Original article

Imaging characteristics of lumbar spine lesions and their associations in patients with axial spondyloarthritis

Nguyen Hoang Minh[1], Nguyen Hoang Thanh Van[2], Le Thi Hong Van[2*]

[1]Medic Medical Center Hue

[2]Department of Internal Medicine – Hue University of Medicine and Pharmacy, HueUniversity

***Corresponding author:** Le Thi Hong Van; email: lthvan.noi@huemed-univ.edu.vn

Received: 26/02/2026; **Accepted:** 01/04/2026; **Published:** 30/04/2026

DOI: 10.34071/jmp.2026.2.980

Abstract

Background: Axial spondyloarthritis (axSpA) is a chronic inflammatory disease with heterogeneous clinical manifestations. Lesions of the sacroiliac joints and the lumbar spine play an important role in functional limitation in patients with axial spondyloarthritis. Therefore, this study aimed to evaluate lumbar spine lesions on imaging and to investigate their associations with clinical characteristics and disease activity.

Methods: A cross-sectional descriptive study was conducted on 45 patients with axial spondyloarthritis treated at the Department of General Internal Medicine – Endocrinology – Rheumatology, Hue University of Medicine and Pharmacy Hospital, from 2/2023 to 8/2024.

Results: A total of 73.3% of patients had an ASDAS-CRP score > 3.5, indicating very high disease activity. On radiography, abnormalities related to lumbar spine involvement were observed in 6/32 cases, among which 5 cases showed tangential osteophytes and Romanus lesions, accounting for 15.6%. Active lesions of the lumbar spine on MRI were detected in 13/45 patients (28.9%), with vertebral corner inflammation being the most common finding. Age, disease duration, CRP levels, BASDAI, and ASDAS-CRP were significantly associated with the number of lesions detected on MRI.

Conclusion: Lumbar spine lesions on MRI were identified in 28.9% of patients with axial spondyloarthritis, with a median disease duration of 2 years. Only 6/32 cases showed abnormalities related to axial spondyloarthritis on X-ray. Lumbar spine involvement was associated with age, disease duration, CRP levels, and disease activity indices including BASDAI and ASDAS-CRP.

Keywords: *axial spondyloarthritis; radiography; lumbar spine; magnetic resonance imaging.*

1. INTRODUCTION

Axial spondyloarthritis (axSpA) is a chronic inflammatory disease characterized by inflammation at the entheses, with predominant involvement of the sacroiliac joints and the spine, including the lumbar spine. Axial spondyloarthritis remains challenging to diagnose, with an average diagnostic delay of approximately 6.7 years, and even longer according to various reports, adversely affecting mobility and long-term outcomes in this patient population [1, 2]. The ASAS/EULAR recommendations emphasize the central role of imaging in the diagnosis and management of axial spondyloarthritis [3].

Lumbar spine involvement is closely associated with reduced mobility, disability, and impaired quality of life. The SPACE study conducted in Italy showed that even in the early stage—patients with back pain lasting more than 3 months but less than 2 years—the prevalence of bone marrow edema in the lumbar spine and sacroiliac joints was 51.6% and 56.7%, respectively. Notably, 15% of patients had bone marrow edema in the spine but negative findings in the sacroiliac joints [4].

Inflammatory lesions detected on MRI may be used to monitor disease activity, particularly when clinical findings and C-reactive protein (CRP) levels are inconclusive. According to EULAR, lumbar spine MRI lesions play a role in disease activity assessment. Evaluation of lumbar spine involvement also helps identify patients at higher risk of severe progression, thereby guiding closer monitoring and more appropriate therapeutic strategies. Assessing lumbar spine lesions enables the identification of both inflammatory and structural damage, allowing timely intervention. Furthermore, characterization of lumbar spine imaging findings—especially on MRI—provides additional scientific evidence to support clinicians in reducing diagnostic delay.

In Vietnam, several studies have focused on sacroiliac joint involvement; however, lumbar spine lesions and their associated factors remain under-investigated. Therefore, this study aims to evaluate lumbar spine lesions on radiography and MRI, and to examine their associations with selected clinical and paraclinical factors.

