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RESEARCH ARTICLE

Clinical, Microbiological and Treatment Characteristics of Spondylodiscitis: A Six-Year Single-Centre Neurosurgery Experience from a Brucellosis-Endemic Region of Türkiye

Salim Katar[1], Adil Can Karaoğlu[1], Muhammed Fatih Sarı[1], Mehmet Ali Tüz[2], Rukiye İnan Sarıkaya[2], Emre Fidan[3], Hüseyin Utku Adilay[1]

[1]Department of Neurosurgery, Balıkesir University Faculty of Medicine, Balıkesir, Türkiye
[2]Department of Infectious Diseases and Clinical Microbiology, Balıkesir University Faculty of Medicine, Balıkesir, Türkiye
[3]Balıkesir University Faculty of Medicine, Balıkesir, Türkiye

ABSTRACT

Objective: The microbiological spectrum of spondylodiscitis (SD) varies markedly by region; in *Brucella*-endemic settings, the etiological profile differs from that of Western cohorts, yet contemporary data from neurosurgical practice in Türkiye are limited. We aimed to characterize SD managed in a tertiary neurosurgical service in *Brucella*-endemic Western Türkiye and to identify variables associated with prolonged intravenous antibiotic therapy.

Materials and Methods: Consecutive adult patients with SD treated between January 2020 and December 2025 at a tertiary academic medical center were retrospectively analyzed. Group comparisons were performed using the Mann–Whitney U test, chi-square test, and Fisher's exact test, as appropriate; correlations were assessed using Spearman's rho. A two-sided $p<0.05$ was considered statistically significant.

Results: Fifty-six patients were included (median age, 66 years [IQR, 59–71]; 53.6% male; lumbar involvement, 55.4%). Surgery was performed in 49 patients (87.5%; 95% CI, 76.4–93.8%), and an abscess was identified in 35 (62.5%; 95% CI, 49.4–74.0%). A causative organism was isolated in 29 patients (51.8%); *Brucella* spp. (14.3%) and *Mycobacterium tuberculosis* (7.1%) predominated over *Staphylococcus aureus* (3.6%). The median duration of intravenous antibiotic therapy was 36 days (IQR, 13–52). Surgical management ($p=0.002$) and abscess presence ($p=0.008$) were associated with longer antibiotic therapy; abscess presence was strongly associated with surgery (Fisher's exact $p=0.009$). Pyogenic SD required approximately twice the duration of antibiotic therapy compared with granulomatous SD ($p=0.021$).

Conclusion: In this *Brucella*-endemic neurosurgical cohort, granulomatous pathogens predominated over *S. aureus*, and abscess presence was the central determinant of both operative intervention and prolonged antimicrobial therapy.

Keywords: Antibiotic treatment, brucellosis, neurosurgery, spinal abscess, spondylodiscitis, vertebral osteomyelitis

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INTRODUCTION

Spondylodiscitis (SD) refers to an infection of the intervertebral disc and adjacent vertebral endplates and frequently spreads into the paravertebral or epidural space.[1,2] The reported incidence has increased significantly over the last twenty years, reaching 14.4 cases per 100,000 people in some European registries; factors contributing to this increase include an ageing population, the increasing prevalence of spinal instrumentation, and a rising burden of comorbidities.[2,3] Despite advances in imaging and microbiological diagnostic methods, SD remains associated with significant morbidity; in-hospital mortality remains within the range of 2–17%,

Address for Correspondence: Salim Katar, Department of Neurosurgery, Balıkesir University Faculty of Medicine, Balıkesir, Türkiye
E-mail: salimkatar@gmail.com **ORCID ID:** 0000-0002-8311-1122

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and permanent disability is common.[3,4] The reasons for this rising incidence are multifactorial and include the ageing of European and Mediterranean populations with an associated burden of comorbidities (diabetes mellitus, immunosuppression, chronic haemodialysis), the broader use of spinal instrumentation and percutaneous interventional procedures, the spread of intravenous drug use, and improved diagnostic recognition with the wider availability of magnetic resonance imaging. Healthcare-associated and postsurgical spondylodiscitis now represents a growing proportion of all cases in centres performing high volumes of spinal surgery, with reported rates of 1–4% following instrumented procedures.

