Joint Bone Spine xxx (2019) xxx–xxx

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Original article

Early clinical response and long-term radiographic progression in recent-onset rheumatoid arthritis: Clinical remission within six months remains the treatment target

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ARTICLE INFO

Article history:
Accepted 13 February 2019
Available online xxx

Keywords:
Rheumatoid arthritis
Structural progression
Radiography
Outcomes
Prognosis
Sharp score

ABSTRACT

Objectives: The primary objective was to evaluate the correlation between 5-year radiographic structural disease progression and early clinical remission in recent-onset rheumatoid arthritis (RA). The secondary objective was to assess the correlation between erosion development in joints free of damage at baseline and early clinical remission.
Methods: A single-center retrospective study was performed in 133 patients meeting ACR criteria for RA of recent onset. Two radiologists independently quantified radiographic structural lesions at the hands and forefeet using the Sharp van der Heijde (SVdH) Score at the diagnosis then 5 years later. The patients were divided into two groups based on whether the lesions were stable (SVdH Score increase ≤ 10 points, Xray-STAB group) or had worsened (SVdH Score increase > 10 points, Xray-PROG group). The clinical response was assessed after 3, 6, and 12 months. Clinical remission was defined based on the DAS28-CRP, SDAI, CDAI, and ACR/EULAR Boolean remission criteria.
Results: Of the 133 patients, 90 were in the Xray-STAB group (mean SVdH score increase, 2.4 ± 2.9) and 43 in the Xray-PROG group (22.9 ± 13.4). The 6-month disease activity indices were higher in the Xray-PROG group ($P < 0.05$). Achieving a 6-month clinical remission had 58.6%, 39.1%, 40.0%, and 32.2% sensitivity for predicting 5-year radiographic stability when the DAS28-CRP, SDAI, CDAI, and Boolean definition were used, respectively; corresponding values for specificity were 73.8%, 85.7%, 83.7%, and 90.5%.
Conclusion: Achieving a clinical remission within 6 months is key to preventing radiographic structural progression in patients with recent-onset RA.

1. Introduction

Recent-onset rheumatoid arthritis (RA) is still a common chronic inflammatory disease that can progress to irreversible structural damage responsible for permanent disabilities [1]. Diagnosing and treating RA is an emergency, since the early initiation of effective disease-modifying anti-rheumatic drugs (DMARDs) limits the activity of the disease and prevents structural progression [2]. Both the European League Against Rheumatism (EULAR) and the American College of Rheumatology (ACR) have determined that the treatment objective in patients with recent-onset RA is the prompt achievement of a clinical remission or of low disease activity [3,4]. In many studies, methotrexate combined with either a glucocorticoid or a biologic achieved remission rates of up to 50%–60% [5,6]. Close monitoring with treatment adjustments as needed is effective in preventing joint destruction, minimizing functional impairments, and decreasing the risk of RA-associated complications [7]. Erosions and joint space narrowing, which were usually assessed using the Sharp score as modified by van der Heijde (SVdH) in therapeutic trials, correlate with long-term functional impairments [8,9]. In patients with recent-onset RA, the presence of one or more erosions is a well-established marker of poor prognosis that requires treatment intensification [10]. The introduction two decades ago of biotherapies that act more rapidly and are effective in slowing disease progression [11,12] has markedly decreased the development of structural damage in patients with RA [13,14]. Although many prospective studies have evaluated long-term structural disease progression, and more specifically its potential associations with

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https://doi.org/10.1016/j.jbspin.2019.03.008
1297-319X/

clinical disease activity and early remission, data from everyday clinical practice are scarce.

The primary objective of this study was to assess 5-year radiographic structural disease progression and its potential association with parameters measuring early clinical remission in patients with recent-onset RA. The secondary objective was to assess the potential association between erosion development in one or more previously intact joints and the early clinical response.

2. Methods

Study-related documents were approved by institutional ethics committees and review boards. All patients provided written informed consent.