2. SUBJECTS AND METHODS

2.1. Subjects

The study included 45 patients diagnosed with axial spondyloarthritis according to the Assessment of SpondyloArthritis International Society (ASAS) 2009 classification criteria, treated at the Department of General Internal Medicine – Endocrinology - Rheumatology, Hue University of Medicine and Pharmacy Hospital, from February 2023 to August 2024.

Inclusion criteria:

- Newly diagnosed patients who fully met the ASAS 2009 classification criteria for axial spondyloarthritis.

- Patients who underwent magnetic resonance imaging (MRI) of the sacroiliac joints and lumbar spine.

Exclusion criteria:

- Patients who had previously received specific treatment for spondyloarthritis.

- Patients with a history of spinal surgery or metallic implants affecting MRI image quality.

2.2. Methods

- Study design: Cross-sectional descriptive study.

- **Sampling method:** Convenience sampling.

Study variables

Lumbar spine

- Lumbar spine lesions on plain radiographs typically appear in the late stage of disease and represent structural damage. Common findings include: fibrosis/calcification of the anterior longitudinal ligament, bilateral marginal syndesmophytes along the vertebral bodies, Romanus lesions and/or vertebral body squaring, ankylosis.

- The ASAS MRI working group updated the definitions of spinal lesions on MRI in 2021, as follows [3]:

+ Active lesions

These lesions are divided into those involving the vertebral body and those not involving the vertebral body. For vertebral body lesions, active inflammatory lesions are considered present when bone marrow edema (BME) is located at the vertebral corner. The terms bone marrow edema (BME) and osteitis are used interchangeably.

MRI sequences capable of detecting inflammatory lesions include STIR, T2FS, or contrast-enhanced T1FS after gadolinium injection.

Inflammatory lesions may be identified at different anatomical sites, such as vertebral corners, discovertebral inflammation, and inflammatory lesions of the posterior elements (lesions located posteriorly on lateral slices are also referred to as costovertebral joint inflammation, seen only in the thoracic spine).

Inflammatory lesions not involving the vertebral body include facet joint inflammation and posterior element inflammation (including spinal ligament inflammation), but exclude pedicles, spinous processes, and pars interarticularis.

+ Structural lesions

Structural lesions refer to clearly defined morphological abnormalities such as fat lesions, erosions, sclerosis, syndesmophytes/bridging syndesmophytes, or vertebral ankylosis. All types of structural lesions may appear independently or surrounding areas of bone marrow edema. Most of these lesions are best visualized on T1-weighted sequences.

2.3. Statistical analysis: Data were processed using SPSS 20.0 software. Statistical tests were considered significant at $p < 0.05$.

2.4. Ethics

This study was approved by the Institutional Review Board of Hue University of Medicine and Pharmacy (ID: H2023/412). All participants were informed and provided consent to participate. Patient information was coded and kept confidential. The results were used solely for scientific purposes.

3. RESULTS

3.1. General characteristics of the study population

There was no significant gender difference among patients with axial spondyloarthritis. The majority of patients were aged 18 - 45 years (93.3%). The median disease duration was 2 (2 - 4.5) years. All patients in the study group had inflammatory back pain. HLA-B27 positivity was 48.9%. Elevated CRP was observed in 64.4% of patients.

Table 1. Disease activity according to BASDAI and NRS (n = 45)

	BASDAI	Patient Global (NRS)
Median (Q1-Q3)	3.3 (3.1 - 3.6)	4 (3 - 5)
Min-Max	2.5-6.5	2-6

Disease activity ASDAS-CRP	Moderate (1.3 ≤ ASDAS-CRP < 2.1)	11	24.4
	High (2.1 ≤ ASDAS-CRP < 3.5)	1	2.2
	Very high (ASDAS-CRP ≥ 3.5)	**33**	**73.3**
	Median (Q1-Q3)	5.2 (2.2 - 6.1)	
	GTNN-GTLN	1.6 - 6.8	

The median BASDAI score was 3.3 (3.1 - 3.6) and the median Patient Global (PG) score was 4 (3 - 5). A total of 33 out of 45 patients had an ASDAS-CRP ≥ 3.5, classified as very high disease activity, accounting for 73.3% of the study population.