The microbiological spectrum of SD exhibits marked geographical variations. In Western series, pyogenic pathogens, predominantly *Staphylococcus aureus*, account for 20–80% of cases.[1,5] In contrast, in endemic regions of the Mediterranean and the Middle East, granulomatous pathogens, particularly *Brucella* spp. and *Mycobacterium tuberculosis*, may constitute a large proportion of the identified organisms.[6–8] Türkiye occupies an intermediate epidemiological position: brucellosis remains endemic in provinces with livestock farming, and spinal involvement is observed in up to 50% of focal brucellosis cases.[6,9] In parallel, multicentre series in Türkiye have documented that *Brucella* is the most frequently identified pathogen in spondylodiscitis cohorts.[7,10]

Treatment requires a multidisciplinary approach combining long-term antimicrobial therapy with surgery in cases of neurological deficit, structural instability, abscess formation, or failure of conservative treatment.[1,5] The 2015 Infectious Diseases Society of America (IDSA) guidelines recommend a minimum of six weeks of antimicrobial therapy for native vertebral osteomyelitis, supported by the landmark randomised trial by Bernard et al.,[11] which demonstrated the non-inferiority of six-week treatment compared with twelve-week treatment. However, in real-world practice, the duration of antibiotic therapy often significantly exceeds these reference values, particularly in cases involving complicating factors such as abscesses or instrumentation.[12,13] The clinical variables leading to such treatment intensification have not been sufficiently characterised in neurosurgical practice in Türkiye.

In this study, we aimed to characterise the clinical, microbiological, and treatment characteristics of SD treated over a six-year period in a tertiary neurosurgery department in a Western Anatolian province with a high concentration of livestock farming and to identify variables associated with prolonged intravenous antibiotic therapy and surgical treatment.

MATERIALS and METHODS

Study Design and Setting

We conducted a single-centre retrospective observational study at the Departments of Neurosurgery and Infectious Diseases of a tertiary academic medical centre in Western Anatolia. Consecutive adult patients (aged ≥18 years) admitted with a diagnosis of spondylodiscitis between 1 January 2020 and 31 December 2025 were identified from the hospital's electronic medical records using ICD-10 codes M46.2–M46.5 and M49. The reporting of this study adheres to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for cohort studies.

The diagnosis of SD was based on the following: (i) a consistent clinical presentation (back pain±fever±neurological deficit); (ii) characteristic findings on contrast-enhanced magnetic resonance imaging (endplate destruction, narrowing of the disc space or signal changes, paravertebral or epidural soft tissue involvement); and (iii) confirmation by microbiological isolation from blood, intraoperative tissue, or image-guided biopsy, where possible.[1,5]

Variables and Definitions

The following variables were summarised: age, sex, presence of fever on admission, level of anatomical involvement, aetiology (primary haematogenous vs. secondary [postoperative or post-procedural]), causative organism, presence of a paravertebral or epidural abscess on the first MRI, surgical treatment, and total duration of intravenous antibiotic therapy (in days).

Aetiology was classified as primary if it arose without prior spinal intervention and as secondary if it developed following spinal surgery, a percutaneous procedure, or an adjacent infection. For analytical purposes, the microbiological spectrum was further categorised as culture-negative, pyogenic (Gram-positive cocci, Gram-negative bacilli, enterococci), granulomatous (*Brucella* spp., *M. tuberculosis*), or fungal. Spinal levels were categorised as lumbar, lumbosacral, thoracic, thoracolumbar, or other. Operative management was defined as any surgical intervention performed for spondylodiscitis during hospitalisation, including open or minimally invasive decompression, debridement, instrumented or non-instrumented fusion, and combined approaches; the choice of procedure was at the discretion of the treating neurosurgeon based on the level of involvement, structural integrity, neurological status, and abscess burden.

Statistical Analysis

The distribution of continuous variables was assessed using the Shapiro–Wilk test; none were normally distributed and were therefore reported as the median, interquartile range (IQR), and full range. Categorical variables were presented as numbers (%). For group comparisons, the Mann–Whitney U test was used for continuous data and the Pearson chi-square or Fisher's exact test for categorical data, as appropriate. Spearman's rho was used for correlation analysis. A two-sided $p<0.05$ was considered statistically significant. Analyses were performed using IBM SPSS Statistics version 26.0 (IBM Corp., Armonk, NY, USA).

Ethics

The study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from the Institutional Clinical Research Ethics Committee (Approval No.: 2026/9-7; Date: 05/05/2026). Due to the retrospective design of the study, the requirement for written informed consent was waived.

