuracy to 90%.

The study also evaluated the minimum loss of bone volume necessary for ultrasonography to detect erosion. CT-detected bone erosions were graded using the Outcome Measures in Rheumatology Clinical Trials (OMERACT) RA MRI scoring system (RAMRIS), which scores the percentage of bone loss on a 0–10 scale.

Overall, ultrasonography detected 80% of CT-identified erosions in which bone volume loss was >10% (OMERACT–RAMRIS grade 2 or above); when the analysis was limited

to only those areas accessible to ultrasonography, 94% of CT-identified erosions with >10% bone volume loss were detected. Notably, ultrasonography detected even minor erosive changes: 37% of CT-determined erosions with 1–10% bone volume loss (OMERACT–RAMRIS grade 1) were identified overall, rising to 63% of these erosions in ultrasonography-accessible areas.

Møller Døhn and colleagues also compared two semi-quantitative methods of evaluating ultrasonography-detected bone erosion—the Scoring by UltraSound Structural erosion (ScUSSE) and Szkudlarek scoring systems. Both systems scored larger erosions mostly the same; however, the smallest erosions (Szkudlarek grade 1), of which 86% were confirmed by CT, were not scored by the ScUSSE system as they did not meet the criteria for a definite erosion.

The authors conclude that the results of the study are promising, but further studies developing ultrasonography for the assessment of bone erosion in patients with RA, particularly regarding sensitivity to change, are warranted.

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