

Role of Surgery in Management of Discitis

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ABSTRACT

Background: discitis is an inflammation of the vertebral disc space which may spontaneous or post spinal surgery; that is often diagnosed late. With good response to conservative treatment and in some condition the plan of management is surgical. **Aim of the Work:** to assess the role of surgery in management of discitis and which approach is appropriate, with comparison between conservative and surgical management and the relationship between risk factors and outcome. **Patients and Methods:** this prospective and retrospective study was conducted on 25 patients of specific criteria confirmed to have discitis by clinical presentation, radiological findings and laboratory investigations. **Results:** discitis is more common in old age that occurred in lumbar more than dorsal or cervical disc space with risk factors such as failed spinal surgery (40%), DM (36%), HCV +ve (8%), TB (8%), Brucella (4%) and addiction (4%) of past history with affect the outcome. There was a statistically significant relation between location of discitis and pre modified ranking scale, while modified ranking scale pre and post management were statistically highly significant in each cervical, dorsal and lumbar. **Conclusion:** both conservative and surgical management have good outcome. But we observed that the risk factors like DM and addiction worsened the prognosis. We also observed that the shorter surgical maneuver the better is the outcome.

Keywords: Discitis, failed spinal surgery, conservative and surgical management.

INTRODUCTION

Discitis is an inflammation of the vertebral disc space often related to infection. The lumbar region is most commonly affected, followed by the cervical spine and, lastly, the thoracic spine ⁽¹⁾. Discitis exhibits a bimodal age distribution, with peaks in early childhood and after age of 50. A male predominance is seen. Risk factors for discitis include diabetes, old age, immunosuppression, IV drug use, alcoholism, and renal failure. Although rare, there is an increased risk of discitis following invasive spinal procedures, estimated at 0.5% for anterior cervical discectomy and 0.25% for lumbar discectomy, with an overall rate of 0.1 to 4% of all invasive spinal procedures. Postoperative discitis accounts for approximately 20-30% of cases of discitis ⁽²⁾. There is debate as to the cause, although hematogenous seeding of the offending organism is favored as well as direct spread. It is important to differentiate between spontaneous discitis which is usually from hematologic spread from a genitourinary or respiratory infection versus that from a post-operative complication which usually involves skin flora such as staph aureus. It can be caused due to spinal tuberculosis and spread along spinal ligament to involve the adjacent anterior vertebral bodies, causing angulation of the vertebrae with subsequent kyphosis. The cause may be aseptic ⁽³⁾. The signs and symptoms of discitis are nonspecific, commonly leading to a delay in diagnosis of 2 to 6 months on average after onset of

symptoms. Over 90% of patients with bacterial discitis complain of back pain that is not relieved by rest or common analgesics. Localized tenderness to palpation, muscle spasm, and worsening of symptoms with movement are common. A neurologic deficit is uncommon. Epidural abscess is more common in chronically ill patients who are unfortunately unlikely to exhibit constitutional symptoms usually associated with abscess, such as fever and chills ⁽⁴⁾. Different modalities of imaging are available for diagnosis as plain x ray, computed tomography, nuclear medicine studies, and magnetic resonance imaging with specific criteria for each ⁽⁴⁾. The most common laboratory abnormalities in patients with discitis are an elevated erythrocyte sedimentation rate (ESR) and elevated levels of C-reactive protein (CRP), seen in over 90% of patients ⁽¹⁾. Non-operative treatment is effective in the majority of patients (up to 90%) and consists of 4-8 weeks of parenteral antibiotics and immobilization. Percutaneous CT-guided drainage of paraspinal abscesses larger than 2 cm may also be performed. Surgery is indicated in cases of spinal cord compression, instability, correction of mechanical deformity, abscess, or severe persistent pain. In cases where instability is present, the placement of fixation devices has not been shown to impede healing ⁽²⁾.

AIM OF THE WORK

This work aimed to assess the role of surgery in management of discitis and which

approach is appropriate, with comparison between conservative and surgical management and the relationship between risk factors and outcome.

