The Radiological Assessment of Axial Involvement in Psoriatic Arthritis

ENNIO LUBRANO, ANTONIO MARCHESONI, IGNAZIO OLIVIERI, SALVATORE D'ANGELO, CARLO PALAZZI, RAFFAELE SCARPA, NICOLA FERRARA, WENDY J. PARSONS, LUCA BRUNESE, PHILIP S. HELLIWELL, and ANTONIO SPADARO

ABSTRACT. This article summarizes the state of radiological assessment of axial involvement in psoriatic arthritis (PsA). The definition and measurement of axial disease in PsA remain problematic and this situation in turn could affect the choice of approach to evaluate radiological findings of the spine. At present, the radiological assessment has been evaluated by using scoring systems borrowed from ankylosing spondylitis (AS). In particular, the Bath AS Radiology Index (BASRI) and the modified Stoke AS Spine Score (m-SASSS) have been validated for axial PsA. A recent study showed that BASRI and m-SASSS were valid instruments; however, neither score encompassed all radiological features of PsA. Therefore, a new index for assessing radiological axial involvement in PsA was developed — the PsA Spondylitis Radiology Index (PASRI). This new index encompassed a greater range of the spinal radiological features of PsA, providing a greater score range, and it correlated well with anthropometric and patient-reported outcomes. Recently, a study assessed the sensitivity to change of BASRI, m-SASSS, and PASRI, and showed that these 3 instruments provided a moderate sensitivity to change but high specificity to detect the true changes. (J Rheumatol 2012;39 Suppl 89:54–56; doi:10.3899/jrheum.120244)

Key Indexing Terms:
PSORIATIC ARTHRITIS AXIAL INVOLVEMENT BASRI
RADIOGRAPHIC SCORING METHODS m-SASSS PASRI

The definition and measurement of axial disease in psoriatic arthritis (PsA) remain problematic[1]. In fact, axial disease in PsA has been defined in many ways, varying from an isolated unilateral grade 2 sacroiliitis to criteria for ankylosing spondylitis (AS)[2]. Therefore the prevalence of axial PsA, depending on the criteria used, is very broad, ranging from 25% (early disease and based only on clinical assessment) to 75% (late disease and sophisticated imaging). Psoriatic axial involvement (axial PsA) is usually less severe than AS and is dissimilar in many respects[2]. Some radiographic features of axial PsA, such as asymmetrical sacroiliitis, nonmarginal and asymmetrical syndesmophytes, paravertebral ossification, and frequent involvement of cervical spine, seem to be so characteristic as to be potentially helpful in diagnosing PsA and differentiating this condition from some cases of psoriasis with coincidental AS[3,4]. With regard to radiological assessment, there are no specific instruments to assess axial PsA at present. Such an assessment would provide information on disease evolution and outcome either at the level of the individual patient or clinical trials. The main instruments to assess axial radiological involvement are those validated for AS: the Bath AS Radiology Index (BASRI)[5], and the modified Stoke AS Spine Score (m-SASSS)[6]. These instruments have been validated for axial PsA, but neither instrument score encompassed all radiological features of PsA[7].

There has been increasing interest in this topic in the last 5 years. The Group for Research and Assessment of Psoriasis and Psoriatic Arthritis (GRAPPA) carried out a survey on outcome measures. In particular, the role of spinal involvement in patients with psoriasis and PsA was assessed and deemed a common and important problem[8]. Therefore,

From the Academic Rheumatology Unit, Department of Health Sciences, University of Molise, Campobasso; Rheumatology Department, Istituto Ortopedico G. Pini, Milan; Rheumatology Department of Lucania, San Carlo Hospital, Potenza; Madonna Delle Grazie Hospital, Matera; Academic Rheumatology Unit, University of Naples Federico II, Naples; Fondazione Maugeri, IRCCS, Istituto Scientifico Telese Terme, Benevento; Dipartimento di Medicina Interna e Specialità Mediche, UOC Reumatologia, Sapienza - University of Rome, Rome, Italy; Academic Unit of Musculoskeletal and Rehabilitation Medicine, University of Leeds, Leeds, UK.

E. Lubrano, MD, PhD, Academic Rheumatology Unit, Department of Health Sciences, University of Molise; A. Marchesoni, MD, Rheumatology Department, Istituto Ortopedico G. Pini; I. Olivieri, MD, Rheumatology Department of Lucania, San Carlo Hospital and Madonna Delle Grazie Hospital; S. D'Angelo, MD, Rheumatology Department of Lucania, San Carlo Hospital and Madonna Delle Grazie Hospital, and Department of Health Sciences, University of Molise; C. Palazzi, MD, Rheumatology Department of Lucania, San Carlo Hospital, and Madonna Delle Grazie Hospital; R. Scarpa, MD, Academic Rheumatology Unit, University of Naples Federico II; N. Ferrara, MD, Department of Health Sciences, University of Molise, and Fondazione Maugeri, IRCCS, Istituto Scientifico Telese Terme; W.J. Parsons, MSC, MPH, Academic Rheumatology Unit, Department of Health Sciences, University of Molise; L. Brunese, MD, Department of Health Sciences, University of Molise; P.S. Helliwell, MD, PhD, Academic Unit of Musculoskeletal and Rehabilitation Medicine, University of Leeds; A. Spadaro, MD, Dipartimento di Medicina Interna e Specialità Mediche, UOC Reumatologia, Sapienza - University of Rome.

