CLINICAL SCIENCE

High prevalence of spondyloarthritis-like MRI lesions in postpartum women: a prospective analysis in relation to maternal, child and birth characteristics

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Handling editor Josef S Smolen

► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/annrheumdis-2020-217095).

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Received 4 February 2020
Revised 25 March 2020
Accepted 3 April 2020
Published Online First 16 April 2020

To cite: Renson T, Depicker A, De Craemer A-S, *et al*. *Ann Rheum Dis* 2020;**79**:929–934.

ABSTRACT

Objectives Bone marrow oedema (BMO) on MRI of sacroiliac joints (SIJs) represents a hallmark of axial spondyloarthritis (SpA), yet such lesions may also occur under augmented mechanical stress in healthy subjects. We therefore sought to delineate the relationship between pregnancy/delivery and pelvic stress through a prospective study with repeated MRI. Results were matched with maternal, child and birth characteristics.

Methods Thirty-five women underwent a baseline MRI-SIJ within the first 10 days after giving birth. MRI was repeated after 6 months and, if positive for sacroiliitis according to the Assessment of SpondyloArthritis International Society (ASAS) definition, after 12 months. BMO and structural lesions were scored by three trained readers using the Spondyloarthritis Research Consortium of Canada (SPARCC) method.

Results Seventy-seven per cent of the subjects (27/35) displayed sacroiliac BMO immediately postpartum, 60% fulfilled the ASAS definition of a positive MRI. After 6 months, 46% of the subjects (15/33) still showed BMO, representing 15% (5/33) with a positive MRI. After 12 months, MRI was still positive in 12% of the subjects (4/33). Few structural lesions were detected. Intriguingly, in this study, the presence of BMO was related to a shorter duration of labour and lack of epidural anaesthesia.

Conclusion A surprisingly high prevalence of sacroiliac BMO occurs in women immediately postpartum. Our data reveal a need for a waiting period of at least 6 months to perform an MRI-SIJ in postpartum women with back pain. This study also underscores the importance of interpreting MRI-SIJ findings in the appropriate clinical context.

Key messages

What is already known about this subject?

- Bone marrow oedema (BMO) on MRI of the sacroiliac joints (SIJs) lacks specificity for spondyloarthritis and can also occur under circumstances of augmented biomechanical stress.

What does this study add?

- A strikingly high number of postpartum women display sacroiliac BMO on MRI.
- The occurrence of sacroiliac BMO on MRI in postpartum women is associated with a shorter duration of labour and the lack of epidural anaesthesia.
- Sacroiliac BMO on MRI in postpartum women decreases significantly over time, but persists mainly in subjects older than 30 years.

How might this impact on clinical practice or future developments?

- Our data indicate the need for a waiting period of at least 6 months to perform an MRI of the SIJs in postpartum women with back pain.

INTRODUCTION

Axial spondyloarthritis (axSpA) is an inflammatory rheumatic condition, characterised by involvement of the spine and/or sacroiliac joints (SIJs). Bone marrow oedema (BMO) on MRI of the SIJs plays a central role in the Assessment of SpondyloArthritis International Society (ASAS) classification criteria for axSpA, with a sensitivity of the imaging arm of 66%.[1 2] SIJ BMO on MRI is present in up to 84% of patients with non-radiographic axSpA.[3] However, it is frequently seen in a non-inflammatory setting. Recently, a high prevalence of BMO meeting the ASAS definition of a positive MRI for sacroiliitis was seen even in young, active individuals, such as military recruits (36%) and professional ice hockey players (41%).[4 5] A significant number of healthy volunteers (23%) and patients with mechanical chronic back pain (6%–8%) also fulfil the ASAS definition of a positive MRI for active sacroiliitis.[6 7] Seventeen per cent of the mechanical chronic back pain patients show structural SIJ lesions on MRI; however, the different combinations of structural lesions are more seen in patients with axSpA.[7] Although structural lesions of the SIJ are also important characteristics of axSpA, they are not included in the ASAS MRI definition.[8] Importantly, structural lesions may differentiate patients with axSpA from patients with a non-SpA back pain.

