Ulusal ROMATOLOJİ Dergisi
Journal of Turkish Society for Rheumatology www.romatolojidergisi.org

Original Article / Orijinal Araştırma

DOI: 10.4274/raed.galenos.2024.42714
Ulus Romatol Derg 2024;16(3):106-112

Sensitivity and specificity of the detection of spondylodiscitis by conventional radiography

Spondilodiskit tanısının konvansiyonel radyografi ile saptanmasının duyarlılık ve özgüllüğü

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Abstract

Objective: Diagnosis of spondylodiscitis is usually possible radiographically with magnetic resonance imaging (MRI). However, the first imaging method evaluated in daily practice is conventional radiography. The aim of the study was to determine the sensitivity and specificity of detecting infectious or rheumatological spondylodiscitis in the lumbar region with conventional radiography by rheumatologists.

Methods: Among 102 patients with spondylodiscitis on lumbosacral (LS) MRI, 23 patients who also underwent simultaneous conventional LS radiography were included. TThe control group consisted of 52 outpatients with no evidence of spondylodiscitis on LS MRI. Eleven rheumatologists blindly evaluated conventional LS radiographs. Sensitivity, specificity, positive, and negative predictive values of LS conventional radiography were calculated.

Results: While the cause was infection in 8/23 (34.7%) of spondylodiscitis patients, it was spondyloarthritis in 15/23 (65.2%). According to LS MRI findings, 23 patients had spondylodiscitis in a total of 31 vertebral units. When we evaluated the detection of spondylodiscitis according to the vertebral unit level, it was mostly at one level [14 (60.8%)], primarily at the L4-5 vertebral unit [13 (56.5%)]. The sensitivity of detecting LS spondylodiscitis on conventional radiography was found to be 52% (30-65), and the specificity was 86% (59-94). While the median (minimum-maximum) sensitivity was 75.0 (50.0-87.5) in patients with infectious spondylodiscitis, it was 46.6 (13.3-76.9) in patients with spondylodiscitis due to spondyloarthritis.

Conclusion: Clinicians can miss spondylodiscitis. Although it is evaluated with conventional radiography in the first stage in the presence of appropriate clinical findings, the clinician should be careful and consider more advanced approaches.

Keywords: Spondyloarthritis, spondylitis, inflammation, sensitivity and specificity

Öz

Amaç: Spondilodiskit tanısı genellikle manyetik rezonans görüntüleme (MRG) ile radyografik olarak mümkündür. Ancak günlük pratikte ilk değerlendirilen görüntüleme yöntemi konvansiyonel radyografidir. Bu çalışmanın amacı lomber bölgedeki enfeksiyöz veya romatolojik spondilodiskitlerin romatolog tarafından konvansiyonel radyografi ile saptanmasının duyarlılığını ve özgüllüğünü belirlemektir.

Yöntem: Lumbosakral (LS) MRG'de spondilodiskit saptanan 102 hasta içerisinden eş zamanlı konvansiyonel LS grafisi çekilen 23 hasta çalışmaya dahil edildi. Kontrol grubunda LS MR'de spondilodiskit olmayan 52 hasta dahil edildi. On bir romatolog konvansiyonel LS radyografilerini değerlendirdi. LS konvansiyonel radyografinin duyarlılığı, özgüllüğü, pozitif ve negatif prediktif değeri hesaplandı.

Bulgular: Spondilodiskit hastalarının 8/23'ünde (%34,7) neden enfeksiyon iken, 15/23'ünde (%65,2) spondiloartritti. LS MR bulgularına göre 23 hastada toplam 31 vertebral ünitede spondilodiskit mevcuttu. Spondilodiskiti, vertebral ünite seviyesine göre değerlendirdiğimizde en fazla tek seviyede [14 (%60,8)], en fazla L4-5 vertebral ünitede [813 (%56,5)] görüldü. Konvansiyonel radyografide LS spondilodiskitini saptamanın duyarlılığı %52 (30-65), özgüllüğü ise %86 (59-94) olarak bulunmuştur. Enfeksiyöz spondilodiskitli hastalarda ortanca (minimum-maksimum) duyarlılık 75,0 (50,0-87,5) iken, spondiloartrite bağlı spondilodiskitli hastalarda 46,6 (13,3-76,9) idi.

