



Original Article

Prognosis of spinal infections managed by minimal debridement: A case series in two tertiary centers

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ABSTRACT

Background: Spinal infections can be challenging in their management and include spondylitis, epidural abscess, and spondylodiscitis. Usual treatment is conservative through antimicrobials or surgery to decompress neural tissue, debride all infected tissues, and fix if needed. We propose the concept of surgery without formal debridement aiming at neural protection.

Methods: The study was performed at two tertiary centers on 25 patients with clinical findings. One patient was treated conservatively and the rest surgically by laminectomy and fixation if needed. Evacuation of fluid pus was performed. In the cervical and the thoracic region, if the granulation tissue was anterior to the cord, only decompression by laminectomy was done.

Results: Low back pain was present in 22 cases (88%), 16 cases (64%) had lower limb pain, and 12 cases (48%) had weakness. The level of spinal infection was lumbar in 15 cases (60%), thoracic in 9 cases (36%) cases, and cervical in 1 case (4%). The type of infection was epidural abscess in 20 cases (80%), discitis in 16 cases (64%), and vertebral osteomyelitis in 12 cases (48%). Laminectomy was performed in 20 cases (80%) and fixation in 17 cases (68%). The symptoms improved in all cases. On follow-up, the lesion was reduced in 14 patients (56%) and disappeared in 11 cases (44%). One case required ventriculoperitoneal shunt placement due to postinfectious hydrocephalus.

Conclusion: Dealing with spinal infections surgically through decompression or fixation with minimal debridement of infected tissue appears to be a safe and effective method of management.

Keywords: Debridement, Infection, Spine

INTRODUCTION

Spinal infections represent a grave condition in adults which can be difficult to treat. Most of these patients have a weakened immunity due to comorbidities and malnutrition.^[22] Management is usually conservative with intravenous antibiotics for around 6–8 weeks.^[25] In some cases, however, epidural abscess can cause a neurological deficit warranting surgical decompression. Bony destruction can lead to instability that requires surgical treatment. The classic teaching of surgical management includes aggressive debridement of the infected pus or granulation tissue which may require an additional anterior approach in addition to stabilization.^[5] However, this method is associated with an increased rate of morbidity and

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mortality in such population.^[5,22] In this study, we present our experience in the management of patients of spinal infection. We consider the value of avoiding excessive debridement during decompression and/or spinal fixation.

MATERIALS AND METHODS

After approval from the Institutional Review Board, we retrospectively analyzed patients with spinal infections (discitis, vertebral osteomyelitis, and spinal epidural abscess) managed either surgically or conservatively in Kasr El-Aini and Beni-Suef University hospitals during the period between January 2018 and April 2020. The study included patients with clinical manifestations. Patients with normal motor power without back or limb pain and the imaging showing stable spine were excluded from the study. Patients with motor power grade zero for more than 24 h were also excluded from the study. All patients were investigated through imaging tools including plain X-rays, computed tomography scans, or magnetic resonance imaging.

Conservative treatment was considered first in patients with minimal or no neurological deficits. All patients underwent antibiotic therapy for 6–8 weeks with immobilization. Surgery was decided in case of the following: spinal instability, neurological deficits, sepsis unresponsive to antibiotics, and a lesion inaccessible to needle biopsy. The presence of epidural abscess warranted surgery. Spinal fixation was performed if there was apparent spinal instability from the preoperative dynamic X-rays or Kyphotic deformity.

The patients were prepared for surgery by laboratory tests: complete blood picture, coagulation profile, liver, and kidney function tests. Preoperative consent was taken. The prone position was used. After subperiosteal muscle separation, fixation if needed was achieved by transpedicular screws and rods. Laminectomy was then performed for evacuation of the fluid pus in addition to foraminotomy. If the epidural collection was granulation tissue, biopsy was taken in the lumbar (L) region. However, in the cervical and the thoracic (T) region, if the tissue was anterior to the cord, only decompression by laminectomy was done. Closure in layers was performed with subfascial drainage.

