Imaging technology has made clinical trials in rheumatology shorter and more sensitive, but more research is needed on how best to use ultrasound and MRI in practice.

MRI in particular has made it easier for researchers to detect changes in clinical trials, enabling safer courses of treatment, more sensitive outcome measures and reducing cost and recruitment, said Philip Conaghan, M.B., Ph.D., the chair of musculoskeletal medicine at the University of Leeds in the UK and the co-author of the new review in Current Opinion in Rheumatology. New data on ultrasound as a trial outcome should be forthcoming soon, Dr. Conaghan said.

Meanwhile, ultrasound and MRI have been shown to have use in the clinic, particularly in detecting inflammation in joints that aren’t clinically assessed as synovitic. Rheumatology Network spoke with Dr. Conaghan about what is on the horizon for MRI and ultrasound in rheumatoid arthritis research and practice. This conversation has been edited and condensed.

Philip Conaghan, M.B., Ph.D.

How have MRI and ultrasound changed clinical practice?

We’ve certainly got better access to modern imaging than we had even 10 years ago, with expansion in numbers of MRIs and an increasing number of rheumatologists who have skills in ultrasound. The key concept we’ve learned is that the old belief that persistent inflammation results in damage has been proven with modern imaging. The second big concept is that we’re not very accurate with our fingers. There is disease that we term ‘subclinical inflammation,’ that might have been better termed ‘inflammation that we don’t pick up with our clinical examinations.’ That explains the discrepancies that we’ve seen in people who have apparently clinically responded, and whose X-rays continue to deteriorate. In terms of making an RA diagnosis, we think maybe 5 to 10 percent of people benefit from having imaging at the time of their initial presentation, to help with both accurate identification of synovitis and the extent of joint involvement.

How useful is imaging for monitoring and follow-up in patients being treated for rheumatoid arthritis?

We still lack the cost-effective algorithms. It’s very likely that you may only need imaging of joints in a strategic way. If a patient is doing badly, has a high sed rate, high CRP and swollen joints, you don’t really need imaging to tell you that patient isn’t doing well. But for that patient who you think is doing well, and where there are still treatment options available, it might be useful to say, let’s have a look with imaging to see how well they are being controlled.

We haven’t got as much evidence as we have for use in clinical trials. We have got to think about it in a cost-effective way: Where will it change management? Usage might look different if we are using modern treat-to-target, tight disease control treatment algorithms.

You write about the use of imaging in tapering biologics. What clarity can imaging bring to that question?

It’s a hot area at present. We’ve got clues from a few studies, and these were largely ultrasound studies, that people with a lot of power Doppler signal at time of tapering/withdrawal were more likely to flare. So it may well be that when you’re looking to reduce a patient’s drugs (or the patient wants to), it might be wise to say, let’s have a look first and see how active your disease is.

What we don’t know is if you look at the person who has a lot of active disease, would you switch their drug? I think there are a number of really interesting clinical questions still to answer.

What research is needed on imaging in the clinic?

My big plea for the private practice side is we really need to do some real-world studies on how imaging is used. You can do studies where you have an arm with or an arm without the imaging, you can supply information from imaging to clinicians or not and see if that changes practice. You could do it at the community level, especially at places where people are using one central imaging lab. The ARCTIC study is a recent big study looking at imaging’s role. There’s about four or five studies coming along that might help us.

What has been the effect of imaging on clinical trials?

I do believe ultrasound will be useful in trials, but this was a review of research that is out there. The effect is that with MRI, we can have a shorter number of clinical trials, that the outcome measures are getting better, and soon the outcome measures will be good enough for trials in which you have two active comparators.

We’ve now seen half a dozen studies with biologic versus biologic, and it’s just really hard to show differences in those patients when you’re using only damage measures, because there’s very little damage happening — good for patients but bad for demonstrating effects.
For rheumatoid arthritis, MRI means you can do shorter duration studies of three to six months with much fewer patients. You can pick up erosion changes much earlier than radiographs can and you can measure short-term changes in inflammation objectively by measuring synovitis and osteitis.

How about ultrasound’s use in clinical trials?

Ultrasound is a bit being MRI in clinical trials, but we know that a lot of data is coming. Ultrasound’s strength is that it is much more patient friendly. You’re not restricted to a relatively small number of joints, which traditionally MRI has been. The ultrasound scoring systems are become more robust, and so we will see data out in the next year or two about ultrasound as a trial outcome.

KEY POINTS

- MRI and ultrasonography are highly sensitive modalities and their use can improve diagnostic criteria for rheumatoid arthritis.
- The concept of subclinical inflammation has been established by MRI and ultrasonography, and is evident from the earliest phases of pre-rheumatoid arthritis to those with sustained clinical remission.
- MRI studies of cartilage composition have confirmed a close relationship between synovitis to cartilage proteoglycan loss.
- As evidence on the predictive validity of early MRI findings for radiographic progression and functional outcomes accumulates, MRI is increasingly being employed in outcome assessment in rheumatoid arthritis therapy trials.
- Reduced ultrasonography joint scores are being developed and validated to improve feasibility of both diagnosis and monitoring in routine clinical care.

 [Epub ahead of print] PMID: 26927442


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