3.2. Lesion Characteristics

Table 2. Lumbar spine lesions on X-ray (n = 32)

Characteristics		**Number (n)**	**Percentage (%)**
Number of lesions	0	26	81.3
	≥ 1	6	18.7
Radiographic findings	Anterior longitudinal ligament calcification	3	9.4
	Tangential syndesmophytes	5	15.6
	Romanus lesions	5	15.6
	Ankylosis	3	9.4

Only 6/32 cases showed abnormalities related to axial spondyloarthritis. Among these, tangential syndesmophytes and Romanus lesions were the most common findings (15.6%), while anterior longitudinal ligament calcification and ankylosis were less frequent.

Table 3. Lumbar spine lesions related to axial SpA on MRI (n = 45)

Lumbar spine MRI – active lesions	**Number (n)**	**Percentage (%)**
	13	**28.9**
Vertebral corner inflammation	**11**	**24.4**
Discovertebral inflammation	1	2.2
Facet joint inflammation	4	8.9
Enthesitis	1	2.2
Lumbar spine MRI-structural lesions	**6**	**13.3**
Vertebral corner erosion	1	2.2
Fat metaplasia at vertebral corner	2	4.4
Ankylosis	3	6.7

A total of 13/45 patients had active lesions on lumbar spine MRI, with vertebral corner inflammation being the most common finding (11/45).

Table 4. Factors associated with lumbar spine lesions on X-ray (n = 32)

Factors		**Lesions numbers on Radiography**		**p**
		0	**≥ 1**	
Age	Median (SD)	29.5 (8.2)	34 (14.1)	0.301*
Gender	Male	11 (68.75%)	5 (31.25%)	0.172***
	Female	15 (93.75%)	1 (6.25%)	
Family History	No	17 (77.27%)	5 (22.73%)	0.637***
	Yes	9 (90%)	1 (10%)	
Disease duration (years)	Median (Q1-Q3)	2 (2 - 3.5)	4 (1.6 - 12.5)	0.264**
CRP (mg/L)	Median(Q1-Q3)	6.8 (1.4 - 44.6)	13.5 (8.4 - 24)	0.408**

NSAIDs response	No	7 (87.5%)	1 (12.5%)	1***
	Yes	19 (79.17%)	5 (20.83%)	
Inflammatory back pain	Yes	26 (81.25%)	6 (18.75%)	-
Peripheral arthritis	No	13 (86.67%)	2 (13.33%)	0.659***
	Yes	13 (76.47%)	4 (23.53%)	
Enthesitis	No	25 (83.33%)	5 (16.67%)	0.345***
	Yes	1 (50%)	1 (50%)	
Uveitis	No	25 (80.65%)	6 (19.35%)	1***
	Yes	1 (100%)	0 (0%)	
Dactylitis	No	23 (79.31%)	6 (20.69%)	1***
	Yes	3 (100%)	0 (0%)	
Psoriasis	No	23 (79.31%)	6 (20.69%)	1***
	Yes	3 (100%)	0 (0%)	
Crohn's disease or colitis	No	19 (86.36%)	3 (13.64%)	0.346***
	Yes	7 (70%)	3 (30%)	
CRP level classification	Normal (≤ 5 mg/L)	12 (100%)	0 (0%)	0.061***
	Elevated (> 5mg/L)	14 (70%)	6 (30%)	
BASDAI	Mean (SD)	3.3 (0.4)	4.7 (1)	**0.02 ***
Patient Global	Median (Q1 - Q3)	4 (3 - 5)	4 (3.8 - 5)	0.408**
ASDAS-CRP	Median (Q1 - Q3)	4.9 (1.9 - 6)	6 (5.7 - 6.2)	**0.025****

There was a significant difference in BASDAI and ASDAS-CRP scores between patients with and without lumbar spine lesions on X-ray.