2.1. Patients

We conducted a single-center retrospective study at the Saint-Luc University Hospital in Brussels (Belgium). Patients diagnosed with recent-onset RA between January 1999 and August 2011 were included. We included those patients in the UCLouvain Brussels cohort who met the following criteria: age > 18 years; RA meeting 1987 ACR and 2010 ACR/EULAR criteria; disease onset within the past 3 years; absence of treatment with conventional DMARDs or biologics at the time of RA diagnosis; clinical follow-up including determination of the Disease Activity Score on 28 joints (DAS-28), Simple Disease Activity Index (SDAI), Clinical Disease Activity Index (CDAI), and ACR/EULAR Boolean definition of clinical remission, at diagnosis then 3, 6, and 12 months later; and availability in our Archiving System of anteroposterior radiographs of the hands and wrists and of the forefeet, taken at diagnosis (baseline) then 5 years later and meeting standard image-quality criteria.

2.2. Radiographic assessments

Between February and March 2017, two radiologists blinded to all patient data reviewed the radiographs independently. One was a final-year radiology resident (junior reader) and the other was a radiologist who had 2 years of experience with musculoskeletal imaging (senior reader). Structural lesions visible on the radiographs of the hands and wrists and of the forefeet were quantified by determining the SVdH Score [15,16]. The readers assessed the baseline and 5-year radiographs at the same time and were aware of the chronological order of the images. The SVdH Score was determined according to the standard procedure involving the assessment of erosions at 44 sites and of joint space narrowing at 42 sites. Erosions were scored from normal (0) to complete collapse (5 at the hands and wrists and 10 at the forefeet). Joint space narrowing was scored from normal (0) to fusion (4). The SVdH score was computed as the sum of the subscores, at baseline and after 5 years. Interobserver reproducibility and intraobserver repeatability of the radiographic SVdH assessments were excellent, with intraclass correlation coefficients above 0.81.

Several patient groups were defined based on the radiographic findings. The change in the SVdH Score between baseline and the 5-year timepoint was used to separate the patients into two groups, one with stable radiographic findings defined as an SVdH change no greater than 10 points (Xray-STAB group] and the other with structural progression defined as an SVdH score change greater than 10 points (Xray-PROG group). The 10-point SVdH Score cutoff was selected based on the distribution of SVdH score changes shown in Fig. 1. Furthermore, the patients were also separated into two groups based on whether they experienced the development of at least one erosion in a previously healthy joint among the 44 sites evaluated to determine the SVdH. Thus, one of these groups had a score of 0 at baseline and of 1 or more after 5 years at one or more sites (NEW-ER$^+$ group) and the other had a score of 0 at both time points at all sites free of erosions at baseline (NEW-ER- group).

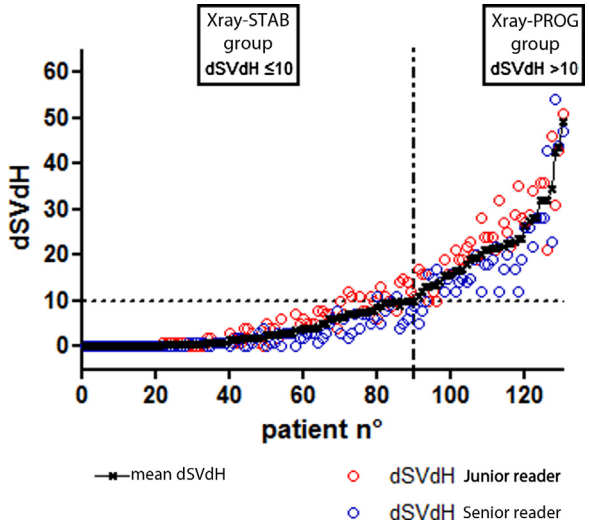

Fig. 1. Cumulative plot of change in the SVdH Score between baseline and year 5 in each patient. SVdH, Sharp score modified by van der Heijde; ΔSVdH, change in SVdH Score over 5 years. Each dot represents ΔSVdH in a given patient, as assessed by each of the two readers. The values obtained by the senior reader were used to plot the overall ΔSVdH.

