Open Transforaminal Lumbar Interbody Fusion (TLIF) for post-discectomy spondylodiscitis: Our experience

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Abstract

Introduction: Post operative lumbar Spondylodiscitis after lumbar discectomy surgery is well known complication with has a variable incidence rate, usually less than 1%.[1] Post op spondylodiscitis is an infection of nucleus pulposus , annulus fibrosis with sometimes secondary involvement of cartilaginous end plates and vertebral bodies following lumbar disc surgeries.[2] Early diagnosis of discitis based on clinical, laboratory, radiological findings and appropriate management is essential to reduce morbidity.

Aim: Retrospective review of patients undergoing transforaminal lumbar interbody fusion (TLIF) for post-op discitis to evaluate clinical outcome and complications.

Material and Methods: All patients undergone TLIF for post-lumbar discectomy spondylodiscitis at our institute from sept'13 to sept'17 were included in our study. All patients had moderate to severe lumbar backage. Initialy a course of conservative treatment with broad spectrum I .V antibiotics was given followed by surgery. On follow up patients were assessed with physical examination and radiographs. Outcome were measured in terms of operative time, blood loss, and surgical complications. Parameters like Visual analogue scale(VAS) for pain,modified Rankin scale (mRS) were evaluate before and after surgery and on subsequent follow up visits.

Results: Modified Rankin scale (mRS) and VAS enhanced in all patients.

Conclusion: Postoperative spondylodiscitis can be successfully managed with transforaminal lumbar interbody fusion (TLIF) and posterior spinal instrumentation. There is significant pain relief and good functional outcome after surgery.

Keywords: Spondylodiscitis, Post discectomy infection, Transforaminal Lumbar Interbody Fusion (TLIF), Lumbar disc infection.

Introduction

Post op Spondylodiscitis after lumbar discectomy was first discussed as a clinical entity 1953.[1] Its incidence varies in various studies, represents 30.1% of all cases of pyogenic spondylodiscitis.[2] It has been reported to occur after open and minimally invasive spinal surgery, including laminectomies,[3,4] discectomies,[5–18] and fusions with or without instrumentation.[5,13,19–22] There is ongoing debate on management of postoperative disc space infections. Post op infections after lumbar discectomy is still treated with non operative methods and prolonged antibiotics in many cases.[30-33] In past, many authors recommended prolonged bed rest and prolonged spinal bracing. Others recommended a staged surgery with a period of antibiotic therapy between first debridement and instrumentation procedures.[39-42] There is no increase in rate of infection in cases where disc debridement and instrumentation is done in same sitting.[38,43,44] Specially in cases of redo surgery, where presence of scar and fibrosis makes posterior lumbar interbody fusion difficult ,at times impossible, transformational lumbar interbody fusion (TLIF) gives excellent surgical exposure, adequate decompression and good outcome.[45] TLIF is safe and viable option than anteroposterior circumferential fusion or anterior lumbar interbody fusion.[45] Therefore, in cases of spondylodiscitis not responding to conservative management having intractable back pain or neurological deficit can benefit greeatky from a TLIF and posterior instrumentation.

Material and Methods

A retrospective study in which 11 patients with the mean age of 42.5 years (ranging between 22-64yr) among them male were 7 and female were 4 .Duration of study from sept'13 to sept'17. All our patients had undergone single level open discectomy as a method of treatment for symptomatic prolapsed lumbar discs, which was complicated by infection in the operated disc spaces. Conservative treatment with broad spectrum antibiotics and bracing was given initially in all cases. The antibiotic regimen was chosen empirically to cover gram positive, gram negative and anaerobic organisms. Initially and for the first 2 weeks, Ampicillin/ sulbactam, Amikacin and metronidazole were administered intravenously. This was followed by oral ciprofloxacin and clindamycin until normalisation of the CRP. The mean duration of the conservative treatment was 6 weeks (range 4 weeks to 12 weeks). Despite adequate and prolonged conservative treatment, these 11 patients continued to suffer from significant low back pain, the average severity of which, assessed by the visual pain analogue scale (VAS), was 8 (range: 8-10). Plain radiographs revealed disc space narrowing with erosion and sclerosis of the adjacent end-plates in all cases. Accordingly, these patients were treated

by single stage surgical debridement, TLIF and posterior instrumentation. Preoperative evaluation included full examination of the patients and their radiological data, including plain radiographs and magnetic resonance imaging (MRI). In addition, laboratory tests were performed in the form of white blood cell count (WBC; count/mm3), C-reactive protein (CRP; mg/dl), and erythrocyte sedimentation rate (ESR; mm/h). Patients were evaluated by modified Rankin scale (mRS), and the VAS for the severity of back pain. Patients were mobilized within the first few postoperative days, wearing a lumbosacral brace. All patients received a six-week antibiotic regimen (3 weeks intravenous and 3 weeks oral), according to the result of culture and sensitivity. If no organism was identified, the empirical preoperative antibiotic regimen was continued. During the first 6 weeks (the antibiotics period), ESR and CRP were done on weekly basis, then they were done again during each follow up visit. Plain radiography, VAS and modified Rankin scale mRS were checked during follow-up visits. The mean follow-up period was 18 months (range: 6 months to –36 months).