Main goals of treatment were clinical improvement of back or limb pain and motor power with normalization of erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and blood culture. The patients were followed up with visits after 6 months and 1 year.

RESULTS

The study was conducted on 25 patients. The mean age was 44.8 years old. There were 13 male patients (52%) and 12 female patients (48%).

Low back pain was present in 22 cases (88%), 16 cases (64%) had lower limb pain (sciatic and claudication pain), and 12 cases (48%) had weakness. Eight patients (32%) were diabetic, and 9 cases (36%) were hypertensive. The site of involvement with spinal infection was lumbar spine in 15 cases (60%), thoracic spine in 9 cases (36%) cases, and cervical spine in 1 case (4%). The type of spinal infection was spinal epidural abscess in 20 cases (80%), discitis in 16 cases (64%), and vertebral osteomyelitis in 12 cases (48%). The mode of infection was spontaneous in 18 cases (72%) and postoperative in 7 cases (28%). The infection laboratory indices as ESR, CRP, and blood culture were normal in 4 cases (16%) and abnormal in 21 cases (84 %) [Table 1].

Surgery was done in the form of laminectomy in 20 cases (80%), and fixation was required in 17 cases (68%). Conservative medical treatment was completed in 1 case (4%) without surgical intervention. The lower limb and low back pain improved in all cases. On follow-up, the lesion decreased in size in 14 patients (56%) and disappeared in 11 cases (44%). One case required ventriculoperitoneal shunt placement due to postinfectious hydrocephalus. Screws removal was performed in two cases of postoperative infections (8%).

DISCUSSION

Bacterial spinal infections are usually caused by pyogenic bacteria, for example, *Staphylococcus aureus*. They comprise spondylitis, epidural abscess, and spondylodiscitis. In many cases, conservative management with antibiotics is carried out for several weeks up to months and external immobilization using a thoracolumbosacral orthosis.^[14,19,21] Surgery is conventionally indicated to obtain bacteriological diagnosis and to drain abscess in the presence of neurological compromise or instability or deformity.^[18] In our study, conservative management as successful in only 1 case (4%) and surgery was performed according to the previously mentioned indications found in literature.

The application of instrumentation in the presence of spinal infection is controversial.^[2,6,7,13] The traditional management of bony infections in general includes intravenous antibiotics, drainage or debridement of all pus, and possibly removal or avoidance of hardware, to avoid bacterial colonization.^[5] However, several studies in literature reported patients with spinal infections who were treated by spinal stabilization while in the acute stage and had good outcomes. Moreover, these patients less likely need additional surgery than patients who did not undergo spinal fixation.^[9,11,12] The main criticism for the placement of metallic implants is the possibility of bacterial colonization and the formation of a biofilm which blocks the penetration of antimicrobials.^[24] However, titanium

Table 1: Summary of demographic, clinical, radiological, laboratory, pathological, and prognostic data of the patients.