RESULTS

Demographic and Clinical Characteristics

Fifty-six patients met the inclusion criteria. The median age was 66 years (IQR 59–71; range 27–84); 30 (53.6%) were male. Most patients (37/56, 66.1%) were aged 61–75 years; this reflects the highest incidence, which is well established among older adults. Consistent with the typically indolent clinical presentation of SD, fever was detected in only 8 patients (14.3%; 95% CI 7.4–25.7%) on admission. Demographic and clinical characteristics are summarised in Table 1.

The most commonly affected region was the lumbar spine (31 patients, 55.4%), followed by the thoracic spine (11, 19.6%), the lumbosacral junction (9, 16.1%), and the thoracolumbar junction (4, 7.1%). One patient had multilevel involvement that could not be classified into these categories. Secondary (post-procedural) aetiology was predominant (43, 76.8%); primary haematogenous SD was detected in 10 patients (17.9%), and the route of transmission could not be reliably determined in 3 patients (5.4%).

Microbiological Profile

The causative microorganism was identified in 29 of the 56 patients (51.8%; 95% CI 39.0–64.3%); in the remaining 27 patients (48.2%; 95% CI 35.7–61.0%), blood cultures and, where performed, intraoperative tissue samples were obtained, but culture results were negative. *Brucella* spp. was the most frequently isolated pathogen (8 patients, 14.3%; 95% CI 7.4–25.7%), followed by *M. tuberculosis* (4, 7.1%). Pyogenic bacteria accounted for a total of 16 cases (28.6%); these included coagulase-negative staphylococci (3, 5.4%), MRSA/methicillin-resistant coagulase-negative staphylococci (3, 5.4%), *S. aureus* (2, 3.6%), *S. epidermidis* (2, 3.6%), and single cases of *Klebsiella pneumoniae, Enterobacter spp., Proteus* spp., *Acinetobacter* spp., *Salmonella* spp., and *Enterococcus* spp. A single fungal case (*Candida* spp., 1.8%) was identified. The full distribution is shown in Table 2 and depicted graphically in Figure 1. The microbiological yield of 51.8% in this cohort is comparable to the ranges reported from European tertiary centres (50–70%) and recent single-centre series from Türkiye, although direct comparison is complicated by differences in sampling strategy, biopsy timing, and the extent of empirical antibiotic exposure before tissue acquisition.

Table 1. Demographic and clinical characteristics of the study population (n=56)

Variable	Value
Age (years), median (IQR), [range]	66 (59–71),(27–84)
Age category, n (%)	
≤40	4 (7.1)
41–60	11 (19.6)
61–75	37 (66.1)
>75	4 (7.1)
Male sex, n (%)	30 (53.6)
Fever at admission, n (%)	8 (14.3)
Aetiology, n (%)	
Primary	10 (17.9)
Secondary	43 (76.8)
Uncertain	3 (5.4)
Anatomical level, n (%)	
Lumbar	31 (55.4)
Lumbosacral	9 (16.1)
Thoracic	11 (19.6)
Thoracolumbar	4 (7.1)
Other	1 (1.8)
Abscess on MRI, n (%)	35 (62.5)
Surgical treatment, n (%)	49 (87.5)
Duration of IV antibiotics (days)[a], median (IQR), [range]	36 (13–52),(6–94)

[a]: Duration available for 55 patients. IQR: Interquartile range; MRI: Magnetic resonance imaging; IV: Intravenous

Table 2. Microbiological distribution of identified pathogens (n=56)

Category / Organism	n	%
Granulomatous	12	21.4
Brucella spp.	8	14.3
Mycobacterium tuberculosis	4	7.1
Pyogenic Gram-positive	10	17.9
Coagulase-negative staphylococci	3	5.4
MRSA / MRCoNS	3	5.4
Staphylococcus aureus	2	3.6
S. epidermidis	2	3.6
Pyogenic Gram-negative	5	8.9
Klebsiella pneumoniae	1	1.8
Enterobacter spp.	1	1.8
Proteus spp.	1	1.8
Acinetobacter spp.	1	1.8
Salmonella spp.	1	1.8
Enterococci	1	1.8
Fungi (*Candida* spp.)	1	1.8
Culture negative	27	48.2

MRSA: Methicillin-resistant *S. aureus*; MRCoNS: Methicillin-resistant coagulase-negative staphylococci

Treatment Modalities and Duration of Antibiotic Therapy

Surgical treatment comprising decompression, debridement, and/or instrumented fusion was performed in 49 patients (87.5%; 95% CI 76.4–93.8%) based on clinical indications; the remaining 7 patients (12.5%) were treated conservatively with long-term antibiotic therapy and brace use. The median duration of intravenous antibiotic therapy was 36 days (IQR 13–52; range 6–94) among the 55 patients for whom treatment duration was documented; data for this variable were missing for one patient.

