Research Article

The effectiveness of vancomycin injection in disc space during lumbar discectomy in prevention of postoperative discitis

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Date Submitted:24.5.2012

Date Accepted:4.10.2012

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Abstract

Background: Post discectomy disc space infection is relatively uncommon 4 %; nevertheless it is the most disabling causes of failed back surgery.

Aims: To assess the effectiveness of intra-discal vancomycin in discectomy operation, we evaluated operative time, blood loss, postoperative complications (discitis) by measuring CRP, ESR and temperature in the preoperative and postoperative period. Blood culture was done in complicated case postoperatively. Social habit (smoking & drinking alcohol) and past medical history (Diabetes Mellitus) had been taking in consideration.

Patients and Methods: This is a prospective study on 150 patients operated upon by lumber discectomy, 75 cases have been treated by injection of 4 ml of (2 mg/ml) vancomycin in the disc space that removed while in the other 75, 4 ml of normal saline was injected in the disc space (placebo).

Results: There were 6 cases of postoperative discitis, all in the placebo group. There were 4 men and 2 women, ranging in age between 26 and 63 years. 3 were diabetics. All cases were in L4-5 disc space. The frequency of discitis was (4 %).In vancomycin group the frequency was 0% and in placebo group 6/75 (8 %).

Conclusions: We concluded that the intra-operative prophylaxis with vancomycin intra-discaly is effective in prevention of postoperative discitis.

Keywords: Lumber discectomy, Discitis, Vancomycin, Prevention

INTRODUCTION

Postoperative discitis (POD) is defined as primary infection of the nucleus pulposus with secondary involvement of cartilaginous endplate and vertebral body following lumbar discectomy.[1]

It is the most disabling causes of failed back surgery.[2] POD may lead to long-lasting and sometimes permanent morbidity.[3] Despite the use of antibiotics; the management of POD still presents a challenging problem. Iatrogenic discitis occurs in up to 4% of all spinal surgery.[4] Infection is usually due to micro-organisms originating from the patient. Alternatively organism may be from the operating room environment, including theatre personnel, or inadvertently introduced into the disc space by direct implantation through

surgical instruments. Staphylococci (staphylococcus aureus) and coagulase-negative staphylococci (staphylococcus epidermidis) are common skin organisms which cause the vast majority of infections.

Interval from operation to onset of symptoms is about three days to eight months.[5] MRI is the imaging method of choice in the evaluation of patients with recurrent clinical symptoms after disc surgery. It demonstrates involvement of disc space and vertebral bodies can rule out paravertebral or epidural spinal abscess.

Characteristic findings may occur three to five days after onset of symptoms.[6] Despite the widespread use of antibiotics in spine surgery, little is known about the factors influencing the delivery of antibiotics to the intervertebral disc, which is one of the largest avascular structures in the body.[7] The transport of solutes from the extracellular space into the nucleus pulposus is primarily by passive diffusion. Therefore, transport of solutes is dependent on properties of the solute itself and the permeability of the adjacent endplate and annulus fibrosus.[8] The antibiotic charge has a major influence on its penetration. Positively charged antibiotics (gentamycin and vancomycin) can enter the disc, whereas negatively charged antibiotics (penicillin and cephazolin) have limited or no penetration because of mutually repellent charges.[9]

PATIENTS AND METHODS

From February 2009-October 2011 in Neuroscience Hospital and Al-Amel private hospital we take 150 patients, most of our patients were males (85) the rest were females (65). We divided them into two groups taking in consideration male to female ratio. Inclusion criteria include all patients of both sexes and any age with lumbar disc prolapsed diagnosed by CT and/or MRI and indicated for surgery by clinical and radiological data. Exclusion criteria include all patients with previous history of spine infection, patients receiving immunosuppressant therapy or immune compromised patients with systemic infection at time of surgery and patients receiving systemic vancomycin perioperatively. The operated patients were divided into 2 groups. One group was treated after discectomy by injection of 4 ml of (2mg/ml) vancomycin in the disc space while in the other group 4 ml of normal saline was used. No suction after injection was used. The operative technique was the same in both groups. All cases were followed up for 8 months.

Laboratory investigations and MRI lumbar spine were done postoperatively if history and examination was suggestive of discitis.

