

Evaluation of Safety and Effectiveness of Instrumentation in Treatment of Spondylodiscitis Cases, Taking into Consideration the Clinico-Radiological Outcome

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Abstract

Aim: The study was conducted for evaluation of safety and effectiveness of instrumentation in treatment of spondylodiscitis cases, taking into consideration the clinico-radiological outcome.

Material & Methods: In a retrospective case series study, patients of spondylodiscitis were operated between January 2016-January 2017 in the Department of Orthopaedics, IGIMS, Patna, Bihar, India. The data of the 50 patients who had suffered from spondylodiscitis have been analyzed and studied.

Results: In the present study, 72% were male and 28% were females with mean age of 48 ± 2 years. 8 patients were having diabetes, 4 patients with liver disease, 2 patients were suffering from end-stage renal disease, 2 patients were having hypertension and 2 patients were on chronic steroid use for systemic lupus erythromatosis. The period of symptoms prior to diagnosis was between 2 and 24 weeks, with a mean duration of 12.48 ± 6.54 weeks. Persistent back pain, local spinal tenderness during palpation, paravertebral muscle spasm in 42 cases, fever in 20 cases, radiculopathy in 16 cases and radiculopathy of the neck were found. Neurological deficits have been detected in 10 cases, and in 2 cases, deformity was found. In these cases, the indications of surgical intervention were medical trial failure for 3 weeks in 16 cases, as indicated by persistent elevation of inflammatory markers and radiological progression of the inflammatory phase, the development of abscesses (9 cases), Extreme chronic pain (8 cases), cognitive deficit (6 cases), end-plate destruction and severe pain (5 cases), deformity (3 cases), and, in 3 cases, the diagnosis was unclear in the presence of end-plate destruction.

Conclusion: Spinal instrumentation is an effective and safe method in the treatment of spondylodiscitis in selected patients.

Keywords: Spondylodiscitis; Instrumentations; Spinal Infection; Visual Analogue Scale.

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Introduction

Spondylodiscitis is a relatively rare disorder, accounts for 2-4% of all infectious bone disease, but an increase in the incidence of pyogenic as well as granulomatous spondylodiscitis has been

reported. [1] Spondylodiscitis is an uncommon infection of the intervertebral disc with osteomyelitis of the adjacent vertebral body endplates and represents 0.15%–5% of all osteomyelitis cases. [2,3]

The lumbar and the thoracic regions are affected in 50% and 35 % of patients, respectively; the cervical spine is affected in 3 to 10% of cases. [4]

Risk factors for spondylodiscitis include underlying compromise of the immune system, such as human immunodeficiency virus/acquired immunodeficiency syndrome, end-stage renal disease, diabetes mellitus, hepatic cirrhosis, and malignancy. [5] Spondylodiscitis symptoms are usually non-specific with insidious onset. Back or neck pain is the most frequent presenting complaint, and spinal tenderness is the commonest sign detected on examination. [6,7] Diagnosis of spondylodiscitis necessitating specific laboratory and radiological studies, with MRI which is the modality of choice. [8] The treatment of spondylodiscitis varies from conservative medical management to surgical decompression with or without instrumented fusion, depending on a multitude of factors. Conservative medical management typically involves isolation of an organism via culture or percutaneous biopsy, appropriate antibiotic treatment, and external bracing for pain control.

The surgery is indicated for cases with neurologic deficit, abscess formation, destruction of endplates evident with proper imaging, chronic osteomyelitis with instability in dynamic x-ray, local kyphosis, septic pseudarthrosis or failure of medical treatment. Instrumentation in the presence of active infection is still controversial. [9] In the presence of active infection, internal spinal fixation began to gain some popularity in reconstructive surgery with the advantages of improved sagittal balance and substantial fusion rates. Instrumentation can also minimize the need for prolonged external immobilization as opposed to non-instrumented situations. [10]

Hence this study was conducted for evaluation of safety and effectiveness of instrumentation in treatment of spondylodiscitis cases, taking into

consideration the clinico-radiological outcome.

Material & Methods

A retrospective observational study was performed in the Department of Orthopaedics, IGIMS, Patna, Bihar, India. The study was conducted over a period of almost three years January 2016-January 2017. A total of 50 patients were included.

Inclusion criteria

Patient diagnosed as spondylodiscitis not responding to medical treatment within maximum 6 weeks as evidenced by persistent pain and persistent elevation ESR and CRP. Patients with significant neurological deficit due to compressive mechanism, epidural abscess, spinal deformity, or instability.

Exclusion criteria

Patients responded to medical treatment or unfit for surgery and also patients had multiple distant levels more than two distant levels.

