



BMH Med. J. 2019;6(1):4-12. **Research Article**

## **Treatment Of Spondylodiscitis, Epidural Abscess And Spondylitis – A Retrospective Study Of 20 Cases With Exclusion Of TB Cases**

Suresh S Pillai<sup>1</sup>, Arunkumar C<sup>2</sup>, Jayafar K<sup>2</sup>

<sup>1</sup>Consultant Spine Surgeon, Baby Memorial Hospital, Calicut, Kerala

<sup>2</sup>Department of Orthopaedics, Aster MIMS Hospital, Calicut, Kerala

**Address for Correspondence:** Dr. Suresh S Pillai, MBBS, D. Ortho, MS (Ortho), DNB (Ortho), MNAMS, Spine Fellow (Chang-Gung University, Taiwan), AO Spine Fellow (Nottingham, UK), MCh (Ortho), Consultant Spine Surgeon, Baby Memorial Hospital, Kozhikode, Kerala, India. PIN: 673004. E- mail: [sureshorth@googlemail.com](mailto:sureshorth@googlemail.com)

### **Abstract**

A retrospective study of 20 patients who were diagnosed with spondylodiscitis or epidural abscess or spondylitis were reported. Most of our patients underwent surgical treatment by posterior approach for thoracic and lumbar vertebrae and one patient by anterior approach for cervical vertebrae with iliac crest grafting and they were followed up regularly until complete recovery. Clinical outcomes were assessed. Out of 20 patients, 9 patients were diagnosed with both spondylodiscitis and epidural abscess, 7 patients with spondylodiscitis alone, 2 patients with spondylitis and 2 patients with epidural abscess alone. Finally 18 patients were diagnosed as culture positive pyogenic infection including 2 patients with fungal infection and remaining 2 patients with no organisms grown in culture. Pathogens responsible were Staphylococcus aureus (11 patients), Escherichia coli (2 patients), Aspergillus species (2 patients), Pseudomonas species (2 patients) and Salmonella enteritidis (1 patient). Fourteen patients with lumbar involvement, five patients with thoracic involvement and one patient with cervical involvement were identified. 7 patients had pre-operative neurological deficits and all of them improved postoperatively.

### **Introduction**

Spondylodiscitis and epidural abscess are relatively rare conditions and their incidence has increased in the past few years [1,2]. They are associated with significant morbidity and mortality, if not diagnosed and managed during the initial period itself.

The importance of this study is, we had a sudden increase in the number of cases dramatically during the past 6 months. Due to dengue epidemic recently, 8 patients were infected due to the sequelae to dengue fever. We report the clinical outcomes of 20 patients treated for spondylodiscitis, epidural abscess and spondylitis.

## Patients And Methods

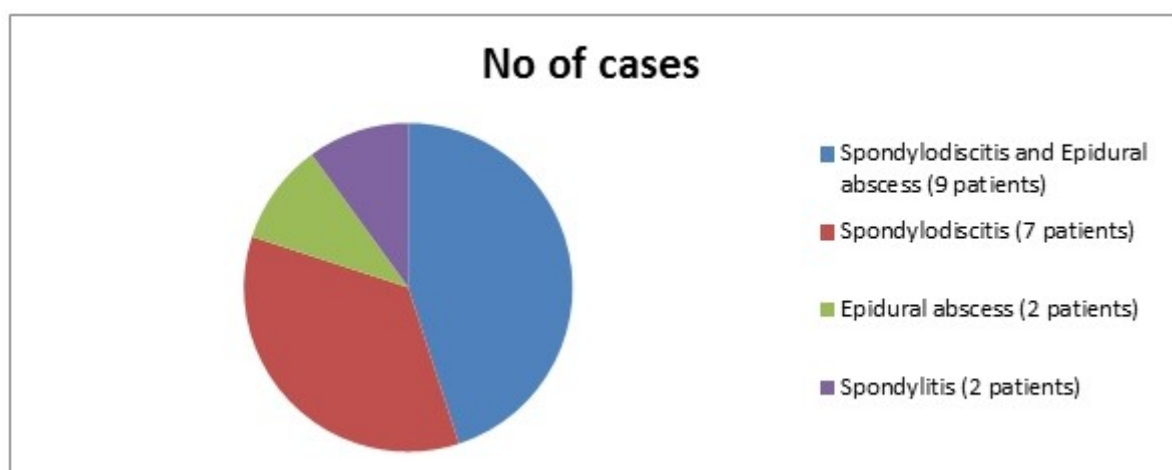
Retrospectively we collected data of 20 patients diagnosed with spondylodiscitis or epidural abscess or spondylitis of cervical or thoracic or lumbar vertebrae from June 2016 to December 2017. Most of our patients underwent surgical treatment by posterior approach for thoracic and lumbar spine and one patient by anterior approach for cervical spine. Demographic pattern, predisposing conditions, clinical presentation, co-morbidities, microbiology, type of surgery and clinical and radiological outcomes of the 20 patients were retrospectively reviewed.