Address correspondence to Dr. E. Lubrano, Department of Health Sciences, University of Molise, Campobasso, Italy.
E-mail: enniolubrano@hotmail.com

the assessment of the spine was considered as recommended but not mandatory for randomized controlled trials or for longitudinal observational study; it was allocated to the so-called "outer core"[9]. This was based on the paucity of validated instruments for some of the domains[9]. GRAPPA considered the development of instruments tailored for PsA or, alternatively, the validation of instruments already developed for other diseases such as AS.

The nontypical radiological pattern of axial PsA, compared to that observed in patients with AS, was first described by McEwen, *et al*[3] and later by Helliwell, *et al*[4]; the 2 studies showed a radiological picture with some peculiarities. For instance, sacroiliac joint involvement was not so frequent and was mainly found as asymmetrical in axial PsA compared to AS. A similar result was found in our previous study, in which axial involvement at the cervical and lumbar spine without sacroiliac involvement was observed in 7/71 patients by BASRI (9.8%) and in 3/70 by m-SASSS (4.28%)[7]. This aspect, in turn, could suggest a different pathophysiology of PsA compared to AS, supporting the concept that among the seronegative spondyloarthritides some identities should be considered separately but under the same umbrella.

Another radiological finding distinguishing axial PsA from AS is the type of syndesmophytes. In fact, since the studies by McEwen, *et al*[3] and Helliwell, *et al*[4], nonmarginal and asymmetrical syndesmophytes were found in patients with axial PsA. These syndesmophytes had a so-called "chunky" shape, meaning a substantial structural difference from those "coarse" marginal and symmetrical ones observed in typical AS. The radiological patterns of axial PsA might be completely different qualitatively from those observed in patients with AS. Even the distribution along the spine is not like AS, in which a progression of syndesmophytes from lumbar toward cervical is the rule; a more random distribution is the most frequent finding in axial PsA. Indeed, sometimes the type of syndesmophytes occurring in patients with axial PsA could be so "atypical" as to be quite difficult to distinguish from those occurring in AS, as well as from those occurring in osteoarthritis. Baraliakos, *et al* proposed a way to differentiate the 2 main radiological findings (syndesmophytes and spondylophytes) by using a 45° angle cut off on lateral views[10]. In fact, the syndesmophytes grow at an angle of < 45° to the vertebral edge, while spondylophytes grow at an angle of > 45° to the vertebral edge[10]. This is a possible way to split the inflammatory radiological findings from those truly degenerative, at the spinal level.

Another aspect, very commonly observed in clinical practice, is the frequent involvement of the zygoapophyseal joints. In some patients they are the only anatomical areas of the vertebrae to be involved. The radiological scoring systems developed and validated for AS do not take into account the posterior elements of the spine. In our previous study, for instance, 22/77 patients (28%) showed fusion of the zygoapophyseal joints at the cervical spine, and this radiological finding was not considered by BASRI and m-SASSS[7].

All these intriguing and to some extent contradictory aspects lead to at least 2 main questions: (1) which patients with PsA should be evaluated radiologically for axial involvement; and (2) how should the evaluation be performed? Few studies address the first question. We evaluated PsA patients with established disease and axial disease. Inclusion criteria were the presence of clinical spinal involvement (inflammatory back pain according to the Calin criteria) and/or radiological axial involvement[7]. More recently, Chandran, *et al* evaluated PsA patients with grade 2 sacroiliitis or greater, inflammatory back pain, and/or restricted spinal mobility[11]. In both studies the inclusion criteria were associated with the presence of symptoms, functional impairment, and structural damage at spinal joints, meaning an established stage of the natural course of the disease and, in turn, meaning that an early stage or even an occult stage of the disease[12] is quite difficult to identify with the present radiological scoring system instruments.

To address the second point, different approaches were used. We evaluated the radiographs of patients with PsA using the BASRI and m-SASSS to validate these 2 instruments for axial PsA[7]. Our study showed, in a group of 77 patients with established disease and axial involvement, that the 2 radiological scores were found to be valid and feasible instruments. Both instruments were easy to use and took little time to complete, both had good test-retest reliability and both showed modest but significant correlations with anthropometric measures of spinal involvement in this disease. It is noteworthy that our results were obtained from real clinical practice. However, in terms of the weakness of these 2 scores in radiologically detecting axial PsA, we found that BASRI assumes at least grade 2 sacroiliitis, and in many patients with axial PsA, spinal involvement without a sacroiliac joint involvement is possible. Again, m-SASSS is characterized by frequent missing data and it takes longer, making it not very practical in daily clinical practice. Finally, both BASRI and m-SASSS do not take into account in their scores the zygoapophyseal joints. In other words, both scores leave out some radiological features of axial PsA. Therefore a new index called PASRI (PsA Spondylitis Radiology Index) was developed in a group of 73 patients with established PsA and axial involvement[13].