2.3. Clinical assessment

Each patient received follow-up from a rheumatologist after 3 and 6 months then every 6 to 12 months. Disease activity was assessed based on the tender joint count (TJC, among 68 joints) and swollen joint count (SJC, among 66 joints); patient and physician Visual Analog Scale (VAS) Scores for disease activity; the DAS28-CRP, CDAI, SDAI, and ACR/EULAR Boolean definition of remission; and the Health Assessment Questionnaire (HAQ) Score. Clinical remission was defined as DAS28-CRP $\leq$ 2.6, SDAI $\leq$ 3.3, CDAI $\leq$ 2.8, and the Boolean definition met (TJC, SJC, CRP, and VAS Score all $\leq$ 1).

2.4. Statistical analysis

The statistical tests were performed using XLSTAT (Addinsoft, New York, NY, USA) and SPSS Statistics (IBM, Armonk, NY, USA). Values of *P* below 0.05 were taken to indicate significant differences. Interobserver reproducibility was assessed based on the intraclass correlation coefficients (ICCs) computed using a two-way mixed effects model. The correlation between an early clinical remission and the 5-year radiographic outcome was evaluated based only on the findings by the senior reader. Student's *t*-test was chosen for between-group comparisons. Performance of the early clinical response in predicting 5-year radiographic progression was determined using Fisher's exact test to analyze the contingency table.

3. Results

3.1. Patients

Of the 175 patients who met all but the last inclusion criteria, 41 had at least one missing radiograph and 1 had at least one radiograph that failed to meet standard quality criteria, leaving 133 patients for the study. Table 1 lists their main baseline features. At diagnosis, the groups showed no significant differences for age, sex distribution, or disease activity. The proportions of patients with positive tests for rheumatoid factor and anti-cyclic

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Table 1
Main baseline features of the 133 study patients.

	Overall population $n=133$	Xray-STAB group $n=90$	Xray-PROG group $n=43$
Age, years, mean ± SD	49.9 ± 13.3	51.23 ± 13.4	47.2 ± 12.8
Females/Males, (% females)	100/33 (75.2)	70/20 (77.8)	30/13 (69.8)
Symptom duration, months, mean ± SD	10.5 ± 10.3	9.9 ± 9.7	11.7 ± 11.3
Disease duration, months, mean ± SD	8.6 ± 15.5	6.7 ± 12.1	12.5 ± 20.4
Smokers/non-smokers (% smokers)	35/68 (26.3)	26/43 (28.9)	9/25 (20.9)
Anti-CCP$^+$/Anti-CCP$^-$ (% Anti-CCP$^+$)	98/31 (73.7)	63/26 (70.8)[a]	35/5 (81.4)[a]
RF$^+$/RF$^-$ (% RF$^+$)	92/39 (69.2)	56/32 (62.2)[a]	36/7 (83.7)[a]
HAQ, mean ± SD	1.25 ± 0.67	1.32 ± 0.60	1.10 ± 0.77
SJC, mean ± SD	7 ± 6	7 ± 5	7 ± 6
TJC, mean ± SD	8 ± 7	8 ± 7	8 ± 7
DAS28-CRP, mean ± SD	4.89 ± 1.30	4.94 ± 1.18	4.78 ± 1.51
SDAI, mean ± SD	28.4 ± 15.5	28.6 ± 14.1	27.8 ± 18.2
CDAI, mean ± SD	25.8 ± 14.8	26.2 ± 13.3	25.1 ± 17.6
SVdH, mean ± SD	6.2 ± 13.9	4.6 ± 7.0[a]	9.5 ± 22.2[a]
Patients with/without erosions (% with erosions)	79/54 (59.4)	47/43 (52.2)[a]	32/11–74.4)[a]
Patients with/without joint space loss (% with joint space loss)	57/76 (42.9)	35/55 (38.9)	22/21 (51.1)

Xray-STAB group, patients with a no greater than 10-point increase in the SVdH score between baseline and year 5; Xray-PROG group, patients with a greater than 10-point increase in the SVdH Score between baseline and year 5; SJC: swollen joint count; TJC: tender joint count; DAS28-CRP: disease activity score on 28 joints with C-reactive protein; SDAI: simple disease activity index; CDAI: clinical disease activity index; SVdH: sharp score modified by van der Heijde.
[a] $P<0.05$.

citrullinated peptide antibodies were significantly higher in the Xray-PROG group.