Factors Associated with the Duration of Antibiotic Therapy

Two factors were significantly associated with a longer duration of intravenous antibiotic treatment (Table 3). Patients who underwent surgery received significantly longer treatment than those who received conservative treatment (median 38 days [IQR 17–54] vs. 8 days [IQR 7–10]; U=262, p=0.002). Similarly, patients in whom an abscess was detected on imaging received longer treatment than those without an abscess (39 days [IQR 22–58] vs. 16 days [IQR 11–37]; U=502, p=0.008) (Fig. 2a,b). In contrast, aetiology (primary vs. secondary; p=0.347), fever on admission (p=0.830), and age (Spearman's rho=0.105, p=0.446) were not associated with the duration of antibiotic treatment.

Table 3. Factors associated with the duration of intravenous antibiotic therapy

Variable	n	Median (IQR) days	Test statistic	p
Surgical treatment			U=262	**0.002**
Yes	49	38 (17–54)		
No	6	8 (7–10)		
Abscess on MRI			U=502	**0.008**
Present	35	39 (22–58)		
Absent	20	16 (11–37)		
Aetiology			U=169	0.347
Primary	10	20 (12–42)		
Secondary	42	38 (14–54)		
Fever on admission			U=198	0.830
Present	8	34 (10–66)		
Absent	47	36 (14–46)		
Age (Spearman)	55	rho=0.105		0.446

Bolded values indicate statistical significance (p<0.05). All comparisons, except for age (Spearman correlation), were performed using the Mann–Whitney U test. IQR: Interquartile range; MRI: Magnetic resonance imaging

Abscess as a Determinant of Surgical Treatment

An abscess was identified on imaging in 35 of the 56 patients. Of these, 34 (97.1%) underwent surgery, whereas only 15 of the 21 patients without an abscess (71.4%) required surgical intervention (Table 4; Fig. 3). The association between the presence of an abscess and surgical treatment was statistically significant (Fisher's exact test: odds ratio=13.60, p=0.009).

Granulomatous and Pyogenic Spondylodiscitis

A comparative analysis of culture-positive cases revealed clinically significant differences (Table 5). Patients with pyogenic SD required significantly longer courses of intravenous antibiotic treatment than those with granulomatous SD (median 43 days [IQR 36–60] vs. 21 days [IQR 15–39]; p=0.021; Fig. 2c). All pyogenic cases (16/16, 100%) underwent surgery, whereas 9 of 12 granulomatous cases (75.0%) underwent surgery. Thoracic involvement was disproportionately common in the granulomatous group (5/12, 41.7%) compared with the pyogenic group (2/16, 12.5%); this is consistent with the classic tendency of *M. tuberculosis* to affect the thoracic spine.

DISCUSSION

In this six-year single-centre series involving 56 patients with spondylodiscitis treated at a tertiary neurosurgery de-

