Original Article

Role of Topical Vancomycinin Reduction of Sternal Wound Infection in Patients Undergoing Cardiac Surgery

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ABSTRACT

Objective: To examine the effectiveness of topical vancomycin to reduce the rate of wound infection in patients undergoing open heart surgery.

Study Design: Randomized controlled trial.

Place and Duration of Study: This study was conducted at the Department of Cardiac Surgery, Sandeman Provincial Hospital Quetta from June 2018 to December 2018.

Materials and Methods: One hundred and eighty patients of both genders undergoing open heart surgery were included in this study. Patient ages ranged from 40 to 70 years. All the patients were divided into two groups. Group I consistedof 90 patients and received topical vancomycinpaste on the sternal wound, Group II also consisted of 90 patients who received topical normal saline before sternal wound closure. The rate of sternal wound infection was examined.

Results: There were 133 (73.89%) males and 26.11% females. Patients who received vancomycin had less superficial and deep sternal wound infections than the patients who didn't received vancomycin (2.22% vs 6.67%) and (1.11% vs 4.4%).

Conclusion: The use of vancomycin paste to the sternal edges with perioperative antibiotics helps to reduce the sternal wound infection rate.

Key Words: Heart surgery, Vancomycin, Sternal Wound infection

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INTRODUCTION

Worldwide, heart surgeries perform in very clean atmosphere to prevent the infectious complications. The rate of sternal wound infection is ranging from 0.5 to 8%. Sternal wound infection causes morbidity, mortality and increase cost of treatment. After cardiac surgery use of only antibiotics may not helps to prevent infectious complications.[1-3] Many of factors involved in developing surgical site infection such as diabetes mellitus, COPD, obesity and time taken emergency surgery.[4,5]

Cardiac surgeries with these comorbidities may increase the incidence of sternal wound infection. Many of studies and researches conducted to reduce the rate of infectious complication using different antibiotics and treatment protocols but still there is no improvement demonstrated regarding infectious complication.[6,7]

The use of topical antibiotics at the time of cardiac surgery may helps to reduce the surgical site infection. In these topical antibiotics, topical vancomycin and cefazolin and gentamycin use on the sternal edges resulted better outcomes.[8] Many of studies regarding sternal wound infection resulted that the use of topical antibiotics at the time of cardiac surgery helps to reduce the sternal wound infection.[9]For antibiotic prophylaxis, vancomycin used IV after cardiac surgery and use vancomycin topically on the sternal edges.[10]

The present study was conducted aimed to examine the effectiveness of topical vancomycin along with antibiotic prophylaxis after cardiac surgery.

MATERIALS AND METHODS

This randomized controlled trial was conducted at Department of Cardiac Surgery Sandeman Provincial Hospital Quetta from 1st June 2017 to 31st December 2017.A total of 180 patients of both genders who underwent open heart surgery were included. Patient's ages rangedfrom 40 to 70 years. Patients detailed medical history including age, sex, history of previous cardiac surgery, diabetes mellitus, smoking history, hypertension, were examined after taking informed consent from all the patients. All patients received peri-

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operative antibiotics, comprising of ceftriaxone(1g IV every 12 hours) and gentamicin (80mgIV every 8 hours) on induction of anesthesia and early postoperatively. After surgery antibiotics IV were used for 48 hours. Insulin IV was used to maintain the glucose level after surgery.All the patients were equally divided into two groups; Group I consist of 90 patients and received topical vancomycin solution (2gms in 5ml of normal saline) and Group II consist of 90 patients received spray of 50ml normal saline on the sternal wound before closure. Effectiveness of topical vancomycin regarding SWI was examined.Risk factors such as diabetes mellitus, smoking history, hypertension was also examined. Mean operative time and cross lamp time was recorded.

All the statistical data was analyzed by SPSS 20. Frequencies and percentages were obtained. P-value <0.05 was considered as significant.

RESULTS

There were 70 (77.78%) males and 20 (22.22%) females in group I while in group II, 63 (70%) males and 27 (30%) females. Thirty four patients belonged to age group <50, 42 were between 50-60 years and 14 patients were>60 in group I. Whereas in group II, 30 patients were <50 years, 44 patients were between 50-60 and 16 patients were >60 years of age. In group I, 26 (28.89%) were hypertensive while in group II, 29 (32.22%) patients had this comorbidity. The incidence of diabetes was higher in group I, 18 (20%) vs 10 (11.1%). There were 20 (22.22%) and 14 (15.55%) smokers in Group I and Group II respectively. We found no significant difference according to age, sex, BMI except diabetes mellitus and smoking (Table 1).

