

## The Use of Intraoperative Antibiotic Irrigation in Decreasing the Incidence of Lumbar Disc Space Infection

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**Abstract:** One rare but significant complication of this intervention is discitis, an infection that occurs in the space between vertebrae and is estimated to affect approximately 1–2% of patients who have undergone spine surgery. The objective of this article is to evaluate the clinical evidence regarding the efficacy of intraoperative antibiotic irrigation in reducing the incidence of lumbar disc space infection. A study in Kirkuk City, Iraq, found that postoperative lumbar discitis was more common in 400 patients with low back pain, elevated ESR levels, and MRI indications. Patients were divided into two groups, one receiving antibiotic irrigation and the other not. Most were treated conservatively with bed rest, antibiotics, NSAIDs, and occasionally corticosteroids. The current outcomes demonstrated that patients within the age range of 31–40 years constituted the majority of the study population (42.5%), with males representing 53.5% and females accounting for 46.5%. Patients who underwent discectomy at the L4–L5 level exhibited the highest prevalence (42%), while those who underwent discectomy at the L1–L2 level demonstrated the lowest prevalence (2%). Lumbar disc space infection was observed in 5.5% of the first group and 10.5% of the second group. The results indicate that patients who underwent antibiotic irrigation (gentamycin) following discectomy exhibited enhanced surgical outcomes in comparison to patients who did not receive antibiotic irrigation.

**Keywords:** Lumbar Disc Space Infection; MRI Indications; Nsaids; Antibiotics; Corticosteroids.

### INTRODUCTION

It was Turnbull in 1953 that introduced the phrase 'postoperative discitis' to refer to a clinical entity. After lumbar discectomies, it is described as an initial infection in the nucleus pulposus involving subsequent involvement of the vertebral body and cartilaginous endplate [Turnbull, F, 1953].

An uncommon but serious side effect of spine surgery is discitis, which is described as an infection for the intervertebral disc region affecting 1% to 2% of individuals after the treatment [Rawlings, C. E. *et al.*, 1996]. The likelihood of contracting an infection is influenced through several factors, with the patient's health playing a major role. This intricate interaction includes a lot of variables, like patient weight, glucose management, nutritional health, smoking status, and particular illness [Darden, B. V, 2006].

Elevated erythrocyte sedimentation rates (ESR) or C-reactive protein (CRP) levels are commonly used in clinical diagnosis for postoperative lumbar discitis, whereas computerized tomography scanning (CT) or MRI (magnetic resonance imaging) are commonly used in radiographic diagnosis. For the diagnosis of postoperative discitis, it is crucial to identify the typical syndrome, which manifests as severe back pain, paravertebral lumbar muscle spasm, limited spine motility, and fever starting 3–30 days after surgery. Additionally, certain laboratory tests, such as an elevated erythrocyte sedimentation rate (ESR) as well as mildly towards moderately

elevated white blood cells (WBC), must be studied [Bavinzski, G. *et al.*, 2003].

Only when the following three distinct symptoms are present—a) anterior paravertebral tissue swelling, including obliteration in paravertebral fat planes, (b) vertebral end plate fragmentation or erosion, along with (c) paravertebral fluid collection (abscess)—can a CT scan be used to diagnose discitis [Natale, M. *et al.*, 1992]. In order to effectively manage discitis, an early diagnosis is crucial since postponing therapy may raise the risk in morbidity and death [Luzzuti, R. *et al.*, 20]09.

There is currently no evidence to support the effectiveness of standard postoperative lumbar discitis therapies. Bed rest and long-term antibiotic medication are the main treatments for discitis. In situations where conventional treatments are unsuccessful, surgery can be necessary. The majority at the time, cautious antibiotic therapy is enough [Viale, P. *et al.*, 2009; Basu, S]. The possibility of surgical intervention must be taken into consideration in situations of retrodiscal abscess. If treatment is not received, the discitis may go away on its own, cause a persistent low-grade infection, develop into osteomyelitis (also known as spondylodiscitis), or possibly develop in an epidural abscess. [Shulitz, K. B. *et al.*, 1994; Hincheliffe, R. *et al.*, 2007]

### PATIENT & METHODS

A prospective study was conducted on 400 patients from January 2010 to December 2023 at Kirkuk

City in Iraq. The patients underwent a single lumbar discectomy and were divided into two equal groups. The first group was irrigated with a gentamycin ampule (80 mg) after discectomy, whereas the second group underwent discectomy without antibiotic irrigation. The patients were monitored for the development of postoperative lumbar discitis based on the presence of clinical, radiological, and haematological data.