In contrast to ankylosing spondylitis, non-radiographic axSpA has a more equal sex distribution.[9–11] Hence, a broad differential diagnosis has to be considered in young women with back pain. Peripartum low back pain is common. In approximately

4% of women, pain persists for more than 6 months postpartum and is occasionally inflammatory in nature.[12–17] Up until now, little is known regarding the presence of sacroiliac MRI lesions in postpartum women, which complicates the distinction with axSpA. Sacroiliac BMO during pregnancy and after childbirth has been reported in previous studies,[6 12 14] yet the extent and frequency of MRI lesions is inadequately described and no prospective follow-up was performed. Thus, it can be challenging to discriminate patients with axSpA from postpartum women with persistent back pain. To date, there are no data regarding the evolution of sacroiliac BMO over time in postpartum women, nor links with maternal, child or birth characteristics.

Therefore, our goal was to explore the association between pregnancy and giving birth, and the occurrence of sacroiliac MRI lesions. Furthermore, this study also aimed to detect the time frame in which these lesions disappear. In addition, MRI findings were correlated with maternal, child and birth characteristics.

METHODS

Subjects

Thirty-five subjects were recruited from the Department of Obstetrics of the Ghent University Hospital. All subjects provided written informed consent. All included women were between 18 and 45 years old, after an uncomplicated, vaginal childbirth. Exclusion criteria were a known diagnosis of SpA and/or inflammatory bowel disease, severe scoliosis, treatment with anti-tumour necrosis factor-α agents, any kind of contraindication for MRI, childbirth through caesarean section and multiple pregnancy (pregnancy with more than one fetus). Baseline demographic and clinical data (SpA criteria, visual analogue scale (VAS) back pain at night and VAS back pain day and night, duration of labour, gravida/para/abortus status, weight gain during pregnancy, epidural anaesthesia, and sex, weight, length and head circumference of the newborn) were collected. HLA-B27 status was determined.

MRI assessment

Within the first 10 days after giving birth, an MRI-SIJ was performed, which was repeated after 6 months, and, if the second MRI fulfilled the ASAS definition of a positive MRI for sacroiliitis, another MRI-SIJ was performed 12 months after giving birth. Identical settings as in routine clinical practice were adopted. Images were obtained on a 1.5 T MRI unit (Aero/Avanto, Siemens Medical, Erlangen, Germany). A body flexed array coil was used to scan the SIJs. The sequence protocol included the following: semicoronal (along long axis of the sacral bone) T1-weighted turbo spin echo (tse) (slice thickness (ST): 3 mm; repetition time/echo time (TR/TE): 679/20 ms); semicoronal short tau inversion recovery (STIR) (ST: 3 mm; TR/TE/TI: 5030/70/150 ms); and axial STIR (ST: 5 mm; TR/TE/TI: 7540/70/150 ms). All images were scored for BMO, capsulitis, enthesitis, high signal intensity in joint space, erosions, sclerosis, fat metaplasia and (partial) ankylosis, as defined by the ASAS MRI working group, by three experienced and calibrated readers (MdH, LJ, NH).[1] Scored lesions were regarded by the readers as characteristic for axSpA. Readers were blinded for time sequence and demographic/clinical data. BMO was scored using the Spondyloarthritis Research Consortium of Canada (SPARCC) method, with a maximum score of 72.[18] BMO was evaluated for depth (deep lesions=extending >1 cm from the articular surface) and intensity (intense lesions=high signal intensity as bright or brighter as vascular structures or intervertebral discs). Additionally, fulfilment of the ASAS definition of a positive MRI for sacroiliitis (≥2 BMO lesions on one slice or ≥1 lesion on two consecutive slices and lesions highly suggestive of SpA) was assessed.[8] Structural lesions (erosions, fatty lesions, sclerosis and ankylosis) were scored using an adjusted SPARCC method. In addition, the proposed cut-off values for erosions and fatty lesions of de Hooge *et al* were applied for each subject for each time point.[19] Individual reader scores were combined and for further analyses the median scores were reported. Regarding dichotomous outputs, the consensus of two out of three readers was reported. In case the month 6 MRI fulfilled the ASAS definition of sacroiliitis, the third MRI was provided to the readers for an independent evaluation. A summary of the inter-reader agreement and the measurement error is shown in the online supplementary text.

