

Surgical Management of Patients with Spondylodiscitis at a Tertiary Care Centre

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ABSTRACT

Background:

Spondylodiscitis (SD) is an uncommon but potentially devastating spinal infection with increasing global incidence. Although medical therapy remains the mainstay of treatment, many patients ultimately require surgery due to neurological deficit, instability, or failure of conservative management.

Methods:

We performed a retrospective review of 43 surgically managed SD patients between January 2019 and December 2022. Demographic data, clinical presentation, laboratory markers, microbiological findings, surgical procedures, and postoperative complications were analyzed. Pain and functional outcomes were assessed using the Visual Analog Scale (VAS) and the Oswestry Disability Index (ODI) at initial presentation and at 12 months follow-up.

Results:

The mean age was 47.7 years; 51.2% were female. The lumbar spine was most commonly affected (60.5%). Neurological deficits were present in 16.3% of patients. Mycobacterium tuberculosis was the predominant organism (53.5%), followed by MRSA (14%). Significant improvement was seen in VAS (8.1 → 1.1) and ODI (79.9 → 9.6) at 12 months ($p < 0.001$). No patient developed postoperative deformity during follow-up.

Conclusion:

Surgical intervention in appropriately selected patients with SD provides excellent clinical and functional outcomes. The microbiological profile in our setting underscores the high burden of tuberculosis, reinforcing the importance of region-specific diagnostic and management strategies.

Keywords: Spondylodiscitis, Spinal infections, Discitis

Introduction

Spondylodiscitis (SD) is defined as an infectious disease characterized by inflammation of the intervertebral disc space and adjacent vertebral bodies. It is considered a complex and rare disease, typically accounting for 3–5% of all osteomyelitis cases.¹ It can lead to serious complications if not treated urgently as a delay in diagnosis and treatment, can result in significant number of patients presenting with spinal deformities as well as neurological problems.

The incidence of SD has seen an increasing trend in recent years, attributed to increased diagnostic

capabilities and the aging demographic, coupled with a higher prevalence of co-morbidities like diabetes and the widespread use of immunosuppressive therapies.¹ This presents different challenges in management, as the clinical presentation, laboratory findings, diagnosis and treatment strategies vary significantly. Also, there is paucity of literatures studying the epidemiological profile of spondylodiscitis in our region. Therefore, this study was undertaken to determine the epidemiological profile and etiology of spondylodiscitis.

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Materials and Methods

A retrospective study was conducted at Grande International Hospital, Tokha, Kathmandu, where 43 consecutive patients with spondylodiscitis, those operated on between January 2019 and December 2022 and followed up for a minimum of 12 months, were enrolled in this study. The data were retrieved retrospectively from the hospital's computerized database, including age, gender, clinical symptoms, WBC, ESR, CRP, Level of spondylodiscitis, type of surgical management, and isolated organism with antibiotic sensitivity. For the microbiological diagnosis, Gram Stain, AFB Stain, Culture and Sensitivity along with GeneXpert MTB/RIF test was sent for all the cases from the biopsy sample obtained per-operatively. The patients were followed up regularly at 6 weeks, and then at 3, 6, and 12 months. Pre-operative and postoperative (12 months) VAS scores and ODI scores of the patients were recorded. The retrieved data were recorded in a predesigned pro forma and tabulated in Microsoft Excel 2019. Data was processed and analyzed using the software 'Statistical Package for Social Science' (SPSS) version 25, IBM®, Armonk, USA. The analyses of different variables were done according to standard statistical analysis.

Results

The mean age of the patients was 47.7 years. Twenty-one (48.8%) patients were male, and 22 (51.2%) were female. The primary symptom at presentation for all patients was either back or neck pain, depending on the location of the disease.

The lumbar region was the most commonly affected area, with 26 cases (60.5%). The thoracic region was involved in 17 cases (39.5%), the thoracolumbar junction was involved in 3 cases (7.0%), and the cervical spine was involved in one case (2.3%). Seven patients (16.3%) presented with a neurological deficit. Of these, six cases were associated with thoracic spine involvement, and one case was associated with lumbar spine involvement.