Sonuç: Klinisyenler spondilodiskiti gözden kaçırabilmektedir. Uygun klinik bulguların varlığında ilk aşamada konvansiyonel radyografi ile değerlendirilse de daha ileri tetkikler açısından klinisyenin dikkatli olması gerekir.

Anahtar Kelimeler: Spondiloartrit, spondilit, enflamasyon, duyarlılık ve özgüllük

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Received / Geliş Tarihi: 23.07.2024 **Accepted / Kabul Tarihi:** 21.11.2024

Cite this article as / Atıf: Özsoy Z, Chousein E, Ayan G, Sandal Uzun G, Ekici M, Ünaldı E, Fırlatan B, Kart Bayram GS, Bulat B, Kılıç L. Sensitivity and specificity of the detection of spondylodiscitis by conventional radiography. Ulus Romatol Derg. 2024;16(3):106-112

Introduction

Spondylodiscitis is a name given to the inflammation of the intervertebral disc and adjacent vertebrae. Although its incidence has been reported to be as low as 5-6 in 100,000, the German Federal Statistics Office has reported the incidence of spondylodiscitis as high as 30 in 250,000.[1] This increase is attributed to the development of diagnostic methods. Risk factors that increase the incidence of spondylodiscitis include diabetes mellitus, immunosuppression, history of illicit drug use, and human immunodeficiency virus.[2]

Spondylodiscitis has a wide clinical spectrum. Since spondylodiscitis can mimic many clinical conditions, irreversible deformities may develop as a result of incorrect diagnosis and treatment. Therefore, it is a clinical entity that requires great attention. The heterogeneity of the disease limits the definitive diagnosis and the categorization of treatment recommendations. Spondylodiscitis can develop in relation to rheumatic, infectious, and degenerative diseases. Infection represents the prevailing factor leading to spondylodiscitis.[3] Typically, spondylodiscitis manifests as a monobacterial infection, with hematogenous dissemination being the predominant mode of transmission. *Staphylococcus aureus* is responsible for more than 50% of the cases in Europe, followed by Gram-negative pathogens such as *Escherichia coli* (11-25%). The most frequent cause of granulomatous spondylodiscitis worldwide is *Mycobacterium tuberculosis*. Brucellosis is another significant cause of spondylodiscitis in Mediterranean countries and the Middle East.[3]

One of the probable diagnoses of spondylodiscitis is rheumatic diseases. The most significant cause of spondylodiscitis in rheumatology practice is ankylosing spondylitis (AS).[4] Spondylodiscitis is a rare complication of AS. It was first identified by Andersson[4] in 1937. Its prevalence in patients with AS has been reported to be between 1% and 10%.It often has an acute onset and, unlike previously described pain characteristics, is marked by localized pain that worsens with movement and improves with rest.[5]

Spondylodiscitis is diagnosed based on radiological, laboratory, and microbiological findings in an appropriate clinical background and, if necessary, by pathological examination.[6] The most important assessment in the diagnostic process is imaging.[6] Conventional radiography plays a limited but important role in the evaluation of spondylodiscitis. Conventional radiology is a technique with low sensitivity and specificity (82% and 57%, respectively)[7], especially in the early diagnosis of spondylodiscitis, although conventional X-ray is often used for the first approach to back pain. It is generally used as a screening test and can detect early changes such as localized radiolucency in the subchondral region, often anteriorly, followed by endplate loss and narrowing of the intervertebral disc.[8,9] Once the disease is well-established, radiographic signs are specific enough for a definitive diagnosis. Erosion of two adjacent vertebral bodies extending from the narrowed intervertebral disc is quite typical of infectious spondylitis.[9] Erosion on radiography may occur days or weeks later.[10] Therefore, a negative conventional radiography does not exclude the possibility of spondylodiscitis.[7] Magnetic resonance imaging (MRI) is a preferable method for the diagnosis of spondylodiscitis. The sensitivity and specificity of MRI are 96% and 93%, respectively.[6] MRI evaluates the involvement of bone marrow, disc signal, adjacent neural structures, and paraspinal soft tissue very well. The earliest finding in MRI is bone marrow edema in the vertebral corpus. Bone marrow edema is seen as hypointense in T1A images and as hyperintense in T2A images.[6] Although MRI is the most important test for verifying a spondylodiscitis diagnosis, the imaging method first used in daily practice is the conventional lumbosacral (LS) radiography. On the other hand, we have no data on the role of conventional radiography in confirming the diagnosis of spondylodiscitis.