The new index proved to be capable of encompassing a greater range of the spinal radiological features of PsA and to be a valid instrument with a good correlation with anthropometric measures and patient-reported outcome measures. Finally, the PASRI had the advantage over the existing instruments (i.e., BASRI and m-SASSS) for the capacity to detect posterior axial involvement[13]. Following these studies, other groups reported results on the radiological

involvement of axial PsA. In particular, Chandran, *et al*[11] assessed the sensitivity to change of radiographic scoring instruments in axial PsA. The study was designed to test BASRI spine, m-SASSS, another scoring system called the Radiographic AS Spinal Score, and PASRI, in a group of PsA patients with axial involvement defined as grade 2 sacroiliitis or greater, inflammatory back pain, and/or restricted spinal mobility. The radiographs, taken at 2 time-points at least 2 years apart, were read by 3 rheumatologists, and the independent assessment by an independent assessor represented the true change (gold standard). The main results showed that the 3 scoring instruments had moderate sensitivity to change but high specificity to detect true changes. All measures performed equally well in detecting change[11].

The definition of axial PsA, *per se*, remains to be determined. Studies have assessed the validity and feasibility of instruments already validated for AS and borrowed for axial PsA, showing the instruments to be valid and feasible. PASRI, a new radiological scoring system tailored to detect specific radiological features of axial PsA, has been recently validated. A few studies have aimed to assess the sensitivity to change of the instruments. Further multicenter studies are required to confirm these results.

REFERENCES

1. Taylor WJ, Zmierczak HG, Helliwell PS. Problems with the definition of axial and peripheral patterns in psoriatic arthritis. J Rheumatol 2005;32:974-8.
2. Gladman DD. Axial disease in psoriatic arthritis. Curr Rheumatol Rep 2007;9:455-60.
3. McEwen C, Di Tata D, Lingg C, Porini A, Good A, Rankin T. A comparative study of ankylosing spondylitis and spondylitis accompanying ulcerative colitis, regional enteritis, psoriasis and Reiter's disease. Arthritis Rheum 1971;14:291-318.
4. Helliwell PS, Hickling P, Wright V. Do the radiological changes of classic ankylosing spondylitis differ from the changes found in the spondylitis associated with inflammatory bowel disease, psoriasis, and reactive arthritis? Ann Rheum Dis 1998;57:135-40.
5. MacKay K, Mack C, Brophy S, Calin A. The Bath Ankylosing Spondylitis Radiology Index (BASRI): a new, validated approach to disease assessment. Arthritis Rheum 1998;41:2263-70.
6. Creemers MC, Franssen MJ, van't Hof MA, Gribnau FW, van de Putte LB, van Riel PL. Assessment of outcome in ankylosing spondylitis: an extended radiographic scoring system. Ann Rheum Dis 2005;64:127-9.
7. Lubrano E, Marchesoni A, Olivieri I, D'Angelo S, Spadaro A, Parsons WJ, et al. The radiological assessment of axial involvement in psoriatic arthritis: a validation study of the BASRI total and the modified SASSS scoring methods. Clin Exp Rheumatol 2009;27:977-80.
8. Gladman DD, Mease PJ, Healy P, Helliwell PS, Fitzgerald O, Cauli A, et al. Outcome measures in psoriatic arthritis. J Rheumatol 2007;34:1159–66.
9. Gladman DD, Mease PJ, Strand V, Healy P, Helliwell P, Fitzgerald O, et al. Consensus on a core set of domains for psoriatic arthritis. J Rheumatol 2007;34:1167-70.
10. Baraliakos X, Listing J, Rudwaleit M, Haibel H, Brandt J, Braun J, et al. Progression of radiographic damage in patients with ankylosing spondylitis: defining the central role of syndesmophytes. Ann Rheum Dis 2007;66:910-5.
11. Chandran V, Ibrahim A, Thavaneswaran A, Eder L, Helliwell P, Cook R, et al. Sensitivity to change of radiographic scoring instruments in axial psoriatic arthritis [abstract]. Ann Rheum Dis 2011;70 Suppl 3:239.
12. Palazzi C, Lubrano E, D'Angelo S, Olivieri I. Beyond early diagnosis: occult psoriatic arthritis. J Rheumatol 2010;37:1556-8.
13. Lubrano E, Marchesoni A, Olivieri I, D'Angelo S, Spadaro A, Parsons WJ, et al. Psoriatic arthritis spondylitis radiology index: a modified index for radiological assessment of axial involvement in psoriatic arthritis. J Rheumatol 2009;36:1006-11.