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Clinical Outcome of Surgical Management of Lumber and Dorsal Spontaneous Spondylodiscitis

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ABSTRACT

Background: Spondylodiscitis is an inflammatory condition affecting the spine, discs, and paraspinal tissue. The global incidence is estimated at 4-24 cases/million people annually.

Objective: This study aimed to evaluate the usefulness of surgery in the management of spondylodiscitis by comparing conservative and surgical approaches, as well as the link between risk factors and outcomes.

Patients and methods: A prospective cohort study comprised 32 patients who met precise criteria for spondylodiscitis based on clinical presentation, radiographic findings, and laboratory testing. All patients were treated between January 2017 and January 2021 in the neurosurgery department at Menoufia University Hospitals. Full demographic data, clinical presentation, spinal levels involved, causative organism, risk factors and complications were assessed for each patient under study.

Results: In our study, dorsal found in 20 (62.5%) of cases then lumbar in 8 (25.0%) followed by multilevel in 4 (12.5%). Also, 27 (84.4%) of cases improved, 3 (9.4%) under stabilization and 2 (6.3%) were deteriorated. The most common causative organism was TB found in 11 (34.4%) of cases then brucellosis and streptococcus in 4 (12.5%) followed by staphylococcus aureus in 3 (9.4%). The most common complications were intraoperative bleeding need transfusion and misdirected screw needed revision found in 2 (6.3%) of cases.

Conclusion: Most patients with tuberculosis, instability, or deformity required spinal decompression and instrumentation. In this study, treatment with antibiotics, with or without surgical intervention, resulted in an 84.4% cure rate, 9.4% stabilization, and 6.3% deterioration.

Keywords: Clinical outcome, Conservative management, Spondylodiscitis, Surgical management.

INTRODUCTION

An inflammatory disorder that affects the spine, discs, and surrounding tissue is called spondylodiscitis. Three to five percent of cases of osteomyelitis are spontaneous spondylodiscitis [(1, 2)].

An estimated 4–24 cases per million persons worldwide occur yearly [(3)]. Better diagnostic techniques, the return of tuberculosis (TB), the use of intravenous (IV) drugs, the rise in immunocompromised patients, and the rise in bacteremia and iatrogenic infections have all contributed to its increased prevalence in recent years [(4)].

While the pyogenic spine infection was first identified in 1879, the tuberculous spine infection was first reported in 1779 [(5)]. In 1936, Kulowski published the first collection of pyogenic cases. The disc, vertebral endplates, and paraspinal structures are frequently affected in order of priority by spondylodiscitis [(6)]. There are three types of spondylodiscitis: granulomatous, pyogenic, and parasitic/fungal. Nowadays, pyogenic agents trail TB as the most frequent cause (almost 50% of cases), whereas fungal and parasite infections are less prevalent [(7)]. Hematogenous dispersion from another location, contiguous infection, or external inoculation are the three ways that infections can spread. While tuberculous spondylodiscitis predominantly affects the thoracic vertebrae (often multilevel or multifocal), the most prevalent hematogenous pyogenic organism is staphylococcus, which generally affects the lumbar vertebrae and, to a lesser extent, the cervical and thoracic levels [(7)].

Spondylodiscitis is often assumed to be polymicrobial due to its widespread dissemination. Because the clinical picture usually lacks specific symptoms or signs, it takes 2-6 months on average to reach a definitive diagnosis. This can lead to a poor prognosis and unintended morbidity. As a result, clinicians must make an assumption about spondylodiscitis based on clinical symptoms and signs such as fever, localized soreness, and spinal deformity [(8)]. This study aimed to evaluate the usefulness of surgery in the management of spondylodiscitis by comparing conservative and surgical approaches, as well as the link between risk factors and outcomes.

PATIENTS AND METHODS

Study design: A prospective cohort study comprised 32 patients who met precise criteria for spondylodiscitis based on clinical presentation, radiographic findings, and laboratory testing. From January 2017 to January 2021. All patients were treated in the Neurosurgery Department of Menoufia University Hospital.

Inclusion criteria: Patients who were diagnosed with spondylodiscitis based on clinical presentation, radiographic findings, and laboratory tests.

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Exclusion criteria: Individuals who were lost to follow-up or who got infected after spine surgery.

Patients with spontaneous spondylodiscitis had clinical, radiographic, and laboratory symptoms consistent with spondylodiscitis, which were validated using disc cultures, vertebral material cultures, or other infection-source materials. We were unable to obtain a positive culture in numerous patients, therefore empirical antibiotic therapy was commenced and sustained based on later clinical, radiological, and laboratory findings.

Patients who showed signs of acute or progressive neurological deficit, epidural extension compressing the spinal cord or nerve roots, evidence of deformity or instability in the spine, progressive clinical or radiological deterioration despite appropriate antimicrobial treatment, or inability to mobilize in orthosis due to excruciating pain were advised to have surgery. Generally speaking, it was determined to move on with surgery by laminectomy and debridement with or without internal fixation as well as to gather cultures from the diseased tissues provided the clinical and radiological diagnoses were established and the following criteria for surgical indications were satisfied.

Management

Surgical Techniques

Laminectomy and debridement: Following the administration of general anesthesia, the patient was made to lie prone and underwent a laminectomy. This involved the decompression of the nerve roots and thecal sac, as well as the debridement of purulent or inflammatory collections in the paraspinal and epidural space. The purulent or inflamed areas were then harvested for cultures.