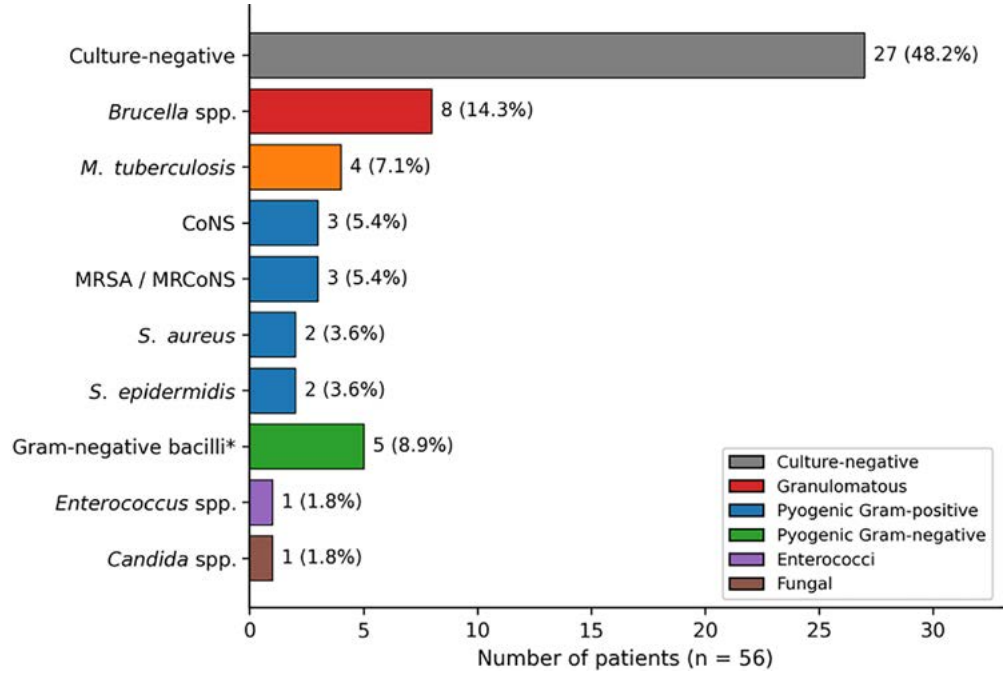

Figure 1. Microbiological distribution of pathogens identified in the study cohort (n=56). The bars are colour-coded according to pathogen category: culture-negative (grey), granulomatous (red/orange), pyogenic Gram-positive (blue), pyogenic Gram-negative (green), enterococci (purple) and fungal (brown). *Brucella* spp. was the most frequently identified single pathogen. *Gram-negative bacilli include *Klebsiella pneumoniae, Enterobacter* spp., *Proteus* spp., *Acinetobacter* spp. and *Salmonella* spp. (one case each)

CoNS: Coagulase-negative staphylococci; MRSA: Methicillin-resistant S. aureus; MRCoNS: Methicillin-resistant coagulase-negative staphylococci

partment in western Türkiye, three key findings emerged. First, the microbiological profile was dominated by granulomatous pathogens (*Brucella* spp. and *M. tuberculosis*); these accounted for 21.4% of all cases and were nearly five times more common than *S. aureus*. Second, the presence of an abscess was the central clinical determinant of treatment intensity and was strongly associated with both surgical intervention and prolonged intravenous antibiotic therapy. Third, despite modern diagnostic methods, the culture-negative rate remained substantial (48.2%), highlighting an ongoing diagnostic challenge in clinical practice.

Our microbiological distribution differs markedly from Western European cohorts, where *S. aureus* is typically predominant and granulomatous aetiologies are rare.[1–5,12] In a recent 14-year Italian series by Conti et al.,[14] *S. aureus* accounted for nearly half of the identified pathogens, and complications such as endocarditis and paravertebral abscesses were frequently observed. In contrast, in a comparative study from Türkiye conducted by Bal et al.[7] in Thrace involving 109 patients, brucellar spondylodiscitis accounted for a significant proportion of all cases and exhibited distinct epidemiological and clinical characteristics compared with pyogenic disease. The 14.3% *Brucella* rate in our study is consistent with reports from other Mediterranean basin countries[6,9] and confirms that, despite ongoing public health efforts, brucellosis remains a leading endemic cause of SD in Türkiye. It is worth noting that although brucellosis shows particularly high transmission in livestock-farming provinces such as ours,

Table 4. Cross-tabulation of abscess presence and surgical treatment

Abscess status	Surgery: Yes	Surgery: No	Total
Abscess present	34 (97.1%)	1 (2.9%)	35
Abscess absent	15 (71.4%)	6 (28.6%)	21
Total	49	7	56

Fisher's exact test (two-sided): odds ratio=13.60, p=0.009. Pearson chi-square was inappropriate due to expected cell count <5