Statistical analyses and data management

Statistical analyses were performed using R (V.3.5.2; R Core Team (2018), Vienna, Austria; http://www.R-project.org/) and RStudio (RStudio Team (2018), Boston, Massachusetts, USA; http://www.rstudio.com/). Mean and median values and confidence intervals were determined using descriptive statistics. The significance of SPARCC score differences between time points was calculated by the Wilcoxon signed-rank test. Difference in proportion of subjects having a positive MRI-SIJ was calculated using the McNemar test. Fisher's exact test was used to compare proportions between two independent groups. Correlation with clinical data was assessed using Spearman's rank correlation coefficient. P values≤0.05 were considered as statistically significant. Non-significant p values were labelled in the main text as NS. Study data were collected and managed using REDCap electronic data capture tools.[20 21]

RESULTS

Subjects

Thirty-five subjects were included and underwent the baseline MRI, which was acquired, on average, 5 days postpartum. Thirty-three subjects underwent the month 6 MRI, two subjects were lost to follow-up. Demographics and clinical data are displayed in table 1. Eleven subjects (31%) had back pain at the time of the first MRI. In 8 out of 11 subjects (73%) back pain was chronic (≥3 months) and in four subjects (36%) back pain was inflammatory according to the ASAS criteria. Two subjects had a positive family history for SpA. No extra-articular SpA manifestations were present, except for three subjects (9%) with a history of skin psoriasis.

Sacroiliac MRI lesions

A summary of the detected MRI lesions is presented in table 2. At baseline, the majority of subjects (77%) displayed BMO on MRI-SIJ, with a median SPARCC score of 5. BMO was numerically, but not significantly, more prevalent at the iliac compared with the sacral side of the joint (14.5% vs 11.3% of the quadrants), and significantly more prevalent at the upper SIJ compared with the lower (15.4% vs 10.5%, p≤0.01), and at the anterior part compared with the posterior (19.6% vs 6.2%, p≤0.001). BMO was equally present at the right SIJ compared with the left (13.7% vs 12.1%). Three subjects (9%) had deep BMO lesions at baseline, whereas seven subjects (20%) had intense BMO lesions. Twenty-one subjects (60%) had a positive MRI according to the ASAS definition. High signal intensity in the SIJ space was seen in 13 subjects (37%); however, median score was low (0). Capsulitis and enthesitis were rarely seen.

