

Assessment of role of the local vancomycin administration to SSI prevention during spine operations

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ABSTRACT:

Background: A surgical site infection (SSI) is an infection that occurs after surgery in the area of the body where the surgical procedure took place. The present study was conducted to assess the role of the local vancomycin administration to SSI prevention during spine operations. **Materials & Methods:** 76 patients who underwent spinal surgery of both genders were divided into 2 groups of 38 each. Group I received local application of vancomycin and in group II no local antibiotic was used. Parameters such as operation time, blood loss, type of SSI and bacteria etc. were recorded. **Results:** Group I had 20 males and 18 females and group II had 21 males and 17 females. In group I and group II, diabetes was seen in 5 and 6 patients respectively. Hypertension was seen in 7 and 5 patients respectively. SSI was seen in 4 and 8 patients respectively. The type of SSI was superficial in 2 and 3 and deep in 2 and 5 patients respectively. Bacteria were E. Coli in 2 and 4, Klebsiella in 1 and 2 and MRSA in 1 and 2 patients respectively. Southampton scale category A was seen in 21 and 20, category B in 15 and 14 and category C in 2 and 4 patients respectively. The difference was significant ($P < 0.05$). The mean operative time in group I was 140.2 minutes and in group II was 142.5 minutes. The mean blood loss was 182.4 ml in group I and 180.2 ml in group II. The difference was significant ($P < 0.05$). **Conclusion:** SSIs are a significant issue that impact spine procedures and use up medical resources. The goal of administering vancomycin powder locally is to reduce the rate of infection. When vancomycin is used locally, fewer bacteria are present at the surgical site, which lowers the risk of surgical site infections.

Keywords: Surgical site infection, Bacteria, vancomycin

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INTRODUCTION

A surgical site infection (SSI) is an infection that occurs after surgery in the area of the body where the surgical procedure took place. SSIs can vary in severity, ranging from superficial infections involving the skin and subcutaneous tissue to more serious infections that extend to deeper structures, such as muscles, fascia, or organs.¹ Risk factors for SSI include patient-related factors and procedure-related factors. Immunocompromised state, obesity, diabetes, smoking, and malnutrition can increase the risk of SSIs.² The type and duration of surgery, the presence of foreign bodies (like implants), and the use of contaminated instruments or inadequate sterilization procedures can contribute to the risk. Signs and symptoms are redness, swelling, and warmth around the surgical site. Increased pain or tenderness at the surgical site, presence of pus or other drainage from the wound, fever and systemic signs of infection.³ Superficial incisional SSI involves the skin and subcutaneous tissue. Deep incisional SSI is an infection involving deeper structures, such as muscles and fascia. Organ/Space SSI is an infection involving any part of the body other than the incision, such as an organ or the abdominal cavity. Intravenous (IV) antibiotics, such as clindamycin or a first-generation

cephalosporin, have historically been used as part of perioperative prophylaxis for SSIs during spinal surgery.⁴ These antibiotics should be started one hour prior to the surgical incision and stopped 24 hours after the procedure is completed. Cephalosporins have been used because of their strong antibacterial properties against Gram-positive bacteria, particularly *Staphylococcus aureus* (*S. aureus*) and other *Staphylococcus* species members, which are the most common cause of SSIs.⁵ The present study was conducted to assess the role of the local vancomycin administration to SSI prevention during spine operations.

MATERIALS & METHODS

The present study consisted of 76 patients who underwent spinal surgery of both genders. All gave their written consent to participate in the study. Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 38 each. Group I received local application of vancomycin (After bathing the surgical site, vancomycin was applied deep to deep fascia and muscles and superficial at subcutaneous tissues), and in group II no local antibiotic was used. History of diabetes and hypertension was taken. Parameters such as operation

time, blood loss, type of SSI and bacteria etc. were recorded. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Method	Vancomycin	No vancomycin
M:F	20:18	21:17

Table I shows that group I had 20 males and 18 females and group II had 21 males and 17 females.

Table II Comparison of parameters

Parameters	Variables	Group I	Group II	P value
Diabetes	Yes	5	6	0.84
	No	33	32	
Hypertension	Yes	7	5	0.90
	No	31	33	
SSI	Yes	4	8	0.02
	No	34	30	
Type	Superficial	2	3	0.05
	Deep	2	5	
Bacteria	E. Coli	2	4	0.03
	Klebsiella	1	2	
	MRSA	1	2	
Southampton scale	Category A	21	20	0.58
	Category B	15	14	
	Category C	2	4	

Table II, graph I show that in group I and group II, diabetes was seen in 5 and 6 patients respectively. Hypertension was seen in 7 and 5 patients respectively. SSI was seen in 4 and 8 patients respectively. The type of SSI was superficial in 2 and 3 and deep in 2 and 5 patients respectively. Bacteria

were E. Coli in 2 and 4, Klebsiella in 1 and 2 and MRSA in 1 and 2 patients respectively. Southampton scale category A was seen in 21 and 20, category B in 15 and 14 and category C in 2 and 4 patients respectively. The difference was significant (P< 0.05).