Regarding the VAS scores, the mean pre-op VAS score was 8.1 ± 1.1 , while the 12-month post-op VAS score was 1.1 ± 0.7 , indicating significant relief of pain ($p < 0.001$, Wilcoxon Signed Rank Test). The average pre-op ODI was 79.92 ± 10.2 , while the 12-month post-op ODI was 9.60 ± 5.56 showing significant improvement in functional outcome ($p < 0.001$, Wilcoxon Signed Rank Test).

The majority of patients (37 cases, 86.0%) underwent surgery involving a single spinal level. Multiple levels were operated on in the remaining cases, with 4 patients (9.3%) undergoing surgery on 5 levels, 1 patient (2.3%) on 2 levels, and 1 patient (2.3%) on 3 levels. Inter-body fusion with posterior instrumentation was done in 22 (51.16%) cases, decompression and biopsy with posterior instrumentation in 14 (32.56%) cases, while decompression with anterior reconstruction and posterior instrumentation and biopsy was done in 7 (16.28%) cases.

Microbiological diagnosis was achieved in 37 of the 43 cases (86.0%). The most frequently isolated organism was *Mycobacterium tuberculosis*, identified in 23 cases (53.5%). Among these, one case (4.3%) was identified as multidrug-resistant tuberculosis (MDR-TB). Other organisms identified included Methicillin-resistant *Staphylococcus aureus* (MRSA) in 6 cases (14.0%), Methicillin-sensitive *Staphylococcus aureus* (MSSA) in 2 cases (4.7%), *Escherichia coli* in 2 cases (4.7%), *Klebsiella pneumoniae* in 1 case (2.3%), Methicillin-resistant coagulase-negative staphylococci (MR-CONS) in 1 case (2.3%), and *Pseudomonas aeruginosa* in 1 case (2.3%). There were 7 cases (16.3%) where no causative organism was isolated. (Fig: 1)

The majority of MRSA cases were sensitive to Vancomycin, Clindamycin, Linezolid, and Co-trimoxazole. MSSA was sensitive to Cefazolin, Cloxacillin, and Ofloxacin. The *Escherichia coli* isolates were sensitive to Amikacin, Tigecycline, and Piperacillin-Tazobactam. Among the 23 cases of tuberculosis, 5 cases (21.7%) presented with a raised white blood cell (WBC) count. In contrast, 10 out of 13 cases (76.9%) of pyogenic spondylodiscitis had a raised WBC count at presentation. Additionally, 12 cases (92.3%) of pyogenic spondylodiscitis had elevated erythrocyte sedimentation rate (ESR), and 11 cases (84.6%) had raised C-reactive protein (CRP) levels.

In the cases of pyogenic spondylodiscitis, a total of at least 6 weeks of antibiotics were given, which included a week of IV antibiotics followed by 5 weeks of oral antibiotics. In cases of Tubercular spondylodiscitis, about 12 months of the ATT regimen was followed, which included 3 months of HRZE (Isoniazid, Rifampicin, Pyrazinamide, and Ethambutol) and 9 months of HR (Isoniazid and Rifampicin). Wound healing difficulty was experienced in 2 cases, repeat debridement was

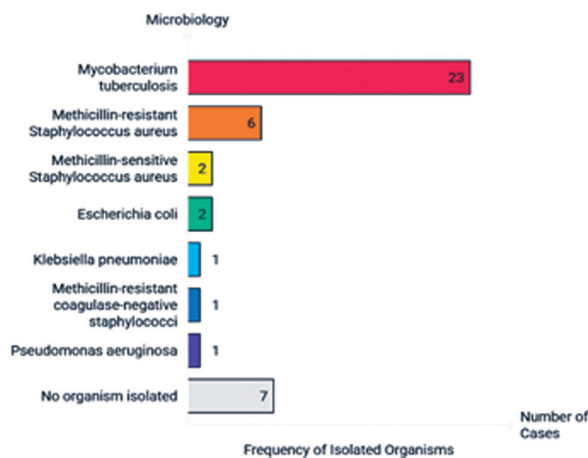


Figure 1: Microbiological isolation

required in one case of pyogenic spondylodiscitis caused by MRSA, and the requirement of insertion of a Pigtail catheter was due to the persistence of abscess in one case of Tubercular Spondylodiscitis with Paravertebral abscess. All the patients were relatively pain-free in the 3-month follow-up, and none of the patients developed postoperative kyphosis or deformity.