Table 1 Demographic and clinical data of subjects

Demographics at baseline (n=35)	
Age, years (mean, SD)	29.7 (2.62)
Age>30 years, n (%)	12 (34)
Smoking status, n (%)	
Never	29 (83)
Cessation>3 years	2 (6)
Cessation<3 years	3 (9)
Current smoker	1 (3)
Profession, n (%)	
Physical labour	6 (17)
Non-physical labour	27 (77)
Unemployed/student	2 (6)
Clinical characteristics at baseline (n=35)	
Weight, kg (mean, SD)	68 (10.9)
BMI, kg/m² (mean, SD)	25 (3.7)
Weight gain during pregnancy, kg (median, 95% CI)	10 (9 to 10)
HLA-B27 positivity, n (%)	1 (3)
Back pain symptoms, n (%)	11 (31)
Duration back pain, weeks (mean, SD)*	13.8 (7.65)
≥3 months of back pain (=chronic), n (%)*	8 (73)
VAS back pain at night (median, 95% CI)*	0.5 (0 to 2)
VAS back pain day and night (median, 95% CI)*	1 (1 to 3)
Insidious onset of back pain, n (%)*	9 (82)
Back pain improvement with exercise, n (%)*	9 (82)
No improvement of back pain with rest, n (%)*	3 (27)
Nocturnal back pain, n (%)*	5 (46)
Alternating buttock pain, n (%)*	3 (27)
Morning stiffness, n (%)*	1 (9)
Inflammatory back pain (ASAS criteria), n (%)*	4 (36)
Family history of SpA, n (%)	2 (6)
Arthritis (history or current), n	0
Enthesitis (history or current), n	0
Dactylitis (history or current), n	0
Uveitis (history or current), n	0
Psoriasis (history or current), n (%)	3 (9)
Inflammatory bowel disease (history or current), n	0
Current pregnancy and delivery (n=35)	
First pregnancy (G=1), n (%)	18 (51)
First delivery (P=1), n (%)	22 (63)
Duration of labour, hours (median, 95% CI)	8 (6 to 12)
Epidural anaesthesia, n (%)	22 (63)
Male newborn, n (%)	17 (49)
Weight newborn, g (mean, SD)	3341 (502)
Length newborn, cm (mean, SD)	50 (2.4)
Head circumference newborn, cm (mean, SD)	34 (1.5)

*Only those patients with back pain were retained.
ASAS, Assessment of SpondyloArthritis international Society; G, gravida; P, para; SpA, spondyloarthritis; VAS, visual analogue scale.

A significant decrease in SPARCC score was seen after 6 months ($p \leq 0.001$) (figure 1). Five subjects (15%) still had a positive MRI ($p \leq 0.001$), persisting in four subjects (12%) after 12 months. A significant drop in high signal intensity in the joint space was seen after 6 months ($p \leq 0.01$), while no residual capsulitis or enthesitis was reported. There were no deep or intense BMO lesions detected at follow-up.

Almost no structural MRI lesions were seen, neither at baseline nor at follow-up (table 2). No subjects displayed erosions on ≥3 quadrants at baseline, while only one subject showed erosions on three quadrants at month 12. Two subjects had ≥3 quadrants showing fatty lesions at month 6 and one subject had five quadrants showing fatty lesions at month 12. In three subjects (7.4% of the quadrants) BMO transformed to fatty lesions during follow-up. An example of a subject with postpartum sacroiliac MRI lesions is shown in figure 2.

Correlation between MRI lesions and clinical data

The correlation of MRI findings with relevant clinical data is shown in table 3. No significant association was found between baseline MRI findings and the presence of back pain. Both subjects developing erosions or fatty lesions in ≥3 quadrants after 12 months had back pain. One subject was HLA-B27 positive; she did not have back pain and had a baseline SPARCC score of 8 with one intense BMO lesion. Unfortunately, she was lost to follow-up. Four subjects would have fulfilled the ASAS classification criteria if there was a suspicion of axSpA: three fulfilled the ASAS definition of a positive MRI for sacroiliitis and had inflammatory back pain, one had chronic back pain, a positive MRI and skin psoriasis. Baseline SPARCC scores and a positive MRI-SIJ were not significantly associated with the subject's age, although all five subjects with persistent BMO up to 12 months were older than 30 years. No significant association was found between baseline MRI lesions and the subject's gravidity and parity. A shorter duration of labour was associated with higher baseline SPARCC scores and consequently also with a higher percentage of women fulfilling the ASAS definition of a positive MRI for sacroiliitis at baseline. When epidural anaesthesia was performed, significantly lower baseline SPARCC scores were found. Baseline MRI findings were not associated with the sex and biometry of the newborn.

