



Original Article

Relationship between Postoperative Dexamethasone Following Posterior Spinal Surgery and Surgical Site Infection

Imran Altaf

Department of Neurosurgery, Khawaja Muhammad Safdar Medical College, Sialkot

ABSTRACT

Objective: Studies have shown that postoperative dexamethasone administration in patients in whom posterior spinal surgical interventions have been carried out reduces the postoperative pain and decreases the analgesia requirement. Our study aimed to find out whether the use of postoperative steroids in patients that had undergone posterior spinal surgical procedures led to an increased incidence of wound infections.

Materials and Methods: The medical data of 52 patients in whom posterior spinal surgical interventions had been performed were retrospectively analyzed. The patients were divided into two groups. In the first group, postoperative dexamethasone had been administered after spinal surgery, and in the second group, no postoperative dexamethasone had been given. The two groups were then compared for their association with postoperative surgical site infection.

Results: Forty-five patients were included in the group in whom postoperative dexamethasone was given. Six (13.3%) of these patients developed postoperative surgical site infections. None of the seven patients in the second group in whom no postoperative dexamethasone had been administered developed postoperative wound infection. The difference in infection rate between the two groups did not reach statistical significance ($p = 0.3$).

Conclusion: An infection rate of 13.3% in the group of patients in whom postoperative dexamethasone had been administered is considerably high as compared to the 1 – 2% incidence quoted in the literature for simple laminectomy procedures. A prospective study with a larger sample size is needed to accurately define the relationship between postoperative dexamethasone administration and surgical site infection following posterior spinal surgery.

Keywords: Postoperative dexamethasone administration, spinal surgery, surgical site infection.

Corresponding Author: Imran Altaf

Department of Neurosurgery, Khawaja Muhammad Safdar
Medical College, Sialkot
Email: drimr2@hotmail.com

Date of Print: 30-9-2022

DOI: 10.36552/pjns.v26i3.779

Date of Submission: 07-04-2022

Date of Revision: 18-08-2022

Date of Acceptance: 17-09-2022

Date of Online Publishing: 30-9-2022

INTRODUCTION

Surgical site infections are one of the most serious complications that could occur in patients

that have undergone spinal surgical interventions.^{1,2,3} The incidence ranges from 1 – 2% for simple laminectomy procedures.^{4,5} For instrumented spinal fusions the incidence of postoperative infection ranges from 2.4 – 8.5%.⁵ Wound infections following spinal surgical interventions lead to increased morbidity and also the management costs of healthcare rise significantly.^{1,2,6,7,8} Such infections are also implied in worsening the postoperative clinical outcome.^{3,6,7} The impact of such infections could be judged by the fact that Calderone et al,⁹ estimated that in patients developing postoperative wound infections following spinal surgical interventions the costs of healthcare management get increased more than four times. Treatment of such infections could turn out to be a challenging task and they may even require further surgical interventions.^{2,3,7}

Studies have shown that postoperative steroids given after posterior spinal surgeries reduce postoperative pain and decrease the postoperative analgesia requirement.^{10,11} There is still, however, hesitancy on the part of the surgeons to employ postoperative steroids for pain control and reduction in analgesia requirements because of the fear that it may impair wound healing and lead to an increase in infection rate.^{11,12} These fears are however not substantiated by evidence.¹² Our study aimed to find out whether the use of postoperative steroids in patients that had undergone posterior spinal surgical procedures in our institution had led to an increased incidence of wound infections.

MATERIALS AND METHODS

Study Design and Setting

A retrospective observational study was carried out in the neurosurgery department of Khawaja Safdar Medical College Sialkot. The medical data of all the adult patients in whom posterior spinal surgical interventions had been performed

between 3rd March 2016 and 31st November 2017 were retrospectively analyzed.

Inclusion Criteria

The study included all the adult patients in whom posterior spinal surgical procedures had been carried out.

Exclusion Criteria

Patients with a history of diabetes were excluded from the study. Patients in whom a previous spinal surgical intervention had been carried out were also excluded from the study.

Patient Groups and Management Protocol

The patients were divided into two groups. In group one, the patients had been administered postoperative dexamethasone intravenously after spinal surgery. Group two consisted of patients to whom no dexamethasone had been administered postoperatively. The postoperative management of both groups was similar to the employment of routine analgesia and antibiotics. All the patients were followed for a minimum of three months.