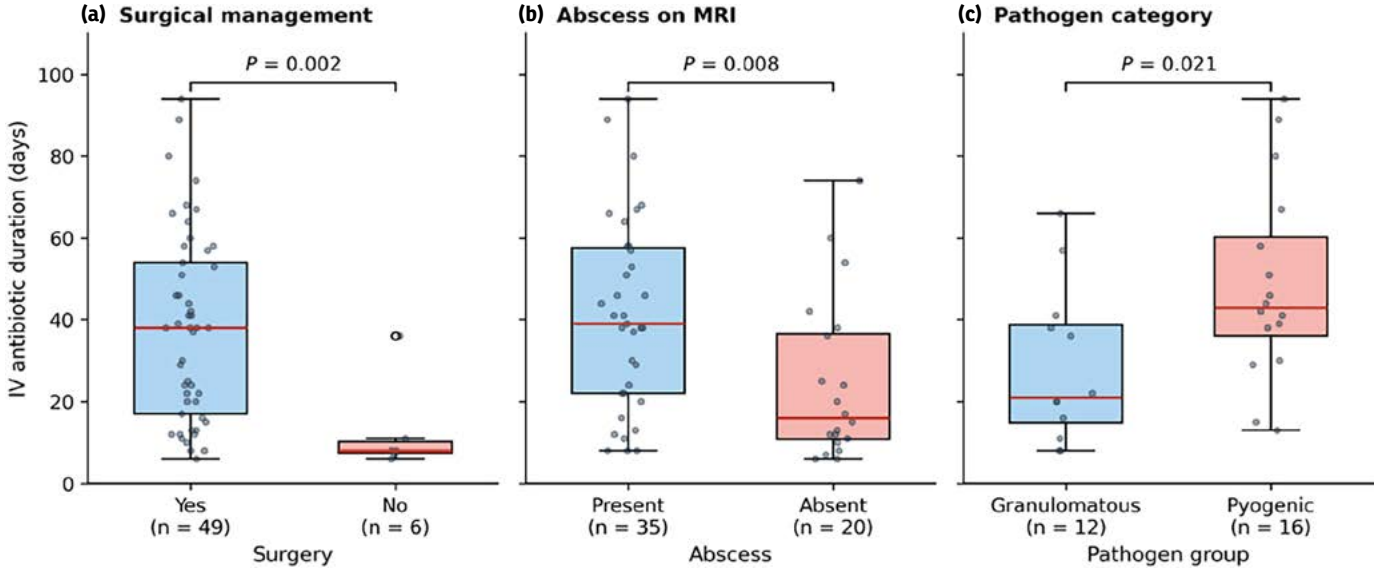

Figure 2. Duration of intravenous antibiotic therapy classified by **(a)** surgical treatment, **(b)** presence of an abscess on magnetic resonance imaging, and **(c)** pathogen category. Boxes show the interquartile range (red line); bars extend up to 1.5 × IQR. Individual patient values are shown as semi-transparent dots. All three comparisons were found to be statistically significant using the Mann–Whitney U test