In this study, we aimed to determine the sensitivity and specificity of detecting infectious or rheumatological spondylodiscitis in the lumbar region, confirmed with MRI, through conventional radiography.

Materials and Methods

Patients and Study Groups

Patients who were diagnosed with spondylodiscitis on spinal MRI performed at our center between January 2010 and September 2021 were identified. Patients with spondylodiscitis were divided into two groups, infectious and AS-related, and 102 patients diagnosed with spondylodiscitis on LS MRI were included in the study. Of these 102 patients, 74 (72.5%) did not have a simultaneous conventional LS radiography in addition to MRI, 2 had low-quality LS radiographs, and 3 patients had undergone lumbar vertebra intervention. These patients were excluded from the analysis, and a total of 23 patients who had LS MRI and conventional LS radiography were included in the final analysis.

The control group was selected from patients who had LS MRI taken from the outpatient clinic due to low back pain, and no spondylodiscitis was detected according to the evaluation of the radiologist. A total of 52 patients diagnosed with spondyloarthritis, rheumatoid arthritis, and Behçet's disease were included as the control group. Conventional

radiographs of 23 spondylodiscitis patients and 52 patients in the control group were evaluated blindly by rheumatologists.

Detection of Spondylodiscitis in Conventional Radiography

Eleven rheumatologists (2 with >10 years' experience, 9 with <5 years' experience) evaluated the conventional LS radiographs. They were blind to clinical data and the presence/absence of spondylodiscitis. The region between T12-S1 was evaluated. The presence of spondylodiscitis was grouped by the doctors as "definitely absent," "suspicious," or "definitely present." The location of spondylodiscitis in the radiographs was recorded as vertebral units, and if there were findings in more than one vertebral unit, it was noted.

A vertebral unit included the lower endplate of the upper vertebra and the upper endplate of the lower vertebra. Levels were defined according to the number of vertebral units in which spondylodiscitis was detected. Moreover, patients were further categorized according to the presence of spondylodiscitis above/below the L3-4 vertebral unit. Regarding the patients who were evaluated according to the location on the lumbar vertebra, 4 patients who had spondylodiscitis both below L3-4 and above L3-4 vertebral units were not included in the localization analysis.

Our study was conducted in accordance with the 2013 amendment of the Declaration of Helsinki, ethical approval was obtained from Hacettepe University Non-Interventional Clinical Research Ethics Committee (decision no: 2021/15-55, date: 21.09.2021) and written informed consent for participation was obtained from each participant.

Statistical Analysis

Data were analyzed using SPSS Statistics for Windows, Version 23.0 (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp). Numerical variables conforming to the normal distribution were investigated by visual (histogram and probability graphs) and analytical methods (Kolmogorov-Smirnov and Shapiro-Wilk tests). Descriptive analyses were displayed by median and interquartile range for non-normally distributed numerical variables.

In independent groups, chi-square or Fisher's exact tests were used for analyzing categorical data and rates. The Mann-Whitney U test was utilized to compare the medians of non-normally distributed data from independent groups. A p-value of <0.05 was considered statistically significant. Positivity in MRI was accepted as the gold standard, and the sensitivity, specificity, and positive and negative predictive values of LS conventional radiography were calculated for each evaluator.

