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# POSTOPERATIVE COMPLICATIONS IN OPERATED CASES OF PYOGENIC SPONDYLODISCITIS

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### Abstract:

**Study Design:** A prospective study from January 2013 to December 2015 was conducted at a single tertiary-care institution.

**Objective** - The aim of the study was to identify the postoperative adverse events and characterize recovery from pain and neurologic deficit after surgery for pyogenic spondylodiscitis at thoracolumbar level. Majority of the patients with spondylodiscitis presenting with severe back pain, neurological deficits, spine instability, progressive kyphosis or epidural abscess and usually require surgical intervention. Although prior studies have characterized outcomes after medical management, the morbidity after surgery is poorly defined.

**Methods:** Analysis of change in self-reported pain from Visual Analog Scale (VAS, 0–10 scale) was done. VAS score were collected throughout the postoperative course once in 3 monthly intervals for maximum period of 12 months. Adverse events in postoperative period were noted during the one year follow up period. New-onset or worsening of neurologic deficits were considered neurologic complications in the postoperative period.

**Results:** 40 patients were included in our study; a majority (40%) presented with a neurologic deficit preoperatively. The median length of follow-up was 12 months. It was observed that by end of 3 months there was a statistically significant improvement in VAS. The mean improvement in

VAS was from 7.93 to 2.20. 5% of patients required reoperation for surgical site complications. At end of follow up, 5% died, 5% underwent reoperation, and 5% experienced a neurologic complication.

**Conclusion:** We observed significant improvements in VAS in the postoperative period. In the one year follow up period the incidence of overall adverse events was 27.5%. Main risk factors of poor general condition, the co-morbidities and the long duration of symptoms were associated for poor clinical outcome. Patients and clinicians should not only be aware of the postoperative improvement but also the incidence of adverse events after surgery for spondylodiscitis. We reiterate the fact that spinal stabilization in the setting of pyogenic spondylodiscitis is safe and we also ascertain that some postoperative wound complications are accepted and be ready to address them.

**Key-words:** antibiotics, epidural abscess, immunocompromised, neurologic complications, neurologic deficit, operative levels, reoperation, spondylodiscitis, Visual Analog Scale (VAS).

## Introduction:

Pyogenic spondylodiscitis is one of the challenging problems to treat, one of the reasons being presentation with poor general condition although it is seen in normal healthy person. With the advent of MRI, early accurate diagnosis of spondylodiscitis can be made and appropriate intervention can be taken before the progression of the disease [4]. Patients presenting with epidural abscess resulting in neurological deficit/presenting with sepsis, failed medical management, instability due to bony destruction, require surgical treatment [5], in the form of adequate drainage/debridement and surgical stability with instrumentation. The rationale for this surgery is to reduce the bacterial load and give a rigid fixation across the involved vertebral segments, allowing better antibiotic penetration and tissue healing in the disc space, similar to what has been postulated in most of the literature [5].

This is the study done on patients of pyogenic spondylodiscitis who were operated with debridement/drainage, decompression and pedicle instrumentation, to study the clinical, neurological and radiological outcome and identify the adverse events associated with it.

## Materials And Method:

A prospective study of all the patients diagnosed with thoracic and lumbar pyogenic spondylodiscitis between the age group of 18 to 70yrs which were diagnosed based on clinical history, physiological and neurological examination, blood parameters and MRI. The included patients required surgical stabilization based on the instability and neurological status. The study was conducted between January 2012 and December 2014.

Patients with prior history of spine surgery, pott's spine, history of any trauma and neurological deficits more than 6 months were excluded from the study. Patients with malignancy, long-term steroid use, and immunosuppressive therapy and HIV infection were considered immunocompromised. To measure the degree of pain, Visual Analog Scale was used (0 – no pain, 10 - worst pain imaginable). British Medical Research Council grading system was used for motor evaluation (0-no contraction, 1-flicker/trace contraction, 2-active movement with gravity eliminated, 3- active movement against gravity, 4- active movement against resistance, 5-normal/full power) and sensory evaluation was done based on the dermatomal distribution.