Posterior spinal fusion: In addition to the therapy, a posterior transpedicular fusion with titanium screws and rods was done. If the patient's own bone showed no symptoms of infection, it was utilized for fusion. Wound drains were kept in place for 5 days following surgery to allow for antibiotic lavages in response to culture and sensitivity data. Nine patients were treated conservatively, with total bed rest, IV antibiotics for six weeks, oral antibiotics for another six weeks, and a spinal brace. Empirical antibiotics were given in the form of ceftriaxone, metronidazole, and vancomycin, which targeted gram-positive, gram-negative, and anaerobic bacteria. Patients suspected of having Pott's disease were treated with a six-month course of rifampicin and isoniazid, followed by two months of ethambutol and pyrazinamide.

Three instances underwent surgical intervention, including laminectomy, debridement, and open biopsy. 90% of the samples had a net diagnostic yield. Laminectomy and surgical stabilization with fusion were performed on twenty patients. An etiological diagnosis (11 TB, 4 brucellosis, 2 streptococci, and 1 S. aureus) was made in 18 of these 20 cases, resulting in an 81.8% net diagnostic yield. Fusion was recommended in situations of radiologic malformation or instability.

Patients' data assessed: All patients included in the current study were subjected to demographic data (age & sex), clinical presentation (local pain, fever, neurological deficit), spinal levels involved (dorsal, lumbar & multilevel), management [(conservative, decompression and biopsy decompression, biopsy and fusion (fixation)], causative organism (TB, brucellosis, staphylococcus aureus, streptococcus), risk factors (diabetes mellitus, chronic kidney disease, ischemic heart disease & bronchial asthma), outcomes of the study (number of patients improved, stabilization & deterioration), and complications (intraoperative bleeding need transfusion, misdirected screw needed revision, and deep vein thrombosis).

Sample size estimation: The minimal sample size calculated is 32 participants divided into 2 equal groups using statistics and sample size program at 80% power and 95% CI. This is based on a review of previous literature [(9)], which reported improvement and stabilization in the conservative group, 83.3%, versus 96.9% in the surgical group.

Ethical consideration: The study was approved by the Faculty of Medicine, Menoufia University's Ethics Committee (IRB approval number: 4/2024NEU56) and followed the Declaration of Helsinki. After explaining the nature and scope of the study. Every participant or their legal guardian signed an informed consent form.

Statistical analysis

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS, IBM Corporation, Armonk, New York, USA, version 25.0). To verify that the data had a normal distribution, the Shapiro-Wilk test was performed. Standard deviation and frequency are used to report qualitative data, while mean ± SD is used for quantitative data. A test for comparing qualitative category data is the Chi-square (X^2) test. When comparing quantitative variables between more than two groups of normally distributed data, the One-Way ANOVA test (F) is utilized. At $p < 0.05$, statistical significance was determined.

RESULTS

A flowchart of the study population is shown in figure (1). Of 51 patients who had spondylodiscitis, 19 patients were excluded from the study (11 patients declined consent and 8 patients did not meet the inclusion criteria) and 32 patients were willing to participate in the study.