Results

Characteristics of the Patient Group and the Control Group

Twenty-three patients with spondylodiscitis were included in the study. The median [minimum-maximum (min-max)] age of spondylodiscitis patients was 53 (23-91), and 16 (69.6%) patients were male. While the proven cause was an infection in 8/23 (34.7%) of the patients with spondylodiscitis, it was spondyloarthritis in 15/23 of the patients (65.2%). The median (min-max) age of patients with infection-related spondylodiscitis was 57 (30-91), and 4 (50%) were male. The median (min-max) age of patients with spondylodiscitis due to spondyloarthritis was 48 (23-70), and 12 (80%) were male. The median (min-max) age of the 52 patients included in the control group was 58.5 (20-80). Thirty-nine (75%) of this patient group were women.

Spondylodiscitis Regions Affected in the Lumbar Vertebra According to Diseases

According to LS MRI findings, 23 patients had spondylodiscitis in a total of 31 vertebral units. Detection of spondylodiscitis in 1, 2, and 3 levels according to the number of vertebral units was as follows: 14 (60.8%), 5 (21.7%), and 4 (17.3%), respectively. The distribution of the localizations was as follows: L5-S1 4 (17.4%), L4-5 13 (56.5%), L3-4 3 (13%), L2-3 5 (21.7%), L1-L2 4 (17.4%), and L1-T12 2 (8.7%).

According to LS MRI findings of the patients who had spondyloarthritis-related spondylodiscitis, 15 patients had spondylodiscitis in a total of 22 vertebral units. Detection of spondylodiscitis in 1, 2, and 3 levels according to the number of vertebral units was as follows: 9 (60.0%), 5 (33.3%), and 1 (6.6%), respectively. The distribution of the localizations was as follows: L5-S1 4 (18.1%), L4-5 8 (36.3%), L3-4 2 (9.0%), L2-3 2 (9.0%), L1-L2 4 (18.1%), and L1-T12 2 (9.0%).

According to LS MRI findings of the patients who had infection-related spondylodiscitis, 8 patients had spondylodiscitis in a total of 12 vertebral units. Detection of spondylodiscitis in 1, 2, and 3 levels according to the number of vertebral units was as follows: 5 (62.5%), 2 (25.0%), and 1 (12.5%), respectively. The distribution of the localizations was as follows: L4-5 5 (41.6%), L3-4 4 (33.3%), L2-3 3 (25.0%).

Diagnostic Performance of Detecting Spondylodiscitis

When the results of all evaluators were analyzed, the following results were obtained: In all spondylodiscitis

patients, the median (min-max) specificity was calculated as 86.5 (58.8-94.2), sensitivity as 52.1 (30.4-65.2), positive predictive value (PPV) as 63.6 (44.7-75.0), and negative predictive value (NPV) as 79.6 (58.8-83.6). In the patients with infectious spondylodiscitis, the median (min-max) specificity was found as 86.5 (58.8-94.2), sensitivity as 75.0 (50.0-87.5), PPV as 44.4 (25.0-57.1), and NPV as 95.0 (92.1-96.7). In those with spondylodiscitis due to spondyloarthritis, the median (min-max) specificity was calculated as 86.5 (58.8-94.2), sensitivity as 46.6 (13.3-76.9), PPV as 39.1 (31.5-62.5), and NPV as 84.9 (78.6-90.9).

Specificity, sensitivity, PPV, and NPV values according to the experiences of the researchers with >10 years and <5 years of experience are presented in Table 1.

Specificity, sensitivity, PPV, and NPV values of all evaluators' detection of spondylodiscitis according to the presence of spondylodiscitis above/below the L3-4 vertebral unit and according to etiology are presented in Table 2.

Clinical information and conventional radiographs of cases diagnosed with spondylarthritis, which is recognized by rheumatologists with the highest and lowest sensitivity in direct radiography, and spondylodiscitis caused by infection, are given in Figures 1, 2 and 3.

Discussion

Spondylodiscitis is a condition that may arise from both infectious and rheumatic causes and lead to a severe clinical picture. There are no studies in the literature in which the detection of spondylodiscitis through conventional LS radiography has been demonstrated. In the present study, the sensitivity and specificity of detection of LS spondylodiscitis with conventional radiography in all patients were determined to be 52% (30-65) and 86% (59-94), respectively. Particularly, it is easier to detect infectious spondylodiscitis, probably due to the extent of the lesion. Still, lesions can go unnoticed with conventional radiography in a significant number of patients, even when an experienced rheumatologist is the assessor.