Frankel's grading was used for patients presenting with neurological deficits. Blood parameters like White Blood Cell count (WBC), Erythrocyte Sedimentation Rate (ESR), C-Reactive Protein (CRP) and Serum ferritin levels were measured. Every patient was evaluated with Plain radiographs and Magnetic Resonance Imaging (MRI). Indications for surgery included abscess formation, instability, severe pain, neurological deficit.

Posterior approach was performed for thoracic or lumbar spine - Drainage of abscess, decompression, biopsy with or without instrumentation/fusion done. Anterior approach was performed for cervical spine - Discectomy, decompression, biopsy and iliac crest grafting without instrumentation was done. Specimens from affected vertebral body, disc, pus and surrounding affected soft tissues were sent for Gram staining, aerobic and anaerobic culture and sensitivity, fungal culture and acid fast staining. No pre-operative antibiotic was started, intravenous cefuroxime was started for all patients only after taking specimens during surgery and culture specific antibiotics were started after culture report.

## Results

Out of 20 patients (**Table 1**), 9 patients were diagnosed with both spondylodiscitis and epidural abscess, 7 patients with spondylodiscitis alone, 2 patients with spondylitis and 2 patients with epidural abscess alone (**Figure 1**). 14 were male patients and 6 were female patients with a mean age of 60 years (ranging from 39 to 75 years). Out of 20 patients 18 patients were diagnosed as culture positive pyogenic infection (mean age 59 years) including 2 patients with fungal infection (mean age 60 years) and remaining 2 patients with no organisms grown in culture, but gram stain was positive.



**Figure 1:** Total number of cases with diagnosis

**Table 1:** List of cases showing age, sex, diagnosis, surgery done, organism isolated, Frankel Grade pre operatively

CASES	AGE/SEX	DIAGNOSIS	SURGERY DONE	ORGANISM ISOLATED	PRE-OP NEUROLOGY Frankel Grade	FOLLOW UP
1	70/F	L2-L3 discitis	Discectomy&biopsy	Aspergillus fumigatus	Grade C	-
2	73/M	L5-S1 epidural abscess&discitis	PLIF L5-S1	Escherichia coli	Grade E	8months
3	53/F	L5-S1 epidural abscess&discitis	Discectomy&biopsy	Staphylococcus aureus	Grade D	1year
4	49/M	D8-D9 discitis	Biopsy & stabilisation D6-D11	MRSA	Grade C	1year
5	39/M	L5-S1 epidural abscess&discitis	Discectomy&biopsy	Escherichia coli	Grade E	10 months
6	63/M	L4-S2 epidural abscess	Abscess drainage	MRSA	Grade E	9months
7	54/F	L4-L5 discitis	Discectomy&biopsy	Pseudomonas	Grade D	8months
8	49/M	L5-S1 epidural abscess&discitis	Discectomy&biopsy	Staphylococcus aureus	Grade E	8months
9	65/M	L2-L3 epidural abscess&discitis	Discectomy&biopsy	MRSA	Grade E	7months
10	71/M	C5-D1 epidural abscess&discitis	ACDF C5-C6, C6-C7	MRSA	Grade E	6months
11	75/M	L3-L4 epidural abscess&discitis	Discectomy&biopsy	Pseudomonas	Grade E	3months
12	51/M	L3-L4 discitis	Discectomy&biopsy	Staphylococcus aureus	Grade D	5months
13	63/F	D12 spondylitis	Biopsy D12	Staphylococcus aureus	Grade E	6months
14	50/M	D12 spondylitis	Biopsy&stabilisation D11-L1	Aspergillus niger	Grade E	5months
15	75/M	D9-D10 epidural abscess&discitis	Abscess drainage & stabilisation D8-D11	Salmonella enteritidis	Grade A	5months
16	60/F	L3-S1 epidural abscess	Abscess drainage & stabilisation L3-L5	Staphylococcus aureus	Grade C	4months
17	65/M	L1-L2 discitis	Discectomy & stabilisation D12-L3	Staphylococcus aureus	Grade E	4months
18	54/M	D8-D9 epidural abscess&discitis	Discectomy & stabilisation D7-D10	MRSA	Grade E	4months
19	45/F	L1-L2 discitis	Discectomy & stabilisation D12-L3	No growth	Grade E	4months
20	69/M	L3-L4 discitis	Discectomy & stabilisation L3-L4	No growth	Grade E	3months

