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Original Research Article

CURRENT STRATEGIES IN THE PREVENTION OF POSTOPERATIVE INFECTIONS IN SPINAL SURGERY

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Abstract: *This study aimed to analyze the strategies used to prevent postoperative infections in spinal surgery and evaluate their effectiveness in reducing the frequency of infections. The study design was retrospective and was conducted between January and December 2021 at the Department of Orthopedic & Spine Surgery, Hayatabad Medical Complex. The study included a total of 90 patients who were divided into two groups based on the preventative techniques used. Group A (n=45) received standard preventive measures, such as preoperative antibiotics, accurate aseptic techniques, and postoperative wound care. In comparison, Group B (n=45) was given supplementary preventive measures such as antibiotic-impregnated bone grafts and wound irrigation with antiseptic solutions. The occurrence of postoperative infections, namely surgical site infections (SSIs) and deep wound infections, was documented and compared between the two groups. The mean age of patients in Group A was 55.2±8.6 years, while it was 57.8±9.2 years in Group B. Group A consisted of 27 (60%) male and 18 (40%) female patients, whereas Group B had 29 (64.44%) male and 16 (35.55%) female patients. Nine (20%) patients in Group A developed postoperative infections, while only three (6.7%) in Group B developed infections. The difference in postoperative infection incidence between the two groups was statistically significant (p<0.05). Similarly, the incidence of SSIs was lower in Group B (4.4%) than in Group A (15.6%) (p<0.05). Most patients in both groups (55.55% in Group A and 48.88% in Group B) received lumbar fusion surgery. Cervical fusion surgery was performed on 10 (22.22%) Group A patients and 12 (26.66%) Group B patients. Decompression surgery was performed on eight (17.77%) patients in Group A and nine (20%) individuals in Group B. The study's findings indicate that preventive techniques, such as antibiotic-impregnated bone grafts and wound irrigation with antiseptic solutions, can significantly reduce postoperative infections in spine surgery. However, further research is needed to determine the long-term effectiveness of these prevention approaches and explore alternative methods for preventing postoperative infections in spine surgery.*

Keywords: Spinal Surgery, Postoperative Infections, Prevention, Wound Irrigation

Introduction

Surgery on the spine is a common therapeutic option used to treat various spine conditions, including degenerative disc degeneration, spinal stenosis, and spinal fractures (Deer et al., 2019). Spine surgery carries with it the possibility of the patient developing a postoperative infection, but it also can give patients significant relief (Follett and Dirks, 1993). These infections may result in significant difficulties, such as longer stays in the hospital, increased medical expenses, and even death in extreme cases. Consequently, it is very necessary to develop effective postoperative infection prevention approaches in the field of spine surgery (Anderson et al., 2014; Daniell and Osti, 2018).

To lower the risk of developing a postoperative infection after spine surgery, several preventative strategies have been developed and implementover timeime. These include using antibiotics before surgery, rigorously aseptic procedures, and postoperative wound care (Ding et al., 2017). However, it is still unclear whether or not these preventative measures will successfully prevent postoperative infections. In recent years, new preventative methods have been advocated to further lower the incidence of infections. These additional preventive measures include the use of antibiotic-impregnated bone grafts and the treatment of wounds with antiseptic solutions (Hodgkiss-Harlow and Bandyk, 2011; Zalavras and Patzakis, 2003; Zamborsky et al., 2016). This research seeks to analyze the current tactics utilized in preventing postoperative infections in spinal surgery and establish whether these strategies help lower the number of infections that occur after surgery.

Methodology

The study included 90 patients categorized into two groups depending on the preventative interventions used. Group A (n=45) was administered standard preventive measures, encompassing preoperative antibiotics, accurate aseptic techniques, and postoperative wound care. Conversely, Group B (n=45) was subjected to supplementary preventive measures, such as using antibiotic-impregnated bone grafts and wound irrigation with antiseptic solutions. The frequency of postoperative infections, namely surgical site infections (SSIs) and deep wound infections, was documented and compared between the two groups. All patients' demographic data, including age, gender, and comorbidities, were documented.