All 133 patients received methotrexate therapy. During the 5-year follow-up, the proportion of patients given biologic DMARD therapy of any duration was 44.3% overall, with no significant difference between groups (46.7% vs. 39.6%). Glucocorticoid therapy was prescribed to 37.8% of the patients. The treatment sequences varied widely over the 5-year follow-up in the study population.

3.2. Structural progression

Overall, the mean SVdH Score was 6.2 at the diagnosis of RA and 14.8 at the 5-year timepoint. At diagnosis, 79 (59.4%) patients had at least one erosion. Of the 133 patients, 90 (67.7%) were in the Xray-STAB group (mean SVdH change, 2.4 ± 2.9) and 43 (32.3%) were in the Xray-PROG group (mean SVdH change, 22.9 ± 13.4) (Fig. 1). At diagnosis, the total SVdH Score and the SVdH Erosion Score were significantly higher in the Xray-PROG group (9.5 ± 22.2 and 5.9 ± 15.2, respectively) than in the Xray-STAB group (4.6 ± 7.0 and 2.4 ± 4.1, respectively). After 5 years, the total SVdH Score, SVdH Erosion Score, and SVdH joint space narrowing score were significantly higher in the Xray-PROG group (32.3 ± 25.0, 17.0 ± 16.9, and 15.3 ± 13.3, respectively) than in the Xray-STAB group (6.4 ± 7.8, 3.7 ± 4.4, and 3.1 ± 6.2, respectively).

3.3. Clinical response

Table 2 reports the values of the clinical scores after 3, 6, and 12 months. At diagnosis, overall disease activity was moderate according to the DAS28-CRP (4.89 ± 1.3) and severe according to the SDAI (28.4 ± 15.5) and CDAI (25.8 ± 14.8), with no significant difference between the Xray-STAB and Xray-PROG groups.

When the Boolean definition was used, clinical remission was significantly more common in the Xray-STAB group after 3, 6, and 12 months. After 6 months, all three disease activity scores were significantly higher in the Xray-PROG group than in the Xray-STAB group.

3.4. Correlation between the early clinical response and 5-year structural progression

Table 3 shows the performance of a clinical remission at 6 months for predicting radiographic structural stability after 5 years.

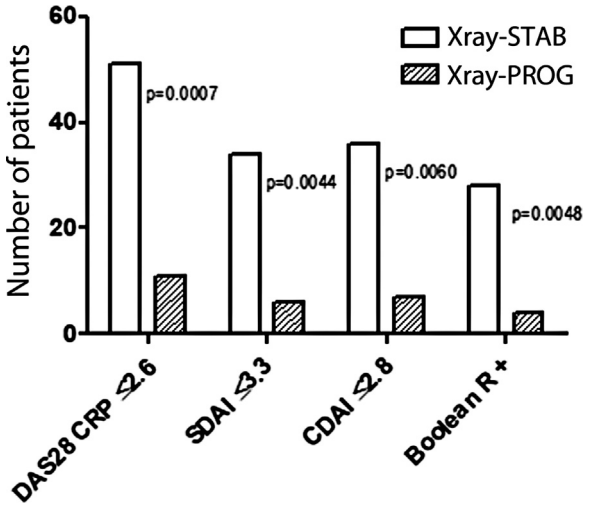

Fig. 2. Distribution of the absolute number of patients between the groups with and without radiographic progression after 5 years according to whether a clinical remission was achieved by 6 months, as defined using various tools. Xray-STAB group, patients with a no greater than 10-point increase in the SVdH Score between baseline and year 5; Xray-PROG group, patients with a greater than 10-point increase in the SVdH Score between baseline and year 5; DAS28-CRP: disease activity score on 28 joints with C-reactive protein; SDAI, Simple Disease Activity Index; CDAI: clinical disease activity index; Boolean-R: ACR/EULAR Boolean definition of remission met.

