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Outcome of micro-lumbar discectomy and preventive measures to control discitis

Abstract

Objective: The purpose of the present study is to describe the rate of post-operative discitis following micro-lumbar discectomy.

Methods and Materials: This is a retrospective study of 203 patients who underwent micro-lumbar discectomy between March 2015 and April 2018 in our institute. Prior to surgery, patients were optimized by maintaining personal hygiene, controlling blood sugar in diabetics and withholding steroids. Standardized intra-operative measures were taken to prevent discitis. Post-operatively on day 7, patients were evaluated for symptoms like back pain, fever and wound infection. If there was any sign of infection then the patient was evaluated with a plain x-ray of lumbosacral spine, inflammatory blood markers like complete blood count, erythrocyte sedimentation rate, C-reactive protein and Magnetic Resonance Imaging of lumbosacral spine to rule out discitis.

Results: There were 127 males and 76 females, the age ranging from 8 years to 80 years. MRI imaging showed 94.6% single and 5.4% multilevel disc prolapses with 4.2% high lumbar and 95.8% low lumbar disc prolapse. Indications for surgery were failed conservative treatment (44), intractable pain (102), neurological deficit (49), and cauda equina syndrome (8). None of the 203 patients developed post-operative discitis, however, some of them had nerve root injury (4), dural tear (5), wound infection (5) and pseudo-meningocele (2). Almost all patients were mobilized within 48 hours (98%) after surgery. 95% were discharged on the 7th day of surgery and 5% within two weeks. Radicular pain was relieved in 92% patients within one week, 6% within three weeks and 2% had no change. Low back pain was relieved in 80% of patients in three weeks, 15% in three months and 5% had persistent back pain. The recurrence rate was 2.5% in our series. 80% had joined their previous job after four weeks, 15% after three months and 5% had changed their job.

Conclusions: Post-operative discitis can be prevented if appropriate precautions are taken like

using separate dedicated neurosurgical operation theatre, prophylactic antibiotics, minimally invasive procedure and not curating the end-plates.

Key words: Inflammatory blood markers, Post-operative discitis, Prolapsed intervertebral disc

Introduction

Micro-lumbar discectomy is a procedure of choice for prolapsed intervertebral disc for those who fail conservative management or develop cauda equina syndrome or neurological deficits. Post-operative discitis was first described as a clinical entity by Turnbull in 1953 and it is defined as primary infection of the nucleus pulposus with secondary involvement of cartilaginous endplate and vertebral body following lumbar discectomies.¹ It is controversial whether discitis can be caused by aseptic or infectious processes as only 42–73% of such cultures obtained from tissue and fluid aspirated are positive in discitis. Discitis is considered to be a serious complication of lumbar disc surgery. Recent data suggests that post-operative discitis is mainly bacterial.² The majority of surgeons are of the opinion that it results from direct inoculation of an offending pathogen into the avascular disc space.^{2,3,4} The incidence of discitis after lumbar discectomy is 0.2-4%. It is one of the most disabling cause of failed back syndrome. Post-operative discitis leads to a long standing and sometime a permanent morbidity.^{5,6} However, there are some general preventive measures like adoption of aseptic techniques, optimization of patients by controlling blood sugar level, maintaining personal hygiene before surgery, good post-operative follow-up,^{7,8} irrigation of the incision with saline, peri-operative/intra-operative antibiotics which can prevent post-operative spondylodiscitis.^{9, 10} A retrospective study reported that placement of gentamicin-containing collagenous sponges in the disc space were effective in preventing post-operative spondylodiscitis.¹¹ The objective of our study was to observe the outcome of these measures when taken in micro-lumbar discectomy in terms of occurrence of discitis. In this study we analyzed and discussed the outcome of minimal invasive open laminectomy and discectomy and have elaborated on the preventive measures to decrease the discitis rate.

Methods and Materials

This is a retrospective study of 203 patients who underwent minimally invasive open laminectomy and

discectomy between March 2015 and April 2018 in our institute, Dhirghayu Guru Hospital and Research Center. Patient with symptomatic prolapsed intervertebral disc who failed conservative management, patient with cauda equina syndrome, neurological deficits like weakness of limbs, severe pain despite taking adequate analgesics were included in this study and those in whom general anesthesia could not be given, skin infection at the site of incision, uncontrolled diabetic mellitus or patient in sepsis were excluded from the study. Records of patients who had undergone minimal invasive open laminectomy and discectomy were reviewed and analyzed. During evaluation if the patient was asymptomatic then no investigation was performed. However, in symptomatic patients serological markers like CBC, ESR, CRP, X-ray of lumbosacral spine and if needed MRI of lumbosacral spine was performed to confirm discitis. Data were recorded from patient record file, operational theatre registration file and out-patient file record.