Table 5. Factors associated with the number of lumbar spine MRI lesion types (n = 45)

Factors		**Lesions numbers on MRI**			**p**
		0	**1**	**≥ 2**	
Age	Mean (SD)	28.1 (7.9)	28 (7.6)	39.9 (12.2)	**0.007***
Gender	Male	13 (56.52%)	5 (21.74%)	5 (21.74%)	0.078***
	Female	19 (86.36%)	1 (4.55%)	2 (9.09%)	
Family History	No	22 (64.71%)	6 (17.65%)	6 (17.65%)	0.319***
	Yes	10 (90,91%)	0 (0%)	1 (9,09%)	
Disease duration	Median (Q1-Q3)	2 (2 - 3)	2 (1-5)	5 (3 - 10)	**0.042****
CRP (mg/L)	Median (Q1-Q3)	6.7 (1.2 - 43.6)	13.6 (6.3-41.6)	21 (9 - 51.8)	0.271**
NSAIDs response	No	13 (86.67%)	1 (6.67%)	1 (6.67%)	0.324***
	Yes	19 (63.33%)	5 (16.67%)	6 (20%)	
Inflammatory back pain	Yes	32 (71.11%)	6 (13.33%)	7 (15.56%)	-
Peripheral arthritis	No	18 (81.82%)	2 (9.09%)	2 (9.09%)	0.325***
	Yes	14 (60.87%)	4 (17.39%)	5 (21.74%)	
Enthesitis	No	29 (70.73%)	6 (14.63%)	6 (14.63%)	0.759***
	Yes	3 (75%)	0 (0%)	1 (25%)	

Uveitis	No	29 (69.05%)	6 (14.29%)	7 (16.67%)	1***
	Yes	3 (100%)	0 (0%)	0 (0%)	
Dactylitis	No	29 (69.05%)	6 (14.29%)	7 (16.67%)	1***
	Yes	3 (100%)	0 (0%)	0 (0%)	
Psoriasis	No	29 (69.05%)	6 (14.29%)	7 (16.67%)	1***
	Yes	3 (100%)	0 (0%)	0 (0%)	
Crohn or colitis	No	24 (75%)	4 (12,5%)	4 (12.5%)	0.594***
	Yes	8 (61.54%)	2 (15.38%)	3 (23.08%)	
CRP level	Normal (≤ 5 mg/L)	15 (93.75%)	1 (6.25%)	0 (0%)	**0.034*** **
	Elevated (> 5mg/L)	17 (58.62%)	5 (17.24%)	7 (24.14%)	
BASDAI	Mean (SD)	3.3 (0.5)	3.3 (0.3)	4.3 (1.2)	**0.001***
Patient Global	Median (Q1-Q3)	4 (3 - 5)	3.5 (3 - 4.3)	4 (3-5)	0.778**
ASDAS-CRP	Median (Q1-Q3)	4.9 (1.9 - 5.9)	5.4 (4.4 - 6)	6.1 (5.8 - 6.3)	**0.015****

Patients presenting with at least two types of lumbar spine MRI lesions were significantly older and had longer disease duration, higher BASDAI scores, and higher ASDAS-CRP scores compared to the other groups. Interestingly, elevated CRP levels tended to appear more frequently in patients without lumbar spine MRI lesions.