Methodology

The patients were subjected to history taking with stress on any past history of diseases, drug, operation, or any invasive spinal procedure and history of TB or contact with animals. VAS was used to assess the severity of pain. Complete general examination with searching for

primary infection and systemic disease that may affect the surgery, and neurological assessment. All patients submitted to routine laboratory investigations with special interest for CRP, ESR and WBC count: Blood culture, urine culture, sputum culture. CRP level was used as a serum marker during follow-up. Neuroimaging studies (plain X-ray- CT-MRI); MRI (with gadolinium contrast) was the gold standard in the diagnosis.

Surgical procedures

Different technique and instrumental approaches have been used in the

management of these patients according to their pathology, including:

- Anterior corpectomy and reconstruction by either (titanium mesh cage and z-plate or expandable cage).
- Posterior decompression and transpedicular screws fixation.
- Single stage Combined anterior and posterior approach.
- Lateral extracavitary approach with posterior Transpedicular screws fixation.
- TLIF and Posterior Instrumentation.

Biopsy material sent for aerobic, anaerobic, fungal, mycobacterial cultures and stained with gram stain, Ziehl-Neelsen and special stain for fungi. Postoperative empiric antibiotics were given then were modified according to cultures results.

Follow up and outcome

The patients were followed monthly post-operative taking into consideration the clinical outcome using Barthel Index, as regarding activity of daily living, and Visual pain analogue scale (VAS) was used to assess the severity of pain. These data were compared with the preoperative state. Also follow up included the laboratory markers (WBC count, CRP and ESR) and radiological follow up, included X-rays within 3 days post-operatively, and CT was done in cases that needed more evaluation.

Statistical Analysis

All the data were collected the one-sample t-test and the paired t-test using SPSS 12.0 for statistical comparisons. In all cases, p values < 0.05 were, statistically, considered significant.

Results

Table 1: Patient details

Gender	N%
Male	36 (72)
Female	14 (28)
Mean age	48 ± 2 years
Co-Morbidities	
Diabetes	8 (16)
Liver disease	4 (8)
End stage renal disease	2 (4)
Hypertension	2 (4)
Systemic lupus erythromatosis	2 (4)

In the present study, 72% were male and 28% were females with mean age of 48 ± 2 years. 8 patients were having diabetes, 4 patients with liver disease, 2 patients were suffering from end-stage renal disease, 2 patients were having hypertension and 2 patients were on chronic steroid use for systemic lupus erythromatosis.

Table 2: Clinical presentation

Clinical picture	No. of cases	%
Back pain, tenderness and spasm	42	84
Fever	20	40
Radiculopathy	16	32
Neurological deficit	10	20
Deformity	2	4
Neck pain and brachialgia	2	4

The period of symptoms prior to diagnosis was between 2 and 24 weeks, with a mean duration of 12.48 ± 6.54 weeks. Persistent

back pain, local spinal tenderness during palpation, paravertebral muscle spasm in 42 cases, fever in 20 cases, radiculopathy

in 16 cases and radiculopathy of the neck were found. Neurological deficits have

been detected in 10 cases, and in 2 cases, deformity was found.

Table 3: Indications for surgical intervention

Clinical picture	No. of cases	%
Failure of medical management	16	32
Abscess formation	9	18
Severe persistent pain	8	16
Neurological deficit	6	12
Endplate destruction and severe pain	5	10
Neurological deficit and deformity	3	6
Unsure diagnosis and destruction of end plate	3	6

In these cases, the indications of surgical intervention were medical trial failure for 3 weeks in 16 cases, as indicated by persistent elevation of inflammatory markers and radiological progression of the inflammatory phase, the development

of abscesses (9 cases), Extreme chronic pain (8 cases), cognitive deficit (6 cases), end-plate destruction and severe pain (5 cases), deformity (3 cases), and, in 3 cases, the diagnosis was unclear in the presence of end-plate destruction.

Table 4: Laboratory markers preoperative and at 4 weeks and Barthel Index

	Pre-operative	Post-operative
ESR	83.27	9.27
CRP	55.35	8
WBC	9300	7350
Barthel Index	46	90

Postoperatively, inflammatory markers in all cases were normalised within 2-4 weeks. The mean Barthel index was 44 ± 16 (range, 10 -70) before surgery and 90 ± 18 (range, 65-100) with a markedly effective p-value (< 0.001) at the end of the follow-up period.