Discussion

The global incidence of SD has been rising, which could be due to improved diagnostic capacity and the increasing number of elderly and immunocompromised individuals. The estimated annual incidence in developed countries ranges

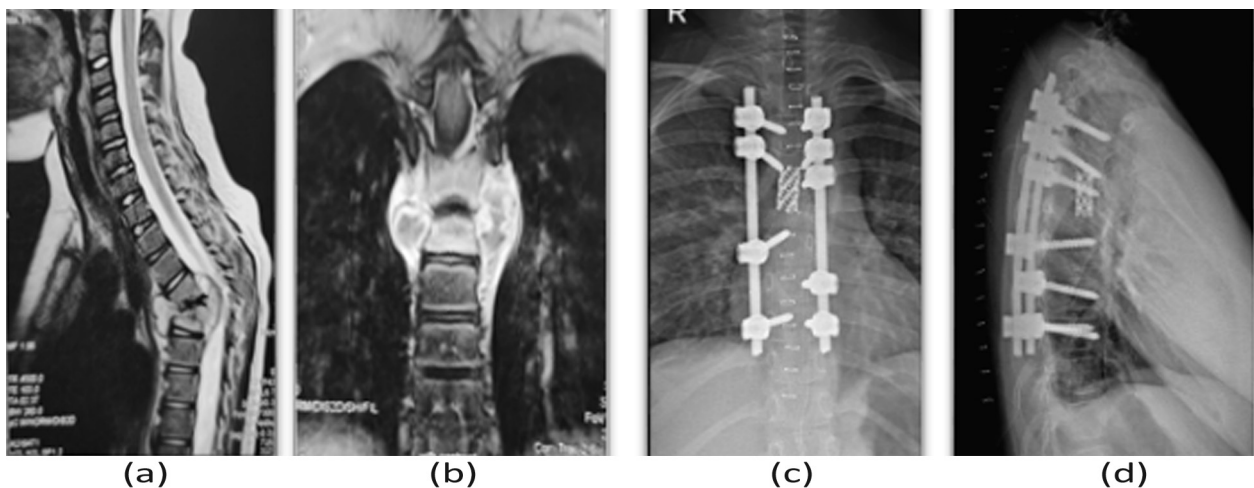


Figure 2: (a, b) shows T2-weighted MRI scan of a 9-year-old female with Tubercular Spondylodiscitis involving Dorsal 4th and 5th Vertebrae with kyphotic deformity and collection compressing on the spinal cord. Figure 2 (c, d) x-ray shows Posterior Approach debridement, anterior reconstruction with Harms Cage, and Posterior Instrumentation.

