

## Section V: Bone Patho-Physiology

# Morphometric Vertebral Assessments via the Use of Dual X-ray Absorptiometry for the Evaluation of Radiographic Damage in Ankylosing Spondylitis: A Pilot Study

Bérenère Aubry-Rozier,<sup>\*,1,2</sup> Didier Hans,<sup>2</sup> Marc-Antoine Krieg,<sup>2,3</sup>  
Olivier Lamy,<sup>2</sup> and Jean Dudler<sup>3</sup>

<sup>1</sup>Division of Rheumatology, Department of Bone and Joint Diseases, Lausanne University Hospital, Lausanne, Switzerland; <sup>2</sup>Center for Bone Diseases, Department of Bone and Joint Diseases, Lausanne University Hospital, Lausanne, Switzerland; and <sup>3</sup>Department of Rheumatology, Physical Medicine and Rehabilitation, Fribourg Hospital, Fribourg, Switzerland

### Abstract

We performed a pilot study to compare vertebral fracture assessments (VFA) and lateral X-rays in terms of inter- and intraobserver reliability and degree of correlation for the detection of syndesmophytes in ankylosing spondylitis (AS). We recruited 19 patients with AS and recent lumbar or cervical lateral X-rays with at least one syndesmophyte. Each patient underwent dual-energy X-ray absorptiometry with measurement of bone mineral density and dorso-lumbar VFA. Intra- and interreader reliability for VFA and X-rays were measured using 2 independent, blinded observers and Cohen's kappa values. An adapted modified Stoke Ankylosing Spondylitis Spinal Score (amSASSS) was generated with each method, and these 2 values correlated. For X-rays, intraobserver and interobserver agreement were 94.3% ( $\kappa = 0.83$ ) and 98.6% ( $\kappa = 0.96$ ), respectively; for VFA, corresponding values were 92.8% ( $\kappa = 0.79$ ) and 93.8% ( $\kappa = 0.82$ ). Overall agreement between the 2 techniques was 88.6% ( $\kappa = 0.72$ ). The Pearson correlation coefficient for the 2 methods was 0.95 for the modified Stoke Ankylosing Spondylitis Spinal Score. Per dual-energy X-ray absorptiometry-generated bone mineral density, >50% of patients were osteopenic and 10% osteoporotic. In terms of reproducibility and correlation with X-rays, performing a VFA appears to be a candidate for assessing radiographic damage in AS, though further research is necessary to justify this indication.

**Key Words:** Ankylosing spondylitis; inter-rater reliability; mSASSS score; syndesmophyte; VFA.

### Introduction

Ankylosing spondylitis (AS) is a common chronic inflammatory rheumatic disease that typically presents in young men and, to a lesser extent, women (1), classically affecting the axial skeleton. If inflammatory back pain is the cardinal feature, new bone formation with ankylosis is another major characteristic and a pathognomonic sign of AS, as well as

a key element in treatment outcomes (2). Various procedures exist to image structures that are subject to change, but conventional spinal X-rays remain the gold standard for assessing the progression of AS by demonstrating either the stabilization or ongoing evolution of syndesmophytes and ankylosis (3,4). Syndesmophytes remain the best predictors of radiographic progression, and the development of even one syndesmophyte within 2 years indicates the progression of structural change in AS (2,5).

The assessment and follow-up of patients with AS requires repetitive X-ray imaging (6). Even the current recommendations of the international Assessment of SpondyloArthropathy Society, which state that imaging may not be needed more often than once every 2 yr (7), nevertheless represent

Received 07/09/13; Accepted 09/05/13.

\*Address correspondence to: Bérenère Aubry-Rozier, MD, Division of Rheumatology and Center for Bone Diseases, Department of Bone and Joint Diseases, Hôpital Orthopédique, Avenue Pierredacker 4, CHUV-1011 Lausanne, Switzerland. E-mail: [Berengere.aubry@chuv.ch](mailto:Berengere.aubry@chuv.ch)

a significant amount of radiation in this young population (mean age at diagnosis = 26). Furthermore, the thoracic spine is most commonly affected in AS (4), and analyzing the thoracic spine is difficult, from a reproducibility standpoint, because of technical problems related to the anatomy of the chest, so that repeat evaluations tend to be limited to the cervical and lumbar spines (6). Thus, an alternative method that is characterized by high sensitivity for syndesmophyte progression, high reproducibility, and low radiation doses would be desirable, especially if it allows for thoracic spine imaging as well. So-called vertebral fracture assessment (VFA), performed with morphometry using dual-energy X-ray absorptiometry (DXA), is a technique that may facilitate the detection of vertebral fractures (8). The images for VFA are obtained at the same time as bone mineral density (BMD) measurement, which incorporates spinal imaging (9). VFA can image vertebrae at the lumbar and mid- and lower thoracic levels (9), where syndesmophytes tend to occur, with the added benefit of decreased radiation exposure (10). Furthermore, AS is associated with increased spinal rigidity (11,12), as well as bone loss in the vertebrae and hip that is due to inflammation (13,14). All of this is influenced by the duration and structural severity of the disease (15). These phenomena are, in turn, associated with osteoporosis and vertebral fractures, such fractures being four times more prevalent in patients with AS than in the normal population (16–18). As such, regular assessment of BMD in this population would certainly be highly desirable.