PATIENTS AND METHODS

This prospective and retrospective study was conducted on 25 patients of specific criteria confirmed to have discitis by clinical presentation, radiological findings and laboratory investigations. This study included 25 patients of discitis (1 case cervical, 7 cases dorsal and 17 cases lumbar). All cases tried conservative measures for at least one week of antibiotics, analgesic and support by neck collar, dorsolumbar brace or lumbosacral brace before going to surgical treatment. The patients were randomly chosen. 4 cases had conservative treatment only and 21 cases had surgical interference (9 cases did debridement and posterior decompression, 9 cases did fixation only, 1 case did debridement and posterior decompression with fixation, 2 cases did corpectomy and Pyramidal insertion with fixation). 14 cases were operated upon in El-Sayed Galal Hospital of Al-Azhar University and 11 cases were operated upon in El-Hussin Hospital of Al-Azhar University between August 2016 and February 2018. Long term follow up was done for average 1 year. **The study was approved by the Ethics Board of Al-Azhar University.** **Inclusion criteria:** Adult age group (18 years and above). Spontaneous and post-operative discitis. **Exclusion criteria:** Child age group (less than 18 years). **The following methods were applied for the all studied cases:** **History Taking:** A full personal taking including name, age, sex, and symptomatology including pain (Site, Radicular and Claudicating), motor, sensory, sphincter affection and fever with past history of risk factors (previous spine surgery, DM, HCV, T.B, Brucella and addiction). **Examination:** The patients were examined for: Vital signs (pulse, arterial blood pressure and temperature), Motor affection, Sensory affection, sphincter affection, back examination, and deformity. **Investigations:** Routine laboratory investigations: During preoperative preparation of the patients all cases were subjected to complete blood picture, blood glucose, liver and kidney functions bleeding profiles and ESR,CRP. **Radiological investigations: that include:** Plain X-ray (Anteroposterior view and Lateral view) -Computed tomography - Magnetic resonance imaging. We started the conservative treatment and if the patient was still complaining or had pus collection we started surgical interference. So 4 cases had conservative treatment only and 21 cases

had surgical interference (9 cases did debridement and posterior decompression, 9 cases did fixation only, 1 case did debridement and posterior decompression with fixation, 2 cases did Corpectomy and Pyramidal insertion with fixation). **Follow up: All patients were followed up for average 1 year after management:** Clinically by assessment of the subjective symptoms as (Back pain, radiculopathy and claudicating pain) and assessment of the functional outcome by the Modified Rankin Scale (MRS). **Radiologically by:** Plain x-ray after surgery (antero-posterior, dead lateral view) - CT for postoperative fixation system and all complicated cases - MRI for all complicated cases. **Statistical analysis:** Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean± standard deviation (SD). Qualitative data were expressed as frequency and percentage.

RESULTS

In our study that included 25 patients there was no sex difference as a risk factor for discitis which is common in old age more than young age. Also we observed that the lumbar discitis was the most common and the dorsal discitis was more common than cervical discitis. The back pain was present in all cases and its site is depending on the location of discitis. Also, radiculopathy is the most common presentation after back pain. The past history as risk factors of discitis included failed spinal surgery: 10 cases (40%), DM: 9 cases (36%), HCV +ve: 2 cases (8%), TB: 2 cases (8%), Brucella: 1 case (4%) and addiction: 1 case (4%). Failed spinal surgery and DM are the most common risk factors for development of discitis. Our study found that the single level of discitis was the most common presentation. The associated presentations of MRI included associated epidural abscess: 5 cases (20%), associated subcutaneous abscess: 2 cases (8%), associated paravertebral abscess: 2 cases (4%) and amalgamation of the vertebral body: 4 cases (16%). The associated epidural abscess was more common with discitis and the associated amalgamation of the vertebral bodies was more common in late stages of discitis that was observed in our study. The plan of management depended on the presenting history, examination and investigations. Conservative cases were 4 patients and surgical cases 21 patients (16% and 84%