4. DISCUSSION

In this study, patients with newly diagnosed axial spondyloarthritis showed a very high level of disease activity, with 73.1% classified as very high activity according to the ASDAS-CRP. According to Hoang Cong Trong, high and very high disease activity accounted for up to 90% of cases [5]. Although the median disease duration was only 2 years, 28.9% of patients already had lumbar spine lesions detected on MRI. Conventional radiography showed a significantly lower rate of axial spondyloarthritis-related lesions. Therefore, evaluating lumbar spine lesions is necessary, particularly in patients with negative sacroiliitis findings. However, as mentioned in the Methods section, lumbar spine lesions must be carefully identified and differentiated from common degenerative conditions such as spondylosis and disc herniation. The most frequent active lesion was vertebral corner inflammation (24.4%). This finding has important clinical significance in detecting axial spondyloarthritis-related lesions in patients with back pain undergoing MRI. Compared with the study by Haidmayer et al., which evaluated spinal MRI findings in 55 patients with axial spondyloarthritis (13/55 female, mean time since diagnosis 14.9 years, mean symptom duration 20 years), MRI-detected syndesmophytes were reported in 2.3% and ankylosis in 0.9% of cases [6]. That study assessed the entire spine and included patients who had received treatment, including biologic agents, which differs from our cohort of newly diagnosed patients. Vertebral corner inflammation was the most common active MRI lesion and is particularly valuable in patients with inflammatory back pain without sacroiliitis. Our study also found associations between MRI lesions and factors such as age, disease duration, CRP level, and disease activity indices (BASDAI and ASDAS-CRP). Chung et al. reported that ASDAS correlates with the severity and extent of spinal inflammatory lesions on MRI [7]. Lee et al. found that spinal inflammation on MRI was associated with disease activity (BASDAI) and functional indices (BASFI, BASGI) [8]. However, previous studies have shown inconsistencies in these associations [6]. The limitations of our study include the relatively small sample size and the lack of evaluation in treated patients. Further studies should expand the sample size and assess additional spinal regions.

5. CONCLUSION

Lumbar spine MRI lesions are valuable for both diagnosis and follow-up of patients with axial spondyloarthritis, particularly in those without radiographic lesions or sacroiliitis. Vertebral corner inflammation is the most common active MRI finding. However, interpretation requires close collaboration between experienced radiologists and rheumatologists to ensure accurate diagnosis, as spinal lesions have lower specificity compared with sacroiliac joint lesions.

ACKNOWLEDGEMENTS

The research team gratefully acknowledges financial support from Hue University under grant number DHH2024-04-220.

REFERENCES

1. Zhao SS, Pittam B, Harrison NL, Ahmed AE, Goodson NJ, Hughes DM. Diagnostic delay in axial spondyloarthritis: a systematic review and meta-analysis. Rheumatology. 2021;60(4):1620-8.

2. van Gaalen FA, Rudwaleit M. Challenges in the diagnosis of axial spondyloarthritis. Best Practice & Research Clinical Rheumatology. 2023;37(3):101871.

3. Baraliakos X, Østergaard M, Lambert RG, Eshed I, Machado PM, Pedersen SJ, et al. MRI lesions of the spine in patients with axial spondyloarthritis: an update of lesion definitions and validation by the ASAS MRI working group. Annals of the rheumatic diseases. 2022;81(9):1243-51.

4. Lorenzin M, Ortolan A, Frallonardo P, Vio S, Lacognata C, Oliviero F, et al. Spine and sacroiliac joints on magnetic resonance imaging in patients with early axial spondyloarthritis: prevalence of lesions and association with clinical and disease activity indices from the Italian group of the SPACE study. Reumatismo. 2016;68(2):72.

5. Trọng HC, Thông NH. Nghiên cứu thang điểm SPARCC và mối liên quan với một số chỉ số lâm sàng, cận lâm sàng ở bệnh nhân viêm khớp-cột sống thể trục. Journal of 108-Clinical Medicine and Phamarcy. 2025.

6. Haidmayer A, Adelsmayr G, Spreizer C, Klocker EV, Quehenberger F, Fuchsjaeger M, et al. Distribution of spinal damage in patients with axial spondyloarthritis as assessed by MRI: a prospective and blinded study. Arthritis Research & Therapy. 2025;27(1):8.

7. Chung HY, Chui ETF, Lee KH, Tsang HHL, Chan SCW, Lau CS. ASDAS is associated with both the extent and intensity of DW-MRI spinal inflammation in active axial spondyloarthritis. RMD open. 2019;5(2).

8. Lee KH, Chung HY, Xu X, Lau VW, Lau CS. Apparent diffusion coefficient as an imaging biomarker for spinal disease activity in axial spondyloarthritis. Radiology. 2019;291(1):121-8.