Graph I Comparison of parameters

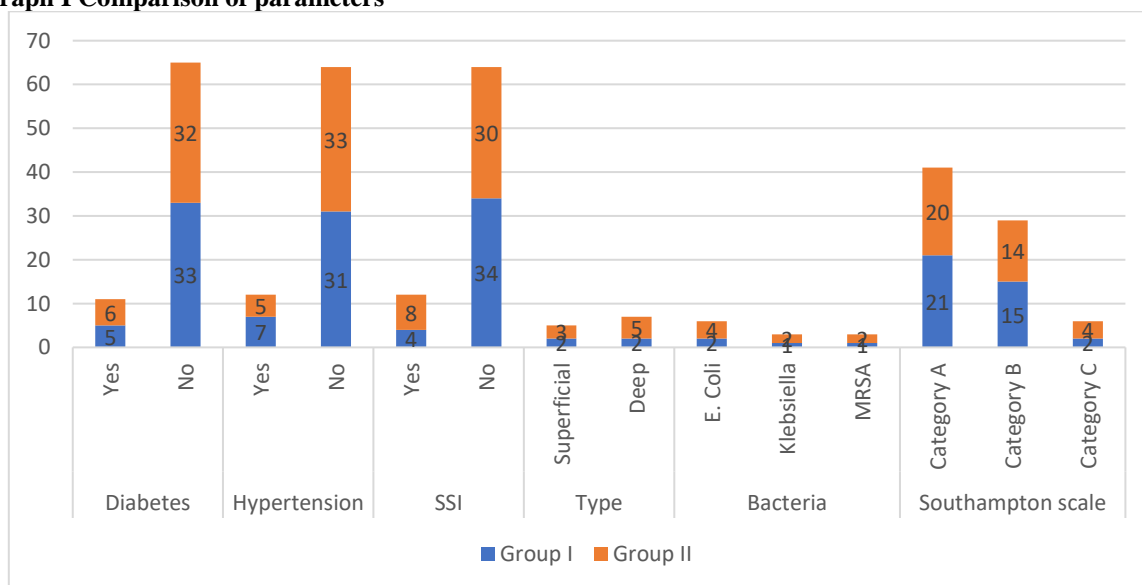


Table III Operative time, and blood loss

Parameters	Group I	Group II	P value
Operative time (mins)	140.2	142.5	0.92
blood loss (ml)	182.4	180.2	0.97

Table III shows the mean operative time in group I was 140.2 minutes and in group II was 142.5 minutes. The mean blood loss was 182.4 ml in group I and 180.2 ml in group II. The difference was significant (P< 0.05).

DISCUSSION

Treatment of SSIs involves a combination of measures, including antibiotic therapy, wound care, and, in severe cases, surgical intervention to drain abscesses or remove infected tissue.⁶The choice of antibiotics is based on the type of bacteria causing the infection and may be adjusted based on culture and sensitivity results.^{7,8,9}The present study was conducted to assess the role of the local vancomycin administration to SSI prevention during spine operations.

We found that group I had 20 males and 18 females and group II had 21 males and 17 females. In group I and group II, diabetes was seen in 5 and 6 patients respectively. Hypertension was seen in 7 and 5 patients respectively. SSI was seen in 4 and 8 patients respectively. The type of SSI was superficial in 2 and 3 and deep in 2 and 5 patients respectively. Bacteria were *E. Coli* in 2 and 4, *Klebsiella* in 1 and 2 and MRSA in 1 and 2 patients respectively. Southampton scale category A was seen in 21 and 20, category B in 15 and 14 and category C in 2 and 4 patients respectively. Abdullah et al¹⁰ included 150 consecutive patients who underwent craniotomy. Seventy-five patients received 1 g of vancomycin powder applied in the subgaleal space at the time of closure. This group was compared with 75 matched-control patients who were accrued over the same time interval and did not receive vancomycin. The primary outcome measure was the presence of surgical site infection within 3 months. Secondary outcome measures included tissue pH from a subgaleal drain and vancomycin levels from the subgaleal space and serum. Vancomycin was associated with significantly fewer surgical site infections (1 of 75) than was standard antibiotic prophylaxis alone (5 of 75; $p < 0.05$). Cultures were positive for typical skin flora species. As expected, local measured vancomycin concentrations peaked immediately after surgery (mean \pm SD 499 ± 37 $\mu\text{g/ml}$) and gradually decreased over 12 hours. Vancomycin in the circulating serum remained undetectable. Subgaleal topical vancomycin was associated with a lower incidence of surgical site infections after craniotomy. The authors attribute this reduction in the infection rate to local vancomycin concentrations well above the minimum inhibitory concentration for antimicrobial efficacy.

We found that the mean operative time in group I was 140.2 minutes and in group II was 142.5 minutes. The mean blood loss was 182.4 ml in group I and 180.2 ml in group II. Godil et al¹¹ in their study 110 patients with traumatic spine injuries treated with instrumented posterior spine fusions. One group (control group) received standard systemic prophylaxis only, whereas another (treatment group) received 1 g of locally applied vancomycin powder (spread over the surgical wound) in addition to systemic prophylaxis. A total of 110 patients were included in the study. The control ($n = 54$) and treatment groups ($n = 56$) were similar at baseline.

Use of vancomycin powder led to significant reduction in infection rate (13% infection rate in the control group vs 0% in the treatment group, $p = 0.02$). There were no adverse effects noted from the use of vancomycin powder. The total mean cost of treating postoperative infection per patient was \$33,705. Use of vancomycin powder led to a cost savings of \$438,165 per 100 posterior spinal fusions performed for traumatic injuries.

Surgical Site Infections pose a significant challenge in healthcare, as they can lead to prolonged hospital stays, increased healthcare costs, and potentially serious complications. Preventive measures and early detection are crucial in managing SSIs effectively.¹²The limitation of the study is the small sample size.

CONCLUSION

Authors found that SSIs are a significant issue that impact spine procedures and use up medical resources. The goal of administering vancomycin powder locally is to reduce the rate of infection. When vancomycin is used locally, fewer bacteria are present at the surgical site, which lowers the risk of surgical site infections.

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