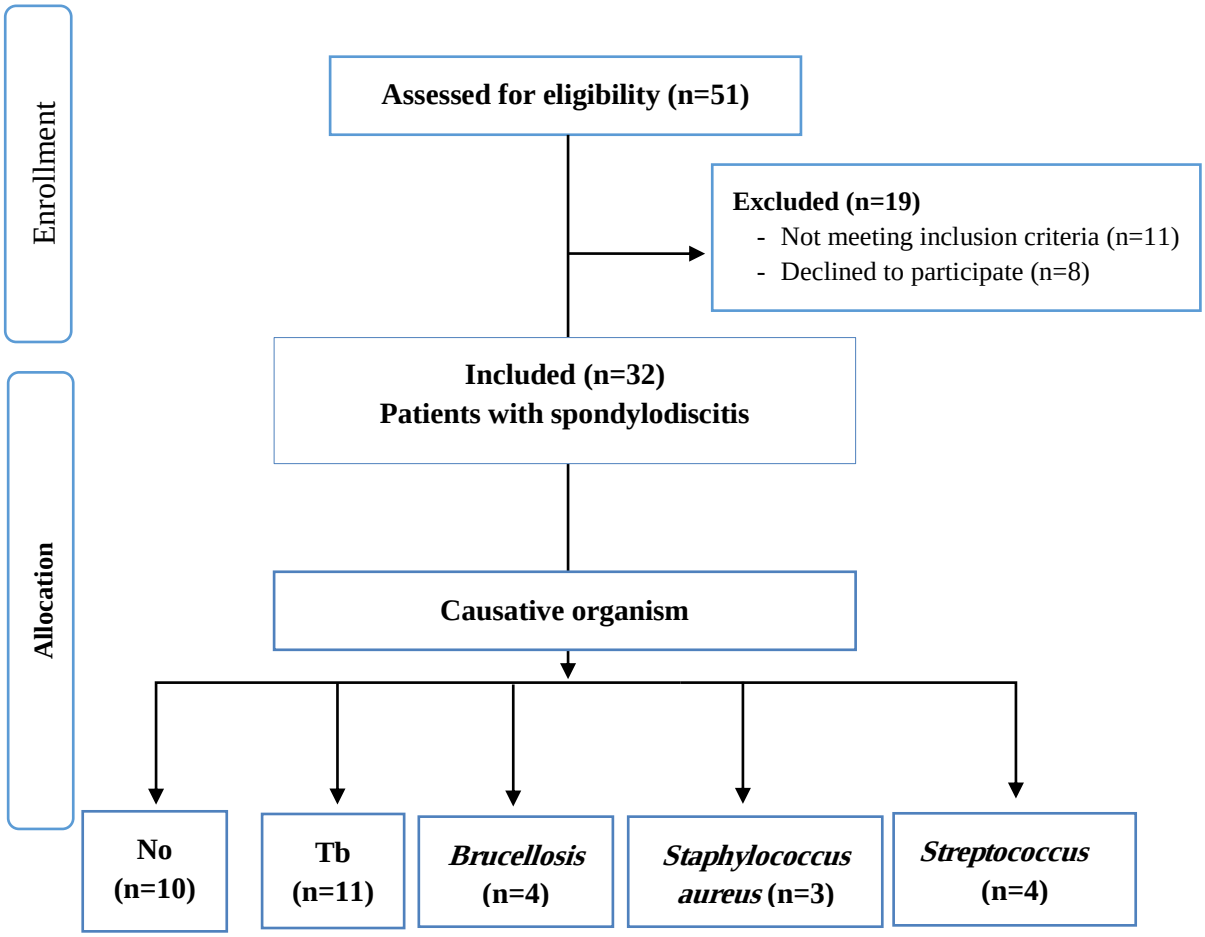


Figure (1): Flowchart of patients with spondylodiscitis.

The mean age was 42.16 ± 9.73 years, 18 (56.3%) of cases were males and 14 (43.8%) were females. Regarding clinical presentation, local pain was found in 32 (100.0%), fever was found in 18 (56.3%), and neurological deficit was found in 11 (34.4%) (Table 1).

Table (1): Demographic data and clinical presentation among the studied cases (n=32)

	The studied cases (n=32)	
	N	%
Age/years, Mean ±SD.	42.16±9.73	
Male/Female	18/14	56.3/43.8
Clinical presentation		
Local pain	32	100.0
Fever	18	56.3
Neurological deficit	11	34.4

Regarding spinal levels involved, the most common was dorsal, found in 20 (62.5%) of cases, then lumbar in 8 (25.0%), followed by multilevel in 4 (12.5%). According to management, decompression, biopsy, and fusion (fixation) were found in 20 (62.5%) of cases, conservative in 9 (28.1%), and decompression & biopsy in 3 (9.4%). Moreover, 27 (84.4%) of cases improved, 3 (9.4%) under stabilization, and 2 (6.3%) deteriorated (Table 2).

Table (2): Spinal levels involved, management and outcomes of the study among the studied cases (n=32)

	The studied cases (n=32)	
	N	**%**
Spinal levels involved		
Dorsal	20	62.5
Lumbar	8	25.0
Multilevel	4	12.5
Management		
Conservative		
Decompression & biopsy	9	28.1
Decompression, biopsy, & fusion(fixation)	3	9.4
	20	62.5
Outcomes of the study		
Improved	27	84.4
Stabilization	3	9.4
Deterioration	2	6.3

The most common causative organism was TB found in 11 (34.4%) of cases then brucellosis and streptococcus in 4 (12.5%) followed by staphylococcus aureus in 3 (9.4%). Regarding risk factors, DM was found in 6 (18.8%) of cases, chronic kidney disease (CKD) was found in 10 (31.3%), bronchial, asthma was found in 2 (6.3%) and IHD was found in one patient. Furthermore, the most common complications were intraoperative bleeding that needed transfusion and misdirected screw that needed revision was found in 2 (6.3%) of cases, (Table 3).

Table (3): Causative organism, risk factors and complications among the studied cases (n=32)

	The studied cases (n=32)	
	N	**%**
Causative organism		
No organisms	10	31.3
Tb	11	34.4
Brucellosis	4	12.5
Staphylococcus aureus	3	9.4
Streptococcus	4	12.5
Risk factors		
DM	6	18.8
Bronchial. Asthma	2	6.3
CKD	10	31.3
IHD	1	3.1
Complications		
No complications	27	84.4
Intraoperative bleeding need transfusion	2	6.3
Misdirected screw needed revision.	2	6.3
DVT	1	3.1

Diabetes mellitus (DM), chronic kidney disease (CKD), ischemic heart disease (IHD), Deep vein thrombosis (DVT)

There was no significant relation among causative organisms regarding age, sex, and clinical presentation (P>0.05), (Table 4).

Table (4): Demographic data and clinical presentation in relation to causative organism among the studied cases (n=32)

Variable	Causative Organism										X^2	P value
	No organisms (n=10)		TB (n=11)		Brucellosis (n=4)		Staphylococcus aureus (n=3)		Streptococcus (n=4)			
	N	%	N	%	N	%	N	%	N	%		
Age/years Mean± SD.	40.30±6.90		43.27±11.72		50.50±6.66		41.33±2.31		36.00±12.99		F=1.322	0.287
Sex												
Male	6	60.0	7	63.6	1	25.0	2	66.7	2	50.0	2.084	0.720
Female	4	40.0	4	36.4	3	75.0	1	33.3	2	50.0		
Clinical presentation												
Local pain	10	100.0	11	100.0	4	100.0	3	100.0	4	100.0	---	---
Fever	5	50.0	6	54.5	3	75.0	1	33.3	3	75.0	1.955	0.744
Neurological deficit	5	50.0	5	45.5	0	0.0	0	0.0	1	25.0	5.503	0.239

Tuberculosis (Tb), ONE WAY ANOVA F test (F), Chi-square test (X^2)

There was a significant relation among causative organisms regarding spinal levels involved and management (P>0.05), (Table 5).