respectively). The plan of surgery depended first on failed medical treatment, neurological deficit or biomechanical instability and abscess formation; so, the cases of medical treatment less than 4 months/cases and medical treatment more than 4 month ratio is 17/8 (68%: 32%) as the following: The conservative only were 4 cases (16%), debridement and posterior decompression: 9 cases (36%), Fixation: 9 cases (36%), debridement and posterior decompression with fixation: 1 case (4%) and corpectomy and Pyra mish insertion with fixation were 2 cases (8%). In our study, the improvement cases/ non improvement cases was 21/4 (84%/16%). The complications of post-surgical management of discitis were kyphosis: 1 case (4%), urine and stool incontinence: 1 case (4%), renal impairment and death: 1 case (4%), septicemia and death: 1 case (4%) of the study group. So the cases of morbidity were 2 patients (8%) and the cases of mortality were 2 patients (8%). In our study, we used the Modified Rankin Scale (MRS) in the all cases pre management and post management to assess the outcome and disability. Also, our study showed statistically significant relation between location of discitis and pre-management modified ranking scale. While modified ranking scale pre- and post-management was statistically highly significant in each cervical, dorsal and lumbar. As well as, our study revealed that changes in Modified ranking scale pre-management and post-management are statistical highly significant in conserve and statistically significant in surgery plan of management. In our study, there was a statistical highly significant difference between improvement and non-improvement according to sex especially in females, according to age (years), to location of discitis, to case presentation, to past history, to number of level of discitis, and according to presenting investigation of associated epidural abscess, associated paravertebral abscess collection, associated subcutaneous abscess collection and associated amalgamation of the vertebral bodies. Also, our study revealed highly statistically significant difference between improvement and non-improvement according to treatment (P-value: <0.001). There was statistically significant difference between improvement and non-improvement according to conservative only (P-value: 0.034), debridement and posterior decompression (P-value: 0.005) and fixation (P-value: 0.005). We also observed that a case of debridement and posterior

decompression with fixation was not improved and some cases of corpectomy and Pyra mish insertion with fixation were improved. Our study also raveled that highly statistically significant difference between improvement and non-improvement according to complications and according to plan of management (P-value: <0.001) where there was a statistically significant difference between improvement and not improvement according to conserve (P-value: 0.034) and surgery (P-value: 0.002) plan of management. Also, our study revealed a statistical highly significant difference between improvement and non-improvement according to duration (P-value: <0.001); according to less than 4 months duration of medical treatment (P-value: 0.006) and according to more than 4 months duration of medical treatment (P-value: <0.001).

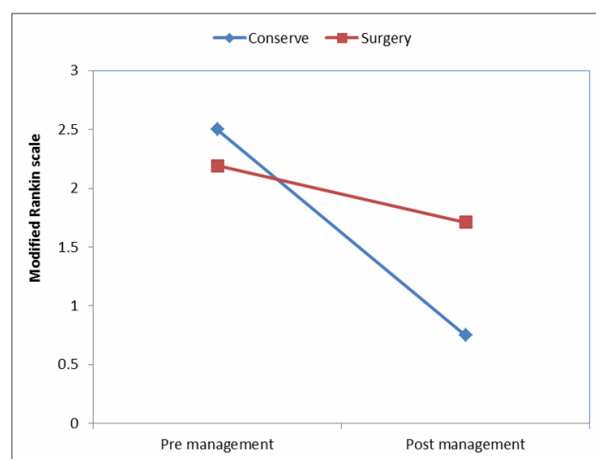


Fig. (1): Shows line chart between plan of management and modified ranking scale.

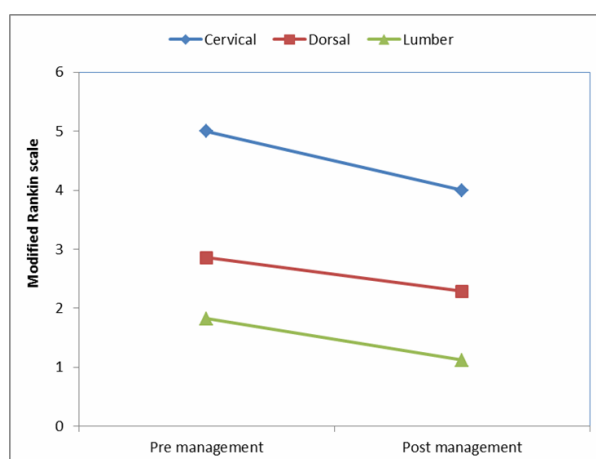


Fig. (2): Shows line chart between back pain and modified ranking scale.