Age	Sex	Clinical picture	Associated medical condition	Level	Type	Spontaneous/postoperative	Motor Power	Erythrocyte sedimentation rate	C-reactive protein	Bacteriology	Procedure/complications	Follow-up at 6 months: motor power/pain	Follow-up at 1 year: lesion on radiology
1	25	M	BP	T	SEA	SP	5	++			Lam/FIX	5	Disapp
2	18	F	BP/LLP	L	SEA	SP	4	++			Nil	No pain	Disapp
3	20	M	BP/LLP	L	SEA/VO	SP	5	++			Lam	No pain	Disapp
4	55	F	BP/LLP	L	D/VO SEA/D	SP	4	++			Lam/FIX	No pain	--Size
5	64	M	BP/LLP	L	SEA/D/VO	SP	5	++		MRSA	Lam/FIX	No pain	Disapp
6	61	F	BP/LLP	T	VO	PO	4	++		<i>Brucella</i>	Nil	No pain	Disapp
7	60	M	BP/LLP	T	D/VO	SP	4	Normal			conservative	No pain	Disapp
8	19	F	Quadripar-esis headache	C	SEA	SP	4	++			Nil	No pain	--Size
9	60	F	BP/LLP	L	SEA	PO	5	Normal			Lam/FIX	No pain	Disapp
10	34	M	BP/LLP	T	SEA/D VO	SP	5	++			Nil	No pain	--Size
11	23	M	LLP	L	SEA	SP	5	++			Lam/FIX	No pain	--Size
12	65	F	BP/LLP	L	SEA/D VO	SP	4	++			Lam/FIX	No pain	--Size
13	40	F	BP/LLP	L	SEA/D VO	SP	5	++			Lam/FIX	No pain	--Size
14	28	F	BP/LLP	L	SEA/D VO	SP	4	++			Lam/FIX	No pain	--Size
15	65	F	BP	L	SEA/D	SP	3	++			Lam/FIX	No pain	--Size
16	60	F	BP/LLP	L	SEA	PO	5	Normal			Lam	No pain	Disapp
17	35	M	BP	L	SEA/D	PO	5	++			Nil	No pain	--Size
18	40	F	BP	L	SEA/D	PO	5	++			FIX	No pain	--Size
19	55	M	BP	T	D/VO	SP	3	++			Hardware Removal	No pain	--Size

(Contd...)

Table 1: (Continued).

Age	Sex	Clinical picture	Associated medical condition	Level	Type	Spontaneous/postoperative	Motor Power	Erythrocyte sedimentation rate C-reactive protein Bacteriology	Procedure/complications	Follow-up at 6 months: motor power/pain	Follow-up at 1 year: lesion on radiology
20	64	M	BP	T	SEA/D VO	SP	4	++	Lam/FIX	5 No pain	Disapp
21	59	F	BP	L	D/VO	PO	5	++	Hardware Removal	5 No pain	Disapp
22	45	M	BP	T	SEA	SP	3	++	Nil Lam	5 No pain	Disapp
23	33	M	BP	L	D/SEA	SP	5	MRSA ++	Nil Lam	5 No pain	--Size
24	50	M	LLP	T	D/VO	SP	5	++	Nil Lam/FIX	5 No pain	Disapp
25	44	M	BP	T	SEA	PO	4	Normal	Nil Lam/FIX	5 No pain	Disapp

BP: Back pain, LLP: Lower limb pain. Db: Diabetic, H: Hypertensive, SEA: Spinal epidural abscess, D: Discitis, VO: Vertebral osteomyelitis, SP: Spontaneous, PO: Postoperative, ++: Increased, Lam: Laminectomy, Fix: Fixation, ---: Decreased, Disapp: Disappeared

alloy which was used in this study is less susceptible for this problem than stainless steel.^[17,23,24] It is thought that posterior instrumentation in spinal infections is acceptable due to the fact that the implant traverses apparently healthy tissue.^[4] We applied the same concept in our study and accordingly interbody cages were not used to avoid dealing with the unhealthy area.