Table (5): Spinal levels involved and management in relation to causative organism among the studied cases (n=32)

Variable	Causative Organism										X^2	P value
	No organisms (n=10)		TB (n=11)		Brucellosis (n=4)		Staphylococcus aureus (n=3)		Streptococcus (n=4)			
	N	%	N	%	N	%	N	%	N	%		
Spinal Levels Involved												
Dorsal	8	80.0	6	54.5	2	50.0	3	100.0	1	25.0	9.87	**0.027***
Lumbar	2	20.0	2	18.2	2	50.0	0	0.0	2	50.0		
Multilevel	0	0.0	3	27.3	0	0.0	0	0.0	1	25.0		
Management												
Conservative												
Decompression, biopsy,	4	40.0	3	27.3	0	0.0	2	66.7	0	0.0	11.9	**0.015***
Decompression fixation	1	10.0	0	0.0	0	0.0	1	33.3	1	25.0		
	5	50.0	8	72.7	4	100.0	0	0.0	3	75.0		

Tuberculosis (Tb), Chi square test (X^2)

There was no significant relation among causative organisms regarding risk factors (P>0.05), while a significant correlation was found between causative organisms with complications and outcomes of the study. Both brucellosis and streptococcus organisms are significantly more related with complications. Also, 11 cases with TB (100%), 4 cases with brucellosis (100%), 3 cases with staphylococcus aureus (100%) and 2 cases with streptococcus (50%) were improved (Table 6).

Table (6): Risk factors, complications, and outcomes of the study in relation to causative Organism among the studied cases (n=32)

Variable	Causative Organism										X^2	P value
	No organisms (n=10)		TB (n=11)		Brucellosis (n=4)		Staphylococcus aureus (n=3)		Streptococcus (n=4)			
	N	%	N	%	N	%	N	%	N	%		
Risk factors												
DM	3	30.0	1	9.1	0	0.0	1	33.3	1	25.0	2.949	0.566
Bronchial Asthma	1	10.0	0	0.0	0	0.0	0	0.0	1	25.0	3.840	0.428
CKD	3	30.0	6	54.5	1	25.0	0	0.0	0	0.0	6.040	0.196
IHD	0	0.0	0	0.0	1	25.0	0	0.0	0	0.0	7.226	0.124
Complications												
No complications												
Intraoperative	9	90.0	10	90.9	2	50.0	3	100.0	3	75.0		
bleeding need	0	0.0	0	0.0	1	25.0	0	0.0	1	25.0	14.83	**0.025***
transfusion												
MS needed revision.	1	10.0	1	9.1	0	0.0	0	0.0	0	0.0		
DVT	0	0.0	0	0.0	1	25.0	0	0.0	0	0.0		
Outcomes of the study												
Improved	7	70.0	11	100	4	100.0	3	100.0	2	50.0	8.859	**0.035***
Stabilization	2	20.0	0	0.0	0	0.0	0	0.0	1	25.0		
Deterioration	1	10.0	0	0.0	0	0.0	0	0.0	1	25.0		

There was no significant relation among outcomes of the study regarding age, sex, and clinical presentation (P>0.05). However, the presence of complications and outcomes of the study showed significant relation with causative organism (p=0.025, 0.35) respectively (Table 7).

Table (7): Demographic data and clinical presentation in relation to outcomes of the study among the studied cases (n=32)

	Outcomes of the study						X^2	P value
	Improved (n=27)		Stabilization (n=3)		Deterioration (n=2)			
	N	%	N	%	N	%		
Age/year, Mean± SD.	43.04±9.22		32.67±14.29		44.50±3.54		F=1.665	0.207
Male/Female	14/13	51.9/48.1	2/1	66.7/33.3	2/0	100/0	1.900	0.387
Clinical presentation								
Local pain	27	100.0	3	100.0	2	100.0	---	---
Fever	16	59.3	1	33.3	1	50.0	0.771	0.680
Neurological deficit	8	29.6	2	66.7	1	50.0	1.873	0.392

There was significant relation between outcomes of the study with spinal levels involved (P = 0.035), most of improved cases were found in dorsal (70.4%). While, there was no significant relation among outcomes of the study with management, risk factors and complications (P > 0.05), (Table 8).

Table (8): Spinal Levels Involved, management, risk factors and complications in relation to outcomes of the study among the studied cases (n = 32)

	Outcomes of the study						X^2	P value
	Improved (n=27)		Stabilization (n=3)		Deterioration (n=2)			
	N	%	N	%	N	%		
Spinal Levels Involved								
Dorsal	19	70.4	1	33.3	0	0.0	10.370	**0.035***
Lumbar	4	14.8	2	66.7	2	100.0		
Multilevel	4	14.8	0	0.0	0	0.0		
Management								
Conservative	8	29.6	0	0.0	1	50.0	2.532	0.639
Decompression, biopsy,	3	11.1	0	0.0	0	0.0		
Fixation	16	59.3	3	100.0	1	50.0		
Risk factors								
DM	6	22.2	0	0.0	0	0.0	1.368	0.505
Bronchial Asthma	0	0.0	1	33.3	1	50.0	2.089	0.085
CKD	9	33.3	1	33.3	0	0.0	0.970	0.616
IHD	1	3.7	0	0.0	0	0.0	0.191	0.909
Complications								
No complications	23	85.2	3	100.0	1	50.0	7.517	0.276
Intraoperative bleeding need transfusion	1	3.7	0	0.0	1	50.0		
MS needed revision.	2	7.4	0	0.0	0	0.0		
DVT	1	3.7	0	0.0	0	0.0		