For the DAS28-CRP, SDAI, CDAI, and Boolean definition, sensitivity for predicting radiographic stability after 5 years was 58.6%, 39.1%, 40.0%, and 32.2%, respectively. Corresponding specificities were 73.8%, 85.7%, 83.7%, and 90.5%. The odds ratios were 3.992, 3.849, 3.429, and 4.508. Thus, patients in clinical remission 6 months after treatment initiation had a high likelihood of experiencing no radiographic structural progression within the first 5 years (Fig. 2).

3.5. Correlation between the early clinical response and joints with new erosions

Of the 133 patients, 51 were in the NEW-ER$^+$ group, i.e., had at least one erosion in a joint that was erosion-free at baseline (Table 4). The baseline SVdH Score was not significantly different between the NEW-ER$^+$ and NEW-ER- groups. In contrast, after 5 years the total SVdH Score and SVdH erosion component were significantly higher in the NEW-ER$^+$ group. None of the three clinical

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Table 2
Clinical disease activity scores at baseline then 3, 6, and 12 months later and radiographic SVdH Score at baseline then 5 years later.

	Overall population $n = 133$	Xray-STAB group $n = 90$	Xray-PROG group $n = 43$
Clinical scores, mean ± SD			
DAS28-CRP T0	4.89 (±1.30)	4.94 (±1.18)	4.78 (±1.51)
DAS28-CRP 3M	3.25 (±1.44)	3.11 (±1.47)	3.54 (±1.35)
DAS28-CRP 6M	2.99 (±1.40)	2.73 (±1.37)[a]	3.50 (±1.33)[a]
DAS28-CRP 12M	2.75 (±1.30)	2.66 (±1.37)	2.94 (±1.11)
SDAI T0	28.4 (±15.5)	28.6 (±14.1)	27.8 (±18.2)
SDAI 3M	13.2 (±13.0)	12.2 (±13.0)	15.3 (±12.9)
SDAI 6M	11.1 (±12.7)	9.4 (±12.47)[a]	14.7 (±12.1)[a]
SDAI 12M	8.9 (±10.4)	8.5 (±11.4)	9.8 (±8.2)
CDAI T0	25.8 (±14.8)	26.2 (±13.3)	25.1 (±17.6)
CDAI 3M	12.3 (±12.3)	11.6 (±12.6)	13.8 (±11.5)
CDAI 6M	10.2 (±12.2)	8.6 (±12.2)[a]	13.5 (±11.6)[a]
CDAI 12M	8.2 (±10.0)	7.8 (±10.9)	9.1 (±7.7)
HAQ T0	1.25 (±0.67)	1.32 (±0.60)	1.10 (±0.77)
HAQ 3M	0.75 (±0.66)	0.71 (±0.67)	0.84 (±0.65)
HAQ 6M	0.59 (±0.59)	0.52 (±0.58)	0.73 (±0.58)
HAQ 12M	0.50 (±0.50)	0,47 (±0.56)	0.55 (±0.50)
Boolean definition of remission met, yes/no (% yes)			
3M	28/100 (28%)	25/62 (40%)[a]	3/38 (8%)[a]
6M	32/97 (33%)	28/59 (47%)[a]	4/38 (11%)[a]
12M	38/91 (42%)	30/58 (52%)[a]	8/33 (24%)[a]
SVdH, mean ± SD			
SVdH baseline	6 ± 14	5 ± 7[a]	10 ± 22[a]
SVdH 5Y	15 ± 19	6.82 ± 7.86[a]	32.37 ± 24.44[a]

Xray-STAB group, patients with a no greater than 10-point increase in the SVdH score between baseline and year 5; Xray-PROG group, patients with a greater than 10-point increase in the SVdH score between baseline and year 5; SVdH: Sharp score modified by van der Heijde; DAS28-CRP: Disease Activity Score on 28 joints with C-reactive protein; SDAI: simple disease activity index; CDAI: clinical disease activity index; T0: baseline (diagnosis of rheumatoid arthritis); M: month; Y: year.
[a] $P < 0.05$.