DISCUSSION

Spine is susceptible to infection, accounting for 2–7 % of all cases of musculoskeletal infections⁽⁵⁾. Its incidence varies between 1:100,000 and 1:250,000 in developed countries and its estimated mortality rate ranges between 2 and 4 %^(6,7). Numerous studies refer to a bimodal distribution with a peak below 20 years and another between 50 and 70 years of age, representing in this group, approximately 3–5 % of all cases of osteomyelitis^(8,9). Furthermore, a 2:1–5:1 male/female ratio has been reported^(10,11). In the current study that included 25 patients with female: male ratio was 13:12 (52%: 48%). This study shows that there was a relationship between sex and outcome that is statistical highly significant. Females are accompanied by better prognosis. Despite indication for surgery in the presence of neurological deficits, age and presence of concurrent medical conditions may affect surgical decision⁽¹²⁾. According to **Yoshimoto *et al.***⁽¹³⁾ in a review of 45 cases of pyogenic spondylitis in elderly, 42 % of patients with paralysis on admission were not submitted to surgery due to poor general condition. Yet, paralysis was improved in 73 % of these patients with conservative treatment⁽¹³⁾. Also, in the current study the age less than 40 year old: more than 40 year old ratio was 9:16 (36 %: 64%). This study shows that there was a relationship between age (years) and outcome that is statistical highly significant. Age less than 40 years is accompanied by better prognosis. Pyogenic spondylodiscitis caused by hematogenous spread affects mainly the lumbar spine (58 %), followed by thoracic (30 %) and cervical (11 %)^(14,15), reflecting to some extent the vascular supply of these structures. Tuberculosis lesions preferentially affect the thoracic spine, often involving more than two levels, which differentiates it from pyogenic spondylodiscitis⁽¹⁵⁾. As well as, in the current study the location of discitis represent that the cervical: dorsal: lumbar ratio was 1:7:14 (4%: 28%: 68%). This study shows that the case of cervical discitis had improved. The Lumbar discitis improved better than dorsal discitis. Nonspecific back or neck pain are generally the first clinical features of discitis. However, up to 15 % of patients could be pain free⁽¹⁶⁾. With this insidious onset, patients have constant pain that worsens at night, often associated with radicular pain to the

chest or abdomen⁽¹⁷⁾. Fever is less common⁽¹⁸⁾ occurring in about 48 % of patients with pyogenic spondylodiscitis and in about 17 % of tuberculosis spondylitis cases. Dysphagia and torticollis are symptoms that may be caused by cervical location⁽¹⁹⁾. Also, in the current study the presenting history was showing that radioclopathy: 13 cases (52%), Claudicating pain: 2 cases (8%), Motor affection: 9 cases (36%), Sensory affection: 4 cases (16%), Sphincter affection: 6 cases (24%) and Fever: 3 cases (12%). This study shows that there was a relationship between presentation of discitis and outcome that was statistical highly significant. Radioclopathy, Cludication, sphincter affection and fever were accompanied by better prognosis. Known predisposing risk factors include previous spine surgery, a distant infectious focus, diabetes mellitus, advanced age, intravenous drug use, HIV infection, immunosuppression, oncologic history, renal failure, rheumatological diseases, and liver cirrhosis^(20, 21). The current study represent that the risk factors of discitis were including that failed spinal surgery: 10 cases (40%), DM: 9 cases (36%), HCV +ve: 2 cases (8%), TB: 2 cases (8%), Brucella: 1 case (4%) and addiction: 1 case (4%). This study showed that there was a relationship between past history (risk factors of discitis) and outcome that was statistically significant. Failed spinal surgery, TB and Brucella were accompanied by better prognosis. The controversy arises in the presence of minor neurological deficits^(22,23,24). In **Pigrau *et al.*** series, only 13 % of the patients required surgery, even though 29.7 % of patients had neurologic symptoms. In **Pigrau** opinion, the conservative approach in this particular scenario is desirable if there is no spinal instability. Neurological symptoms are minor and expected to improve with specific antibiotic therapy⁽²²⁾. Early surgical treatment should be performed in the presence of neurological deficits or sepsis⁽²⁵⁾. Absolute surgical indications also include spinal instability due to extensive bone destruction, severe kyphosis, intracanal spinal lesion with mass effect, unknown etiologies associated with active tumor, and in failure of conservative treatment^(7,26). Some authors also recommend surgical treatment in the presence of epidural abscess even without associated neurological deficits, especially in the cervical and thoracic region⁽²⁷⁾. The relative indications consist of the presence of uncontrolled pain and inexistent conditions for conservative