**Clinical Presentation**

8 patients had lumbar vertebrae involvement, 6 patients had lumbosacral vertebrae involvement, 5 patients had thoracic vertebrae involvement and 1 patient with cervical vertebrae involvement. Most commonly affected level was L5-S1 in six patients (30%). Single level involvement noted in 16 patients, two level involvement noted in 1 patient and three level involvement noted in 3 patients. Co-morbid conditions were evaluated and found 10 patients had diabetes mellitus, 4 patients had hypertension, 1 patient had cirrhosis, 1 patient had chronic obstructive pulmonary disease, 1 patient had Sjogren's syndrome and 5 patients had no co-morbid conditions.

Local spinal pain was present in 17 patients (85%) out of 20 patients and 8 patients (41%) had radicular symptoms of which 5 patients had unilateral radicular pain and 3 patients had bilateral radicular pain. Duration of symptoms from the onset of pain to the time of diagnosis ranges from 4

days to 3 months (mean 2 weeks).

Neurological deficits were present in 7 patients (35%), out of that 3 patients were Frankel Grade D, 3 patients were Frankel Grade C and 1 patient with Frankel Grade A.

**Laboratory Results**

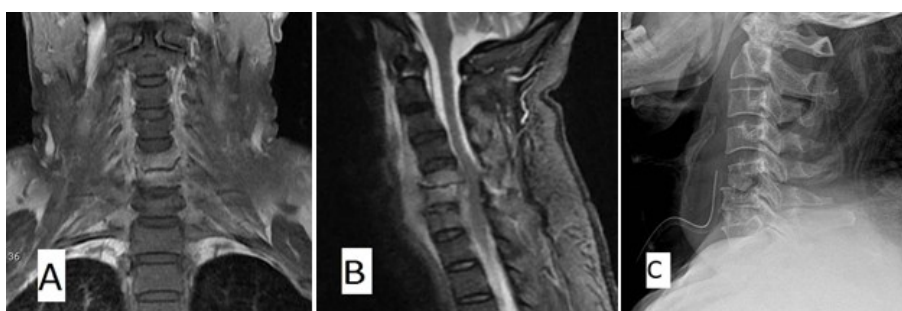
Total white blood cell (WBC) counts were elevated in 8 patients (>11,000 cells/ $\mu$ L) pre-operatively. Erythrocyte sedimentation rate (ESR) was elevated in 18 patients (>25 mm/1hr) ranging from 5 to 140. C-reactive protein (CRP) levels were elevated in 16 patients (>5 mg/L) ranging from 3 to 227. Serum ferritin levels were tested in 8 post dengue cases and it was elevated in all of the patients pre-operatively ranging from 376 to 1551 (males >275 ng/ml, females >204 ng/ml) (Table 2).