Spondylodiscitis is characterized radiographically by erosion of the vertebral endplate adjacent to the disc, its sclerosis, and sometimes narrowing of the disc space.[11-13] In the early stages of the disease in AS, it may occur without the development of ankylosis of the vertebral body, and it is reported that 13.5% of cases affect several different vertebral units of the spine simultaneously.[5,11,14-16]

In the study conducted by Langlois et al.[17] in France in 2004, which compared AS patients with and without discitis, of the 79 AS patients included in the study, 14 patients had radiological discitis, 12 of whom had discitis at one level, and 2 had discitis at two levels. It was significantly more widespread among stage III sacroiliitis cases compared to the control group (57% versus 29%, p=0.045). While Langlois et al.[17] reported predominantly thoracolumbar involvement (75%), in this study, only 38% thoracolumbar lesions and 44% lumbar lesions were reported.

In the study by Kabasakal et al.[16] with included 147 AS patients, spondylodiscitis was detected in 12 patients (8%) with a total of 32 vertebral units affected. In infection-related

Table 1. Rheumatology specialists' rates of detecting spondylodiscitis according to their experiences and spondylodiscitis etiology

	All spondylodiscitis		Spondylodiscitis due to infection		Spondylodiscitis due to spondyloarthritis	
	>10 years experience	<5 years experience	>10 years experience	<5 years experience	>10 years experience	<5 years experience
Sensitivity	63.0 (60.8-65.2)	52.1 (30.4-59.0)	75.0 (75-75)	75.0 (50.0-87.5)	56.6 (53.3- 60.0)	46.6 (13.3-76.9)
Specificity	72.0 (71.1-73.0)	88.4 (58.8-94.2)	72.0 (71.1- 73.0)	88.4 (58.8-94.2)	72.0 (71.1- 73.0)	88.4 (58.8-94.2)
PPV	49.9 (48.3- 51.7)	65.0 (44.7-75.0)	29.2 (28.5- 30.0)	46.1 (25.0-57.1)	36.9 (34.7-39.1)	50.0 (31.5-62.5)
NPV	81.5 (80.4- 82.6)	78.8 (58.8-83.6)	94.9 (94.8- 95)	95.1 (92.1-96.7)	85.1 (84.0- 86.3)	84.9 (78.6-90.9)

Data are presented as median (minimum-maximum), NPV: Negative predictive value, PPV: Positive predictive value

Table 2. Rheumatology specialists' rates of detecting spondylodiscitis according to spondylodiscitis etiology and localization

	All spondylodiscitis		Spondylodiscitis due to infection		Spondylodiscitis due to spondyloarthritis	
	L3-4 and below vertebral units	Vertebral units above L3-4	L3-4 and below vertebral units	Vertebral units above L3-4	L3-4 and below vertebral units	Vertebral units above L3-4
Sensitivity	38.4 (15.3-84.6)	33.3 (33.3-66.6)	60.0 (20-80)	50.0 (50.0-100)	37.5 (0-87.5)	25.0 (0-75.0)
Specificity	92.9 (83.8-96.5)	92.3 (81.5-98.4)	92.5 (62.5-96.2)	92.9 (80.7-100)	92.8 (80.3-98.2)	91.6 (81.6-98.3)
PPV	50.0 (28.5-71.4)	37.5 (14.2-66.6)	37.5 (16.6-50.0)	33.3 (12.5-100)	42.8 (0-75.0)	28.5 (0-90.9)
NPV	87.5 (82.8-96.6)	94.1 (92.9-96.6)	95.8 (92.4-97.7)	98.2 (97.8-100)	91.3 (83.3- 97.8)	94.8 (93.6-98.1)

Data are presented as median (minimum-maximum), NPV: Negative predictive value, PPV: Positive predictive value

spondylodiscitis, similarly, the lumbar vertebra is more frequently involved, followed by the thoracic and cervical vertebrae.[18] Tuberculosis (TB).[19] Multi-vertebral unit involvement is seen in 5-18% of patients with pyogenic infection and 20% of TB patients.[19,20]