Table 5: Causative organisms and complications

Causative Organisms	N
Staphylococcus Aureus	20
Mycobacterium tuberculosis	8
Brucella	5
Streptococci	2
Coagulase -ve staph	2
Escherichia coli	1
Pseudomonas	1
Pneumococci	1
Complications N%	
Superficial wound infection	5 (10)
Malposition of transpedicular screws	6 (3)
Dural tear	6 (3)
Death from renal failure	6 (3)

Among the 40 positive culture patients, the most common strain was Staphylococcus Aureus in 20 cases, followed in 8 cases by mycobacterium tuberculosis. In 5 cases, Brucella was isolated, in 2 cases,

Streptococci, and in 2 cases, Coagulase -ve staph. Also isolated were Escherichia coli, Pseudomonas and Pneumococci, each in a single case. 5 cases of superficial wound infection, treated with superficial

debridement and antibiotics, In 6 cases, malposition of transpedicular screws was found but without any symptoms and the patient declined a second repositioning procedure.

Discussion

Spondylodiscitis is an uncommon infection of the intervertebral disc with osteomyelitis of the adjacent vertebral body endplates and represents 0.15%–5% of all osteomyelitis cases. [11,12] Its incidence has been reported to be between 0.2 and 2.4/100,000 annually, with a broad consensus indicating that cases are on the rise. [12,13] Typical clinical manifestations include back pain, fever, malaise, and variable compressive neurological symptoms; however, severe cases can escalate to epidural abscesses, septicemia, and general multiorgan failure. [14,15] Hematogenous spread is the more common route, likely secondary to the vascular anatomy of the spine. [16,17] Typically, a single vascular pedicle will bifurcate and supply 2 adjacent vertebral endplates, which become infected first and propagate to the disc and body nearby. [18]

In the present study, 72% were male and 28% were females with mean age of 48 ± 2 years. In Lim et al [19] study on 28 patients, the male to female ratio was 3:1, and in the study conducted by Pee et al [20], it involved 60 patients, the male to female ratio 1.5:1. 8 patients were having diabetes, 4 patients with liver disease, 2 patients were suffering from end-stage renal disease, 2 patients were having hypertension and 2 patients were on chronic steroid use for systemic lupus erythromatosis. In the study by Lee et al [21] were; diabetes mellitus (44%); long term steroid drug use (24%); malignancy (17%); and alcoholism (11%).

The period of symptoms prior to diagnosis was between 2 and 24 weeks, with a mean duration of 12.48 ± 6.54 weeks. Persistent back pain, local spinal tenderness during

palpation, paravertebral muscle spasm in 42 cases, fever in 20 cases, radiculopathy in 16 cases and radiculopathy of the neck were found. Neurological deficits have been detected in 10 cases, and in 2 cases, deformity was found. In these cases, the indications of surgical intervention were medical trial failure for 3 weeks in 16 cases, as indicated by persistent elevation of inflammatory markers and radiological progression of the inflammatory phase, the development of abscesses (9 cases), Extreme chronic pain (8 cases), cognitive deficit (6 cases), end-plate destruction and severe pain (5 cases), deformity (3 cases), and, in 3 cases, the diagnosis was unclear in the presence of end-plate destruction. The study conducted by Lee et al [21], who reported that, the most common clinical presentation was axial spine pain presented in (95%) followed by radicular pain in 20 to 65% of cases, and 15% present with neurological deficits, which is slightly lower than that in our study. CRP value was the preferred laboratory marker for monitoring response to treatment in this study as it has short half-life and rapidly normalized and this was similar to what Zarrouk et al. [22]

Among the 40 positive culture patients, the most common strain was Staphylococcus Aureus in 20 cases, followed in 8 cases by mycobacterium tuberculosis. In 5 cases, Brucella was isolated, in 2 cases, Streptococci, and in 2 cases, Coagulase -ve staph. Also isolated were Escherichia coli, Pseudomonas and Pneumococci, each in a single case with similar results in the study of Lim et al [19] in which the most common identified bacteria was staphylococcus (25%). In our study, as well as in study of Lim et al [19], ESR, CRP and leukocyte counts were normalized within 6 months. In our series, it has been noticed that the neurological outcome after surgery for spondylodiscitis was determined mostly by preoperative neurological state, and this is similar finding in most published series. It is unusual for neurological worsening to

be due to surgery itself. Nevertheless, postoperative neurological deterioration is often associated with recurrence. [23]

Conclusion

Spinal instrumentation is an effective and safe method in the treatment of spondylodiscitis in appropriately selected patients. If infected tissue is completely debrided, instrumentation shows neither persistence nor recurrence of infection and does shorten the hospitalization. Further study would be necessary to give a more definite conclusion.

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