

Magnetic resonance imaging findings and complications in patients with spondylodiscitis in a high complexity center in Bucaramanga

Hallazgos por imagen en resonancia magnética y complicaciones en pacientes con diagnóstico de espondilodiscitis en un centro de alta complejidad en Bucaramanga

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Summary

Introduction: The diagnosis of spondylodiscitis requires a high index of suspicion since symptoms and imaging findings can be variable, delayed, and nonspecific; its delay increases morbidity and mortality rates. ***Objective:*** To describe the imaging findings on magnetic resonance and complications in patients with spondylodiscitis at Hospital Los Comuneros, Bucaramanga, in the period from 2020-2023. ***Methodology:*** A retrospective, descriptive, case series study involving 21 patients diagnosed with spondylodiscitis. The frequency of positive bone biopsy cultures, magnetic resonance findings, and complications are presented. ***Results:*** The mean age was 60.2 years, with a higher prevalence in males. Magnetic resonance reported hyperintensity in the vertebral bodies, endplates, and intervertebral discs in T2 and STIR sequences with diffuse enhancement after contrast administration. In contrast to literature reports, the most frequently isolated pathogen was *Staphylococcus Aureus,* with greater involvement in the thoracic spine. Paravertebral abscess was present in 71.40 % of the cases, epidural abscess in 61.9 %, and spinal cord compression in 47.6 %. Complications included chronic pain, pathological fracture, neurological deficit, and vertebral fusion. ***Conclusions:*** Diagnostic suspicion is crucial for timely treatment. Destruction of intervertebral endplates along with hyperintensity in intervertebral discs in T2 sequences and contrast enhancement are the most sensitive findings. Chronic pain and pathological fractures are the main complications.

Resumen

Introducción: El diagnóstico de espondilodiscitis requiere un alto índice de sospecha dado que los síntomas y hallazgos por imágenes pueden ser variables, tardíos e inespecíficos; su retraso aumenta las cifras de morbimortalidad. ***Objetivo:*** Describir los hallazgos por imagen en resonancia magnética y complicaciones en pacientes con espondilodiscitis del Hospital Los Comuneros, Bucaramanga, Colombia, en el periodo 2020-2023. ***Metodología:*** Estudio retrospectivo, descriptivo, de tipo serie de casos, en 21 pacientes con diagnóstico de espondilodiscitis. Se expone la frecuencia de cultivos de biopsia ósea positivos, los hallazgos en resonancia magnética y las complicaciones. ***Resultado:*** La media de edad fue de 60,2 años, con prevalencia en el sexo masculino. En resonancia magnética se observó alta señal en el cuerpo, platillos y discos intervertebrales en secuencias T2 y STIR con realce difuso tras la administración del medio de contraste. A diferencia de lo descrito en la literatura, el germen más frecuentemente aislado fue *S. aureus* y con mayor afectación en la columna torácica. En el 71,40 % de los casos se encontró absceso paravertebral; en el 61,9 %, absceso epidural, y en el 47,6 %, compresión del cordón espinal. Entre las complicaciones se registraron dolor crónico, fractura patológica, déficit neurológico y fusión vertebral. ***Conclusiones:*** La sospecha diagnóstica es fundamental para un tratamiento oportuno. La destrucción de los platillos vertebrales junto con alta señal en los discos intervertebrales en secuencias T2 y realce difuso con el medio de contraste son los hallazgos más sensibles. El dolor crónico y la fractura patológica son las principales complicaciones.

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Introduction

Spondylodiscitis is defined as the simultaneous inflammation of the vertebral body and the adjacent intervertebral disc, caused by a bacterial, tuberculous, or fungal infection (1). It is estimated to affect between 2 and 5.8 per 100,000 inhabitants per year, with a higher prevalence in the elderly (1), and accounts for up to 5% of osteomyelitis cases (2); high mortality rates of up to 20% have been reported in some series (3). Currently, the epidemiology of this pathology in Bucaramanga and Colombia is unknown. Its pathophysiology includes a primary form, in which, in the presence of bacteremia, the germ is inoculated into the non-vascularized disc, and a secondary cause due to direct inoculation, generally associated with trauma or surgical procedures (4).

Symptoms are diverse and nonspecific; up to 62% of patients may have fever and 90% may have nonspecific back pain (5). Neurological deficits have also been reported in 33% to 59% of cases, attributable to direct root compression or inflammation (6). Laboratory findings are nonspecific, showing elevated acute phase reactants. Blood cultures are positive in less than 60% of cases; the germ can be identified in up to 59% of cases (7). Biopsy is considered the gold standard for confirmed diagnosis of spondylodiscitis; however, the use of antimicrobials prior to sampling increases the risk of false negatives (8). In 2020 (7), a study was conducted in Bogotá with *S. aureus* isolated as the main etiological agent; however, in 30% of cases, the causative microorganism was not identified. In Bucaramanga, the percentage of germ isolation and the main etiological agents are unknown.

In imaging, magnetic resonance imaging (MRI) is the study of choice for both diagnosis and follow-up, as it allows for the evaluation of soft tissue components, the spinal cord, and nerve structures (9, 10). Depending on the infectious etiology, some structural changes may occur. Typical pyogenic spondylitis occurs mainly in the lower lumbar vertebrae, starting at the most anterior aspect of the vertebral body, which has abundant arterial blood flow. The infection then spreads to the endplate and ultimately compromises the intervertebral disc (discitis) (8,9). In 98% of cases, the infection can spread to adjacent soft tissues, crossing the anterior and posterior longitudinal ligaments, with dissemination to the retroperitoneum, epidural space, and paraspinal muscles (11).

