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## Ultrasound of Arthritis

### Learning Objectives:

1. To learn preferred, fast ultrasound approaches for arthritis detection
2. To show arthritis examples of upper and lower extremity large joints and MTPs and MCPs
3. To show the OMERACT – EULAR US method, used by rheumatologists

Ultrasonography has become widely available and is increasingly used in patients with rheumatologic diseases [1, 2]. Radiologists and rheumatologists are frequently involved in the (early) diagnosis, intra-articular treatment and, often time-consuming, follow-up of multiple joints in patients with rheumatic disease [3-6]. The specific question to be answered is the presence of arthritis. Knowledge of a fast and reliable, point-of-care ultrasound technique to detect arthritis is important (7,8).

Point-of-care ultrasound is defined as a goal-directed, (bedside) ultrasound examination performed by a health provider to answer a specific question or to guide performance of an invasive procedure [9]. It differs from comprehensive ultrasound exams which provide a thorough evaluation of all anatomic structures. It is less time consuming and often takes only a few minutes for the diagnosis.

Rheumatoid arthritis is the most common chronic systemic inflammatory disease and characterized by proliferative synovitis and inflammatory arthritis. Rheumatoid arthritis affects approximately 1% of the population and is more frequently seen in women [2]. Preferential sites are the peripheral joints, especially the hand and feet, less involvement is seen of hip and knee joints [2]. Since effective medication (biologicals) has become available, the disease has become less clinically relevant and a chronic disease. Follow-up of disease activity is done clinically using DAS 28, a disease activity score however ultrasound is used as well [10]. The exact position of ultrasound has not yet been established. In the last two decades the focus has shifted towards early disease detection, early treatment and remission [3]. Imaging, both magnetic resonance imaging and ultrasound, have gained attention in research, since subclinical inflammation can be detected. It has been shown there is a correlation between the presence of subclinical inflammation and the development of structural damage as erosions [11].

### Transducers

Linear transducers are the preferred choice for most joints. For a medium size or large joint (shoulder, elbow, hip, knee, and ankle), a 9–12 MHz transducer is sufficient. A curvilinear transducer (5–8MHz) may be necessary for the hip joint in a larger patient. For the smaller, more superficial joints (wrist, subtalar, hand and foot joints), a higher frequency transducer (12–18MHz) or a small footprint hockey-stick transducer (18Mhz) is used [1, 2, 4].

Ultrasound features of arthritis include:

- Fluid in the joint
- Synovial hypertrophy
- Hyperemia

Imaging technique

In the lecture the optimal ultrasound approaches for the joints will be shown, together with some tips and tricks to optimize the procedure [1].

OMERACT – EULAR US method

An increasing number of rheumatologists use ultrasound in the management of rheumatic disease. In order to monitor disease, rheumatologists, joined in a EULAR -OMERACT taskforce, developed a standardised method for the scoring of ultrasound synovitis [5,6]. This is a quantitative scoring system for synovitis, using both grey scale and doppler ultrasound. This method is time-consuming and not practical for routine use. However, this is used in the research setting. Havaardsholm et al. published on ultrasound in the management of rheumatoid arthritis in a large randomised controlled strategy trial (ARCTIC trial) [12]. They conclude that the use of ultrasound in the follow-up of patients with early rheumatoid arthritis treated according to current recommendations is not justified based on the ARCTIC results. Also aiming to achieve imaging remission increases treatment cost and effort but does not significantly improve results [13].

Conclusion

Arthritis is easily detected with knowledge of the positioning of the patient and transducer for each joint. A fast screening technique might be of help to shorten US procedures.

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