RESULTS

Six patients developed discitis. All cases were in the placebo group with incidence of 4% of all cases in this study. There were 3 men and 3 women, ranging in age between 29 years and 55 years. 3 were moderate smokers and 3 were nonsmokers. They had duration of sciatica between 2 months to 8 months preoperatively,

Four had left sciatica and 2 had right. Three cases of them were diabetics. All of the cases were in L4-L5 disc space. Four patients developed discitis 3-4 weeks postoperatively after an interval period of pain relief and wound healing. The other 2 cases developed discitis earlier.

All patients complained of sever back pain which exacerbated by any motion of the spine, pain was often accompanied by back stiffness. On examination all patients had paravertebral muscle spasm and limited range of movements in all direction. Fever of 38.5 was found in the 2 cases with wound infection. An elevated E.S.R. that never decreased after surgery was found in all patients; also all patients had elevated C-reactive protein. MRI was done and the early changes started 4days after onset of symptoms. Treatment in all cases was conservative in form of immobilization, analgesics, muscle relaxant, and antibiotic. A wide spectrum, bactericidal antibiotic guided by the result of culture was used until the ESR became normal. Wound culture was positive in 2 cases and the organism was staphylococcus aureus. All patients improved on these measures and became pain free after 6-9 months.

DISCUSSION

Discitis, or disc space infection, is an inflammatory condition of the intervertebral disc that was first described clinically in 1953 by Turnbull.[10]

Discitis is considered to be a serious complication of lumbar disc surgery.[11] The retrospective design of most studies and the rare use of MRI for early radiologic diagnosis suggest that the reported incidence rate may be underestimates.[1]

Discitis occurs after 0.1to 4% in most series.[11] In this study the incidence was 4%. It may have resulted either from mechanical injury to the vertebral body end plate causing aseptic necrosis of these structures followed by

bacterial contamination or it may have resulted from an autoimmune process.[12]

In this study, one third only of cases had positive culture. Post-operative discitis occurred not by hematogenous spread but by direct inoculation of organisms into the disc space by a surgical procedure. The surgeon operates on an a vascular structure and leaves behind pieces of degenerated disc, necrotic tissue, and a varying size hematoma, all elements strongly predisposing to an eventual infection.

Interval from operation to onset of symptoms is about three days to eight months. In this study 4 patients developed discitis 3 weeks postoperatively while the other 2 cases developed it earlier, both of them on the 5th day. Patients complained of moderate to severe back pain which is exacerbated by any movement. 35% of patients had fever; signs include paravertebral muscle spasm and limited range of movements in all patients

An elevated E.S.R. that never decreases after surgery is strong indication of discitis. There is no direct relation between level of E.S.R. and the severity of infection.[13]

Plain x-ray of lumber spines usually is not helpful for early diagnosis. Interspace narrowing with some demineralization of the vertebral body is not seen before 2-4 weeks following onset of clinical symptoms.

MRI was found to be a more valuable diagnostic method than CT.[14] MRI findings of decreased signal from the disc and adjacent portion of vertebral bodies on T1, and increased signal from these structures on T2 may occur 3-5 days after onset of symptoms. MRI also rules out other causes of postoperative pain. Gadolinium enhancement is strongly suggestive of discitis. The enhancement will be in the vertebral bone marrow.[4] In this study all patients were investigated by MRI and MRI changes were found in all cases.

The transport of solutes from the extracellular space into the nucleus pulposus is primarily by passive diffusion. Therefore, transport of the antibiotics solutes is dependent on properties of the solute itself and the permeability of the adjacent end plates and annulus fibrosus.[7]

Urban et al concluded that solute charge had a major influence on their transport into the nucleus pulposus, which is rich in glycosaminoglycans and carries a net negative charge. They also showed that the annulus fibrosus and end plates had different intrinsic permeabilities to solutes. The peripheral annulus was found to be completely permeable, while the permeability of the bone- disc interface showed regional variation.[4]

Studies on the penetration of positively charged Gentamycin, Vancomycin, and Teicoplanin into the nucleus pulposus of rabbits showed that they reached peak concentration at 2 hours and remained at peak levels for at least 6 hours with adequate antimicrobial levels against both gram positive and gram negative microorganisms.[15]

Riley et al. determined the qualitative distribution of negatively charged Penicillin and positively charged Gentamycin within the rabbit disc, and found that Gentamycin readily penetrated and was evenly distributed in the nucleus pulposus, while negatively charged Pencillin was much less intense.[16]

In current study using positively charged vancomycin has the same effect in distribution that prevents post-operative discitis.

Conclusion

It is concluded that the use of vancomycin in the cleared disc space is effective in preventing postoperative discitis.

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