**Table 2:** List of post dengue cases with serum ferritin levels preop and postop

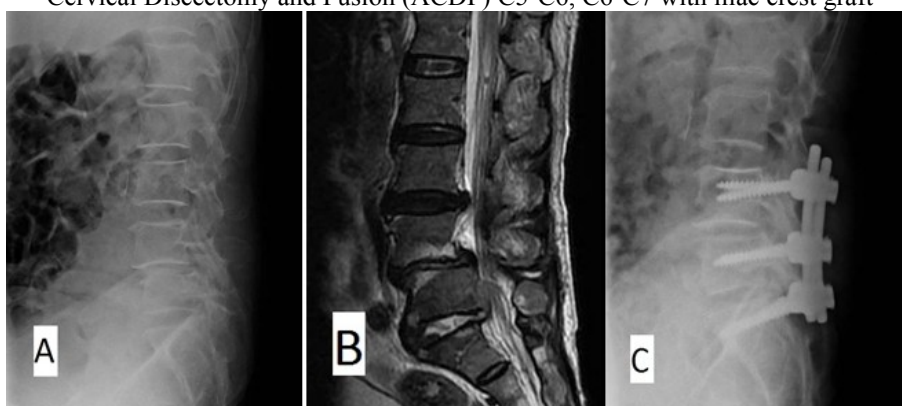
AGE/SEX	PREOP	POSTOP
49/M	610.97	29.24
65/M	1551.37	Not done
71/M	465	52
75/M	502	94
51/M	376	Not done

**Surgery**

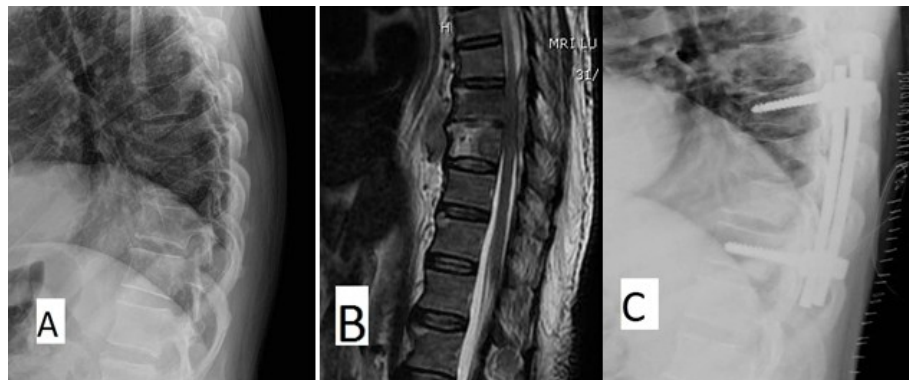
1 patient underwent cervical two level discectomy + fusion (Figure 2), 1 patient underwent discectomy + fusion + instrumentation (Figure 3), 5 patients underwent discectomy + instrumentation (Figure 4), 1 patient underwent vertebral biopsy with instrumentation (Figure 5), 8 patients underwent single level discectomy alone (Figure 6A), 2 patients underwent epidural abscess drainage + instrumentation, 1 patient underwent only epidural abscess drainage (Figure 6B), and 1 patient underwent vertebral biopsy without instrumentation. Indications for surgery included abscess formation, instability, neurological deficit.



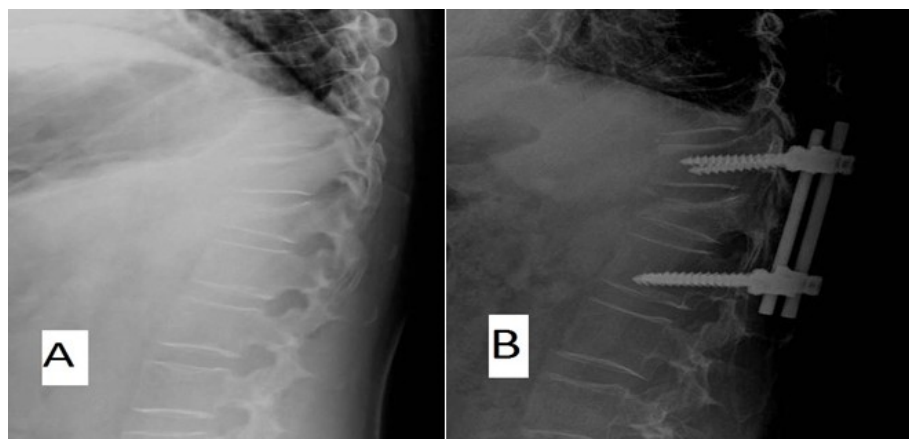
**Figure 2:** Case of epidural abscess and discitis C5-D1 - A) MRI coronal and B) Sagittal view C) Post OP Anterior Cervical Discectomy and Fusion (ACDF) C5-C6, C6-C7 with iliac crest graft