On the other hand, tuberculous spondylitis has a slower progression, with a lower degree of inflammatory response. It mainly affects the thoracolumbar spine and is associated with extensive destruction of the vertebral body and a tendency to preserve the intervertebral disc; another important feature is the involvement of multiple vertebral bodies with discontinuous lesions and a predisposition to affect posterior elements (11, 12). In addition, disproportionate thin-walled abscesses are observed in relation to the changes caused by bone destruction. Like tuberculosis, Brucella spondylodiscitis affects multiple vertebrae and is differentiated by the involvement of lower lumbar vertebral bodies associated with greater destruction of the intervertebral disc, relative preservation of vertebral body height, and infrequent formation of perivertebral abscesses (13, 14).

Complications mainly include chronic pain and neurological symptoms, depending on the level and degree of severity, which have a significant impact on the quality of life of patients suffering from this condition (15, 16). In Colombia and Bucaramanga, the most common complications following spondylodiscitis have not yet been described. The purpose of this study is to determine the MRI imaging characteristics of patients with a confirmed diagnosis of spondylodiscitis and to describe the most frequent complications.

Material and methods

Study design and sample

Retrospective, observational, descriptive, case series study of patients treated at the Hospital Universitario de Bucaramanga Los Comuneros, with an imaging or microbial diagnosis of spondylodiscitis, who completed medical follow-up at the same hospital between 2020 and 2023. The sample included all patients diagnosed with spondylodiscitis treated at the hospital, of whom 32 met the inclusion criteria; however, after applying the exclusion criteria, the sample was reduced to 21 patients.

Inclusion and exclusion criteria

The inclusion criterion was defined as the recording of ICD-10 codes M464 or M462 in the medical records of patients admitted to the hospital. Exclusion criteria were diagnosis or suspicion of neoplastic or metastatic disease, absence of microbiological culture, failure to perform spinal MRI or inability to review it, inability to continue medical follow-up (due to transfer to another hospital), and diagnosis other than spondylodiscitis (axial or inflammatory spondyloarthropathy).

Variable matrix

Sociodemographic data on patients were recorded, such as sex, age, and origin. Information on symptoms (fever and pain), inpatient and outpatient antibiotic therapy, and invasive management was also recorded. Data on microorganisms isolated during hospitalization were collected by reviewing paraclinical results (blood culture, urine culture, and bone biopsy) and reviewing outpatient medical records to determine complications at three months, such as pain, neurological deficit, presence or absence of segmental instability, and fractures.

Spinal MRI sequences were performed on a Phillips 1.5T resonator using the institution's protocol (Table 1). Imaging characteristics were obtained by reviewing the imaging studies in sequences with T1, T1 with contrast medium, and STIR information, recording general variables such as the height at which the lesion is located in the spine, vertebral involvement referring to the number of affected vertebrae, involvement of posterior elements, and retropulsion of the posterior wall. Among the specific variables for sequences with T1 information and STIR sequences, the signal intensity of the vertebral body and intervertebral disc (low, medium, or high signal) was determined by comparing it with the signal of the unaffected vertebral bodies and intervertebral discs. In sequences with T1 information, the destruction of the vertebral endplates was classified as preserved, eroded, or completely destroyed, the latter when it was not visualized; likewise, the extent of vertebral body destruction was classified as less than or greater than 50%. Intervertebral disc involvement was recorded as unaffected, affected with less than 50% involvement, or affected with more than 50% involvement when destruction was evident or there was an abscess in the disc.

With regard to the variables after contrast medium administration, the enhancement pattern of the intervertebral disc was taken into account and categorized as follows: diffuse, when the enhancement was homogeneous and uniform throughout the disc; focal, when it was localized in a specific area; and marginal, when it involved the outermost edge of the intervertebral disc. Additionally, the variables for vertebral body enhancement were marginal, when it involved the region adjacent to the vertebral endplates; homogeneous, when the enhancement was uniform; and heterogeneous, when areas of greater or lesser intensity were identified. These variables were considered based on the research conducted by Naselli et al. (12).

Two radiologists with more than seven years of experience in neuroradiology independently assessed the imaging variables; each study was analyzed only once by a single expert, without patient identification to ensure the anonymity of the study. Subsequently, the imaging variable data were collected and tabulated in a Microsoft Excel database.

Table 1. Sequence parameters used in the spinal MRI protocol

Sequence	TR/TE (ms)*	Slice thickness (mm)**
T2-weighted sagittal and coronal	3000/100	3
T1-weighted sagittal	1200/12	3
Sagittal STIR	4500/40	3
T2-weighted axial	6000/100	3

*TR/TE (ms): Repetition time/echo time (milliseconds)

**(mm): millimeters

Source: own elaboration.

Systematization of information and control of biases

Three independent reviews of the information system were conducted, each by a different researcher at different times, applying the inclusion and exclusion criteria. This strategy aimed to reduce selection bias related to subjective interpretation of data or unintentional omission of information. Subsequently, a fourth joint review was conducted to compare and unify the results. To reduce discrepancies in the interpretation of variables, each variable was operationalized beforehand. The data were entered in duplicate into a Microsoft Excel 2010 database and analyzed using STATA software version 18.

Data analysis

This corresponds to a descriptive analysis using frequency and mean values. No measures of association between them were used.