According to the results in the literature, spondylodiscitis can be seen in both the thoracic and lumbar areas. However, it is almost impossible to detect the lesions in the thoracic region with conventional radiography. Therefore, we limited our study to the lumbar region. In the present study, according to LS MRI findings, there was spondylodiscitis at 31 vertebral units in 23 patients. When we evaluated the detection of spondylodiscitis according to the vertebral unit level, it was most frequently present at one level (60.8%), followed by two levels (21.7%) and three levels (17.3%). The distribution of the localizations was the highest at the L4-5 vertebral unit (56.5%). When we grouped the patients according to spondylodiscitis due to spondyloarthritis and infectious causes, spondylodiscitis was most frequently present at one vertebra level and the L4-5 vertebral unit.

The estimated prevalence of spondylodiscitis among AS patients varies between 1% and 10%, with an average of 4.5%.[21] Rasker et al.[5] reported a prevalence between 5-10%, Langlois et al.[17] reported a prevalence of 18%, Rosen et al.[22] reported a prevalence of 5%, and Schulitz[23] reported a prevalence of 6%.

In AS spondylodiscitis, both mechanical stress and inflammation have been identified as causes of vertebral object damage.[11,24,25] There is no consensus on whether these lesions result from the inflammation related to AS or whether mechanical factors play a role.[5] Because both patients and doctors may attribute the complaints to AS, and the lesions are asymptomatic in some cases, a diagnosis of spondylodiscitis may be missed. The clinical picture of spondylodiscitis may range from asymptomatic to severe spinal cord damage symptoms.[12,14]

Due to varying clinical symptoms and onset, it is probably more widespread than anticipated. Clinicians should suspect a diagnosis of spondylodiscitis in an AS patient when the patient has localized pain unlike typical AS pain, with an acute onset that increases with movement and decreases at rest. In the study by Rasker et al.[5] in 2009, in which sterile spondylodiscitis was detected in 6 (1.5%) of 400 AS patients, it was reported that in 5 of these 6 patients, there was a

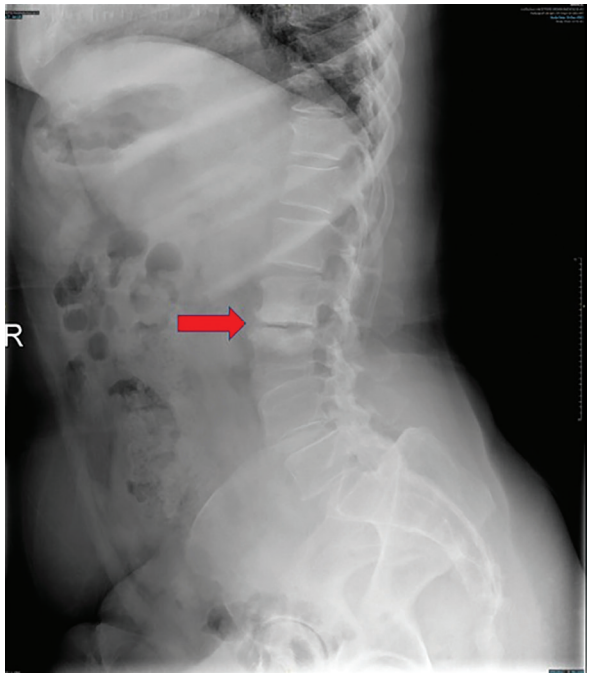

Figure 1. Lateral conventional lumbosacral radiograph. Fifty-six-year-old female patient. Complaints of back pain, night sweats, fever, weight loss. CRP: 0.88 mg/dL. Spondylodiscitis caused by infection. Lumbar MRI: Decrease in L2 and L3 vertebral body heights is evaluated as spondolidiscitis. At the L2-3 disc level, contour irregularities are observed in the palates adjacent to the disc. There is a paravertebral abscess and a right psoas abscess. *Staphylococcus aureus* growth was detected in tissue culture. All 11 of 11 rheumatologists (100%) recognized spondylodiscitis on conventional radiography