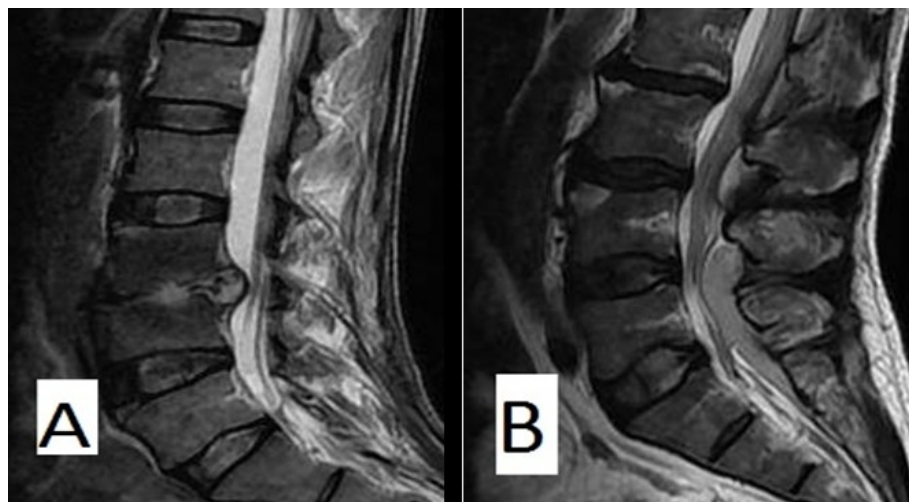
**Figure 3:** Case of epidural abscess and spondylodiscitis L4-L5 – A) X ray lateral view B) MRI sagittal view C) Post OP posterolateral fusion (PLF) L4-L5 and posterior lumbar interbody fusion (PLIF) L5-S1 with corticocancellous laminectomy bone chips



**Figure 4:** Case of epidural abscess and discitis D9-D10 - A) X ray lateral view B) MRI sagittal view C) Post OP X ray discectomy, biopsy and stabilisation D8-D11



**Figure 5:** Case of spondylitis D12 vertebra with collapse – A) X ray pre OP and B) X ray post OP after biopsy and stabilisation D11-L1



**Figure 6:** A) case of spondylodiscitis L3-L4 MRI film sagittal view who underwent only discectomy and biopsy B) case of epidural abscess L4-S2 MRI film sagittal view who underwent only epidural abscess drainage

### Microbiology And Isolation Of Organisms

18 patients were diagnosed as culture positive pyogenic infection including 2 patients with fungal infection and remaining 2 patients with no organisms grown in culture. Pathogens responsible were Staphylococcus aureus (11 patients), Escherichia coli (2 patients), Aspergillus species (2 patients), Pseudomonas species (2 patients) and Salmonella enteritidis (1 patient) (Figure 7).

