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Lessons learned from the PICASSO trial regarding ultrasound examinations of osteoarthritic hand joints performed by occupational therapists

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Osteoarthritis is the most common joint disease, and the hands are commonly affected. In fact, the lifetime risk of getting symptomatic hand osteoarthritis is around 40 % [1]. Commonly reported symptoms are joint pain, stiffness, and problems with daily activities due to reduced physical function [2]. The thumb base joints, more specifically the first carpometacarpal joints (CMC1), represent the most commonly affected joint within the hand [3]. Since the CMC1 joint is important for pinch grip and grip strength, osteoarthritis in this joint has often a larger impact on physical function than osteoarthritis in the finger joints [4].

Although osteoarthritis is considered a non-inflammatory disease, we know that inflammation is commonly present in the joints, and studies have shown that joints with inflammation have a higher risk of symptoms and disease progression compared with joints without inflammation [5–7]. Hence, there is rationale to test whether reducing inflammation has a role in the management of hand osteoarthritis.

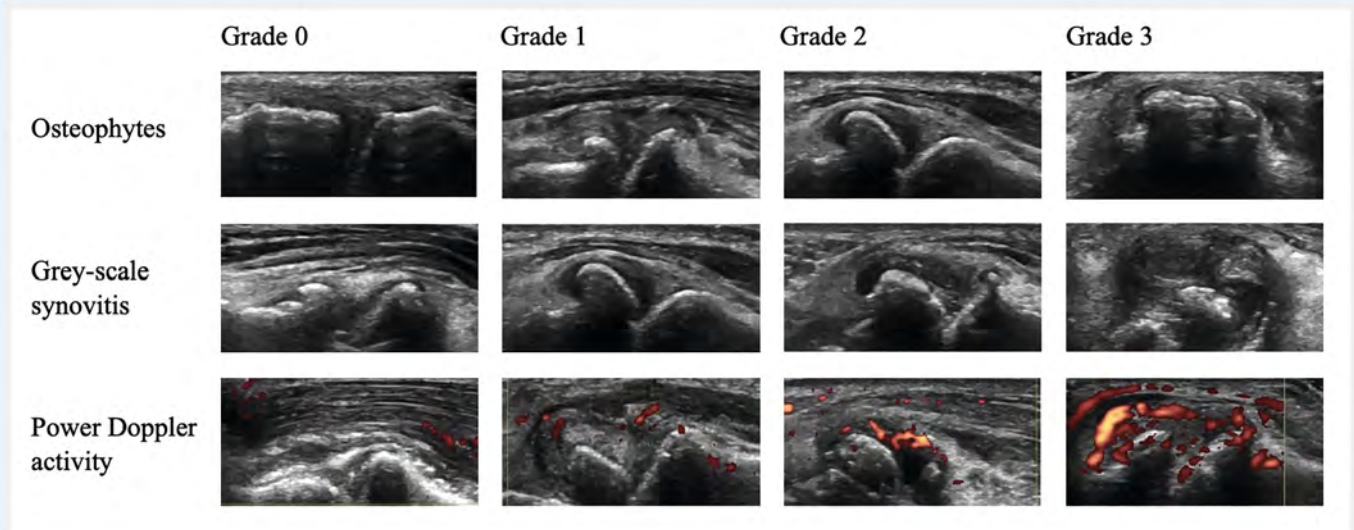
While steroid injections are commonly used in clinical practice to reduce the amount of inflammation in osteoarthritic joints, previous studies have not been able to show a clinical benefit in terms

of pain reduction from these injections [8–11]. However, the previous studies had shortcomings, like not including synovitis or a minimal pain severity as inclusion criteria, and the 2 full-text studies were small with only approximately 20 participants per group. Further, no previous studies have assessed whether a non-pharmacological intervention, focusing on patient education, hand exercises and thumb orthoses is better than intraarticular steroid injections.

The aim of the present study is to compare the efficacy and safety of 3 different therapies: Intraarticular steroid injections in the CMC1 joint, intraarticular saline injections in the CMC1 joint, and a multimodal occupational therapy intervention (ClinicalTrials.gov ID NCT06084364). In total 354 patients with ultrasound-detected synovitis in a painful osteoarthritic CMC1 joint will be randomized to one of the 3 interventions and the duration of the randomized controlled trial (RCT) is 6 months. Our primary endpoints are change in thumb base pain after 4 and 12 weeks. After 4 weeks, the objective is to assess whether intraarticular steroids are superior to intraarticular saline injections, whereas after 12 weeks we aim to compare the efficacy of the intraarticular injections with the occupational therapy intervention. Key secondary endpoints include changes in physical function and synovitis on MRI. The RCT is followed by an open-label extension phase in which all patients can receive steroid injections if there is a clinical indication in terms of pain and synovitis. Participants will be followed for 2 years. Six centers in Norway are recruiting participants, and we started the inclusion of patients in November 2023.

Task shifting from rheumatologists to occupational therapists is increasingly common, and osteoarthritis care led by occupational therapists has shown to not be non-inferior to rheumatologist-led care [12]. Ultrasound may also be a valuable tool in clinical practice for occupational therapists in order to not only confirm the osteoarthritis diagnosis, but also determine the degree of synovial inflammation.

Hence, the participants in the PICASSO trial are examined and followed by trained occupational therapists, who also perform the ultrasound examination of the participants. The occupational therapists were trained by experienced ultrasonographers to learn the basic principles of ultrasound and how to evaluate osteophytes, grey-scale synovitis and power Doppler activity in the CMC1 joints. Both theoretical and hands-on training sessions were arranged ahead of the study. In total, 12 occupational therapists participated in a one-day hands-on course at Diakonhjemmet Hospital where they practiced on ultrasound examination of the CMC1 joint of patients with different degrees of osteophytes, grey-scale synovitis, and power Doppler activity. An online theoretical training session was arranged before the hands-on training, and online meetings about the results from the exercises and discussion of still images were arranged after each reliability exercise. We also arranged monthly online sessions, where the occupational therapists had the opportunity to ask questions. To facilitate scoring, we developed an atlas to be used during scoring. Some examples from our atlas are shown in ► **Fig. 1**. Reliability exercises were performed prior to study initiation. In round 1, 25 images were



► **Fig. 1** Example images from the ultrasound atlas showing CMC1 joints with no pathology (grade 0), mild (grade 1), moderate (grade 2) and severe (grade 3) osteophytes, grey-scale synovitis and power Doppler activity.

► **Table 1** Inter-assessor reliability between the occupational therapists and the experienced ultrasonographer.

	Mean (min-max) weighted kappa
Osteophytes (round 1)	0.71 (0.60–0.85)
Grey-scale synovitis (round 1)	0.54 (0.25–0.77)
Grey-scale synovitis (round 2)	0.72 (0.61–0.94)
Power Doppler activity (round 1)	0.86 (0.70–0.94)

scored for osteophytes and grey-scale synovitis (grade 0–3) and 15 images were scored for power Doppler activity (grade 0–3). In round 2, 25 new images were scored for grey-scale synovitis. We used still images since examination of real patients was not feasible. The inter-assessor reliability between each occupational therapist and the experienced ultrasonographer was calculated. All occupational therapists demonstrated good inter-reader reliability using the experienced ultrasonographer as the gold standard (► **Table 1**).

Our results demonstrate that health personnel who have no experience with ultrasound can learn how to assess ultrasound findings in osteoarthritic joints as long as they receive proper theoretical and hands-on training. Ultrasound may also be a valuable tool for occupational therapists for use in clinical practice.

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