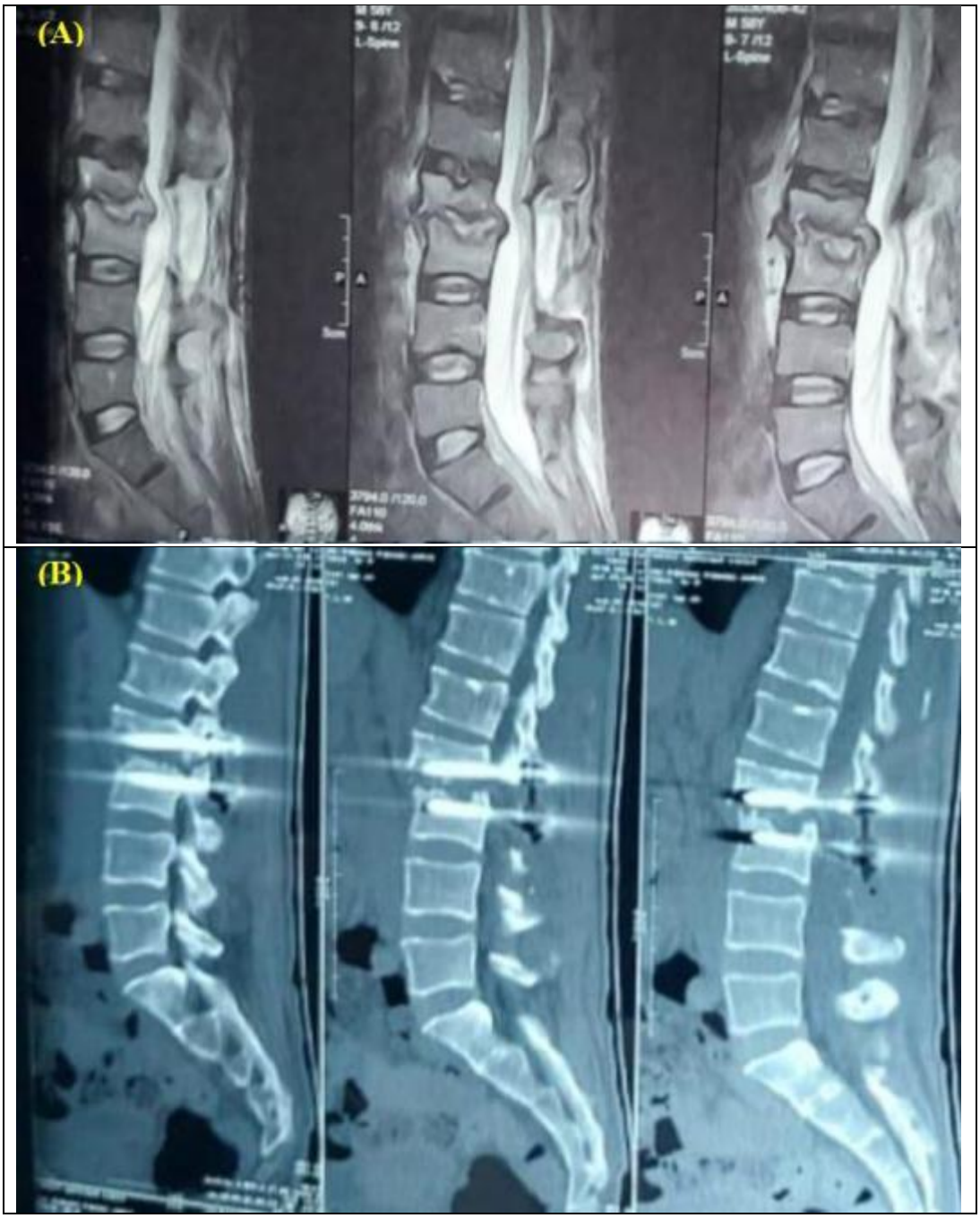
Diabetes mellitus (DM), chronic kidney disease (CKD), ischemic heart disease (IHD), Misdirected screw (MS), Deep vein thrombosis (DVT), Chi square test (X^2), *Significant.

There was no significant relation among management regarding spinal levels involved and complications (P>0.05) (Table 9).