Other aberrant MRI findings

In 21 subjects (60%), aberrant MRI findings, other than sacroiliac inflammatory or structural lesions, were seen at baseline. Fifteen subjects (43%) had both sacroiliac lesions and other aberrant MRI findings. The most frequent unforeseen MRI finding was symphysis pubis BMO, which was present in 18 subjects (51%) at baseline and persisted in 7 (39%) women after 6 months. Fourteen out of 18 subjects (82%) with symphysis pubis BMO at baseline also had sacroiliac BMO. Degenerative disc disease was seen in one subject (3%) at baseline. Two subjects (6%) had a sacral fracture on baseline MRI (figure 3). Both fractures were asymptomatic and healed spontaneously after 6 months.

DISCUSSION

This is the first prospective study investigating the evolution of sacroiliac MRI lesions in postpartum women. In addition, the correlation of MRI findings with clinical data of mother and child was assessed, which has never been done before. A high prevalence of BMO was seen on MRI-SIJ performed immediately after giving birth, even in subjects without back pain. Notably, a significant portion had a positive MRI for sacroiliitis according to the ASAS definition. Four subjects even fulfilled the ASAS classification criteria for axSpA. A significant decrease in BMO was seen over time, but persisted mainly in subjects older than 30 years. Interestingly, the presence of BMO was related to a shorter labour and the lack of epidural anaesthesia.

Since pregnancy-related low back pain in women is common[22] and they occasionally develop an inflammatory pain pattern, our findings affirm concern about the risk of overdiagnosis of axSpA solely based on MRI findings. Although the BMO lesions do not necessarily occur in SIJ locations most specific for SpA,[4 23] most

Table 2 Inflammatory and structural sacroiliac MRI lesions at baseline, after 6 months and after 12 months

	Baseline (n=35)			Month 6 (n=33)			Month 12 (n=5)		
Inflammatory lesions	Subjects with ≥1 lesion (n, %)	Range (min–max)	Median (95% CI)	Subjects with ≥1 lesion (n, %)	Range (min–max)	Median (95% CI)	Subjects with ≥1 lesion (n, %)	Range (min–max)	Median (95% CI)
Sacroiliitis (ASAS definition)	21 (60)	–	–	5 (15)	–	–	4 (80)	–	–
SPARCC score	27 (77)	0–30	5 (1 to 8)	15 (46)	0–16	0 (0 to 1)	4 (80)	0–14	4 (0 to 4)
Capsulitis	4 (11)	0–12	0 (0 to 0)	0	0–0	0 (0 to 0)	0	0–0	0 (0 to 0)
Enthesitis	1 (3)	0–2	0 (0 to 0)	0	0–0	0 (0 to 0)	0	0–0	0 (0 to 0)
High signal intensity joint space	13 (37)	0–12	0 (0 to 1)	4 (12)	0–10	0 (0 to 0)	0	0–0	0 (0 to 0)
Structural lesions									
Sclerosis	4 (11)	0–13	0 (0 to 0)	4 (12)	0–10	0 (0 to 0)	3 (60)	0–13	1 (0 to 6)
Erosions	1 (3)	0–1	0 (0 to 0)	2 (6)	0–2	0 (0 to 0)	1 (20)	0–3	0 (0 to 3)
Fatty lesions	0	0–1	0 (0 to 0)	5 (15)	0–10	0 (0 to 0)	1 (20)	0–5	0 (0 to 5)
(Partial) ankylosis	0	0–0	0 (0 to 0)	0	0–0	0 (0 to 0)	0	0–0	0 (0 to 0)

ASAS, Assessment of SpondyloArthritis International Society; SPARCC, Spondyloarthritis Research Consortium of Canada.