Results

A sample of 21 patients with a mean age of 60.2 years was included, of whom 13 (62%) were male and 8 (38%) were female, with a mean age of 56.3 and 66.6 years, respectively; Likewise, 16 patients came from urban areas (76.2%) and 5 (23.8%) from rural areas. Of the total sample, 4 patients (9%) had fever and 100% had pain as initial symptoms. At least one microorganism was isolated in 66.6% of cases, the most common being S. aureus in 4 cases (19%), while microbiological isolation was not achieved in 7 cases (33%) (Table 2).

All patients received intravenous antibiotic treatment in hospital, with dual therapy in 11 cases (52.4%) and triple drug therapy in only 3 cases (14.3%). Vancomycin was the most commonly used antibiotic, administered to 16 patients (76.1%), of whom 12 (57.1%) received it in dual therapy. With regard to outpatient antibiotic therapy, 11 patients (52.3%) did not receive drug management. Among those who received therapy, 3 (14.3%) were treated with ciprofloxacin as monotherapy or administered in combination with clindamycin, and in 19% of cases, trimethoprim-sulfamethoxazole was administered as monotherapy upon discharge.

Table 2. Demographic characteristics of the study population Symptoms

Variable	*N* (%)
Sex	
Male	13 (62%)
Female	8 (38%)
Sintomatología	
Fever	4 (9%)
Pain	21 (100%)
Microorganismos aislados	
Not isolated	7 (33.3%)
Staphylococcus aureus	4 (19%)
Staphylococcus spp	2 (9.5%)
Klebsiella pneumoniae	1 (4.8%)
Pseudomona	1 (4.8%)
E. coli	2 (9.5%)
Mycobacterium tuberculosis	1 (4.8%)
Manejo intrahospitalario	
1 medication	7 (33.3%)
2 medications	11 (52.4%)
3 medications	3 (14.3%)
Outpatient management	
Did not receive	11 (52.4%)
1 medication	8 (38.1%)
2 medications	2 (9.5%)
3 medications	0 (0%)

Source: own elaboration.

Regarding the location of spondylodiscitis involvement in the spine, single-segment involvement was determined in 13 patients (61.9%), with the thoracic segment being the most affected in 7 cases (33.3%), followed by the lumbar region in 5 cases (23.8%). Two segments were affected in 8 patients (38.1%), with the lumbosacral region predominating in 6 (28.6%) patients. In most cases, 2 vertebral bodies were affected in 16 cases (76.2%), and 3 vertebral bodies were affected in 3 cases (14.3%), distributed between the cervicothoracic region, thoracic region, and lumbosacral region. One case (4.8%) involved four vertebral bodies in the thoracolumbar region, while the case of tuberculous spondylodiscitis involved five vertebral bodies located in the lumbosacral region (Table 3). In 14 (66.6%) cases, extension to the posterior elements was identified, and in 9 (42.8%), total retropulsion of the posterior wall was observed.

Table 3. Distribution of location and number of affected vertebral bodies

Location	Number				Total *n* (%)
	2, *n* (%)	3, *n* (%)	4, *n* (%)	5, *n* (%)	
Cervical	1 (4.8%)	0 (0%)	0 (0%)	0 (0%)	1 (4.8%)
Cervicothoracic	0 (0%)	1 (4.8%)	0 (0%)	0 (0%)	1 (4.8%)
Thoracic	6 (28.6%)	1 (4.8%)	0 (0%)	0 (0%)	7 (33.3%)
Thoracolumbar	0 (0%)	0 (0%)	1 (4.8%)	0 (0%)	1 (4.8%)
Lumbar	5 (23.8%)	0 (0%)	0 (0%)	0 (0%)	5 (23.8%)
Lumbosacral	4 (19%)	1 (4.8%)	0 (0%)	1 (4.8%)	6 (28.6%)
Sacral	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

n: number of cases.

Source: own elaboration.

In imaging variables, in T1 sequences without contrast, 19 cases (90%) showed vertebral bodies with low signal intensity, while in 2 cases (4.8%) the signal was intermediate (Table 4). The intervertebral discs showed similar characteristics, with low signal in 20 cases (95.3%). Additionally, it should be noted that in 12 cases (57.1%) complete destruction of the vertebral endplates was observed, in 9 cases (42.8%) erosion was observed, and in no cases was preservation of the endplates identified (Figure 1). On the other hand, there were 8 cases (38.1%) of destruction of less than 50% of the vertebral body and an equal number of cases with more than 50% involvement (Figure 2). In the STIR sequences, both the vertebral bodies and the intervertebral discs showed high signal intensity in 100% of cases. After contrast administration, 16 cases (76.2%) showed heterogeneous enhancement of the vertebral body, and in 13 cases (61.9%), enhancement covering more than 50% of the vertebral body was observed. As for the intervertebral disc, 17 cases (80.9%) showed diffuse enhancement, and in 19 cases (90.5%), this enhancement affected more than 50% of the intervertebral disc volume (Figure 3).