CRP: C-reactive protein, MRI: Magnetic resonance imaging

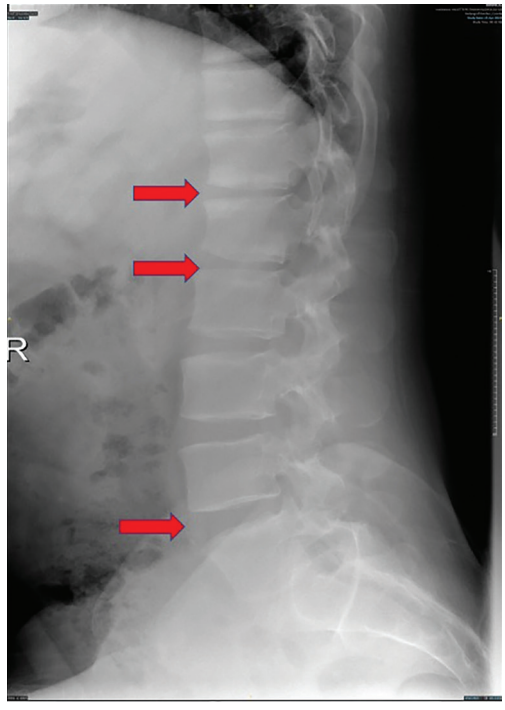

Figure 2. Lateral conventional lumbosacral radiograph. Forty-year-old male patient. Complaints of back pain that increases with movement. CRP: 2 mg/dL. Spondylodiscitis caused by spondyloarthritis. Lumbar MRI: Discal and medullary signal changes compatible with spondylodiscitis are observed in the T12-L1, L1-2, L4-5 discs and adjacent end plates. In addition, there are active corner lesions in the vertebral corners, mostly at the level of L3 and L4 vertebrae in the anterior, and signal changes thought to belong to fatty corner lesions in the posterior. Fatty corner lesions are also observed anteriorly in the L5-S1 end plates. There is no abscess. Culture was not taken. Nine of 11 rheumatologists (82%) recognized spondylodiscitis on conventional radiography

CRP: C-reactive protein, MRI: Magnetic resonance imaging

change in the characteristics of the back pain-it increased during movement instead of recovery, and it decreased after resting instead of exacerbating.

In such situations, clinicians typically begin evaluation with conventional radiography. According to our results, AS-related spondylodiscitis can be detected with conventional radiography with a sensitivity of 46.6%. In other words, spondylodiscitis cannot be detected in more than half of these patients with conventional radiography. Hence, it might be appropriate for clinicians to prioritize MRI instead of conventional radiography in spondyloarthritis patients with changes in pain characteristics where spondylodiscitis is suspected.

Infectious spondylodiscitis constitutes another significant group. In the presence of infectious spondylodiscitis, in addition to the disc area and endplate, surrounding tissues are frequently affected. These lesions can be more widespread.[26] Therefore, the detection of these lesions with conventional radiography can be easier compared to AS. In our study, the sensitivity in detecting infectious sacroiliitis can reach up to 75%.

In other words, with conventional LS radiography, spondylodiscitis can be detected in 3/4 of the patients. More importantly, the negative predictive value in infectious spondylodiscitis is as high as 95%. Accordingly, in the presence of severe pain and fever that disrupts sleep, unresponsiveness to rest and non-steroidal anti-inflammatory drugs, neutrophilic leukocytosis, and elevated acute phase reactants, conventional radiography can be used to exclude spondylodiscitis in the LS region.