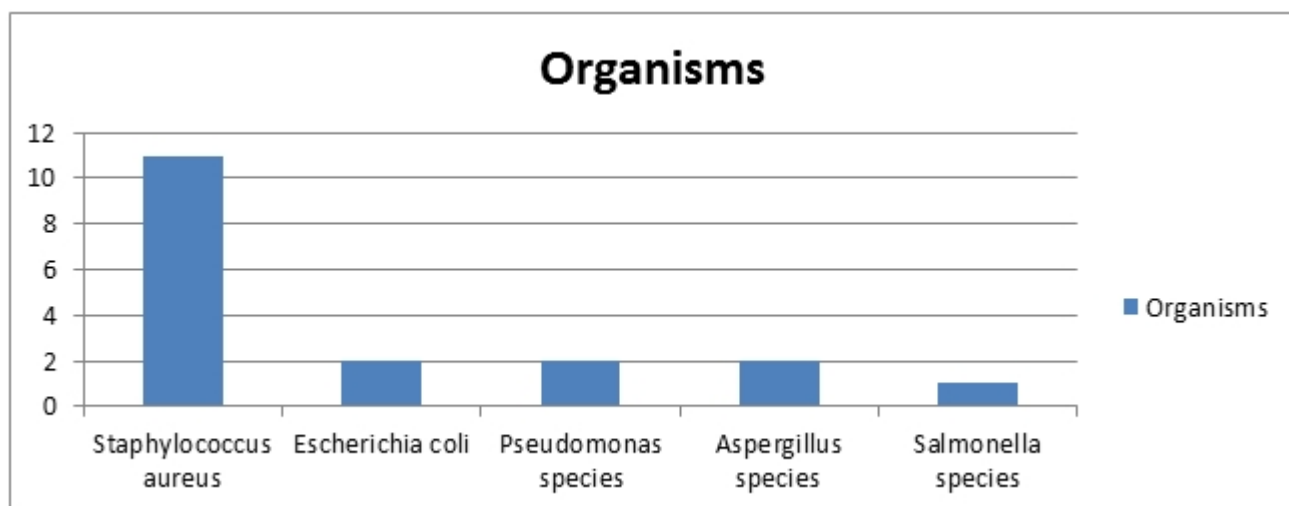


Figure 7: Organisms isolated from biopsy

**Antibiotic**

**Treatment**

Initially intravenous (IV) cefuroxime was given after surgery to all patients and then switched to appropriate culture sensitive IV antibiotics, which were continued for 6 weeks and then followed by oral antibiotics for 6 weeks.

**Complications**

No intra-operative complications encountered in any of our patients. 5 of our patients had wound dehiscence post-operatively, which were treated with regular dressings.

**Clinical Outcomes**

7 patients had pre-operatively neurological deficits and all of them improved. 3 patients improved from Frankel Grade D to Grade E, 3 patients improved from Frankel Grade C to Grade E, 1 patient with Frankel Grade A improved to Grade D. One of our patient had no neurological deficit pre-operatively, but post operatively after one day became paraplegic (Frankel Grade A) for which repeat MRI was taken, MRI findings suspicious of demyelination, sequeale to dengue or anterior spinal artery occlusion with signal changes extending from C2 to D1. Neuromedicine consult was given and according to neurologist opinion IV immunoglobulin and ecosprin were started. He recovered gradually and obtained Frankel Grade D after follow up of 3 months, walking independent at 6 months with little spasm. Out of 7 patients, all patients neurologically improved. Out of 7 patients 2 patients (28%) had cauda equine syndrome and 2 of them had regained bladder control post surgery.

After 2 months of follow up, for every patient MRI scan was repeated and confirmed to have improvement in comparison to previous MRI and patients assessed clinically also. No complications noted like instrumentation failure, loosening or graft related complications.

Out of 20 patients, 10 patients (50%) are cured completely with repeat blood investigations (ESR, CRP) and MRI showed complete recovery. Remaining 9 patients are still under out patient followup. All patients improved neurologically. 1 patient we lost follow up and found out that after surgery patient went for ayurvedic treatment and died at home as patient did not take medicines properly, it was told by bystander.

**Discussion**

Spondylodiscitis is a relatively rare condition accounts for 2% to 7% of osteomyelitis cases. The incidence of the disease has increased in the recent years. This increase is attributed to prolonging of

average age, malnutrition, immunosuppression caused by AIDS or chemotherapy, diabetes mellitus, chronic renal failure, alcohol intake, chronic use of steroids, and septicemia. Diabetes was the most common accompanying disease with spondylodiscitis [1,3].

Spinal epidural abscess (SEA) is a relatively uncommon yet highly morbid and potentially lethal pyogenic infection of the central nervous system (CNS). Spinal epidural abscess can rapidly and unpredictably evolve to irreversible neurologic injury via pathophysiologic mechanisms that culminate in ischemic necrosis of the spinal cord. Spinal epidural abscess appears to be seen with increasing frequency [4]. Their incidence is on the rise because of the various factors such as the increase of the elderly population, intravenous drug use, epidural steroid injection for pain control, epidural anesthesia and development of imaging methods such as computed tomography (CT) and magnetic resonance imaging (MRI).