The ideal approach for the treatment of spine infections is yet to be determined. In spine infections, usually, the anterior vertebral elements are involved, which make the anterior surgical approach the most direct route to the infected lesion. However, the posterior approach is preferable as it leads to earlier ambulation, faster rehabilitation, and higher fusion rates.^[8-10] Our case series incorporated the posterior approach only. Our focus was directed to stabilization and decompression instead of radical debridement of the pus. We believe that excessive manipulation should be avoided especially in the cervical and thoracic regions. We fixed above and below the infected level and skipped the involved level apart from decompression of the neural canal and nerve roots. Several studies state that the importance of stabilization of an infected bony lesion even with instrumentation is crucial in bone healing. These reports involved infected tibial fractures.^[16,20] Mohamed *et al.* believed that instrumentation leads to a faster union and, in turn, enhanced blood supply carrying antibiotics which leads to prevention of infection.^[15] Our results indicate that this approach can be effective in the spine with complete or near complete resolution of all infections and good improvement in neurological status [Figure 1 for an illustrative case]. Some authors reported their success in treating spinal infections through percutaneous fixation. They claim that their procedure is effective, minimally invasive by avoiding long posterior and/or anterior approaches and allows for early ambulation. This method also leads to minimal blood loss.^[3] This goes with our same concept to stabilize the infected level and avoid excessive debridement. However, the system for percutaneous fixation is not available at our institution. Percutaneous fixation is best suited for treating instability.^[1] It does not permit decompression of neural tissues and obtaining a sample for culture and sensitivity, which can be only performed by the open procedure as in our series.

The prognosis in our series was favorable. In our series, there was only one complication of hydrocephalus, which could rather be considered a comorbidity. It is impossible to compare the rate of complications with other case series due to the small number of cases. There are some limitations of this study. We did not have a control group with formal debridement. We hope that this approach with further larger studies can be validated.

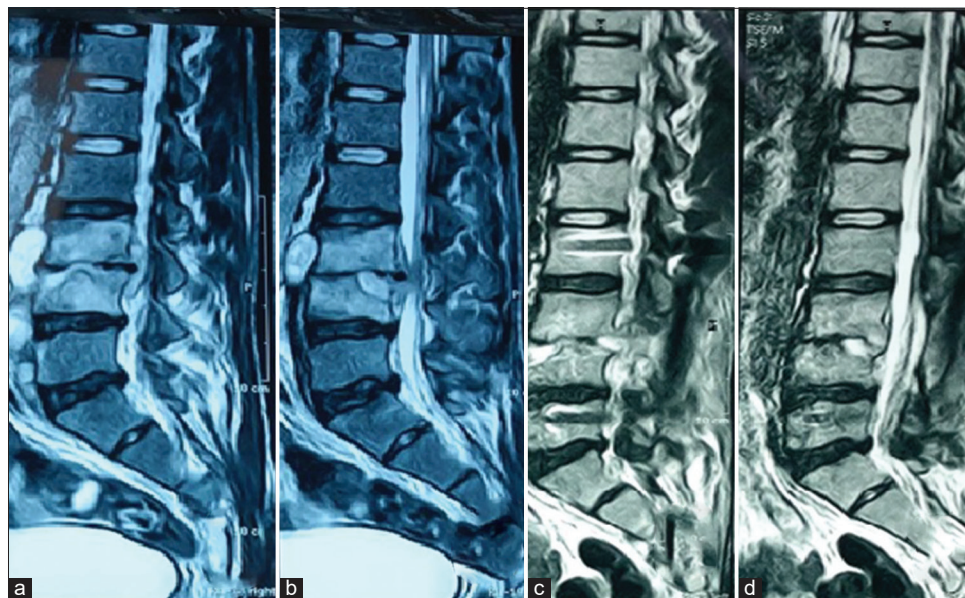


Figure 1: (a and b) Preoperative magnetic resonance imaging (MRI) sagittal images (c and d) 6 months postoperative images. A 20-year-old male patient presenting with severe low back pain and lower limb claudication pain. MRI showed L3–4 spondylodiscitis, which was operated on by fixation of L2 to L5 and laminectomy of L3 and L5 with sampling of the abscess. The symptoms markedly improved. Culture from the pus was negative. Empirical IV antibiotics were administered for 8 weeks. Serial erythrocyte sedimentation rate and C-reactive protein were eventually normalized.

CONCLUSION

Posterior spinal fixation and decompression without excessive debridement, when coupled with thorough antibiotic therapy, are a valuable method of managing spinal infection in patients of such a difficult disease with preexisting comorbidities.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Conflicts of interest

There are no conflicts of interest.

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