Table 4. Parameters evaluated in T1 and T1 with contrast medium of the vertebral body and intervertebral disc

Parameters in sequence with T1 information without contrast medium		*n* (%)
Vertebral disc involvement	Preserved	0 (0%)
	Eroded	9 (42.8%)
	Completelydestroyed	12 (57.1%)
Extent of vertebral body destruction	No evidence	5 (23.8%)
	Less than 50%	8 (38.1%)
	Greater than 50%	8 (38.1%)
Extent of intervertebral disc destruction	No evidence	0 (0%)
	Less than 50%	7 (33.3%)
	Greater than 50%	14 (66.6%)
Parámetros evaluados en secuencia T1 con medio de contraste		***n* (%)**
Enhancement of the vertebral body	Marginal	5 (23.8%)
	Homogeneous	0 (0%)
	Heterogeneous	16 (76.2%)
Percentage of enhancement of the vertebral body	No evidence	0 (0%)
	Less than 50%	8 (38.1%)
	More than 50%	13 (61.9%)
Enhancement of the intervertebral disc	Diffuse	17 (80.9%)
	Marginal	1 (4.8%)
	Focal	3 (14.3%)
Percentage of enhancement of the intervertebral disc	No evidence	0 (0%)
	Less than 50%	2 (9.5%)
	More than 50%	19 (90.5%)

With regard to extravertebral parameters in T1 sequences with contrast medium, paravertebral abscess was identified in 15 cases (71.4%), all with thick and irregular walls. Enhancement of paravertebral soft tissues was characterized as poorly defined and diffuse in 17 cases (80.9%). Spinal cord compression was observed in 10 cases (47.6%), all with epidural abscess (Figure 4). Epidural abscess was observed in 13 cases (61.9%) and epidural phlegmon in 8 cases (38.1%). The anterior longitudinal ligament was affected in 8 cases (38.1%), all of which had epidural abscess or epidural phlegmon (Figure 5). There was only one case of tuberculous spondylodiscitis with evidence of intraosseous abscess, epidural abscess, and thick-walled paravertebral abscess with diffuse soft tissue enhancement (Figure 6). No difference in enhancement was evident on imaging in this case when compared to bacterial spondylodiscitis.

Among the complications recorded, 16 patients (76.2%) reported chronic pain; 10 cases (47.6%) had some type of pathological fracture, and in 4 cases (19%), chronic spondylodiscitis (Figure 7). With regard to neurological involvement, 23.8% of patients presented some type of paresis; 23.8% presented signs of radiculopathy; and 9.5% presented limb paralysis (Table 5). Only 6 patients (28.6%) required some type of invasive management. Laminectomy was the most widely used method (4 cases, 19%), while percutaneous drainage of the abscess, open surgery, and spinal arthrodesis were each performed in only one case (4.8% for each modality).

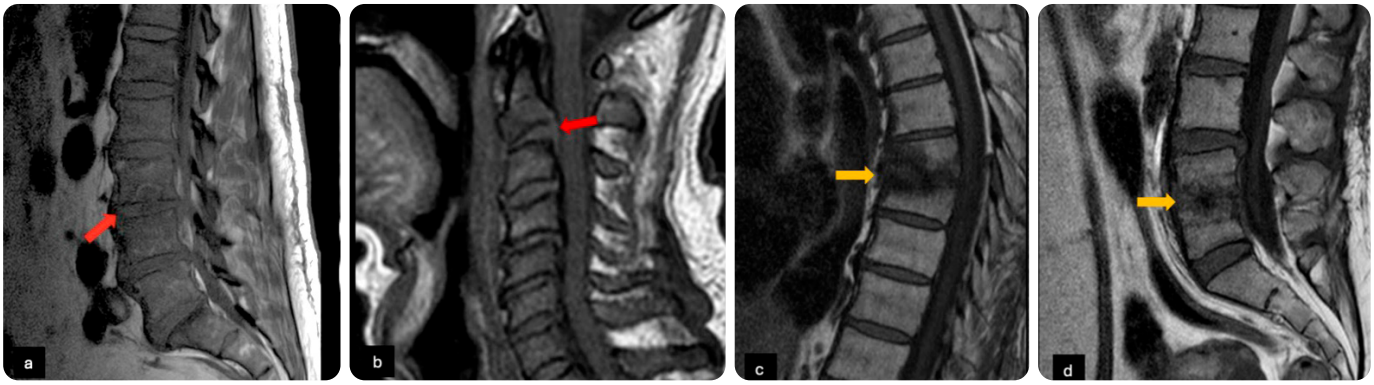


Figure 1. Examples of vertebral endplate involvement. Sagittal sequences with T1 information. a) L4-L5 and b) C2-C3 with irregularity of the vertebral endplates and an eroded appearance (red arrows). c) T7-T8 and d) L4-L5 vertebral endplates completely destroyed with loss of their low signal edge (yellow arrows).