Table 3
Performance of clinical remission within 6 months, as defined using various tools, in predicting 5-year radiographic structural disease progression.

Clinical remission at 6 months	*n*	Xray-STAB group, *n* of patients	Xray-PROG group, *n* of patients *n*	PPV %	NPV %	Se %	Sp %	OR [95%CI]
DAS28-CRP ≤ 2.6	62	51	11	82.3	46.3	58.6	73.8	3.992 [1.8–8.9]
SDAI ≤ 3.3	40	34	6	85.0	40.4	39.1	85.7	3.849 [1.5–10.1]
CDAI ≤ 2.8	43	36	7	83.7	40.0	40.0	83.7	3.429 [1.4–8.5]
Boolean definition of remission	32	28	4	87.5	39.2	32.2	90.5	4.508 [1.5–13.9]

Xray-STAB group, patients with a no greater than 10-point increase in the SVdH Score between baseline and year 5; Xray-PROG group, patients with a greater than 10-point increase in the SVdH Score between baseline and year 5; DAS28-CRP: disease activity score on 28 joints with C-reactive protein; SDAI: simple disease activity index; CDAI: clinical disease activity index; PPV: positive predictive value; NPV: negative predictive value; Se: sensitivity; Sp: specificity; OR: odds ratio; 95% CI: 95% confidence interval.

Table 4
Correlations linking the clinical disease activity scores, the radiographic score, achieving a clinical remission, and the development of erosion(s) in one or more previously healthy joints.

		NEW-ER$^+$ group $n = 51$	NEW-ER- group $n = 78$
DAS28-CRP 6M	mean ± SD	3.02 ± 1.47	2.94 ± 1.30
	remission yes/no (% yes)	25/26 (49%)	37 / 41 (47%)
SDAI 6M	mean ± SD	11.46 ± 13.49	10.57 ± 11.58
	remission yes/no (% yes)	14 / 37 (27%)	26 / 52 (33%)
CDAI 6M	mean ± SD	10.52 ± 12.88	9.94 ± 11.48
	remission yes/no (% yes)	14/37 (27%)	29 / 49 (37%)
Boolean Remission 6M	remission yes/no (% yes)	12/39 (23.5%)	19/59 (24.4%)
SVdH T0	mean ± SD	4.9 ± 6.3	8.0 ± 20.9
SVdH 5Y	mean ± SD	18.2 ± 16.8[a]	10.1 ± 23.5[a]

NEW-ER$^+$ group, patients with at least one new erosion in a previously healthy joint at the 5-year assessment; NEW-ER- group, patients with no new erosions in previously healthy joints at the 5-year assessment; DAS28-CRP: disease activity score on 28 joints with C-reactive protein; SDAI: simple disease activity index; CDAI: clinical disease activity index; SVdH: sharp score modified by van der Heijde.
[a] $P < 0.05$.

scores at 6 months differed significantly between the NEW-ER$^+$ and NEW-ER- groups.

4. Discussion

Earlier treatment and the introduction of new drugs have considerably improved the outcome of RA over the past 20 years. Thus, most patients now remain free of radiographic lesions and progressive disabilities [17]. Many studies sponsored not only by the pharmaceutical industry but also by universities (e.g., the DINORA trial) have established that patients with recent-onset RA benefit from achieving an early remission [18]. Our study of patients managed under the conditions of everyday clinical practice focused on the long-term radiographic outcome. The results confirm that obtaining an early clinical remission is a major treatment goal in patients with recent-onset RA. The decreased risk of long-term structural damage in patients with an early clinical remission in our study is consistent with the results of the FIN-RACO, CAMERA,