The diagnosis of discitis was made in any patient who developed low back pain with or without sciatica (usually after a period of pain relief) associated with high ESR and radiological signs on MRI. In most cases, conservative treatment, comprising bed rest, antibiotics, non-steroidal anti-

inflammatory drugs (NSAIDs), and, on occasion, corticosteroids, proved sufficient. Surgical intervention was required in only two cases, where there was a retrodiscal abscess and neural compression.

## RESULTS

Demographic findings enrolled patients ages (31 – 40) years were the most prevalent in the study, which includes 42.5% of total patients, males included 53.5%, and females were 46.5%, smokers had 39%, and 43% of patients suffered with hypertension, where all variables can be seen *Table 1*.

**Table 1:** Demographic data of participants

Characteristics	No. of patients, 400, [N/%]
<b>Age</b>	
≤ 20	4/1
21- 30	89/22.5
31- 40	170/42.5
41- 50	125/31.5
> 50	12/3
<b>Sex</b>	
Males	214/53.5
Females	186/46.5
<b>BMI</b>	
Underweight	40/10
Normal weight	100/25
Overweight	200/50
Obese	60/15
<b>Smoking</b>	
Yes	156/39
No	244/61
<b>ASA classification (N/%)</b>	
I	80/20
II	120/30
III	200/50
<b>Comorbidities</b>	
Hypertension	172/43
Coronary artery disease	20/5
Anaemia	40/10
Diabetes mellitus	92/23
Others	76/19
<b>Income levels, \$</b>	
≤ 600	88/22
600 - 800	192/48
≥ 800	120/30

In **TABLE 2**, we found patients who underwent discectomy in L4 – L5 were the most prevalent,

with 42%, while patients who underwent discectomy in L1 - L2 were the least with 2%.

**Table 2:** Distribution discectomy levels on patients

Discectomy levels	Percentage
L1 – L2	2%
L2 – L3	6%
L3 – L4	17%
L4 – L5	42%
L5 – S1	33%

The incidence of discitis was 8% (n=32) and was significantly higher in the second group (10.5%)

than in the first group (5.5%), as illustrated in **Table 3.**

**Table 3:** Distribution of discitis incidence in both groups

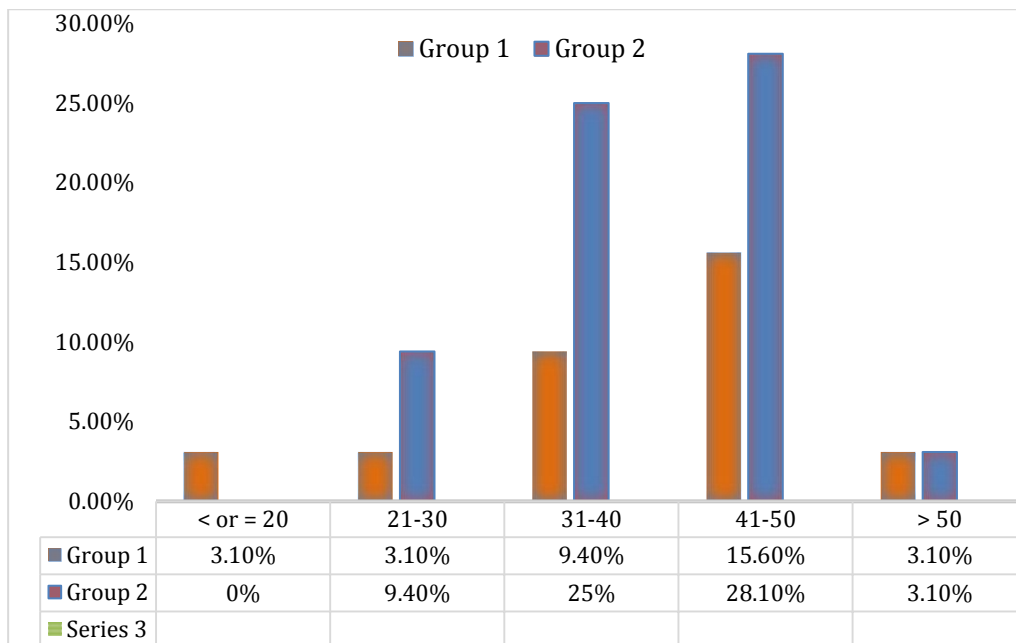
Groups	%
First Group	5.5
Second Group	10.5

**Table 4** illustrates that males received 3% in the initial group and 4% in the subsequent group,

whereas females obtained 2.5% in the initial group and 6% in the subsequent group.