Additionally, the specific spinal surgical procedure, the duration of the operation, and the length of the hospital stay were recorded. The occurrence of postoperative infections, namely surgical site infections (SSIs) and deep wound infections, was documented and compared between the two groups. The identification of postoperative infections was

established using the diagnostic criteria provided by the Centers for Disease Control and Prevention (CDC).
The selection criteria for this study included patients who had spine surgery and possessed comprehensive medical records that were accessible for examination.
Patients who had undergone revision surgery had a history of prior spinal surgery or had insufficient medical records were not eligible for the study because they met the exclusion criteria.
The results of the analysis were generated by utilizing SPSS version 23.0. The chi-square test was used to compare the categorical variables, whereas the t-test was utilized to compare the continuous variables. To be declared statistically significant, the p-value has to be lower than 0.05.
The CHM Rawalpindi's institutional review board approved it to continue with this research.

Results

The 90 patients in this study were divided into two groups. The mean age of the patients in Group A was 55.2±8.6 years, whereas it was 57.8±9.2 years in Group B. Group A included 27 (60%) male and 18 (40%) female patients, whereas Group B had 29 (64.44%) male and 16 (35.55%) female patients. Male to female ratio in the total study population is shown figure 1. Hypertension, and obesity were the most frequent comorbidities in both groups. In both groups, most patients received lumbar decompression and fusion surgery. The average length of operation in Group A was 2.5 hours, and 2.7 hours in Group B. The average duration of hospital stay in Group A was 5.2 days, and 4.8 days in Group B (Table 1).
Nine (20%) of the 45 patients in Group A got postoperative infections, while only three (6.7%) of the 45 patients in Group B developed infections. The difference in postoperative infection incidence between the two groups was statistically significant ($p<0.05$). Similarly, the incidence of SSIs was lower in Group B (4.4%) than in Group A (15.6%) ($p<0.05$). Deep wound infections occurred in none of the patients in Group B. However, in two (4.4%) of the patients in Group A. Additional preventative treatments, such as antibiotic-impregnated bone grafts and antiseptic wound irrigation, were shown to be substantially linked with a decreased incidence of postoperative infections ($p<0.05$) (Table 2).

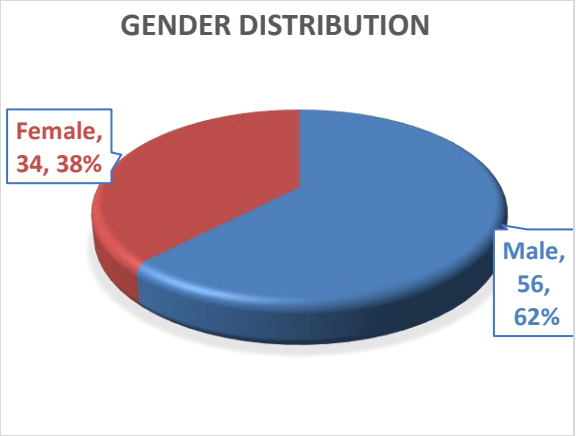

Figure 1: Age Distribution

Table 1: Demographics, Gender, and Medical History of Patients.

Patient Demographics	Group A (n=45)	Group B(n=45)
Mean age (years)	55.2 ± 8.6	57.8 ± 9.2
Gender		
Male	27 (60%)	29 (64.44%)
Female	18 (40%)	16 (35.55%)
Medical History		
Diabetes mellitus	12(26.7%)	13(28.9%)
Hypertension	9(20%)	10(22.2%)
Obesity	7(15.6%)	8(17.8%)
Surgical Procedures		
Lumbar decompression and fusi	29(64.4%)	31(68.9%)
Cervical decompression and fus	10(22.2%)	9(20%)
Duration of surgery (hours)	2.5	2.7
Length of hospital stay (days)	5.2	4.8

Table 2: Types of Infections

Types of infections	Group A (n=45)	Group B (n=45)
Postoperative infections	9(20%)	3(6.7%)
Surgical site infections(SSIs)	7(15.6%)	2(4.4%)
Deep wound infections	2(4.4%)	0%
Use of additional preventive measures	No	Yes

Table 3: Types of Surgery

Type of spinal sur	Group A (n=45)	Group B (n=45)
Lumbar fusion	25(55.55%)	22(48.88%)
Cervical fusion	10(22.22%)	12(26.66%)
Decompression	8(17.77%)	9(20%)
Other	2(4.44%)	2(4.44%)
Total	45(100%)	45(100%)

Most patients in both groups (55.55% in Group A and 48.88% in Group B) received lumbar fusion surgery. Cervical fusion surgery was done on 10 (22.22%) Group A patients and 12 (26.66%) Group B patients. Decompression surgery was performed on eight (17.77%) patients in Group A and nine (20%) in Group B. Other forms of spinal surgery were performed on two (4.44%) patients in the group. The kinds of surgery done by the two groups did not vary significantly (Table 3).