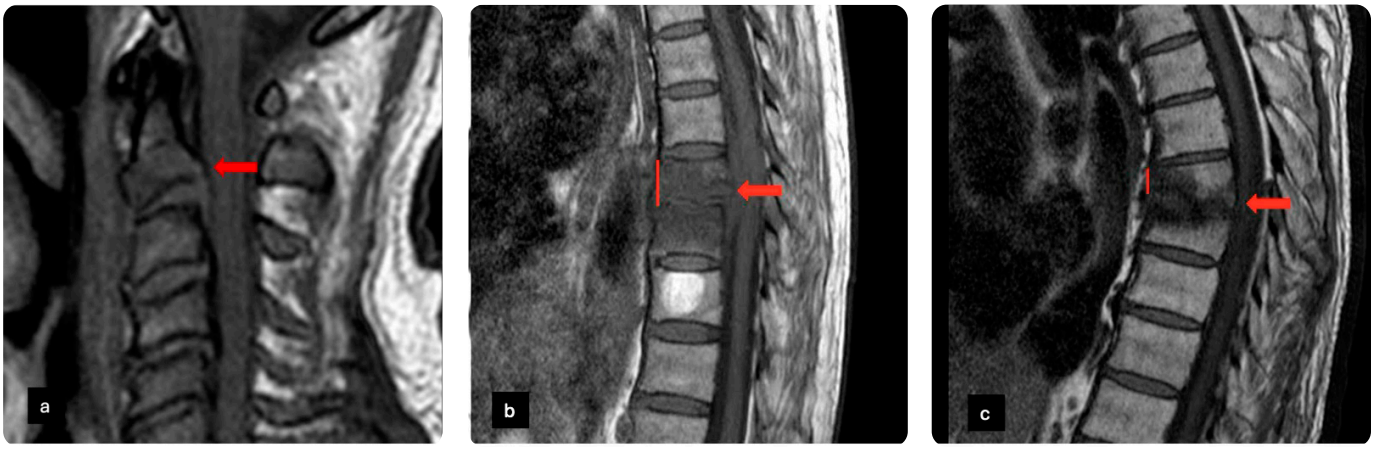


Figure 2. Extent of vertebral body destruction in sagittal sequences with T1 information without contrast medium. The red arrows indicate the segment affected by spondylodiscitis and the red lines show the height of the vertebral body. a) Cervical C2-C3 with no evidence of vertebral body destruction and preservation of height. b) Thoracic, a decrease in the height of the posterior wall of the vertebral body is observed when compared to the anterior wall (red line) and the height of the upper and lower vertebral bodies; this decrease is less than 50% of the longitudinal diameter. c) Extension of vertebral body destruction greater than 50%, the red line indicates the length of the anterior wall of the vertebral body in a thoracic spondylodiscitis involvement.

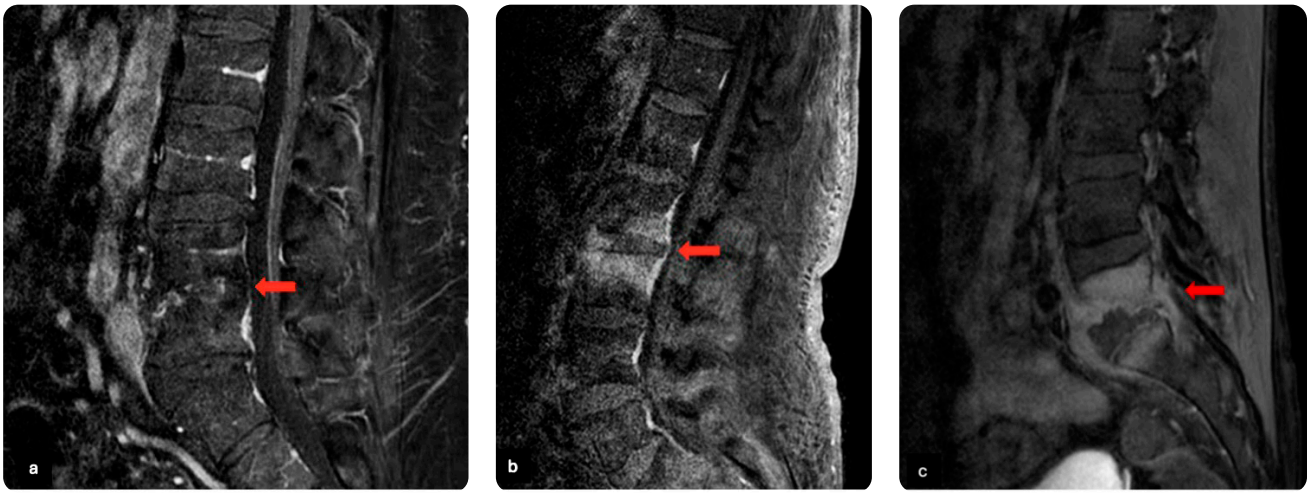


Figure 3. Enhancement of the vertebral body and intervertebral disc in sagittal sequences with T1 information and fat suppression with contrast medium. The red arrows indicate the vertebral segment affected by spondylodiscitis. a) Marginal enhancement of the vertebral body (less than 50%) accompanied by focal enhancement of the intervertebral disc (less than 50%). b) Heterogeneous enhancement of 50% of the vertebral body, the intervertebral disc shows diffuse enhancement greater than 50%. c) Heterogeneous enhancement affecting more than 50% of the vertebral body, the intervertebral disc shows diffuse enhancement.