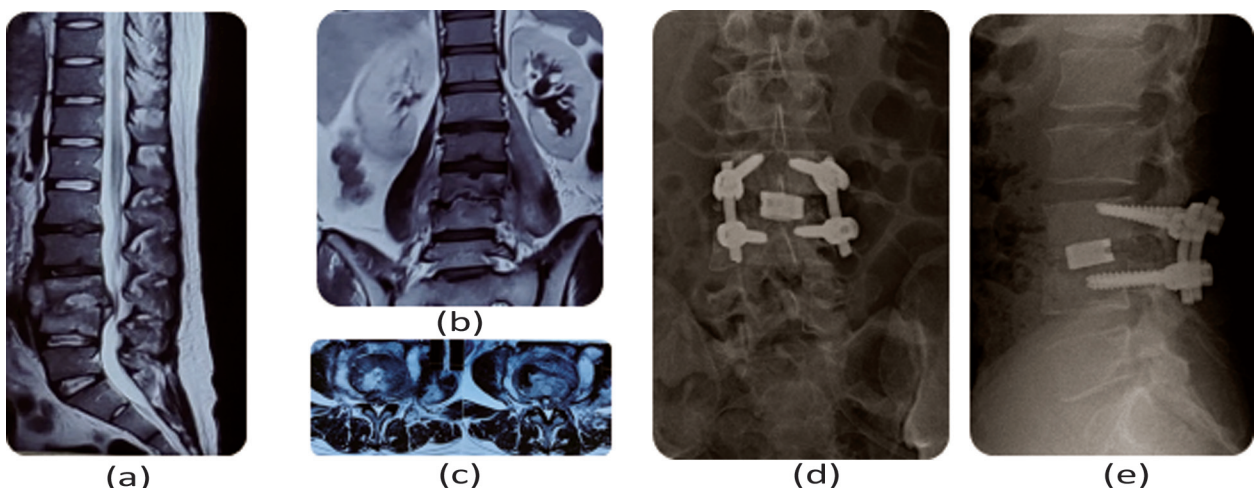


Figure 3: (a, b, and c) shows T2-weighted MRI images of the L3-L4 level disc and vertebral body destruction with anteroposterior and lateral translation. Figure 3 (d and e) shows post-operative images following posterior approach debridement, inter-body fusion and instrumentation. (The patient was a 24-year-old male who presented with intractable back pain for 6 months, not relieved by conservative management. He was diagnosed with a case of MRSA Spondylodiscitis.)

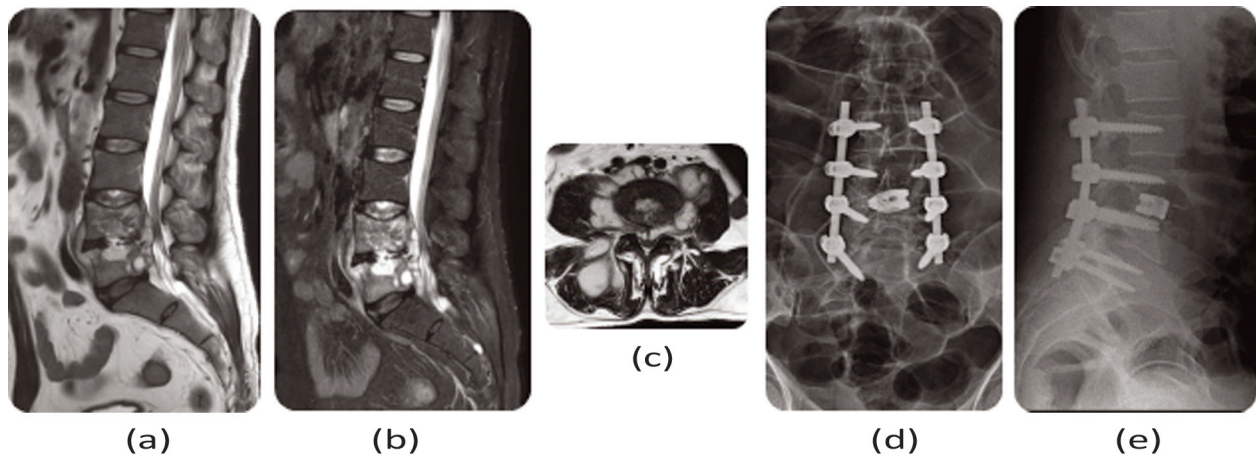


Figure 4: (a, b, and c) shows T2 sagittal, STIR sagittal, and T2 axial images of the Vertebral body and intervertebral body disc destruction in the L4- L5 level. Figure 4(d and e) shows post-operative images following posterior approach debridement, interbody fusion and instrumentation. (The patient was 52 years male who presented with back pain for 3 months. The patient underwent Posterior instrumentation, debridement, and biopsy, along with Titanium interbody cage insertion. He was diagnosed with *Pseudomonas Aeruginosa* Spondylodiscitis.)