Medical and surgical data were collected from the day of presentation to last follow-up (or death) which included level of vertebral

involvement, organism isolated, use of antibiotics, the duration of antibiotic, worsening of medical conditions and systemic complications. Intraoperative, short-term and long term postoperative complications were noted. Preoperative and postoperative neurological status were noted and continued in the follow up period.

All patients included in the study underwent adequate drainage/debridement of the infected level followed by stable pedicle screw fixation and interbody bone grafting harvested from the iliac crest or laminectomy.

## Results:

### Patient Characteristics:

A total of 40 patients with thoracic and lumbar pyogenic spondylodiscitis were studied meeting the inclusion criteria. All the patient were managed surgically. All the epidemiological data is given in Table 1.

**Table 1**

| Patient Characteristic                |                   |
|---------------------------------------|-------------------|
| Characteristic                        | Statistics        |
| <b>Number</b>                         | 40                |
| <b>Age</b>                            | 50 (18-72yrs)     |
| <b>Comorbidities</b>                  |                   |
| Hypertension                          | 11                |
| Diabetes                              | 15                |
| Chronic Kidney disease                | 6                 |
| Immunocompromised                     | 1                 |
| <b>Anatomic involvement in MRI</b>    |                   |
| Bone                                  | 25                |
| Disc                                  | 28                |
| Epidural abscess                      | 14                |
| <b>Presenting symptoms</b>            |                   |
| Back pain alone                       | 11                |
| Back pain with radiculopathy          | 29                |
| <b>Duration of symptoms, days</b>     | 180 (10-450)      |
| <b>Lower Limb weakness</b>            | 16                |
| <b>Lower Limb Numbness</b>            | 25                |
| <b>Bowel and Bladder incontinence</b> | 0                 |
| <b>Preoperative VAS</b>               | 7.93 (6-9)        |
| <b>Laboratory data</b>                |                   |
| <b>WBC (cells/cu.mm)</b>              | 9162 (5300-15110) |
| <b>ESR (mm/hr)</b>                    | 60.4 (8-140)      |
| <b>CRP (mg/dL)</b>                    | 3.54 (0.6-110)    |

Among the 40 patients, 32 were males and 8 were females. 15 patients were between 18-40yrs, 17 were between 40-60yrs and 8 were above 60yrs. Spondylodiscitis was seen in thoracic level in 23 patients (57.5%) and lumbar level in 17 patients (42.5%) and highest in the L3 and L4 with 7 each. The distribution of affected levels is shown in Figure 1 and Table 2.

Among the patients, one (2.5%) patient was immunocompromised due to chronic liver disease secondary to alcohol abuse. One (2.5%) patient had been on prednisolone and etanercept for 8 years for Rheumatoid arthritis, and one (2.5%) patient was on prednisolone for 10 year for Idiopathic thrombocytopenic purpura and splenectomised one month prior to surgery. 14 patients had epidural abscess in addition to spondylodiscitis. 6 patients were known to have chronic kidney disease and were on regular dialysis. Fever was present in 25% of the patients at presentation, whereas 40% presented with neurologic deficits. 10 patients with thoracic spondylodiscitis presented with upper motor neuron lesion and 6 of the lumbar spondylodiscitis patients presented with claudication and neurological deficits. The mean VAS score was 7.93. Leucocytosis was seen only in about 8 patients (>10,000 cells/cu.mm). Mean ESR was 60.4 and CRP was 3.54.

Figure 1:

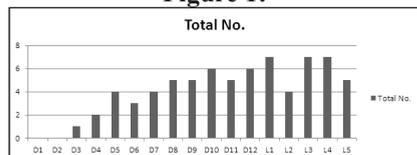


Table 2:

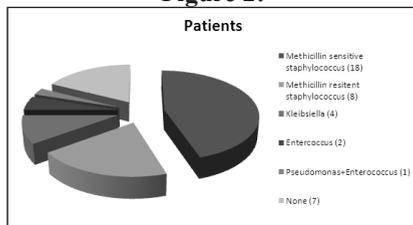
| Affected level | Number | Percentage |
|----------------|--------|------------|
| Thoracic       | 23     | 57.5 %     |
| Lumbar         | 17     | 42.5 %     |

Organism was cultured from infected site in 33 patients (82.5%),

Figure 2.