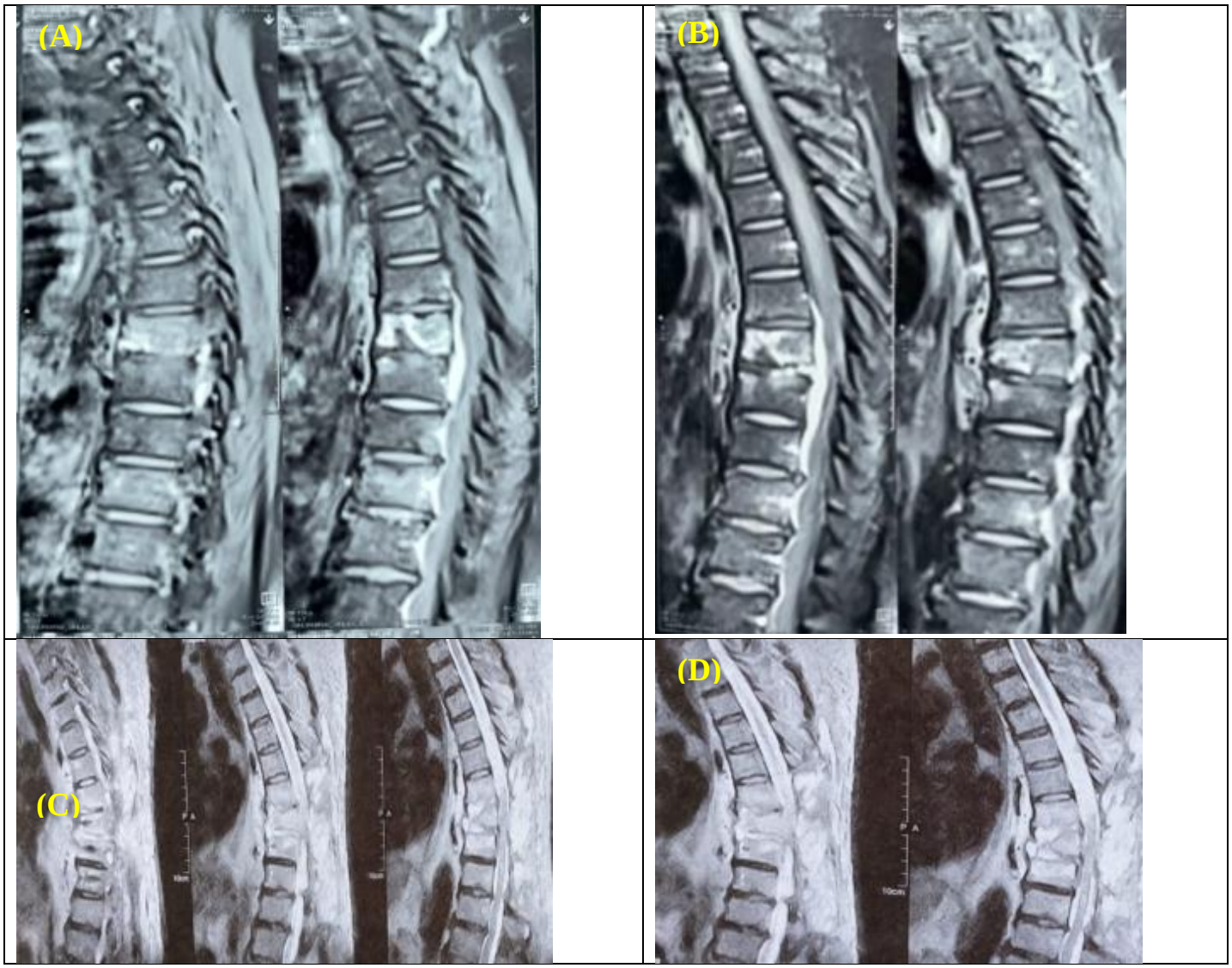
Table (9): Spinal levels involved and complications in relation to management among the studied cases (n=32)

	Management						X^2	P value
	Conservative (n=9)		Decompression & biopsy (n=3)		Decompression, biopsy, & stabilization (n=20)			
	N	%	N	%	N	%		
Spinal Levels Involved								
Dorsal	7	77.8	2	66.7	11	55.0	3.924	0.416
Lumbar	1	11.1	0	0.0	7	35.0		
Multilevel	1	11.1	1	33.3	2	10.0		
Complications								
No complications	8	88.9	3	100.0	16	80.0	2.532	0.865
Intraoperative bleeding need transfusion	0	0.0	0	0.0	2	10.0		
MS needed revision	1	11.1	0	0.0	1	5.0		
DVT	0	0.0	0	0.0	1	5.0		

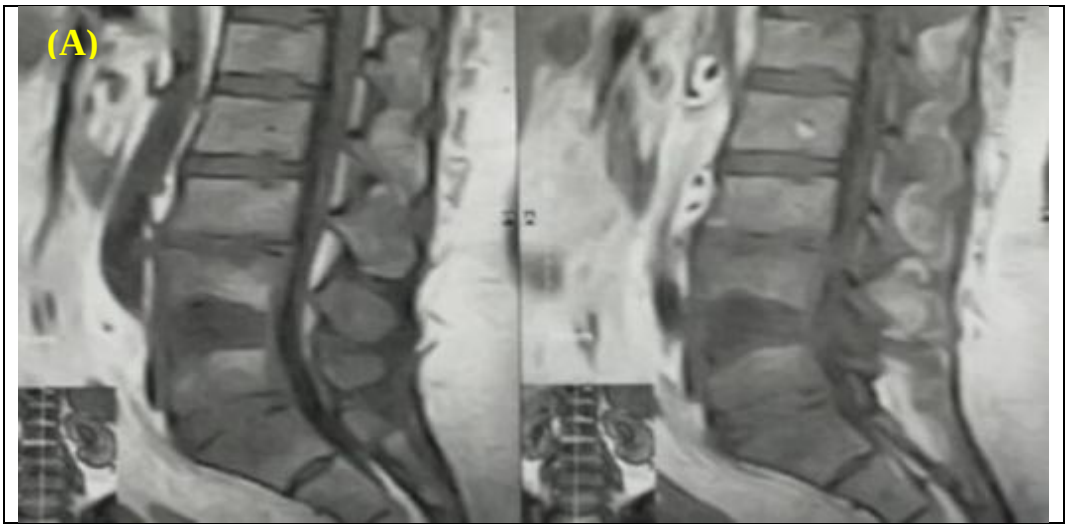
Misdirected screw (MS), Chi square test (X^2), Chi square test (X^2)