rheumatologists and radiologists would score these lesions as suggestive for sacroiliitis. This assumption is supported by the findings of Agten *et al*, showing that BMO on MRI-SIJ of postpartum women is indistinguishable from SpA-related sacroiliitis regarding the extent and distribution of the lesions.[12] In addition, the median SPARCC score in our study is relatively high considering the mean SPARCC score of 4.9 in the total study population of the ABILITY-1 trial and a median score of 10.2 in a study by Varkas *et al* in newly diagnosed patients with axSpA warranting treatment.[24 25] Recently, several studies highlighted that BMO lacks specificity for axSpA. Hence, fulfilment of the ASAS definition of a positive MRI for sacroiliitis can also be seen in a non-SpA context, such as in recreational runners, professional ice hockey players, military recruits, chronic back pain patients and healthy controls.[4–6] In a study by Seven *et al*, sacroiliitis on MRI was seen in 41.3% and 21.4% of the postpartum women with and without back pain, respectively.[26] Other recent studies also demonstrated a relatively high presence of sacroiliac BMO in pregnant and postpartum women.[6 12 14]

The question about the need for a higher threshold for sacroiliitis on MRI arises. Particularly the incorporation of structural lesions in the MRI definitions could augment the specificity. Active lesions remain the hallmark for assessment of inflammation in sacroiliitis, but structural lesions increasingly play a role in SpA diagnosis.[27] In the present study, few postpartum women demonstrated structural lesions on MRI-SIJ, which endorses this assumption. The lack of development of fat metaplasia could indicate towards a more mechanical, compared with inflammatory origin of the BMO lesions.[14] However, the follow-up period may not be long enough to detect this transformation. The lack of structural lesions in our study population is in concordance with the existing literature. Intermediate to high levels of erosions appear to offer a high level of specificity for axSpA.[26] Weber *et al* suggested that incorporating erosions in the ASAS MRI definitions would enhance sensitivity from 67% to 81% while maintaining specificity.[28] De Winter *et al* concluded that deep BMO lesions are almost exclusively found in patients with axSpA.[6] A recent retrospective, cross-sectional study of pelvic MRI in a large population of individuals without a rheumatologic condition found that erosions were uncommon and had no age-dependent increase.[29] In another study, no structural changes on MRI were found in pregnant or postpartum women.[14] In the aforementioned study by Seven *et al*, erosions were only present in patients with axSpA and women with postpartum pain, however, with significantly higher prevalence and severity

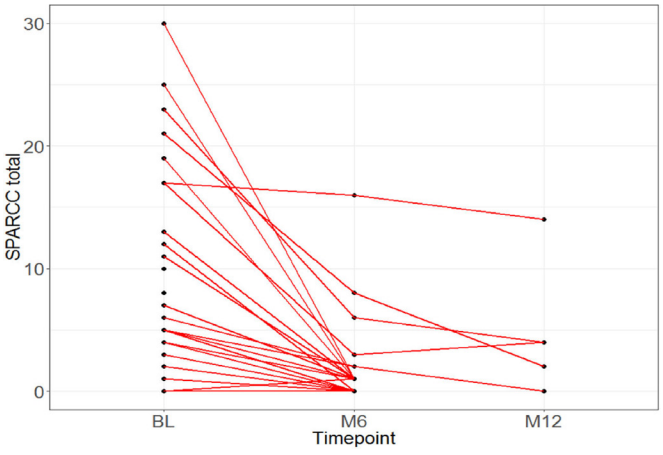

Figure 1 Evolution of the Spondyloarthritis Research Consortium of Canada (SPARCC) scores over time. Each dot represents an MRI of the sacroiliac joints. MRI examinations of the same subject are connected by a straight line. BL, baseline MRI; M6, month 6 MRI; M12, month 12 MRI.

