Diagnostic and Interventional Imaging (2014) xxx, xxx—xxx

REVIEW / *Musculoskeletal imaging*

# Role of ultrasound in assessing remission in rheumatoid arthritis

**K. Ben Abdelghani, S. Miladi*, L. Souabni, S. Kassab, S. Chekili, A. Laatar, L. Zakraoui**

*Rheumatology department, Mongi Slim hospital, la Marsa, Tunisia*

**KEYWORDS**
Rheumatoid arthritis;
Remission;
Ultrasound

**Abstract**
*Introduction:* Remission is the ultimate goal of the treatment of rheumatoid arthritis (RA). However, the diagnosis of remission might still be vague. Musculoskeletal ultrasound (US) seems to effectively assess synovitis, effusion and bone damage. Thus, its role could be relevant for the diagnosis, monitoring or detection of relapse in the follow-up of RA in remission. The goal of this review of the literature was to clarify the added value of ultrasonography during remission.
*Methods:* A systemic search of the literature was performed on Medline and Scopus. The following key words were used: rheumatoid arthritis, remission, US. Fifty-six papers were collected, then after an in depth analysis, twelve articles were selected for analysis.
*Results:* Twelve papers were identified that assessed remission in RA. Remission criteria varied from one author to another. The number of joints assessed by US varied from six to 44 with the wrist and metacarpo-phalangeal joints of the dominant hand scanned at least. Irrespective of remission criteria, all authors demonstrated that US detected Doppler positive synovitis in patients in clinical remission. Also, power Doppler synovitis predicted structural damage and future flares of RA.
*Conclusion:* US seems to be more effective than a clinical exam. True remission in RA must be defined. Moreover, the inclusion of this technique in the new definition of remission is being validated.


*Abbreviations:* ACR, American College of Rheumatology; CDAI, Clinical Disease Activity Index; DAS, Disease Activity Score; DP, Power Doppler Ultrasound; PGA, Patient Global Assessment; GPA, Global Physician Assessment; EULAR, European League Against Rheumatism; SH, Synovial Hypertrophy; PIP, Proximal Interphalangeal Joints; MCP, Metacarpo-Phalangeal Joints; MTP, Metatarso-Phalangeal Joints; TJC, Tender Joint Count; SJC, Swollen Joint Count; OMERACT, Outcome Measures in Rheumatoid Arthritis Clinical Trials; OR, Odds Ratio; RA, Rheumatoid Arthritis; SDAI, Simple Disease Activity Index.

* Corresponding author.
*E-mail address:* saoussenmld@hotmail.com (S. Miladi).

http://dx.doi.org/10.1016/j.diii.2014.07.006


Please cite this article in press as: Ben Abdelghani K, et al. Role of ultrasound in assessing remission in rheumatoid arthritis. Diagnostic and Interventional Imaging (2014), http://dx.doi.org/10.1016/j.diii.2014.07.006

## Introduction

In the past few decades, the rate of remission in rheumatoid arthritis (RA) had increased thanks to the intensive prescription of disease modifying antirheumatic drugs [1] and the introduction of biotherapies when necessary [2]. A specific strategy of treating early RA adapted to each patient and including close follow-up, called ''Treat To Target'' is now being implemented [3]. Indeed, it has been shown that soon after the onset of RA, there is a period of time called a window of opportunity when effective treatment can induce remission in a significant number of patients [4]. Obtaining remission in RA is our ultimate goal because this is the only way to prevent structural progression and articular damage. Several definitions of remission have been established and all of them take into account clinical and biological criteria. However, numerous studies have shown evidence of persistent infra-clinical synovitis on imaging, in particular with musculoskeletal ultrasound (US) [5—7]. Moreover, musculoskeletal US has now been proposed as one of the remission criteria for monitoring RA [8].

The goal of this review of the literature was to assess the role of US in evaluating RA in remission, to determine which joints should be assessed, and which scores should be used.

## Materials and methods

We performed a systematic search of the literature from 2005 to 2013 using the Medline and Scopus databases with the following keywords: rheumatoid arthritis; remission and ultrasound. Fifty-six papers were identified. Only articles published in French or English were selected. Seven articles were excluded because they evaluated US on vessels and three others MRI. Thirteen articles evaluated active RA. Clinical cases; letters; and editorials were also excluded. A total of twelve articles that met our criteria were selected for analysis.