Therefore, we performed a pilot study to compare the diagnostic utility of VFA with DXA to detect syndesmophytes in AS patient, vs lateral spine radiographs, noting that DXA features the added benefit of allowing for osteoporosis and osteopenia screening in this population at risk.

## Materials and Methods

### Study Design

Before any data collection, local ethics committee approval was obtained for the present study.

Nineteen patients followed at our outpatient clinic who fulfilled the modified New York classification criteria for AS (19) and had lumbar or cervical lateral spine films taken within the past year were recruited for this pilot study. To be eligible, subjects also had to have at least one syndesmophyte detectable on a recent X-ray.

Each patient underwent DXA with measurement of BMD at the lumbar spine, proximal hip, and femoral neck, and this examination was coupled to a single-energy morphometry scan (VFA) using a Hologic Delphi densitometer (Hologic, Bedford, MA) with the patient in the lateral position. Data on additional risk factors for osteoporosis and current treatment were collected via a standardized questionnaire. To measure intraobserver reliability, lateral spine radiographs (cervical and lumbar) and VFA (thoracic and lumbar images from D4 to S1) were read twice by one reader (B.A.-R.) in a random order. To assess interobserver reliability, lateral spine radiographs (cervical and lumbar)

and VFA (thoracic and lumbar images) were read independently by 2 readers (B.A.-R. and M.-A.K.), who were blinded to each other's assessment. Specifically, each vertebral space was evaluated for the presence or absence of any syndesmophytes. To calculate the degree of agreement between the 2 methods for the lumbar spine, M.-A.K. and B.A.-R. arrived at a consensus opinion based upon X-ray and VFA results, for both technics in a different time and order. They also rated each lumbar X-ray and VFA using an adapted modified Stoke Ankylosing Spondylitis Spinal Score (amSASSS), from which we excluded stage 1 (erosions), considered impossible to establish with VFA. We then calculated reliability for amSASSS scoring between the 2 techniques. BMD results were interpreted using the World Health Organization T-score classification guidelines.

### Statistical Analysis

Intra- and interobserver reliability for diagnosing syndesmophytes were assessed for X-ray and VFA by calculating Cohen's kappa values ( $\kappa$ ) with 95% confidence intervals. We followed the Landis and Koch guidelines to interpret level of agreement based upon Cohen's kappa results. According to Landis and Koch, a Cohen's kappa value greater than 0.81 is considered almost perfect agreement; between 0.8 and 0.61, good; between 0.6 and 0.4, moderate; between 0.4 and 0.2, fair; between 0.2 and 0, slight; and less than zero, poor. The degree of correlation between amSASSS scores for X-rays and VFA was assessed by calculating Pearson correlation coefficients ( $r$ ).

## Results

### Demographics

All 19 patients fulfilled the modified New York classification criteria for AS, having an average disease duration of 15 years (range, 2–40 yr). All subjects were male, and mean age was 52.4 years (range 27–73 yr). Six of 19 (32%) were HLA-B27 positive; 4 (21%) had concomitant inflammatory bowel disease; and 16 (85%) were currently using some biologic treatment (Table 1).

To meet inclusion criteria, all patients had had at least one cervical or lumbar syndesmophyte previously identified on standard lateral spine X-rays, with 2 patients (10.5%) presenting with complete ankylosis of the spine (bamboo spine); 2 patients (10.5%) both cervical and lumbar syndesmophytes; 3 patients (15.8%) syndesmophytes demonstrable only at the cervical spine level; and the remainder lumbar syndesmophytes only.

### Readers' Agreement on Standard X-ray and VFA

For X-rays, intraobserver agreement was 94.3% with a kappa value of 0.83; agreement between the two observers was 98.6% with  $\kappa = 0.96$ . For the VFA, intra- and interobserver agreement were 92.8% ( $\kappa = 0.79$ ) and 93.8% ( $\kappa = 0.82$ ), respectively.

Download English Version:

<https://daneshyari.com/en/article/10168096>

Download Persian Version:

<https://daneshyari.com/article/10168096>

[Daneshyari.com](https://daneshyari.com)