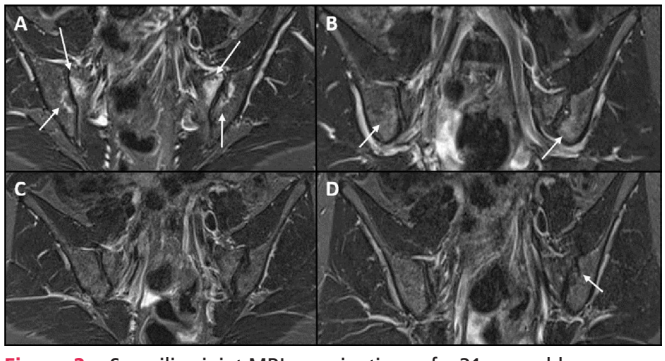

Figure 2 Sacroiliac joint MRI examinations of a 31-year-old postpartum woman. (A) Extensive sacroiliac bone marrow oedema (BMO) on shorttau inversion recovery images at baseline; (B) decrease of the BMO after 6 months; (C) vanishing of the BMO after 12 months; (D) T1 sequences of the month 12 MRI showing sacroiliac erosions.

Table 3 Correlation of baseline SPARCC scores and the presence of sacroiliitis on baseline MRI with clinical data

	Baseline SPARCC		Sacroiliitis on baseline MRI	
	Mean	P value	Yes (n, %)	P value
Back pain		0.36		0.72
Yes	11.6		6/11 (55)	
No	5.6		15/24 (63)	
First pregnancy		0.56		1.00
Yes	8.3		11/18 (61)	
No	6.7		10/17 (59)	
Primipara		0.69		0.69
Yes	7.2		12/22 (55)	
No	8.2		9/13 (69)	
Epidural anaesthesia		**0.050**		0.22
Yes	5.2		11/22 (50)	
No	11.5		10/13 (77)	
Newborn's sex		0.12		0.24
Male	5.8		8/17 (47)	
Female	9.2		13/18 (72)	

	Rho	P value	Yes	No	P value
Subject's age (years)	0.16	0.41	29.9*	29.3*	0.61
Duration of labour (hours)	−0.46	**0.005**	8.4*	12.6*	**0.02**
Newborn's weight (g)	−0.02	0.91	3391*	3266*	0.69
Length (cm)	0.12	0.50	50.2*	49.9*	0.54
Head circumference (cm)	−0.05	0.80	34.3*	34.0*	0.94

Significant correlations are shown in bold.
*Mean values.
SPARCC, Spondyloarthritis Research Consortium of Canada.

in the first. Ankylosis and backfill were only seen in patients with axSpA, making these features highly specific.[26]

As back pain is common in postpartum women,[17 30 31] the differential diagnosis with axSpA is a factual issue in clinical practice. In contrast to the pre-MRI era, in which underdiagnosis of SpA was common, nowadays the risk of overdiagnosis is apparent. This holds several pitfalls. Back pain patients with a false diagnosis of axSpA will likely have less therapeutic effect of non-steroidal anti-inflammatory drugs and are subsequently more likely to receive ineffective biological therapy, which has significant potential side effects and encompasses high socioeconomic costs. Unnecessarily, those patients suffer from the psychological consequences of dealing with a chronic, incurable condition. Considering the significant drop in BMO over time in our study, it seems advisable to wait at least 6 months to perform an MRI-SIJ in postpartum women presenting with back pain. When the MRI is considered as suggestive of SpA, it should be repeated more than 1 year after giving birth.

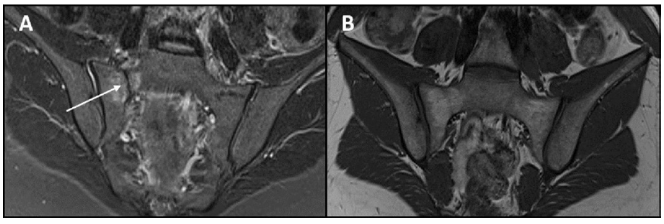

Figure 3 A postpartum sacral fracture on sacroiliac joint MRI of a 28-year-old woman. (A) Shorttau inversion recovery (STIR) sequences of the baseline MRI show a clear fracture of the sacral bone. (B) STIR sequences show a healed sacral fracture after 6 months.