A summary of the selected articles is provided in Fig. 1.

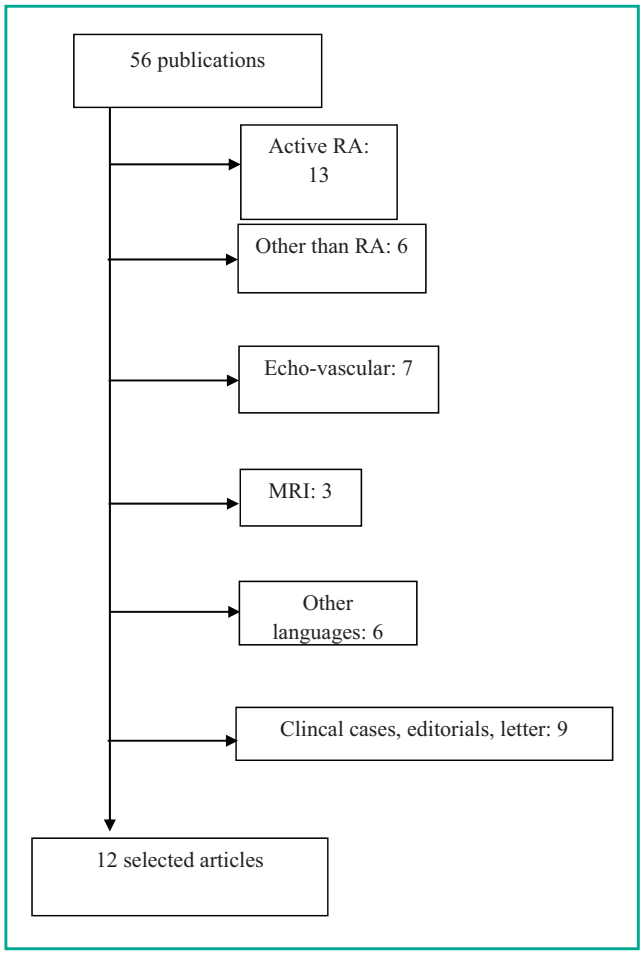


**Figure 1.** Selection of articles.

## Results

Our review of the literature included 12 articles evaluating the role of osteoarticular US in patients followed-up for RA in remission. All studies were prospective. The main results are summarized in Table 1.

First, we looked at the definitions of « remission » that were used in different studies. We then identified the different joints and scores used in US. Finally, the added value of US for monitoring remission was identified in each study.

### Definition of remission

Inclusion criteria varied from one study to another. In 4/12 articles, remission was based on the physician's judgment [9—12]. However, objective composite scores to evaluate RA activity showed that numerous patients were not in remission. The different scores used included the modified American College of Rheumatology (ACR) criteria, the Disease Activity Score of 28 joints (DAS 28), and/or the Simple Disease Activity Index (SDAI) (Appendix 1). The percentage of patients in remission according to these different scores is summarized in Table 2. When ACR or DAS 28 criteria were used, between 76 and 54% of patients were in remission. When SDAI criteria were used (with a cutoff of 3.3), only 29 to 44% were in remission. The duration of remission according to these scores varied from 2 [13] to 6 months [14—17].

### Ultrasound assessment, number of joints tested and scoring

The physicians assessing joints on US were blinded to clinical and biological findings in all the articles in this study. All operators used B-mode to assess synovial hypertrophy (SH) and Power Doppler (PD) to assess synovial vascularization. The OMERACT 2005 (Outcome Measures in Rheumatoid Arthritis Clinical Trials) [18] definitions were used to define B-mode and PD synovitis.

#### Joint scores

B-mode SH and PD hypervascularization were determined using a semi-quantitative score in all studies except one. When a semi-quantitative score was used, a grade of 0 to 3 was assigned to each joint depending on the extent of B-mode SH and then these scores were added together. Also, a score of 0 to 3 was used for each joint depending on the extent of DP synovial vascularization and the scores were

Please cite this article in press as: Ben Abdelghani K, et al. Role of ultrasound in assessing remission in rheumatoid arthritis. Diagnostic and Interventional Imaging (2014), http://dx.doi.org/10.1016/j.diii.2014.07.006