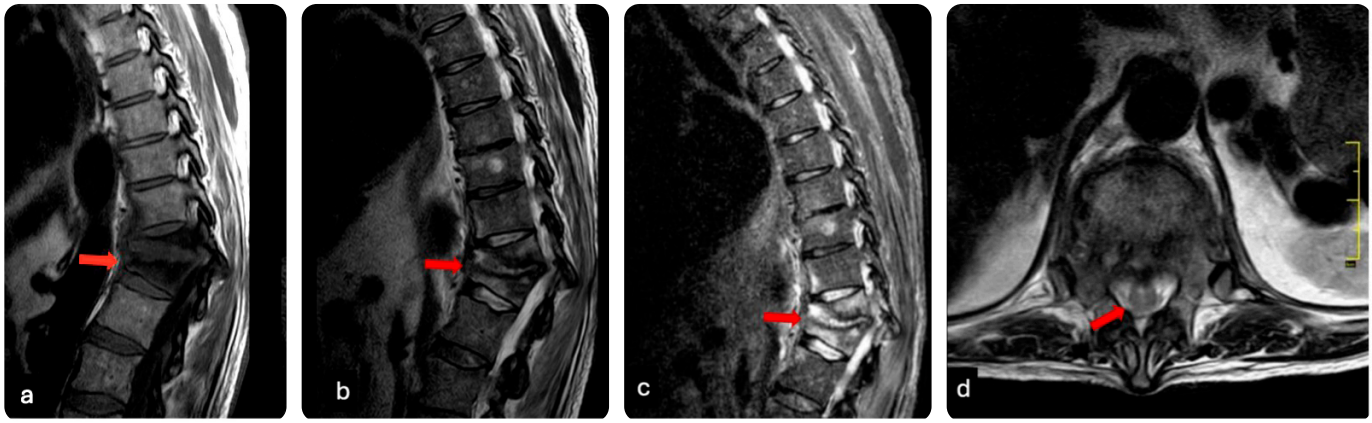


Figure 4. Spinal cord compression. Sagittal and axial MRI sequences: bacterial spondylodiscitis. a) T1-weighted sequence with marked low signal from the bone marrow, irregularity and destruction of the vertebral endplates with involvement of more than 50% of the vertebral body, low signal from the intervertebral disc and decrease in its height. Retropulsion of the posterior wall with extension to the spinal canal. b) High signal on T2-weighted sequence. c) High signal on STIR sequences. d) Axial T2-weighted sequence with retropulsion of the posterior wall contacting the spinal cord, which shows high signal due to myelopathy.

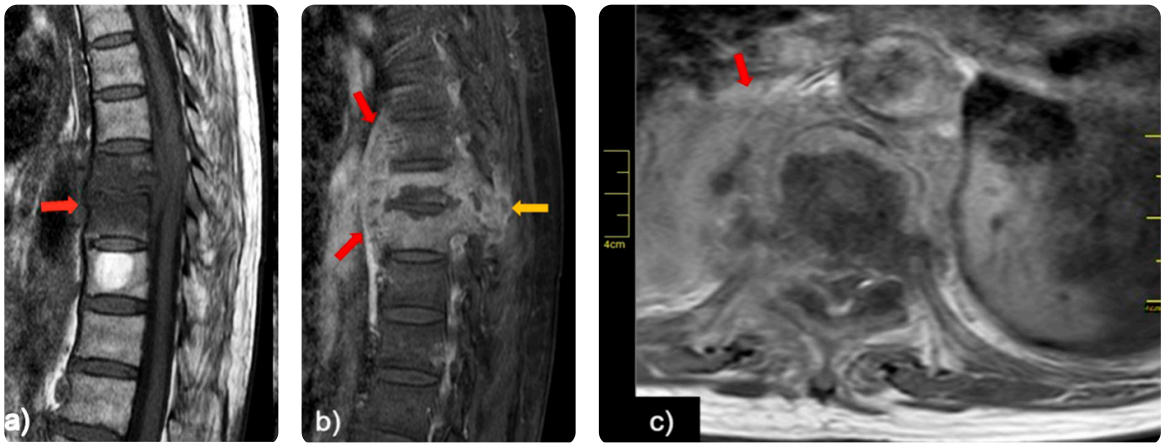


Figure 5. Bacterial spondylodiscitis in the thoracic segment with involvement of the anterior longitudinal ligament. a) Sagittal MRI sequences with T1 and fat saturation information. Low signal intensity in the thoracic vertebral bodies with irregularity and destruction of more than 50% of the vertebral endplates, poor definition of the anterior longitudinal ligament (red arrow). b) Diffuse heterogeneous enhancement after contrast medium administration with involvement of posterior elements and prevertebral tissues (red and yellow arrows). c) Axial sequence with contrast medium showing evidence of soft tissue involvement (red arrow) and epidural component extending to the right intervertebral foramen.

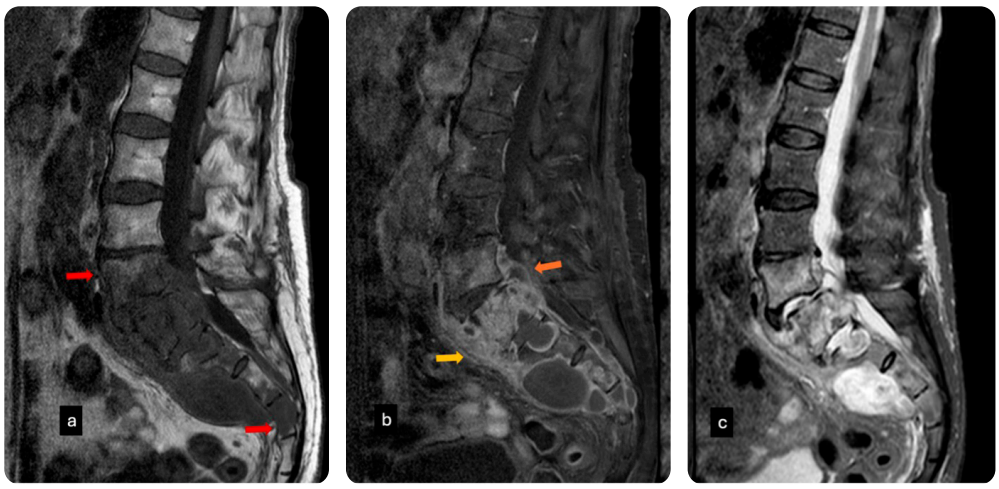


Figure 6. Tuberculous spondylodiscitis. Sagittal sequences. a) T1-weighted without contrast medium with low signal from the vertebral bodies from L4 to S3 (red arrow) accompanied by low signal from the intervertebral discs and irregularity of the vertebral endplates. b) T1-weighted sequence with contrast medium and fat suppression showing diffuse heterogeneous enhancement involving more than 50% of the vertebral bodies, thick-walled paravertebral abscess (yellow arrow) and epidural abscess (orange arrow), with intraosseous abscess visible in S1. c) STIR sequence with diffuse high signal intensity in the vertebral bodies, intervertebral discs, and soft tissues.