IQR: İnterquartile range

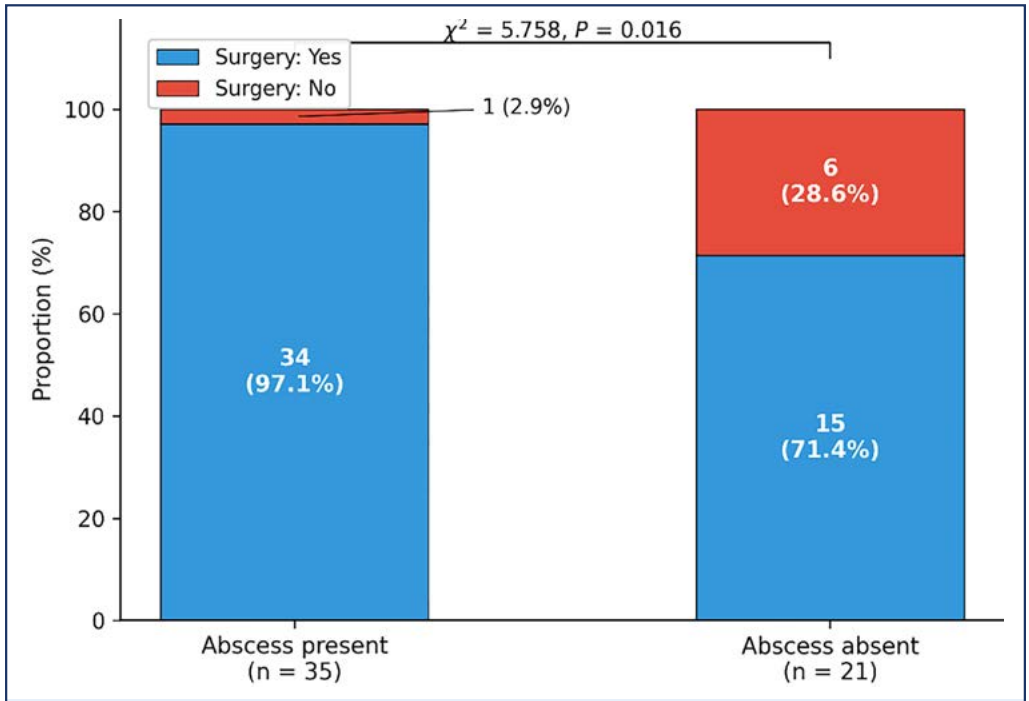

Figure 3. Distribution of surgical and conservative treatment by abscess status. Of the 35 patients in whom an abscess was detected on magnetic resonance imaging, 34 (97.1%) underwent surgical treatment, whereas of the 21 patients in whom no abscess was detected, 15 (71.4%) underwent surgical treatment. This association is statistically significant (Fisher's exact p=0.009)

Table 5. Comparison of granulomatous and pyogenic spondylodiscitis

Variable	Granulomatous (n=12)	Pyogenic (n=16)	p
Age (years), median (IQR)	61 (55–67)	64 (60–71)	0.295
Male sex, n (%)	7 (58.3)	8 (50.0)	0.718
Thoracic involvement, n (%)	5 (41.7)	2 (12.5)	0.103
Lumbar involvement, n (%)	4 (33.3)	10 (62.5)	0.252
Abscess on MRI, n (%)	9 (75.0)	14 (87.5)	0.624
Surgical treatment, n (%)	9 (75.0)	16 (100.0)	0.067
Duration of IV antibiotics (days), median (IQR)	21 (15–39)	43 (36–60)	**0.021**

Granulomatous = *Brucella* spp. + *M. tuberculosis*. Pyogenic = all bacterial pathogens other than granulomatous. Continuous variables were analysed using the Mann–Whitney U test; categorical variables were analysed using Fisher's exact test (two-sided). IQR: Interquartile range; MRI: Magnetic resonance imaging; IV: Intravenous

the disease is not confined to these regions and continues to be reported, albeit at a lower incidence, across Türkiye as a whole. Importantly, granulomatous pathogens may require entirely different antimicrobial strategies, typically rifampicin- or streptomycin-containing regimens combined with doxycycline for brucellosis[9,15] and standard four-drug antituberculosis therapy for spinal tuberculosis,[8] underscoring the importance of early aetiological clarification.

The high culture-negative rate of 48.2% in our cohort is consistent with the wide range reported in the literature (30–70%).[5,16] Several factors likely contribute to this finding, including prior exposure to empirical antibiotics before culture sampling, the slow progression of granulomatous infections caused by difficult-to-culture organisms, and the diagnostic yield gradient whereby blood cultures (≈40–60%) and percutaneous biopsies (≈60–70%) consistently underperform compared with intraoperative tissue cultures (>90%).[5,16] In settings where *Brucella* is endemic, serological tests, including the standard tube agglutination, Rose Bengal, and Coombs anti-*Brucella* tests, are essential because culture sensitivity is limited for slow-growing *Brucella* spp.[9] In our practice, the primary route to microbiological diagnosis remains intraoperative tissue sampling performed during debridement. A further contributor specific to tertiary academic practice in Türkiye is the referral chain itself: most patients reach a neurosurgical centre only after a period of empirical oral antibiotic therapy initiated in primary or secondary care for non-specific back pain, well before magnetic resonance imaging and microbiological sampling are pursued. This pretreatment effect is plausibly an important driver of the high culture-negative proportion observed in surgically referred cohorts and contrasts with the higher microbiological yield reported in series with early infectious diseases involvement and prompt biopsy.

The dominant role of abscesses in shaping treatment is consistent with IDSA recommendations[5] and recent neurosurgical evidence, as abscess presence was associated with both the decision to operate (Fisher's exact p=0.009) and the duration of intravenous antibiotic therapy (p=0.008). While Joerger et al.[4] demonstrated that epidural abscess is a significant prognostic factor for early mortality associated with spondylodiscitis, Motov et al.[17] reported that the presence of complications such as abscesses determines the indication for radical surgical debridement in cervical spondylodiscitis. The newly proposed Spinal Infection Treatment Evaluation (SITE) score similarly incorporates abscesses and neurological deficits as central variables in the surgical decision-making process.[18] Our finding that 34 of 35 patients (97.1%) with an abscess underwent surgery supports the current view that an epidural or paravertebral abscess is one of the strongest indications for surgical intervention, although an abscess alone is not universally regarded as an absolute indication in international guidelines.