All patients received at least one parental antibiotic for 2 weeks followed by 12 weeks of oral antibiotic based on the culture and sensitivity pattern. In 7 patients no organisms was isolated and were given oral linezolid for 12 weeks empirically. The mean number of operative vertebral levels was 4.

Figure 2:



Mean duration of hospital stay was 20 days, where all the patients were kept in hospital till suture removal and 2 weeks of antibiotics, later discharged.

6 patients had delayed wound healing and 2 of them required debridement and secondary suturing for superficial infection. The culture pattern remained same as that of the organism isolated from the spondylodiscitis. One patient out of the two who developed surgical site infection developed implant loosening after 4 months due severe osteoporosis and improper following of instructions

given at the time discharge which at later date underwent revision surgery with proximal extension of pedicle screw construct with bone grafting. Variables associated with reoperation included history of smoking, coronary artery disease and renal osteodystrophy.

One patient out of the 6 chronic kidney disease died within 45 days of the index surgery due to cardiac event and another patient developed CVA on post-operative day 2 and was started on clexane for 2 weeks and later changed to anticoagulants, she developed right sided hemiparesis, later she died 3 months postoperatively due to pneumonia.

All patients were followed up for a minimum period of 12months, one month after index surgery and 3 monthly intervals with clinical and radiological evaluation along with blood parameters for infection.

Mean VAS was improved to 2.20 within 1 month, and on further follow up it worsened in none. Out of the 16 (40%) patients presenting with neurological deficits 2 worsened and on follow both patients improved neurologically which was attributed to neuropraxia at the time of decompression in the index surgery.

Table 3:

| Postoperative Clinical Course         |            |
|---------------------------------------|------------|
| Length of the hospital stay, days     | 20 (15-45) |
| Postoperative complications           |            |
| Delayed wound healing                 | 6 (15%)    |
| -Superficial infection                | 2 (5%)     |
| CVA                                   | 1 (2.5%)   |
| Death                                 | 2 (5 %)    |
| Neurological complication             | 2 (5%)     |
| Other                                 | 0          |
| Reoperation occurred                  |            |
| 1 reoperation required                | 2          |
| reoperations required after 30days    | 1          |
| Indications for reoperation           |            |
| I+D/debridement/superficial infection | 2          |
| Chronic infection                     | 0          |
| Instrument failure/loosening          | 1          |
| Persistent/increased deficits         | 0          |

At the end of the study, 2 (5%) patients had died, 2 (5%) patients had undergone reoperation, 2 (5%) patients had experienced a neurologic complication. Of the 2 (5%) patients who died, the causes of death were Myocardial infarction in one and pneumonia in other patient.



### Discussion:

The main aim of the study was to assess the clinical benefit of the surgery and the adverse event associated with it, if any, since very little data is available on the postoperative morbidity associated with spondylodiscitis.

Most of the studies have suggested that the incidence of spondylodiscitis is increasing, the reason being related to aging population and longer life expectancies of the patients with comorbidities like Diabetes mellitus, immunocompromised health, chronic kidney disease, etc as well as increasing resistance of the pathogen to the antibiotics. This has also been suggested in two large national studies done in Japan and Denmark<sup>[7-12]</sup>.

According to Jacob et al<sup>[2]</sup>, study done on postoperative complication in

vertebral osteomyelitis, a statistically significant improvement was seen in the VAS and the MMS (Modified McCormick Scale), 26% of the patients required reoperation 10% died, 42% experienced a neurologic complication, and 60% experienced at least one of these 3 adverse events. In the present study 5% of the patients required reoperation, died and developed neurological complications each. This rate is slightly lower than published reoperation rates for various degenerative indications (15-25%). With the cause of the death in 5% of the patients not related to the surgery.

Menon et al<sup>[6]</sup>, study done in 32 consecutive patients that underwent surgery for vertebral osteomyelitis, concluded that all the patients qualitatively returned to their mobility status. In our study, all the patients had improved, and none worsened over the period of time.