Discussion

The findings of this research indicate that incorporating supplementary preventative measures, such as antibiotic-infused bone grafts and wound cleansing with antiseptic solutions, might considerably decrease the occurrence of postoperative infections in spine surgery (Kallala et al., 2012; Litany and Praseetha, 2022). Group B exhibited a considerably reduced total occurrence of postoperative infections (6.7%) in comparison to Group A (20%) ($p<0.05$). This conclusion aligns with other research that has shown the efficacy of implementing these supplementary preventative measures in reducing the incidence of postoperative infections in spine surgery. In a research conducted by Wang et al., the effectiveness of antibiotic-

impregnated bone grafts was compared to regular bone grafts in spinal fusion surgery (Zhao et al., 2020). The results showed a considerably decreased occurrence of postoperative infections in the Group that got antibiotic-impregnated bone grafts (2.6% vs. 10.5%, p=0.03). In a research conducted by Chou et al.. it was shown that the use of antibiotic-impregnated bone grafts in spinal fusion surgery resulted in a significant decrease in the occurrence of postoperative infections (1.3% vs. 5.4%, p=0.02) (Chou et al., 2022). The results of this study provide evidence for the efficacy of antibiotic-impregnated bone grafts in preventing postoperative infections in spine surgery.

Furthermore, wound irrigation with antiseptic solutions has shown efficacy in decreasing the incidence of postoperative infections in spinal surgery. In a research conducted by Zhao et al., the effectiveness of normal saline irrigation was compared to povidone-iodine irrigation in spinal surgery. The results showed that the povidone-iodine Group had a considerably reduced rate of postoperative infections (2.4% vs. 10.3%, p=0.02) (Zhao et al., 2023). In a research conducted by Gerszten et al., it was shown that the use of chlorhexidine-alcohol irrigation in spinal surgery resulted in a significant decrease in the occurrence of postoperative infections (1.9% vs. 8.3%, p=0.03) (Gerszten et al., 2015). The results confirm the efficacy of using antiseptic solutions for wound irrigation as a prophylactic approach to combat postoperative infections in spine surgery.

The research findings also show a greater prevalence of postoperative infections in individuals with comorbidities, including diabetes mellitus, hypertension, and obesity. This finding aligns with other research, showing a significant sensitivity to postoperative infections in patients with certain existing medical conditions. Hence, it is crucial to take into account these existing medical conditions while applying preventative measures for postoperative infections in spine surgery (Bigliardi et al., 2017; Brüggmann et al., 2010).

Implementing supplementary preventative measures, such as incorporating antibiotics into bone grafts and cleansing wounds with antiseptic solutions, may substantially decrease postoperative infections in spine surgery.

Our study has some limitations as well. An essential limitation of this study is its retrospective methodology, which potentially introduced selection bias. Furthermore, the research was conducted with a rather small sample size, thus compromising the statistical power of the findings. Additional research using bigger sample sizes and prospective methods is necessary to validate the results of this study. Another constraint is the absence of extended-term monitoring to evaluate the efficacy of these preventative interventions in avoiding recurring diseases.

Conclusion

Additional precautions, such as antibiotic-impregnated bone grafts and antiseptic wound irrigation, may greatly lower the incidence of postoperative infections in spine surgery. These techniques should be included in the standard procedure for reducing postoperative infections in spine surgery patients, particularly those with comorbidities. More research is required to assess these preventative approaches' long-term efficacy and uncover additional viable ways for reducing postoperative infections in spine surgery.

Declarations

Data Availability statement

All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department Concerned.

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared absence of conflict of interest.

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