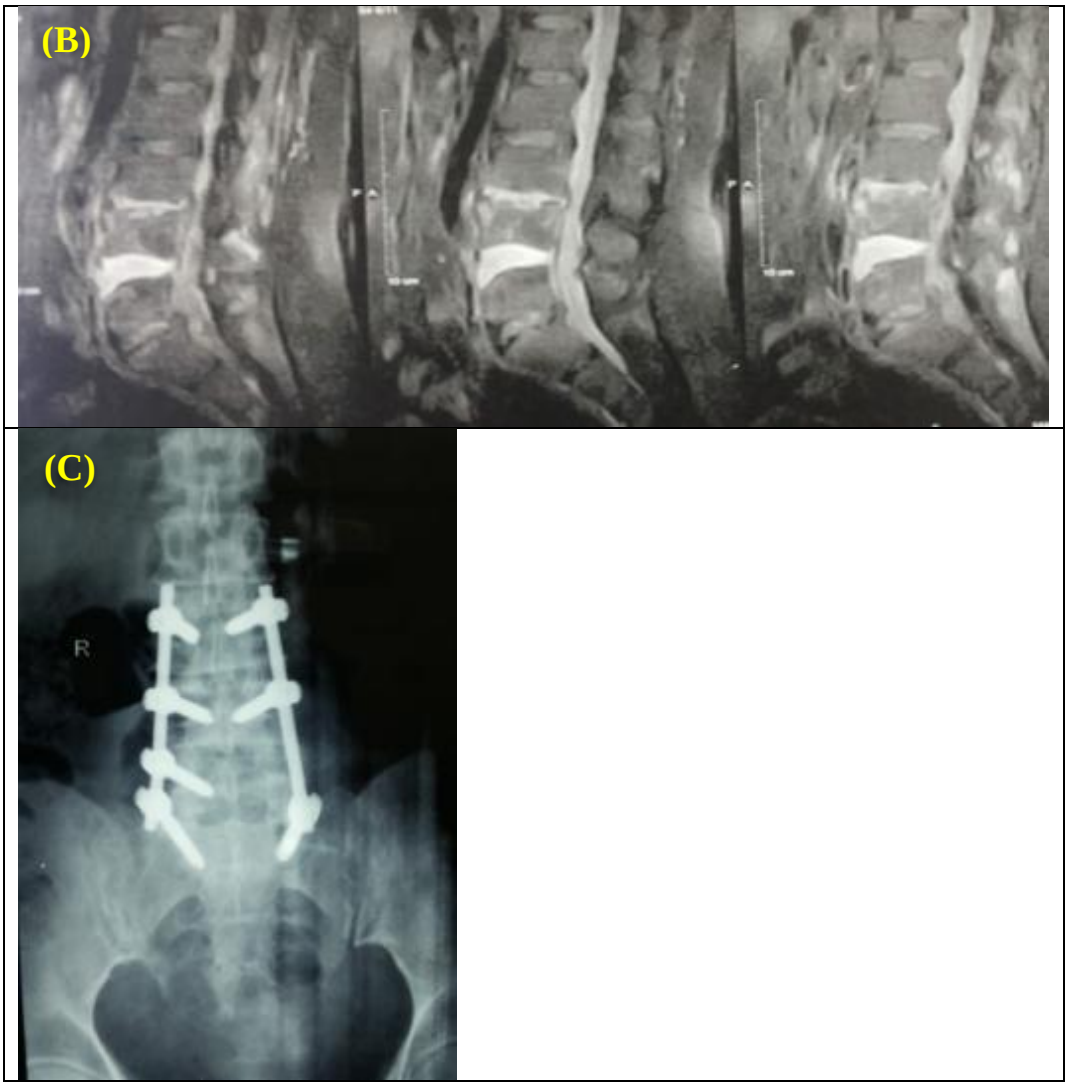


Case (1): Male patients 50 year, L2-3 spondylodiscitis, A) sagittal MRI T2 preoperative, B) CT sagittal postoperative.



Case (2): Male patients 57-year-old age, T8-T9 spondylodiscitis, A) sagittal MRI T2, B) sagittal MRI T1, C-D) sagittal MRI T2 postoperative 6 months.





Case (3): Female patients 52-year-old age, L3-4, L4-5 spondylodiscitis, A) MRI T1 L3-4 and L4-5 spondylodiscitis preoperative, B) MRI T2 L3-4 and L4-5 spondylodiscitis preoperative), C) Xray LSS A.P view postoperative.

DISCUSSION

Although it is uncommon, spondylodiscitis is the most typical type of spinal infection. Inflammation of the surrounding vertebral body and intervertebral disk space is its defining feature. Numerous processes are involved, such as direct inoculation brought on by spinal surgery or trauma, and hematogenous seeding, in which germs spread from distant organs [(10)]. Diabetes mellitus and advanced age stand out among the risk variables that have been found. Approximately three times as many males as women are impacted, and patients are particularly affected in their sixth and eighth decades [(11)].

The 1-year death rate (6%–12%) and neurologic impairments are the most two clinical outcomes that have been described in the literature [(12)]. Following surgical or medical therapy, some patients with persistent neurologic compromises experience improvement or worsening. The range of these compromises is 5% to 26.7%, depending on the treatment modality used, the site/region of infection, the relationship to the formation of an abscess, and the causative pathogens [(13)]. Therefore, the purpose of this study was to evaluate the function of surgery in the treatment of spondylodiscitis by comparing the conservative and surgical approaches and examining the association between risk factors and result.

In 34.4% of our cases, TB was found to be the most prevalent causal organism, followed by streptococcus and brucellosis in 12.5% and staphylococcus aureus in 9.4% of cases, according to the current study. In a similar vein, **Waheed *et al.*** [(9)] discovered that mycobacterium tuberculosis was the most frequently observed causal bacterium in their dataset. However, **Ahmed *et al.*** [(14)] reported that the most common organism isolated from blood culture in all cases of spontaneous spondylodiscitis was staphylococcus aureus, and the most common organism from tissue culture in cases that underwent surgical management was mycobacterium tuberculosis. Their study agree with the studies of **Gouliouris *et al.*** [(2)] and **Tuli** [(15)].