Postoperative surgical site infection (SSI) was diagnosed based on clinical symptomatology. If a patient developed severe backache postoperatively that did not get relieved by rest and was accompanied by a limitation of range of motion and clinical examination revealed back tenderness then a diagnosis of postoperative surgical site infection was made. The initial management in all the cases of postoperative SSI was conservative with the employment of multiple antibiotic therapy regimens. If the conservative measures failed and the symptomatology of the patient did not improve then an open surgical debridement of the infected wound was carried out.

Data Analysis

With the application of a chi-square test, a statistical analysis was carried out for assessing the relationship between postoperative dexamethasone administration and surgical site infection. For statistical analysis, a p-value of < 0.05 was considered to be significant.

Ethical Board Approval

The study was retrospective, and approval from the Ethical Board was not required.

RESULTS

Gender Distribution

Fifty-two patients were included in the study. Twenty-eight of them were males and twenty-four were females.

Age Distribution

Group one consisted of those patients to whom postoperative dexamethasone had been given. Forty-five patients were included in this group and the mean age of the patients was 43.2 years. Group two consisted of patients to whom no postoperative dexamethasone had been given. Seven patients were included in this group and the mean age of the patients was 44.7 years.

Clinical Presentation

The different pathologies in which posterior spinal surgical intervention had been carried out in our institution included thirty-seven cases of the prolapsed lumbar intervertebral disc, eleven cases of lumbar stenosis, and four cases of spinal space-occupying lesions.

Group 1 consisted of forty-five patients to whom postoperative dexamethasone was given. Injection dexamethasone was given to these patients intravenously for a mean of 4.6 days. The mean dose of dexamethasone given was 28 mg (7 ml). Six (13.3%) patients in this group developed deep wound infection postoperatively. Two of them were managed successfully with antibiotic therapy. In the other four open surgical wound debridement had to be carried out. The mean hospital stay of patients who did not develop an infection was 3.8 days, whereas the mean hospital stay of the six patients that developed an infection was 21.2 days. Group two consisted of seven patients to whom no postoperative dexamethasone was given. None of the patients in this group developed a postoperative wound infection. Statistical analysis showed that the difference in infection rate between the two groups ($p = 0.3$) was not statistically significant. The relationship between postoperative dexamethasone administration and the development of postoperative surgical site infection is shown in table 1.

Surgical site infections following spinal surgical procedures could have devastating consequences for the patients.^{2,13,14} They prolong the period of hospitalization,^{3, 15} lead to deterioration of clinical outcome and substantially increase the cost of healthcare management.^{6,7,8}

Table 1: Relationship between postoperative dexamethasone administration following posterior spinal surgery and surgical site infection.

	No Surgical Site Infection (n = 46)	Surgical Site Infection (n = 6)	P-value
Postoperative dexamethasone administration	39	6	0.3062
No dexamethasone administration	7	0	

DISCUSSION

Steroids given postoperatively after posterior spinal surgical procedures are effective in reducing postoperative pain and decreasing the patient's analgesia requirements.^{10,11} Apprehension still exists in the surgical community on the utilization of steroids for postoperative pain control based on the fear that it may increase wound complications and infection rate.^{10,12} There is still, however, no evidence that gives credence to these fears.¹²

In our institution majority of the patients are given steroids postoperatively for pain reduction and to decrease analgesia requirements. A retrospective analysis of the medical data was carried out in our institution to determine if the administration of postoperative steroids has led to an increased infection rate in our patients compared to the historical records, as the surgical cohort of patients who had not been administered postoperative steroids in our department was quite small for a meaningful comparison. Fletcher ND et al¹⁰ in his study found that the opioid requirement of patients was reduced by 40%, and the clinical outcome also improved in patients that had been given postoperative dexamethasone following posterior spinal fusions for treating adolescent idiopathic scoliosis without leading to an increase in wound complications. In our department, only laminectomy procedures had been carried out and no instrumented spinal fusions had been done, yet an infection rate of 13.3% was quite high as compared to the 1 – 2% incidence^{4,5} quoted in the literature for simple laminectomy procedures. Our institutional experience with increased infection rates after postoperative dexamethasone is thus in contrast to the findings of Fletcher ND et al,¹⁰ where postoperative dexamethasone did not significantly increase infection rates.

CONCLUSION

We conclude that an infection rate of 13.3% in the group of patients in whom postoperative dexamethasone had been administered is considerably high as compared to 1-2% incidence quoted in literature after simple laminectomy procedures. A prospective study with a larger sample size is needed, however, to accurately define the relationship between postoperative dexamethasone administration and surgical site infection following posterior spinal surgery.