However, neurological complete recovery rate and mortality were reported to be still 16% and 41-47%, respectively despite appropriate treatments [5,6]. In our study out of 20 patients, 9 patients were diagnosed with both spondylodiscitis and epidural abscess, 7 patients with spondylodiscitis alone, 2 patients with spondylitis and 2 patients with epidural abscess alone. Among them it is found that 10 patients were associated with Diabetes Mellitus. Other associated conditions were 4 patients had hypertension, 1 patient had cirrhosis, 1 patient had chronic obstructive pulmonary disease, 1 patient had Sjogren's syndrome and 5 patients had no co-morbid conditions.

The clinical symptoms of spondylodiscitis are nonspecific. The most frequent symptoms are back pain and paravertebral muscle spasm [1,7]. In our study the most common symptom was found to be back pain. It is found that 17 patients (85%) out of 20 patients had back pain. Lestini and Bell suggested that CRP is superior to ESR in the evaluation of spinal infection as it rises more quickly and is less influenced by other plasma factors [8]. ESR was elevated in 18 patients (90%) and CRP was elevated in 16 patients (80%). Neurological deficits were found in 7 patients pre-operatively.

Magnetic resonance imaging is the most sensitive means of confirming an early diagnosis for spondylodiscitis. With 96% sensitivity, 94% specificity, and 92% accuracy, MRI shows pathological alterations with improved anatomic detail [1,3,7,9,10]. In our study in all patients MRI was taken pre-operatively. In follow up period also we had taken MRI to compare and see the improvement with antibiotics.

Many studies shows open biopsy provides positive cultures in >75% of the cases [1,11-14]. In our study intra-operatively specimen was sent for culture. Out of 20 patients, 18 patients (90%) were culture positive. Staphylococcus aureus has been known to be the most common causative pathogen accounting for 42-84%, and Streptococcal strains and gram-negative bacteria are followed by Staphylococcus aureus [5,6]. In our study, pathogens responsible were Staphylococcus aureus (11 patients-55%), Escherichia coli (2 patients), Aspergillus species (2 patients), Pseudomonas species (2 patients) and Salmonella enteritidis (1 patient).

Early treatment of spondylodiscitis and epidural abscess decreases the morbidity and mortality of the patients [1,5]. In our patients the indications for surgery included abscess formation, instability and neurological deficit. Different surgical techniques for the treatment of spondylodiscitis have been described. Anterior, posterior or combined approaches have been described by authors [1,15-17]. The decision on the surgical approach in the presence of spinal infections depends on the age, general health status of the patient, localization of the infection, stabilization, and the need for fusion; furthermore, the experience of the surgeon in using the surgical approaches and stabilization methods is also important [18].

Most of our patients underwent surgical treatment by posterior approach for thoracic and lumbar

spine and one patient by anterior approach for cervical spine. In posterior approach, decompression is achieved by easily accessing the lesions that are localized in the posterior part through laminectomy and sufficient amount of biopsy material can be taken.

Hyperferritinaemia is used as clinical marker for dengue virus infection, differentiating it from other febrile illness. Ferritin is also considered as marker for highly active disease [19,20]. Serum ferritin levels were tested in 5 post dengue cases and it was elevated in all of the patients pre-operatively ranging from 376 to 1551 (males normal 21-275 ng/ml, females normal 4.6-204 ng/ml).

Post operatively these serum ferritin values came to normal after 2 weeks. Out of 8 post dengue patients, spondylodiscitis or epidural abscess were diagnosed within 1 month of the post fever symptoms. So these dengue patients with high ferritin levels should be monitored periodically until the active disease has been subsided. Out of 7 patients who had pre operatively neurological deficits, 6 patients (86%) had full neurological recovery and 1 patient with paraplegia improved to Frankel Grade D. Out of 7 patients, 2 patients (28%) had cauda equine syndrome and 2 of them had regained bladder control post surgery. Out of total 20 patients, all patients recovered.

### Conclusion

Early treatment of spondylodiscitis, epidural abscess and spondylitis with surgical intervention, biopsy and appropriate intravenous antibiotics reduces the morbidity and mortality of the patients. Most of the patients improved significantly with the proper surgical intervention and culture specific intravenous antibiotics. Neurological improvement is good with the early surgical intervention. Biopsy should be considered compulsory for these patients to make a correct diagnosis and for appropriate IV antibiotics, early recovery and finally to reduce morbidity and mortality. MRI is an important diagnostic tool for detecting these infections and it can also be used to see the prognosis of the patient.