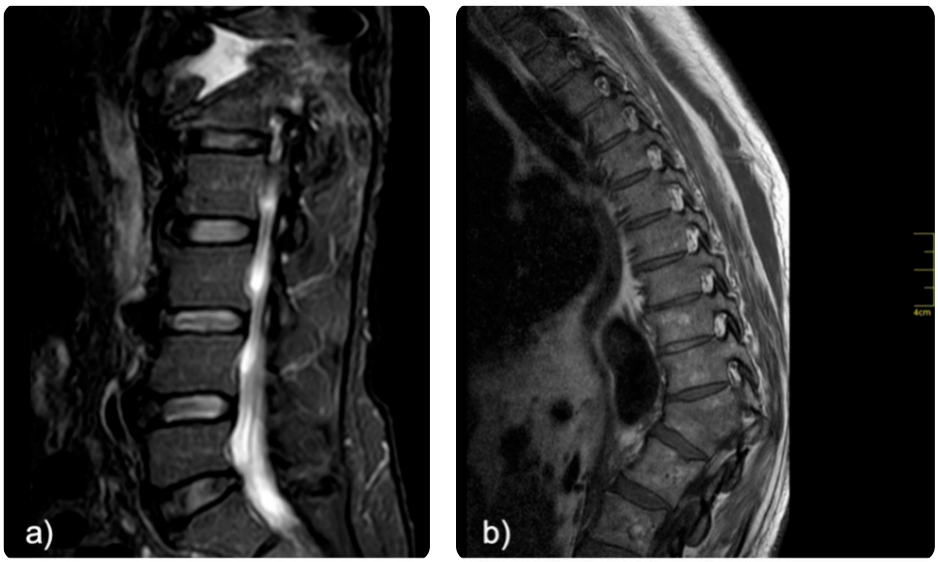


Figure 7. Structural complications due to spondylodiscitis. a) Sagittal STIR sequence showing segmental instability due to destruction of the thoracic vertebral body. b) Sagittal T1-weighted sequence showing vertebral fusion causing increased kyphotic curvature.

Table 5. Distribution of complications after spondylodiscitis

Variable	Yes	No
	***n* (%)**	***n* (%)**
Chronic spondylodiscitis	4 (19)	17 (80.9)
Chronic pain (greater than 6 months)	16 (76.2)	5 (23.8)
Chronic skin fistula	0 (0)	21 (100)
Segmental instability	3 (14.3)	18 (85.7)
Pathological fracture	10 (47.6)	11 (52.4)
Vertebral fusion	1 (4.8)	20 (95.3)
Paresis	5 (23.8)	16 (76.2)
Paralysis	2 (9.5)	19 (90.5)
Radiculopathy	5 (23.8)	16 (76.2)
Bladder dysfunction	2 (9.5)	19 (90.5)

Source: own elaboration.

Discussion and conclusions

The main objective of this study was to describe the MRI findings in patients with spondylodiscitis treated in Bucaramanga between 2020 and 2023. The imaging findings included high signal intensity on STIR sequences and post-contrast enhancement in the affected discs and vertebral bodies, with a notable frequency of vertebral endplate destruction and paravertebral and epidural abscesses. Single-segment involvement was more frequent in the thoracic spine, and two- or more-segment involvement predominated in the lumbosacral region. In terms of complications, chronic pain was the most common sequela, followed by pathological fractures and various neurological deficits. It is estimated that spondylodiscitis, as an infectious entity of the vertebral body and disc, most frequently affects individuals over 65 years of age, up to 3.5 times more than the general population, with a predilection for males, given that women have been shown to have a 0.82 times lower frequency (17). This was reflected in the present study, with 13 (62%) male participants; the mean age was 60.2 years, slightly lower than expected, which could be associated with an increase in risk factors in the population and improved diagnostic techniques (18).

The results of this study showed that the most frequently isolated microorganism was S. aureus (19% of cases), which is consistent with other series in which S. aureus is the most commonly isolated germ, accounting for up to 75% of cases depending on the series (12, 19, 20); however, different articles have described greater involvement by Mycobacterium tuberculosis in developing countries (12, 21). The most common symptom documented in the literature is pain in the spine in up to 80% of cases (18). In the patients in this study, it was present in 100% of individuals as an initial symptom, while fever only affected 19% of participants, a finding consistent with some reports in the literature in which only 13% of patients reported a first febrile episode (22).

It has been described mainly affecting the lumbar segment (16) and in up to 68% of cases affecting multiple segments (18); This study differs from the literature, since the main location of single involvement was the thoracic region with 33.3%, and when evaluating multiple involvement, the most affected region was the lumbosacral region with 28.6% of cases, a finding that is consistent with what has been reported in different studies.

MRI is the technique of choice, with a sensitivity and specificity of 96% and 92%, respectively (6, 7, 23). Early findings are often nonspecific and consist of spinal cord edema in adjacent vertebral bodies, mainly on the anterolateral surface, and edema in the adjacent intervertebral disc. The most specific finding is the destruction of the vertebral endplate visible in T1-weighted sequences as a focal disruption of the cortex. In the present study, involvement of the vertebral endplates was identified in all patients, with erosion in 42.8% and complete destruction in 57.1% of cases, which is consistent with the literature.