from 4 to 24 cases per million.² Epidemiological data and etiological factors vary by location. While *Staphylococcus aureus* is the most frequent agent in Europe, regional studies show different profiles. In Lisbon, *Mycobacterium tuberculosis* accounted for 50.0% of cases.³ In a retrospective analysis in Tehran, Iran, 38.0% of cases were caused by *Brucella* species and 15.5% by *M. tuberculosis*.⁴ A study conducted in a South Indian tertiary care center with 145 adult patients found that 52.4% of spondylodiscitis cases were tubercular, 19.3% brucellar, and 18.6% pyogenic.⁵

SD is associated with significant morbidity and a high rate of complications, especially in cases of delayed diagnosis. The median time spent on diagnosis can be substantial, with one study reporting an average of 4 months and 28 days.⁶

The diagnosis and management of this complex disease necessitate a multidisciplinary approach involving spine surgeons, infectious disease specialists, radiologists, and rehabilitation professionals.⁷ Microbiological documentation is essential for starting antibiotic therapy.⁸

Conservative management is focused on providing appropriate long-term antimicrobial therapy. For pyogenic vertebral osteomyelitis, studies suggest that a 6-week antibiotic course may be conditionally recommended, as a randomized controlled trial found it to be have a similar efficacy as that of a 12-week regimen.⁹ Despite the preference for medical therapy in uncomplicated cases, approximately 50% of affected patients ultimately require surgical treatment.¹⁰

Surgical intervention is indicated for patients presenting with neurological deficits (such as compression of the spinal cord or cauda equina) that necessitates urgent surgical decompression, or spinal instability and deformity, abscess formation or failure of conservative treatment.^{1,6,7}

The goals of surgery include radical debridement of infected lesions, acquisition of tissue samples for microbiological analysis, spinal segment stabilization, and promotion of fusion.¹⁰ Surgical management utilizes various approaches (anterior, posterior, or combined). For pyogenic spondylodiscitis, a single-stage approach combining posterior decompression, debridement, and internal fixation is commonly used for effective infection control and kyphosis correction.

Cervical Spondylodiscitis (CSD) is a rare but severe pathology, with an incidence of 0.5–2.5 per 100,000 population, and is associated with neurological impairment in up to 29% of patients. Radical surgical debridement, fusion, and intravenous antibiotics are considered the gold standard. Complicated CSD cases may require a combined antero-posterior approach, which, in one series, was associated with a higher rate of hardware complications and the need for revision surgery.¹¹

In this study, surgical intervention was primarily indicated for neurological compromise, instability, and failure of conservative therapy. Across all procedures, patients experienced substantial reductions in pain and disability, aligning with published literature that supports a multidisciplinary approach combining surgery and targeted antimicrobial therapy.

This study highlights the strong clinical improvements achievable with timely surgical intervention in spondylodiscitis, even in a resource-limited setting such as Nepal. Our patient population differed from Western cohorts, with tuberculosis emerging as the dominant etiology consistent with regional epidemiology. Interestingly, inflammatory markers were significantly more elevated in pyogenic SD, reinforcing their diagnostic utility in bacterial infections but also reminding clinicians not to rely solely on laboratory values when evaluating potential Tubercular SD.

This highlights the need for region-specific research to optimize strategies based on local etiological patterns. In areas with a high burden of tuberculosis, molecular techniques such as the Xpert MTB/RIF assay are highly relevant for the rapid diagnosis of bone and joint tuberculosis and the simultaneous detection of rifampicin resistance.¹²

Conclusion

Spondylodiscitis is a rare condition that can have devastating consequences; therefore, a high index of suspicion is required for early diagnosis and management. In our experience, surgical management combined with organism-specific antimicrobial therapy resulted in excellent pain relief, functional recovery, and infection control. Regions with endemic tuberculosis must maintain a high index of suspicion and pursue a tissue diagnosis to guide appropriate therapy.

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