Results

Noteworthy improvement was noted in VAS and modified Rankin scale (mRS). Intraoperativelly, around 600ml, 0.6 Litre (range: 0.5-0.7 L) blood loss, surgical duration was 165.5 minutes (range: 120 to 240 mins). No growth was obtained in 2 patients reported with Staphylococcus Aureus and 1 reported with acinetobacter. Acceptable radiological fusion was attained in all cases.

Table 1: Lumbar level of initial surgery

Disc level	No of patients
L4-L5	7
L5-S1	4

Table 2: Patient profile

Sr no	Age	Sex	Level	Co-morbidity	Pain Pre op VAS	mRS pre op	Pre-op antibiotic	Time between two surgery	Disc culture	Post op VAS	Post op mRS 1 month	Post op mRS 6 month
1	22	M	L5-S1	-	8	4	2weeks	6weeks	-	1	1	0
2	35	F	L5-S1	-	7	3	2wk	5wk	-	2	2	0
3	43	M	L4-L5	diabetic	8	4	2wk	7wk	-	2	3	1
4	40	F	L4-L5	-	8	4	2wk	6wk	-	1	1	0
5	38	M	L4-L5	-	7	3	2wk	4wk	-	1	2	0
6	46	M	L5-S1	diabetic	8	4	4wk	7wk	staph	1	2	0
7	33	F	L4-L5	-	7	3	2wk	6wk	-	1	1	0
8	29	M	L4-L5	-	8	4	2wk	8wk	-	1	1	0
9	56	M	L5-S1	-	8	4	4wk	12wk	acinetobacter	3	3	2
10	64	F	L4-L5	diabetic	8	4	4wk	10wk	staph	2	3	1
11	36	M	L4-L5	-	7	3	2wk	7 wk	-	1	1	0

Table 3: Clinical presentation of patients who developed discitis

Symptoms	No of patients
Pain	11 (100%)
Motor deficit	4 (36.3%)
Fever with chills	3 (27.2%)
Local Tenderness over spine	11 (100%)
Paravertebral muscle spasm	11 (100%)
Difficulty in walking	11 (100%)
Superficial surgical site infection	None
Impairment of sensation of leg	9 (81.8%)
Impairment of bladder and bowel function	None

Post op Complications

Table 4: Post op complications

Complications	
Drug induced hepatitis	1 patient
Drug Allergy / skin rash	1 patient
Transient EHL weakness	1 Patient

In one patient, transient L5 nerve root palsy was noted, which resolved spontaneously over approximately 4 months.

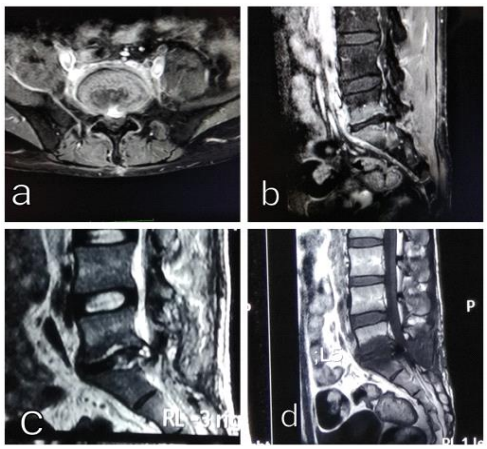

Fig. 1: A: Post discectomy L5-S1 spondylodiscitis. (a) axial T1 contrast view showing disc space infection . (b) T1 contrast sagittal view showing spondylodiscitis, enhancement of vertebral endplates, enhancement of perivertebral soft tissues. (c) T2: high signal in disc space (fluid), high signal in adjacent endplates (bone marrow oedema) loss of low signal cortex at endplates (d) T1: sagittal image showing low signal in disc space (fluid), with low signal in adjacent endplates (bone marrow oedema)

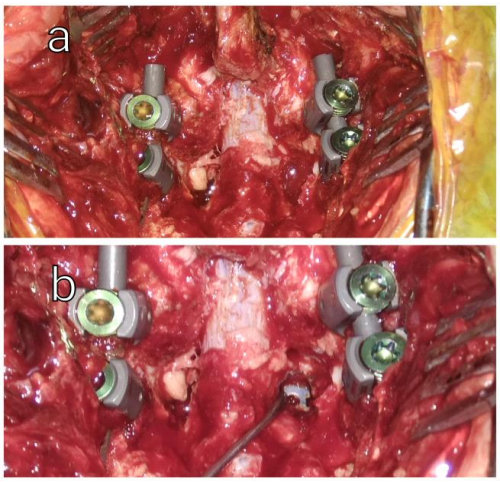

Fig. 2: A: Intraoperative images of TLIF for L5-S1 spondylodiscitis. (a) transpedicular polyaxial screws with rods dural and bilateral roots well decompressed (b) lumbar interbody cage can be seen anterior to dura