Interestingly, the presence of sacroiliac BMO was associated with a shorter duration of labour. At first sight, this could appear counterintuitive. However, a shorter labour likely reflects an association with more biomechanical stress in a shorter time period. SPARCC scores were significantly lower in subjects undergoing epidural anaesthesia. A more painful labour may be associated with higher levels of biomechanical stress due to an inefficient labour. Both correlations indicate towards a more important role of giving birth compared with the pregnancy itself in the occurrence of BMO on MRI-SIJ. Nevertheless, Eshed *et al* showed a high frequency of sacroiliac BMO, both prepartum and postpartum.[14] In a study by Agten *et al*, no differences in BMO between women with and without caesarean section were found.[12] The dual relationship between biomechanical stress-induced MRI lesions mimicking sacroiliitis and the role of biomechanical stress in the pathophysiology of SpA complicates the interpretation of MRI-SIJ in postpartum women with back pain even further.[32 33]

In 60% of the subjects, other aberrant MRI findings were reported. Symphysis pubis BMO was seen in a significant portion of postpartum women. Although this is generally not regarded as an SpA lesion, a study by Jans *et al* found a high specificity of symphysis pubis BMO on MRI in patients with axial SpA at time of diagnosis.[34] Sacral fracture is considered to be a rare complication of giving birth.[35] Nonetheless, in this rather small study population, MRI detected two sacral fractures. The fractures were asymptomatic and giving birth was atraumatic and without complications, making these findings accidental. Thus, presumably, the prevalence of postpartum sacral fractures is higher than previously thought.

Major strengths of the present study are the prospective acquisition of postpartum women who would not have been symptomatic enough to warrant further investigation, the correlation with clinical data from mother and child, and the repeated MRI examinations, allowing evaluation of the evolution of the lesions. Other strengths include the blinded reads by three independent, experienced and calibrated readers. Limitations are the small sample size and the exclusion of postpartum women who gave birth through caesarean section to better investigate the role of pregnancy versus childbirth in the occurrence of sacroiliac MRI lesions. Considering the small study population, a multivariate analysis is not reliable and therefore not added to this manuscript.

In conclusion, women immediately postpartum show a markedly high prevalence of sacroiliac BMO on MRI. A significant proportion of the women even fulfilled the ASAS definition of a positive MRI for sacroiliitis, which questions the threshold of this definition. These MRI findings decrease over time, even though a fraction retains BMO over 1 year. When suspecting axSpA, our data indicate the need to wait at least 6 months to perform an MRI-SIJ in postpartum women, and, if positive, repeat the MRI after 12 months. Our data also underscore that interpretation of MRI in the appropriate clinical context is extremely important.

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Acknowledgements We thank the study subjects and the staff of the Department of Obstetrics of the Ghent University Hospital for their help in conducting this study.

Contributors TR and AD contributed equally to this manuscript and share first authorship. FEVdB and DE both supervised the manuscript and act as senior author. TR, AD, GV, FEVdB and DE conceived of the presented idea. ID, GV and KR helped in recruiting the subjects. TR, AD, A-SDC, LD, GV and PC recruited the subjects and collected the study data. LJ, MdH and NH evaluated and scored the magnetic resonance images. A-SDC did the statistical analyses. TR and AD wrote the manuscript. FVdB and DE reviewed the manuscript.

Funding This observational prospective study has been supported by an Assessment of SpondyloArthritis International Society (ASAS) research grant. DE is supported by grants of the Fund for Scientific Research-Flanders (FWO), an Excellence of Science Grant (EOS), Fund for Scientific Rheumatology Research (FWRO) and the Research Council of Ghent University.

Competing interests None declared.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting or dissemination plans of this research.

Patient consent for publication Not required.

Ethics approval This study was approved by the Ethics Committee of the Ghent University Hospital. All study subjects provided written informed consent.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request.

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