**Table 4:** Determining of discitis incidence in males and females for both groups

Participants, M/F	First group	Second group
Males	3%	4%
Females	2.5%	6%



**Figure 1:** Correlation contracting of patients’ discitis with ages

In **Figure 1**, we noticed that almost of patients (41 – 50) years were prevalent in both groups, where it enrolled 15.6% in group 1 and 28.1% in group 2.

**Table 5:** Correlation conducting of discitis in related to level of discectomy

Level	Group (1)	Group (2)	Total
L1-L2	0 (0 %)	0 (0 %)	0 (0 %)
L2-L3	0 (0 %)	1 (0.5 %)	0 (0.25 %)
L3-L4	2 (1 %)	4 (2 %)	6 (1.5 %)
L4-L5	6 (3 %)	11 (5.5 %)	17 (4.25 %)
L5-S1	3 (1.5 %)	5 (2.5 %)	8 (2 %)
<b>Total</b>	<b>11 (5.5 %)</b>	<b>21 (10.5 %)</b>	<b>32 (8 %)</b>

**Table 6:** Univariate analysis of patient data distributed across both groups

Variables	OR CI 95%	
	Group 1	Group 2
Age	3.13 [1.01 – 6.72]	2.93 [1.83 – 3.20]
Sex	5.74 [0.1 – 6.77]	3.18 [2.94 – 5.64]
Smoking	4.32 [2.44 – 5.86]	4.68 [5.16 – 7.94]
Hypertension	2.3 [1.03 – 6.41]	3.88 [0.53 – 6.58]
Diabetes mellitus	5.95 [3.02 – 7.80]	4.70 [3.10 – 6.40]
Discectomy levels	2.05 [1.10 – 7.32]	1.79 [0.47 – 3.21]
Discitis	4.90 [2.86 – 6.53]	5.45 [2.73 – 7.34]
Infection	5.98 [2.24 – 8.60]	3.96 [2.17 – 5.89]

## DISCUSSION

The preceding study concurred with the growing acceptance of gentamicin as an antibiotic irrigation agent in a range of surgical procedures, including discectomy. This approach has been shown to reduce the incidence of postoperative infections, offering several benefits to the patient.

[Haines, S. J, 1982] US study demonstrated that discectomy is a surgical procedure with an exceedingly high risk of postoperative infections. Furthermore, studies have demonstrated that the use of antibiotic irrigation with gentamicin can markedly reduce the prevalence of these infections. Surgical sites often exhibit high levels of tissue exudates, which can harbour a diverse range of bacteria, including some that are susceptible to gentamicin [Haines, S. J, 1982]. This reduces the likelihood of such infections occurring, which can result in prolonged hospital stays, readmission, and other unfavourable outcomes. [Maguire, W. B, 1964; Molinari, R. W. *et al.*, 2012; Basu, S. *et al.*, 2012; Silber, J. S. *et al.*, 2002; Rathbone, C. R. *et al.*, 2011; Sweet, F. A. *et al.*, 2011]

Some studies have indicated that the use of gentamicin irrigation is beneficial to surgical outcomes in patients. Post-discectomy infections can cause pain, prolong the rehabilitation process, and affect functional recovery. Gentamicin irrigation has been shown to enhance patient outcomes by minimising infection risk, which in turn facilitates faster recovery. [O'Neill, K. R. *et al.*, 2011; Strom, R. G. *et al.*, 2013; Takahashi, J. *et al.*, 2001; Kang, B. U. *et al.*, 2010]

Although the initial cost of gentamicin irrigation may be higher than that of procedures that do not involve antibiotic irrigation, the benefits in the long term are evident [Meyer, B. *et al.*, 1995]. The prevention of postoperative infections has the potential to reduce costs by avoiding the necessity for subsequent therapies, prolonging hospital

admissions, or avoiding the adverse effects of infection [Sasso, R. C. *et al.*, 2008; Gelalis, I. D. *et al.*, 2011].

## CONCLUSION

The results showed that patients who underwent discectomy with the adjunct antibiotic irrigation using gentamicin demonstrated lower risks of infecting the surgical site, better surgical outcomes, a cost-saving approach, and levelled better satisfaction.

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