The intervertebral disc can be visualized with low signal intensity in T1-weighted sequences and high signal intensity in T2-weighted sequences, T2 fat suppression, and STIR. However, in up to 13% of cases in the early stages, it may have low signal intensity on T2; as the infection progresses, a typical pattern of increased enhancement can be seen after the administration of intravenous paramagnetic contrast medium, which allows for the visualization and further characterization

of collections or abscesses (5, 22). In this series, 100% of patients had high STIR signal in the intervertebral disc; after contrast administration, predominantly diffuse enhancement of the intervertebral disc was identified, and in 90.5% of cases it was greater than 50%, with no association between the percentage of enhancement and the type of microorganism. The enhancement of the vertebral body was heterogeneous in a high proportion of cases and mostly affected more than 50% of the vertebral body, a finding consistent with the literature. It is also the earliest sign of healing, when a decrease in enhancement is observed after contrast medium administration and high signal intensity on T2 (5); however, these changes were not evaluated in this series.

With regard to soft tissue involvement, a Colombian study conducted in 2020 (7) in Bogotá documented 82.9% involvement of paravertebral tissues, 15.9% epidural and paravertebral abscesses, and 37.7% no abscesses. In this study, 71.4% of patients had paravertebral abscesses and 61.9% had epidural abscesses, which is higher than the figures reported in the literature. Additionally, in 85.5% of cases, more than 50% of the intervertebral disc was compromised in 61.9% of cases, and vertebral body destruction was found in 71.4% of cases. These findings are consistent with those described by Garkowski et al. (24) and differ from those published in the Colombian study by Herrera et al. (7).

According to Lee et al. (21), patients with tuberculous spondylodiscitis had a higher frequency of epidural abscesses and destruction of more than 50% of the vertebral body, while in cases of pyogenic etiology, the presence of paraspinal abscesses predominated, findings also found in the study by Nasselli et al. (12); However, in the present study, only one case of M. tuberculosis was isolated, so it is unknown whether there is an association.

The treatment of spondylodiscitis can be conservative or surgical, and its main objectives are to eliminate the infectious process, preserve spinal stability, and control pain (5, 16, 23, 25). Conservative management is currently used more frequently and consists of administering antibiotics or antifungals orally or intravenously, ideally targeted according to the results of microbiological studies; however, it has been documented that these are positive in highly variable ranges (26, 27), which is why broad-spectrum antibiotic therapy is also required (27). In the series described here, cultures were negative in 33% of cases, making it necessary to use combined broad-spectrum antibiotic therapy, a practice highly recommended in the literature in this scenario. The most commonly used in-hospital antibiotic treatment was vancomycin (in 67% of cases), which, according to the literature, is the first-line treatment of choice when isolation of methicillin-resistant staphylococcus, penicillin-resistant enterococcus, or negative cultures is confirmed, in order to cover multiple causative agents (23). Surgical treatment is reserved for cases with neurological deficits, sepsis, abscesses, spinal instability, or failure of conservative management. According to the literature, the procedures with the best outcomes are laminectomy, debridement, and decompression, mainly using a posterior approach (28). In line with the above, the most frequently performed procedure in this study was laminectomy, which was required in four patients (19%). In cases of paravertebral or intradiscal abscesses, percutaneous drainage by interventional radiology is recommended (16); in this study, it was necessary for only one patient.

As a result of inflammation and virulence factors of infectious agents, complications such as destruction of vertebral bodies, fractures, instability, kyphosis, and chronic pain arise, as well as neurological symptoms ranging from paresis and paralysis to sphincter compromise (15, 16, 29). In the present study, the most frequent complication was chronic pain (in 71% of cases), which has been described in the literature as an important cause of decreased functionality and quality of life (15). Mortality of up to 20% has been documented in some series; in the population studied here, there were no deaths from this cause.

In conclusion, spondylodiscitis is considered to be a current pathology with nonspecific symptoms that is difficult to diagnose due to the lack of microbiological isolation, leading to the use of empirical antibiotic therapy. When the germ is identified, S. aureus is the most common. MRI remains the test of choice for determining the extent and involvement of the disease. The involvement of the vertebral endplates and the high signal intensity in both the intervertebral disc and the vertebral body in fluid-sensitive sequences raise suspicion. Some imaging characteristics have been described that may indicate the etiology of spondylodiscitis (tuberculous or bacterial); however, to date, there are no imaging patterns that allow for confirmation. It is essential to describe the involvement of extravertebral tissues, as well as their extent; among these, paravertebral and epidural abscesses are the most common. In a significant number of patients, there is involvement of the anterior longitudinal ligament and retropulsion of the posterior wall, so it is recommended that this finding be described in radiological reports.

Ethics Committee

This research was conducted in accordance with the agreements of the Declaration of Helsinki, of the 18th World Medical Assembly (Finland, June 1964) (30). Additionally, in accordance with Resolution 8430 of October 4, 1993, of the Ministry of Health (31), this research is considered risk-free because it is a retrospective study that does not modify the patient's physiological, biological, or psychosocial variables. This research project was carried out under the rules for the management of medical records set forth in Resolution 1995 of 1999 (32) and guarantees compliance with the Privacy Rule of the HIPAA Act of 1996. There is no external funding for this project. Finally, this research complies with the guidelines of the Personal Data Protection Law or Law 1581 of 2012 (33), guaranteeing the confidentiality and security of personal data. It was endorsed by the ethics committee of the Instituto de Diagnóstico Médico (IDIME) and the Los Comuneros Hospital Universitario de Bucaramanga.

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