LIMITATIONS

The study is a single-center, retrospective, and non-randomized study. The sample size is also small. The cohort of patients in whom no postoperative steroids had been administered was quite small for a meaningful comparison. Thus a comparison of infection rates in patients who had been administered postoperative steroids had to be done with historical records of infection rates after laminectomy procedures to analyze our data. A prospective and randomized study consisting of a larger sample size is needed for an accurate definition of the relationship between postoperative dexamethasone administration and wound infection following posterior spinal surgical procedures.

REFERENCES

1. White AJ, Fiani B, Jarrah R, Momin AA, Rasouli J. Surgical Site Infection Prophylaxis and Wound Management in Spine Surgery. *Asian Spine J.* 2022; 16 (3): 451-461.
2. Abhijit Yuvaraj Pawar, Samar Kumar Biswas. Postoperative Spine Infections. *Asian Spine J.* 2016; 10 (1): 176–183.
3. Rao SB, Vasquez G, Harrop J, Maltenfort M, Stein N, Kaliyadan G et al. Risk factors for surgical site infections following spinal fusion procedures: a case-control study. *Clin Infect Dis.* 2011; 53 (7): 686-92.
4. Bible JE, Biswas D, Devin CJ. Postoperative

- infections of the spine. *Am J Orthop* (Belle Mead NJ). 2011; 40 (12): E264-71.
5. J. J. P. Schimmel, P. P. Horsting, M. de Kleuver, G. Wonders, J. van Limbeek. Risk factors for deep surgical site infections after spinal fusion. *Eur Spine J*. 2010; 19 (10): 1711–1719.
 6. Ogiyara S, Yamazaki T, Inanami H, Oka H, Maruyama T, Miyoshi K, et al. Risk factors for surgical site infection after lumbar laminectomy and/or discectomy for degenerative diseases in adults: A prospective multicenter surveillance study with registry of 4027 cases. *PLoS One*, 2018; 13 (10): e0205539.
 7. Liu JT, Liao WJ, Chang CS, Chen YH. Management of Deep Infection after Instrumentation on Lumbar Spinal Surgery in a Single Institution. *Biomed Res Int*. 2015; 2015: 842010.
 8. Jad Chahoud, Zeina Kanafani, and Souha S. Kanj. Surgical Site Infections Following Spine Surgery: Eliminating the Controversies in the Diagnosis. *Front Med* (Lausanne). 2014; 1: 7.
 9. Calderone RR, Garland DE, Capen DA, Oster H. Cost of medical care for postoperative spinal infections. *Orthop Clin North Am*. 1996; 27 (1): 171-82.
 10. Fletcher ND, Ruska T, Austin TM, Guisse NF, Murphy JS, Bruce RW Jr. Postoperative Dexamethasone Following Posterior Spinal Fusion for Adolescent Idiopathic Scoliosis. *J Bone Joint Surg Am*. 2020; 102 (20): 1807-1813.
 11. King JS. Dexamethasone--a helpful adjunct in management after lumbar discectomy. *Neurosurgery*, 1984; 14 (6): 697-700.
 12. McIntosh AL. Dexamethasone Administration Decreases Opioid Usage After Posterior Spinal Fusion in Patients with Adolescent Idiopathic Scoliosis: Commentary on article by Nicholas D. Fletcher, MD, et al.: "Postoperative Dexamethasone Following Posterior Spinal Fusion for Adolescent Idiopathic Scoliosis". *J Bone Joint Surg Am*. 2020; 102 (20): e120.
 13. Vishal Hegde, Dennis S Meredith, Christopher K Kepler, and Russel C Huang. Management of postoperative spinal infections. *World J Orthop*. 2012; 3 (11): 182-189.
 14. Fang-Yeng Chang, Ming-Chau Chang, Shih-Tien Wang, Wing-Kwang Yu, Chien-Lin Liu, and Tain-Hsiung Chen. Can povidone-iodine solution be used safely in a spinal surgery? *Eur Spine J*. 2006; 15 (6): 1005–1014.
 15. Olsen MA, Mayfield J, Lauryssen C, Polish LB, Jones M, Vest J, et al. Risk factors for surgical site infection in spinal surgery. *J Neurosurg*. 2003; 98 (2 Suppl): 149-55.

Additional Information

Disclosures: Authors report no conflict of interest.

Ethical Review Board Approval: The study was conformed to the ethical review board requirements.

Human Subjects: Consent was obtained by all patients/participants in this study.

Conflicts of Interest:

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Financial Relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other Relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

AUTHOR CONTRIBUTIONS

Sr.#	Author's Full Name	Intellectual Contribution to Paper in Terms of:
1.	Dr. Imran Altaf	Study design, methodology, data collection, data analysis and literature review.