Regarding the duration of antibiotic therapy, the median duration of 36 days in our cohort was below the recommended six-week threshold for pyogenic disease when the entire population was considered.[5,11] However, stratification by granulomatous and pyogenic disease revealed that pyogenic SD required approximately twice as long a course of intravenous antibiotic treatment as granulomatous SD (median 43 days vs. 21 days; p=0.021). This reflects only the intravenous phase: brucellosis and tuberculosis regimens are administered predominantly orally following a short parenteral induction phase.[9,15] A landmark study by Bernard et al.[11] demonstrated that a six-week course of antibiotic treatment for pyogenic vertebral osteomyelitis was no less effective than a twelve-week coursealthough most of these patients received only medical treatment and the prevalence of abscesses was low. Our data indicate that, in the pyogenic subgroup of this sur-

gical cohort with a high abscess burden, intravenous treatment durations approached or exceeded six weeks, in line with observations from other neurosurgical centres.[13,17] This is facilitated by the high oral bioavailability of doxycycline, rifampicin, and isoniazid and reduces hospital stay and catheter-related risks, whereas pyogenic infections, particularly methicillin-resistant staphylococcal infections requiring glycopeptide therapy, may depend on prolonged parenteral administration to achieve adequate bone and disc penetration. The seven conservatively managed patients (three with brucellosis and four culture-negative) had a short median intravenous course of 8 days, consistent with early oral step-down rather than inadequate antimicrobial exposure and with the referral logistics whereby non-operative patients continue oral management under Infectious Diseases.

This study has several limitations. First, the single-centre retrospective design and limited sample size restrict generalisability and precluded multivariable adjustment, particularly for the small conservatively managed subgroup (n=7); the association between surgical intervention and prolonged antibiotic therapy should therefore be interpreted in the context of selection by indication, as surgically treated patients generally had more extensive infection at baseline. Second, the high culture-negative rate limited the granulomatous-versus-pyogenic comparison to 28 patients. Third, long-term data on recurrence, mortality, and functional outcomes were not systematically available. Fourth, the absence of serial inflammatory markers (CRP, ESR) and imaging follow-up precluded biomarker-guided assessment of treatment duration. Finally, as a neurosurgical series from a *Brucella*-endemic, livestock-farming region of Türkiye, uncomplicated brucellar spondylodiscitis without neurological deficit, instability, or a significant abscess, which is typically managed conservatively by Infectious Diseases, is under-represented; cases referred to neurosurgery preferentially involve neurological compromise, instability, or substantial epidural or paravertebral collections, which increases the observed proportion of complicated, abscess-associated disease and limits extrapolation of our microbiological distribution to the general regional population.

Practically, these findings argue against pyrexia as a triage criterion for suspected spondylodiscitis: persistent unexplained back pain with elevated inflammatory markers should suffice to trigger urgent MRI. They also support extending brucellar serology and tuberculosis-directed testing to every patient in endemic provinces, irrespective of occupational exposure history, rather than reserving such testing for those with a suggestive exposure or contact history. Future multicentre studies combining neurosurgical and infectious diseases cohorts are needed to validate abscess-centred risk-stratification instruments, such as the SITE score, in brucellosis-endemic settings.

CONCLUSION

In a neurosurgical cohort from western Türkiye, where *Brucella* is endemic, granulomatous pathogens predominated over *S. aureus*, and nearly half of all cases remained culture-negative despite modern diagnostic methods. The presence of an abscess emerged as the primary determinant of both surgical treatment and prolonged intravenous antimicrobial therapy. Stratified analysis revealed that pyogenic SD required approximately twice as long a course of intravenous antibiotic treatment as granulomatous SD. These findings highlight the importance of diagnostic algorithms adapted to local conditions, including routine serological testing for brucellosis, and a pragmatic, abscess-focused approach to surgical and antimicrobial decision-making. Multicentre prospective studies are needed to further clarify treatment-duration criteria and prognostic factors in Türkiye.

Disclosures

Ethics Committee Approval: The study was approved by the Balıkesir University Faculty of Medicine Health Research Clinical Research Ethics Committee (No: 2026/9-7, Date: 05/05/2026).

Informed Consent: The requirement for informed consent was waived by the ethics committee due to the retrospective nature of the study.

Conflict of Interest Statement: The authors declare no conflicts of interest related to this work.

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