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and COBRA studies [19–21]. Disease activity at diagnosis was moderate in our patients recruited at a single center in Belgium, whereas sponsored trials usually included patients from various geographic regions who had high disease activity at baseline [22]. In keeping with our findings, patients in the ESPOIR cohort who achieved a remission within the first year were at lower risk of erosions after 3 years [23]. In a study from Finland, another favorable factor was a radiographic response after 1 year, which predicted better radiological outcomes after 15 years [24]. An interesting point, however, is that 59.4% of our patients had structural lesions at diagnosis and a vast majority had positive tests for RF and anti-CCP antibodies. Our study confirms earlier reports that these characteristics are associated with poorer long-term radiological outcomes [10,25]. The introduction of biologics has almost completely eliminated radiological structural disease progression in RA [26,27,28]. However, no consensus exists about the definition of structural disease progression, and both the hands and the feet must be evaluated to avoid false-negative results [29]. We separated patients with and without structural disease progression, using a cutoff of 10 points for the SVdH Score change between baseline and the 5-year timepoint. This cutoff is greater than the smallest detectable difference, which is often used in studies of RA [30,31].

Distinguishing between patients who will and will not experience meaningful structural disease progression is of considerable interest to the clinician. In patients with recent-onset RA, rapid radiological progression within the first year predicts long-term functional impairments and joint destruction [32]. The treatment goal in recent-onset RA is rapid disease control, i.e., a remission as defined by the various disease activity scores, whose use is recommended [33]. We assessed the sensitivity and specificity of disease activity scores assessed after 3, 6, and 12 months for predicting 5-year structural progression. Given the time-to-action of DMARDs, notably methotrexate, the 6-month assessment is the most relevant. The disease activity score values after 6 months correlated closely with one another. The ACR/EULAR Boolean remission criteria, which define a more firmly established remission, was more specific than the disease activity scores and showed a significant correlation after only 3 months. In the COBRA trial, the ACR/EULAR Boolean definition exhibited very good performance in predicting functional and radiological outcomes [34]. A recent literature review found no evidence of an association at diagnosis of the DAS28-CRP and SVdH Score, whereas the DAS28-CRP during follow-up was associated with radiographic progression [35]. In another study, the DAS28-CRP after 12, 24, 48, and 72 weeks correlated with radiographic progression after 96 weeks [36]. Disease activity is linearly related to radiographic progression, particularly in RF-positive patients [37]. In the SWEFOT trial [38], in contrast, patients experienced radiographic progression within 2 years despite achieving an early remission as defined by the DAS28-CRP. The clinical disease activity scores used in these studies and in ours fail to consider involvement of the feet. This point may explain the discrepancy between control of the inflammatory process and structural progression in some patients.

An increase in the SVdH Score may be related to progression of pre-existing erosions and joint space loss and/or to the development of these features in one or more previously normal joints. De novo joint involvement may be a key determinant of an unfavorable radiological outcome. We are not aware of any published studies in which de novo erosions or joint space loss in previously normal joints were assessed. After 5 years, 38% of our patients had developed at least one erosion in a previously normal joint, and this event was associated with the presence of erosions at baseline. In our study, achieving an early remission did not prevent the development of new erosions.

One limitation of our study is the retrospective design, which is associated with biases related to the lack of standardization in patient follow-up and to differences in the treatment regimens used. In particular, patients with a poor clinical response after 6 months but no structural disease progression after 5 years may have received treatment intensification during this interval. Also, the inclusion period was long and the time from symptom onset to RA diagnosis varied across patients. This last factor may explain the lack of a correlation between the clinical and radiological manifestations, as patients with higher erosions scores at baseline may have had a longer symptom duration at the time of the diagnosis of RA. Structural lesions were assessed only at baseline then 5 years later and, consequently, no information was obtained about the time of new lesion development or the pace of lesion progression during this period. Finally, imaging techniques with greater sensitivity for detecting structural lesions, such as ultrasonography and magnetic resonance imaging, were not used in our study [39].

In conclusion, patients who achieve a clinical remission within 6 months, as defined based on the DAS28-CRP, SDAI, CDAI, and ACR/EULAR Boolean criteria, have a high likelihood of remaining free of radiographic structural progression after 5 years compared to other patients. Achieving a clinical remission within 6 months is therefore crucial to protect patients with recent-onset RA from radiographic structural progression.

Disclosure of interest

The authors declare that they have no competing interest.

Acknowledgments

We thank CAP48 (RTBF) for supporting this study via the rheumatoid arthritis medical research project.

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