treatment⁽²⁸⁾. In the current study, the plan of management depended on the presenting history, examination and investigations. Conservative cases were 4 patients and surgical cases 21 patients (16%: 84%). The plain of surgery depended first on failed medical treatment, neurological deficit or biomechanical instability and abscess formation. So, the cases of medical treatment < 4 months/ cases of medical treatment > 4 months ratio is 17/8 (68%: 32%).as the following: The conservative only: were 4 cases (16%), debridement and posterior decompression: 9 cases (36%), fixation: 9 cases (36%), debridement and posterior decompression with fixation: 1 case (4%) and corpectomy and Pyra mish insertion with fixation: 2 cases (8%). Some retrospective outcome studies present distinct prognostic factors. We summarized those related to a poor outcome in the Table 1. Besides age and spine segment, underlying conditions that are associated with poor prognosis, the major prognostic factor was the presence of a motor deficit before treatment and if the neurological deficits are present for longer than 36 h^(25,28). In our opinion, whenever these patients gather surgical conditions, an operative approach might greatly improve prognosis. In a series by **Hadjipavlou *et al.***⁽²⁵⁾, 23 % of patients with paralysis on admission recovered completely after surgical decompression.

Table (1): Spinal infections' prognostic factors associated with poor outcomes.

Prognostic factor	Poor outcome
Age	Older patients
Spinal segment	Cervical/thoracic involvement
Underlying disease	Diabetes mellitus Chronic heart disease
Clinical presentation	Bowel/bladder dysfunction
Diagnosis	Delayed
Pathogen	MRSA
Length of time for surgery	>36 h

In the current study, the improvement cases: non-improvement cases was 21:4 (84%:16%). The complications of post-surgical management of discitis were Kyphosis: 1 case (4%), urine and stool incontinence: 1 case (4%), renal impairment and death: 1 case (4%), septicemia and death: 1 case (4%) of the study group. The cases of morbidity were 2 patients (8%) and the cases of mortality were 2 patients (8%). Single, posterior approach addressing both columns

poses safe alternative in treatment of pyogenic vertebral osteomyelitis of thoracic and lumbar spine. It proved to be less invasive resulting in faster postoperative recovery⁽²⁹⁾.

CONCLUSION

Our experience in this study concluded that, there was no male to female difference in distribution of the disease. But we observed that females were better improved than males. Also, discitis was more common in old age more than young age. But we observed that the younger were better improved than the old age. Lumbar discitis was the most common and the dorsal discitis was more common than cervical discitis. But we observed that the cervical case improved and lumbar cases were better improved than dorsal cases. Back pain was present in all cases and its site was depending on the location of discitis. But in other studies the back pain was not included in all patients. Also we should consider the infective endocarditis is a co-morbidity with discitis that was not included in our study. Failed spinal surgery and DM were the most common risk factors for development of discitis, and to avoid this risk factors we should inject vancomycin intradisc space post-operative discectomy, also we should measure HbA1C preoperative and control DM. Also, Addiction is a major cause for failure in response to surgical management of discitis. Also, we observed that the single level of discitis was the most common presentation. And the single level of discitis had better prognosis than double or multiple levels. Management of discitis is conservative at first but become surgical in conditions that included failed medical treatment, neurological deficit or biomechanical instability and abscess formation. We should know the specific organism and its specific antimicrobial drugs to insure eradication of the organism and early recovery post plan of management whatever conserve or surgical. Pain (back pain, radiculopathy and claudication pain) and fever had better prognosis than neurological deficit which was confirmed by other studies. Duration of medical treatment has a direct relationship with prognosis. Also, we observed that whatever the decision of operation, it did not affect the outcome except that single dorsal or lumbar discitis that required single, posterior approach to do both surgical interference (corpectomy and posterior fixation at same sitting and same posterior approach)

in treatment of pyogenic vertebral osteomyelitis of thoracic and lumbar spine. It proved to be less invasive resulting in faster postoperative recovery. That is better than two approaches anterior and posterior as confirmed by some studies.

CONFLICTS OF INTEREST

There are no conflicts of interest.

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