In terms of risk variables, our analysis revealed that DM was present in 18.8% of cases, CKD in 31.3%, bronchial asthma in 6.3%, and IHD in one patient. **Ahmed *et al.*** [(14)] discovered that the risk

factors for this issue included hepatitis C virus, diabetes mellitus, and hypertension. While, **Sevic *et al.*** [16] included advanced age to the list of risk factors. **Gouliouris *et al.*** [2] determined that diabetes mellitus was the most prominent risk factor. **Fantoni *et al.*** [17] found in another study that immunosuppression, HIV infection, cancer, chronic kidney illness, elderly age, diabetes mellitus, distant infection site, and liver cirrhosis are risk factors for spondylodiscitis. However, **Waheed *et al.*** [9] noted that only four individuals had uncontrolled diabetes and four had an infection from a remote source and the remaining patients were immunocompetent. This demonstrates that tuberculosis was the most isolated organism in our collection, can affect any immunocompetent person who has been exposed [14].

According to the results of the current investigation, there was no discernible relationship between the causal organisms and clinical presentation. Where all patients had local discomfort, 56.3% had fever, and 34.4% had neurological deficits. According to a **Waheed *et al.*** [9] study, clinical signs like fever, regional back pain, and spinal deformity indicate the possibility of viral spondylodiscitis. Furthermore, regardless of the causing microbe, **Kapsalaki *et al.*** [18] found that back pain was the primary clinical manifestation of the illness in 100% of cases. Additionally, **AlQahtani *et al.*** [19] noted that, while fever was recorded in roughly 40% of patients in their study, compared to 54% by **Waheed *et al.*** [9], back discomfort was reported in all cases. In research by **AlQahtani *et al.*** [19], high-grade fever was more significantly linked to pyogenic spondylodiscitis than to brucellar and tuberculous spondylodiscitis. Since 75% of the brucellar and tuberculous groups experienced pain for 120 and 240 days, respectively. This can be explained by the correlation between the length of discomfort and the presence of fever. This suggests that spondylodiscitis was a late consequence of both brucellosis and tuberculosis.

Additionally, in our investigation, neurologic symptoms were reported at a rate of around 50% in the group without organisms and TB. Neurologic deficits were more common in the brucellar and tuberculous groups, with higher spinal cord compression and disc/bone loss due to granuloma formation, according to a prior study by **Turunc *et al.*** [20]**.** Additionally, **Pandita *et al.*** [21] discovered that the neurologic deficits in their patients varied in terms of involvement.

In this study, there was a substantial relationship observed between causal organisms, spinal levels implicated, and management. Furthermore, in terms of spinal levels affected, dorsal was the most common in 62.5% of cases, followed by lumbar in 25.0% and multilevel in 12.5%. In the same vein, **Gouliouris *et al.*** [2] stated that, whereas dorsal involvement is a hallmark of tuberculosis, which is also consistent with **Afonso Cardoso *et al.*** [11]**. Turunc *et al.*** [20] and **Waheed *et al.*** [9] discovered that the lumbar region was the most affected in terms of spinal anatomic site involvement, owing to increased vasculature and infection proximity, particularly in brucellar spondylodiscitis. While **AlQahtani *et al.*** [19] found that most patients (n = 49) had at least two vertebral bodies affected, and ten of them required surgery. Furthermore, a substantial relationship was discovered between results and the spinal levels included in our investigation. Most improved cases were observed in the dorsal (70.4%). There was no significant relationship established between study outcomes and management and risk factors, or complications. In this regard, **Cottle and Riordan** [22] stated that intravenous antibiotic therapy is the cornerstone of infectious spondylodiscitis treatment, in addition to surgical intervention in some patients.

In a previous study, **Hasanain *et al.*** [23] found that due to the nature of the disease, combination therapy is recommended in tuberculous and brucellar spondylodiscitis. It has been shown to reduce relapse episodes, lower the chance of resistance, and shorten the period of therapy. **AlQahtani *et al.*** [19] discovered that 22.4% of the patients in our study underwent surgery, with a higher number for brucellar spondylodiscitis. In contrast, **Turunc *et al.*** [20] reported a higher rate of tuberculous spondylodiscitis requiring surgical intervention than brucellar and pyogenic spondylodiscitis.

Surgery is the preferred treatment in cases of an epidural collection crushing the spinal cord or nerve roots, gradual or acute neurological loss, evidence of spinal instability or deformity, and uncontrollable severe back pain [9]. This prevents prolonged bedrest, which can lead to issues associated with a lack of muscle activity, such as DVT and disuse muscle atrophy [24]. Furthermore, **Bydon *et al.*** [25] compared decompression surgery to instrumentation in terms of recurrent surgery and infection persistence. **Waheed *et al.*** [9] found that patients treated with internal fixation experienced significant pain relief with early mobilization after surgery, as opposed to patients treated conservatively or with decompression.

In our study, 84.4% of cases improved, 9.4% stabilized, and 6.3% deteriorated. However, **AlQahtani *et al.*** [19] discovered that the total clinical cure rate was > 60% (48/72), which is comparable with the findings of **Waheed *et al.*** [9]. The 90-day death rate was 2.6%, like that of **Waheed *et al.*** [9] (4.5%). While, **Ahmed *et al.*** [14] noticed that functional clinical outcomes and MacNab's criteria results largely match with the results of the study performed by **Thavarajasingam *et al.*** [26] on 16 patients with non-tuberculous thoracic or lumbar spondylodiscitis, where 75% were totally alleviated of pain and fully active.

CONCLUSION

The best way to treat spondylodiscitis remains debatable. Conservative treatment with broad-spectrum antibiotics remained useful in the treatment of spondylodiscitis. However, spinal decompression and instrumentation were recommended in most patients with tuberculous illness, instability, or deformity. In this study, treatment with antibiotics, with or without surgical intervention, resulted in 84.4% cure rate, 9.4% stabilization, and 6.3% deterioration.

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