Surgical Procedure

Minimally invasive open laminectomy and discectomy was performed under general anesthesia. Under all aseptic precautions in prone position, around 2 cm skin incision was given 1 cm lateral to midline. Then the dorso-lumbar fascia was incised and retracted laterally. Sub-periosteal dissection of the paraspinal muscle was carried out exposing the lamina and medial part of the facet joint. Small fenestration was made by excising the ligamentum flavum and edges of adjacent laminae, exposing the underlying root. The nerve root and the thecae sac were retracted medially exposing the prolapsed disc. Prolapsed disc was then excised with the help of pituitary rongeur. Hemostasis was maintained using absorbable hemostat (oxidized regenerated cellulose) or absorbable gelatin sponge. The surgical wound was closed in layers. Cautery or irrigation was not used during the procedure and average time of procedure ranged from 15 minutes to an hour. The following measures were taken to prevent discitis:

1. A separate operation theatre was used for neurosurgery procedure.
2. Unnecessary people were not allowed to enter the operational theatre during surgery.
3. Bipolar or unipolar cautery was not used during surgery.

4. Surgical area was not irrigated with normal saline.
5. Operative field was not touched with even gloved hand or fingers.
6. Per-operative and post-operative vancomycin was used for one week.
7. End plates were kept intact and curette was not used.

Results

There were 127 males and 76 females and the age ranged from 8 to 80 years. 136 patients presented with low back pain, 155 patients with radicular pain, 38 patients with neurogenic claudication, 49 patients with motor deficit and 18 patients with sphincter dysfunction. 4.2% had high lumbar and 95.8% had low lumbar disc prolapse on MRI imaging. 94.6% had single and 5.4% had multilevel disc prolapse.

Indications for surgery were failed conservative treatment for six weeks (44), intractable pain assessed with visual analogue scale above 5 where 0 is no pain and 10 is worst pain (102), neurological deficits like weakness of limbs (49), and cauda equina syndrome (8).

In our study the operative time was an average 30 minutes ranging from 15 mins to an hour, few (less than five) people were allowed in the operation theatre, most surgeries 94.6% were single level surgery, only small incision was given and blood sugar was controlled before and after surgery.

Post-operative discitis was zero in our series but patients had other complications like nerve root injury (4), dural tear (5), wound infection (5) and pseudomeningocele (2). 50% patients were mobilized within 24 hours, 48% after 48 hours and 2% after one week. 95% were discharged on the 7th day of surgery and 5% within two weeks. Radicular pain was relieved in one week in 92%, in three weeks in 6% and 2% had no change. Low back pain was relieved in 80% in three weeks, 15% in three months and 5% had persistent back pain. Recurrence rate was 2.5% in our series. 80% had joined their previous job after four weeks, 15% after three months and 5% had changed their job.

Discussion

Micro-lumbar discectomy has been a popular and well established surgical procedure for symptomatic lumbar disc herniation. Post-operative discitis is one of the common complications and often becomes a nightmare to surgeons and as well as to the patient. However, these days discitis rate is in decreasing trend due to the use of less invasive procedure, prophylactic intravenous antibiotics,

using separate operation theatre and not curetting the adjacent ends plates. Previous studies have identified increased operative time, multilevel surgery, revision surgery, and an increased number of people in the OT as important predisposing factors for post-operative spinal infections.¹² General risk factors of post-operative discitis include advanced age, obesity, immune suppression, diabetes mellitus and systemic infection or local infection at the time of surgery.¹³ In our study due to strict adherence to the protocol, we could achieve zero discitis rate.

The period between surgeries and onset of symptoms was 14 to 24 days. Clinical presentations were severe back pain, spasm, and fever. Typically, the pain and muscle spasm were resistant to bed rest and analgesics.^{14,15} Persistent elevated ESR and CRP together with typical findings like erosion of end plates, collection in disc space and hyperintensity of disc space on T2-weighted imaging in MRI suggests discitis. CRP typically declines by around 10 days post-operatively. Hence, any patient with unexpected rise in CRP beyond two weeks after surgery should be evaluated for post-operative discitis. Some studies indicate that CRP is the most sensitive indicator of post-operative discitis.^{14,15} In our cases there were no discitis but had some other complications like wound infection, dural tear and pseudomeningocele. Injury to the end plate, hematoma collection, and necrotic tissue caused by surgery provide early suitable conditions for bacterial growth.⁴ However, during our surgery we do not curette end plates, we do not use cautery and proper hemostasis is maintained before closure of skin, all of which minimize conditions required for bacterial growth. A wide range of organisms have been associated with post-operative discitis, but it primarily remains a mono-bacterial infection. *Staphylococcus* remains the predominant primary pathogen in various studies.^{16,17} Infections following spine surgery can be prevented by the adoption of aseptic techniques, optimization of patients as mentioned above before surgery, proper use of pre-operative antibiotics, and good post-operative follow-up.^{7,8} Some reports argue that peri-operative antibiotics can effectively prevent post-operative spondylodiscitis.^{9,10} Prophylactic antibiotic treatment must include broad spectrum IV antibiotics with known efficacy to *Staphylococcus* and other commonly found microorganisms (*Staphylococcus epidermidis* and β -hemolytic streptococci, *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Propionibacterium acnes*, and diphtheroids).^{18,19,20} In our practice we used vancomycin peri-operatively and then for seven days if patient is not allergic to it. We then followed the patient in the out patient department within seven days of discharge to see if there were any signs of infection.

Conclusion

Post-operative discitis can be prevented if appropriate precautions are taken like using separate dedicated neurosurgical operation theatre, prophylactic antibiotics, minimally invasive procedure and not curating the end-plates.

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