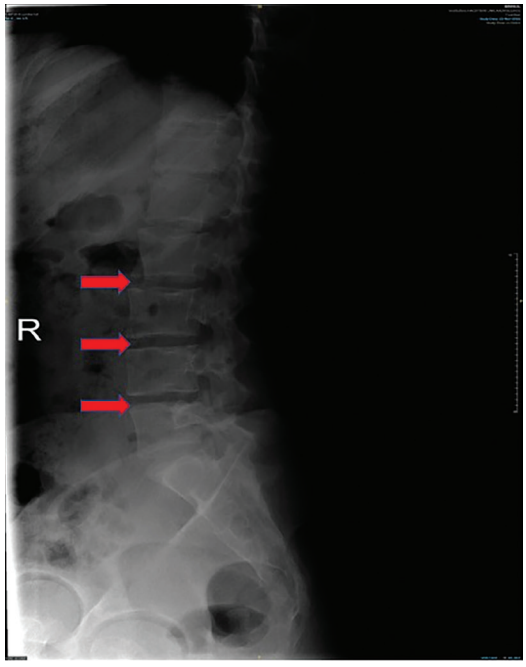

Figure 3. Lateral conventional lumbosacral radiograph. Twenty-four-year-old female patient. Complaints of back pain that increases with movement. CRP: 0.3 mg/dL. Spondylodiscitis caused by spondyloarthritis. Lumbar MRI: There are erosive changes compatible with Anderson lesions in the end plates adjacent to the L2-3, L3-4 and L4-5 discs. There is no abscess. Culture was not taken. Eleven of 11 rheumatologists (100%) could not recognize spondylodiscitis on conventional radiography

CRP: C-reactive protein, MRI: Magnetic resonance imaging

Evaluating these graphs requires minimal experience. No significant differences have been observed between doctors with more than 10 years of experience and those newly specializing in rheumatology. However, it should not be overlooked that infectious spondylodiscitis can develop in the thoracic region as well. If the clinical suspicion is prominent, it is advisable to use advanced imaging techniques such as spinal MRI.

While it should be remembered that while conventional radiography images were investigated in the evaluation of spondylodiscitis lesions, the lumbar region was specifically targeted.

Study Limitations

One limitation of the study is that the thoracic region, which could be affected, was not considered in the present study. The limitations of our study include its retrospective design and the small sample size, as only 23 of 102 patients with spondylodiscitis detected on MRI had conventional radiography. Another limitation is the lack of grouping based on the experience of the rheumatologists who evaluated the radiological images..

The strength of this study is that the opinion of a rheumatologist was used in the evaluation of conventional radiography. Since no second doctor (radiologist) evaluated the images, this study directly relates to clinical practice. The reason why the sensitivity of direct radiography in the literature is higher than in our study is that radiologists evaluated the radiographs.

Conclusion

In conclusion, spondylodiscitis is a disease with variable clinical presentations and onset, and it is more common than expected. Clinicians may miss spondylodiscitis, especially in AS, with direct radiographic assessment. It should be remembered that clinical experience does not make much difference in interpreting conventional radiographs in spondylodiscitis evaluation. It should also be kept in mind that spondylodiscitis can be observed in the thoracic vertebrae, and this lesion cannot be detected by conventional radiography.

Although it is possible to detect lumbar spondylodiscitis in some patients using lumbar spine radiography, the rate of undetected patients is quite high. While conventional

radiography can be used primarily in the presence of consistent clinical symptoms, clinicians should be aware of the need for more advanced approaches when suspicion arises.

Ethics

Ethics Committee Approval: Ethical approval was obtained from Hacettepe University Non-Interventional Clinical Research Ethics Committee (decision no: 2021/15-55, date: 21.09.2021).

Informed Consent: Written informed consent for participation was obtained from each participant.

Footnotes

Authorship Contributions

Surgical and Medical Practices: Z.Ö., E.C., G.A., G.S.U., M.E., E.Ü., B.F., G.S.B.K., B.B., L.K., Concept: Z.Ö., E.C., G.A., G.S.U., M.E., E.Ü., B.F., G.S.B.K., B.B., L.K., Design: Z.Ö., E.C., G.A., G.S.U., M.E., E.Ü., B.F., G.S.B.K., B.B., L.K., Data Collection or Processing: Z.Ö., E.C., G.A., G.S.U., M.E., E.Ü., B.F., G.S.B.K., B.B., L.K., Analysis or Interpretation: Z.Ö., E.C., G.A., G.S.U., M.E., E.Ü., B.F., G.S.B.K., B.B., L.K., Literature Search: Z.Ö., E.C., G.A., G.S.U., M.E., E.Ü., B.F., G.S.B.K., B.B., L.K., Writing: Z.Ö., E.C., G.A., G.S.U., M.E., E.Ü., B.F., G.S.B.K., B.B., L.K.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declare that they have no relevant financial disclosures.

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