### References

1. Yaldız C, Özdemir N, Yaman O, Feran HG, Tansug T, Minoglu M. A Retrospective Study of 39 Patients Treated With Anterior Approach of Thoracic and Lumbar Spondylodiscitis: Clinical Manifestations, Anterior Surgical Treatment, and Outcome. *Shao. A, ed. Medicine.* 2015;94(47):e2110.
2. Bond A, Manian FA. Spinal Epidural Abscess: A Review with Special Emphasis on Earlier Diagnosis. *BioMed Research International.* 2016;2016:1614328.
3. Bettini N, Girardo M, Dema E, Cervellati S. Evaluation of conservative treatment of non specific spondylodiscitis. *European Spine Journal.* 2009;18(Suppl 1):143-150.
4. Artenstein AW, Friderici J, Holers A, Lewis D, Fitzgerald J, Visintainer P. Spinal Epidural Abscess in Adults: A 10-Year Clinical Experience at a Tertiary Care Academic Medical Center. *Open Forum Infectious Diseases.* 2016;3(4):ofw191.
5. Ma H, Kim I. Clinical Outcomes of Spinal Epidural Abscess. *Korean Journal of Spine.* 2012;9(1):6-11.
6. Curry WT, Jr, Hoh BL, Amin-Hanjani S, Eskandar EN. Spinal epidural abscess: clinical presentation, management, and outcome. *Surg Neurol.* 2005;63:364-371.
7. Cottle L, Riordan T. Infectious spondylodiscitis. *J Infect.* 2008;56:401-412.
8. Lestini WF, Bell GR. Spinal infection: patient evaluation. *Semin Spine Surg.* 1996;8:81-94.



9. Varma R, Lander P, Assaf A. Imaging of pyogenic infectious spondylodiscitis. *Radiol Clin North Am.* 2001;39:203-213.
10. Ledermann HP, Schweitzer ME, Morrison WB, et al. MR imaging findings in spinal infections: rules or myths? *Radiology.* 2003;228:506-514.
11. Jimenez-Mejias ME, Colmenero J, Sanchez-Lora FJ. Postoperative spondylodiscitis: etiology, clinical findings, prognosis, and comparison with nonoperative pyogenic spondylodiscitis. *Clin Infect Dis.* 1999;29:339-345.
12. Lam KS, Webb JK. Discitis. *Hosp Med.* 2004;65:280-286.
13. An HS, Seldomridge JA. Spinal infections. *Clin Orthop Relat Res.* 2006;444:27-33.
14. Perronne C, Saba J, Behloul Z, et al. Pyogenic and tuberculous spondylodiscitis (vertebral osteomyelitis) in 80 adult patients. *Clin Infect Dis.* 1994;19:746-750.
15. Mann S, Schu̇tze M, Sola S, et al. Nonspecific pyogenic spondylodiscitis: clinical manifestations, surgical treatment, and outcome in 24 patients. *Neurosurg Focus.* 2004;17:E3.
16. Fukuta S, Miyamoto K, Masuda T. Two-stage (posterior and anterior) surgical treatment using posterior spinal instrumentation for pyogenic and tuberculous spondylitis. *Spine.* 2003;28:e302-e308.
17. Pee YH, Park JD, Choi YG, et al. Anterior debridement and fusion followed by posterior pedicle screw fixation in pyogenic spondylodiscitis: autologous iliac bone strut versus cage. *J Neurosurg Spine.* 2008;8:405-412.
18. Sharif HS. Role of MR imaging in the management of spinal infections. *Am J Roentgenol.* 1992;158:1333-1345.
19. Van de Weg CAM, Huits RMHG, Pannuti CS, et al. Hyperferritinaemia in Dengue Virus Infected Patients Is Associated with Immune Activation and Coagulation Disturbances. Marques ETA, ed. *PLoS Neglected Tropical Diseases.* 2014;8(10):e3214.
20. Roy Chaudhuri S, Bhattacharya S, Chakraborty M, Bhattacharjee K. Serum Ferritin: A Backstage Weapon in Diagnosis of Dengue Fever. *Interdiscip Perspect Infect Dis.* 2017;2017:7463489.