Post –op image

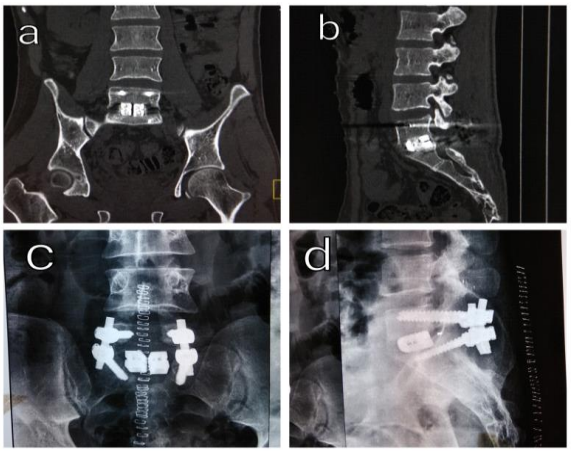

Fig. 3: A: Post op case of TLIF for L5-S1 spondylodiscitis. (a) postoperative C.T scan following TLIF coronal view. (b) post op C.T scan saggital view. (c) post op xray A.P view. (d) post op xray saggital view

Discussion

Post operative spondylodiscitis has been reported to have an incidence of 0.26 to 20% after any spine surgery.[3,8,12,23,48] This incidence is variable and its severity has been reported to generally increases with the complexity of the surgical procedure,[49] post operative spondylodiscitis is reported to have an incidence ranging from 0.6% to 3.7% after lumbar discectomy surgery.[14,50] In case of surgery involving posterior instrumention and fusion ,spine infection is reported to range from 3.7% to 20%.[51,52] There is a ongoing debate over the exact cause of postoperative spondylodiscitis , many author suggest that it secondary to direct inoculation of an pathogen into the operated disc space which is essentially avascular.[17,23] Two types of spondylodiscitis has been described, a septic form caused by an infectious and aseptic form secondary to inflammatory reaction.[10,26] some authors have suggested that aseptic spondylodiscitis is actually low grade infection of disc space due to less virulent organism.[23,53]

MRI with contrast is very informative and should be first investigation to rule out post op spondylodiscitis whereas the first plain X-ray L/S spine amy take four to six postoperative week to show a loss of intervertebral disc space height or blurring of adjacent vertebral end plates at the level of disc infection.[13] MRI is usefull in differentiating a recurrence of disc herniation from post-op spondylodiscitis ,therefore, MRI with contrast is the investigation of choice from diagnosing postoperative spondylodiscitis.[5] MRI has a sensitivity and specificity of 93% and 97%, respectively.[60]

Once inoculated, disc space infection starts which produces lot of inflammation and sometimes frank pus. However, the causative organism is not always

identified in cultures sent for analysis. The most common infectious pathogen islotated in the culture in case of post-op discitis is Staphylococcus aureus followed by other Staph. species[8,13,16,17,19,21,24,54-56] and anaerobic organisms.[2]

Other infrequently encountered pathogens are Streptococcus viridans and Streptococcus species,[55] Escherichia coli and Pseudomonas aeruginosa are also isolated in some cases,[4] rarely discitis can be secondary to fungal infection.[53,56] In our study all patients received a six-week antibiotic regimen (3 weeks intravenous and 3 weeks oral), empirical broad spectrum antibiotics covering both aerobic and anerobic organisms . 3 patients had positive cultures, in these cases antibiotics were given according to the result of culture and sensitivity. Some studies report that wbc is elevated in 42.6% cases of post-op spondylodiscitis.[56] ESR levels can be used to monitor antibiotic therapy in cases if spondylodiscitis. A 50 to 66% reduction in levels of ESR suggests control of infection.[57-59]

In past many authors recommend bed rest and prolonged spinal bracing for post-op spondylodiscitis. Others recommended a staged surgery with a period of antibiotic therapy between first debridement and instrumentation procedures.[39-42] Open surgical drainage for spondylodiscitis was once reserved for cases with an epidural abscess.[61]

In 1996, Rath et al published a series of 43 cases of lumbar spondylodiscitis who were treated by single stage posterior approach.[73] Harms and Rolinger in 1982, with the intention of offering a stable fusion in a single stage approach, pioneered a modified posterior lumbar interbody fusion(PLIF) technique called TLIF - transforaminal lumbar interbody fusion.[78] Compared with the traditional techniques, TLIF provided many advantages by accessing the spinal canal and disc space through the far-lateral location avoiding retraction on the nerve roots and dural sac ,thus reducing the surgical risk for neurological deficit during surgery. TLIF offers a single-stage decompression and fixation through posterior approach.

Conclusion

Transforaminal lumbar interbody fusion (TLIF) is excellent surgery for post discectomy spondylodiscitis .It offers single stage posterior access to spine for debridement of infected tissue and adequate decompression of neural structures with minimal risk and complications. There is significant patient satisfaction in terms of pain relief and early mobilization.

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