In our study, 92.5% of the patient were ambulatory at the end of the follow up. Out of the 7 patients who were non-ambulatory before the surgery, 4 became independent community ambulators and 3 required assistance with walker. With regard to recovery of neurologic function and pain relief there was overall benefit of surgical intervention, there was significant improvement in the VAS and quality of life, which was seen in all the patients.

There was significant improvement in the neurological status of all the patients and it was noticed that all the patients who underwent reoperation for surgical site infection were either immunocompromised or had multiple co-morbidities. This effect may be related to impaired healing in the postoperative period, or due to recurrence of infection and continued vertebral destruction.

It was also observed that the patients, who presented with longer duration of symptoms, had more neurological deficit and took longer time to recover, and also longer period of time to improve in their VAS.

Improvement in the VAS was seen which was clinically significant, which was seen in the first 3 months and continued to improve, suggesting the overall benefit of the surgical intervention.

### Conclusion:

In the present study, it was found that there was a significant improvement in neurologic status at 6 months postoperatively, and in pain at 1 month postoperatively.

And new-onset neurologic deficits in the postoperative period was quiet low (5%), reoperation was low (5%), and the rate of overall adverse events was 27.5% (11 patients).

Main risk factors for poor clinical outcome include immunocompromised state, co-morbidities, and long duration of symptoms. Patients and clinicians should be aware of the postoperative improvement but also the incidence of adverse events after surgery for spondylodiscitis. We feel that improvement in the general condition and co-morbidities should be addressed appropriately before and after surgery to prevent adverse events postoperatively

### References:

1. Liang Zhang, Wei-Hua Cai, Bo Huang, et al. Single-stage posterior debridement and single-level instrumented fusion for spontaneous infectious spondylodiscitis of the lumbar spine. *Acta Orthop. Belg* 2011;77, 816-822.
2. Jacob A. Miller, Rebecca L.

- Achey, Adeeb Derakhshan, et al. Neurologic Complications, Reoperation, and Clinical Outcomes After Surgery for Vertebral Osteomyelitis. *Spine Journal* 2016;41:4, 197–204.
3. Eftichia Kapsalaki, Nikolaos Gatselis, Aggelos Stefos, et al. Spontaneous spondylodiscitis: presentation, risk factors, diagnosis, management, and outcomes. *International Journal of Infectious Diseases* 2009;13, 564-569.
  4. Leopold Arko, Eric Quach, Vincent Nguyen, et al. Medical and surgical management of spinal epidural abscess: a systematic review. *Neurosurg Focus* 2014;37:2, E4.
  5. Ahmed S. Mohamed, Jung Yoo, Robert Hart, et al. Posterior fixation without debridement for vertebral body osteomyelitis and discitis, *Neurosurg Focus* 2014;37:2, E6.
  6. Menon VK, Kumar KM, Al Ghafri K. One-stage biopsy, debridement, reconstruction, and stabilization of pyogenic vertebral osteomyelitis. *Glob Spine J* 2014;4: 93-100.
  7. Zimmerli W. Clinical practice. Vertebral osteomyelitis. *N Engl J Med* 2010;362:1022-9.
  8. Sapico FL, Montgomerie JZ. Vertebral osteomyelitis. *Infect Dis Clin North Am* 1990;4:539-50.
  9. Akiyama T, Chikuda H, Yasunaga H, et al. Incidence and risk factors for mortality of vertebral osteomyelitis: a retrospective analysis using the Japanese diagnosis procedure combination database. *BMJ open* 2013;3:e002412;1-6.
  10. Grammatico L, Baron S, Rusch E, et al. Epidemiology of vertebral osteomyelitis (VO) in France: analysis of hospital-discharge data 2002–2003. *Epidemiol Infect* 2008;136:653-60.
  11. Krogsgaard MR, Wagn P, Bengtsson J. Epidemiology of acute vertebral osteomyelitis in Denmark: 137 cases in Denmark 1978–1982, compared to cases reported to the National Patient Register 1991-1993. *Acta Orthop Scand* 1998;69: 513-7.
  12. Jensen AG, Espersen F, Skinhøj P, et al. Increasing frequency of vertebral osteomyelitis following *Staphylococcus aureus* bacteraemia in Denmark 1980–1990. *J Infect* 1997; 34:113-8