Table No.1: Baseline characteristics of all the patients

Characteristics	Group I	Group II	P-value
Gender			
Male	70 (77.78%)	63 (70%)	0.53
Female	20 (22.22%)	27 (30%)	
Age (years)			
< 50	34 (37.78%)	30 (33.33%)	0.41
50 – 60	42 (46.67%)	44 (48.89%)	
> 60	14 (15.55%)	16 (17.78%)	
Body mass index	25.6±5.9	26.2±5.7	0.68
Hypertension	26 (28.89%)	29 (32.22%)	0.6
Diabetes mellitus	18(20%)	10(11.11)	0.05
Smokers	20 (22.22%)	14 (15.55%)	0.32

Patients who received topical vancomycin had less superficial and deep sternal wound infections than the patients who didn't received vancomycin (1.11% vs 8.89%), (1.11% vs6.67%) and this showed that significant difference between both groups regarding the rate of sternal wound infection (P<0.05).The mean bypass time in Group I and Group II was 114.7±48.5 and 122.6±40.2 minutes, statistically no significant difference was recorded (P>0.05) Cross clamp time in Group I and Group II was 64.4±31.5 and 74.7±30.2 (Table 2).

Table No.2: Post-operative incidence of sternal wound infections

Characteristics	Group I	Group II	P-value
Infections			
Superficial	1 (1.11%)	8 (8.89%)	0.001
Deep Sternal	1 (1.11%)	6 (6.67%)	0.000
Total incidence	2 (2.22%)	14 (15.56%)	0.000
Diabetic Patients			
All sternal infections	0 (0.0%)	3 (3.33%)	0.000
Mean bypass time (min)	114.7±48.5	122.6±40.2	0.000
Cross clamp time (min)	64.4±31.5	74.7±30.2	0.000

DISCUSSION

Sternal wound infection is a major concern after cardiac surgery. Many of studies were conducted to prevent the infectious complications with antibiotics prophylaxis after cardiac surgical procedures. The present study was conducted to examine the effectiveness of topical vancomycin along with perioperative antibiotics to reduce the sternal wound infection rate. In our study most the patients were male 77.78% as compared to females 22.22%. These results shows similarity to some of the studies in which males patients population rate was high 65 to 80%.[11,12] We found that most of the patients were ages above 50 years. These results were similar to other studies in which mostly patients were ages above 45 years.[13]

In present study, we found that the use of topical vancomycin along with perioperative antibiotics with tight glycemic control reduced deep sternal and superfacial wound infection in patients undergoing coronary artery bypass sugery. A study conducted by fowler et al[14] reported that the use of topical vancomycin on the sternal edges reduced the sternal wound infection in patients undergoing cardiac surgery. In present study we found on 1.11% patients developed deep wound infection and 1.11% patients had superfacial infection in vancomycin group and 14.56% patients developed both superfacial and deep wound infection in without vancomycin group. These results showed that use of topical vancomycin along with perioperative antibiotics had very low rate of sternal wound infection as compared to other antibiotics prophylaxis. Many of studies were comparable to our study in which use of topical vancomycin with perioperative antibiotics reduces the sternal wound infection.[15-17]Arruda et al[18] reported that the rate of

sternal wound infection after topical vancomycin in cardiac surgery was 0.49% out of 1020 patients.

In the present study, we found sternal wound infection in diabetic patients was 0% with topical vancomycin and 3.33% patients developed SWI without vancomycin. We found that use of topical vancomycin with tight glycemic control reduces the rate of SWI. These results was similar to another study.[19] In our study, the mean bypass time in Group I and Group II was 114.7±48.5 and 122.6±40.2 minutes, statistically no significant difference was recorded (P>0.05) Cross clamp time in Group I and Group II was 64.4±31.5 and 74.7±30.2. These results were comparable to some other studies in which patients received vancomycin topically had less operative time as compared to those who didn't received vancomycin.[20-22]

Thus, we observed that the use of topical vancomycin with combination of perioperative antibiotics and tight glycemic control reduces the SWI rate in patients undergoing cardiac surgery.

CONCLUSION

Sternal wound infection after cardiac surgery involving median sternotomyis a significant cause of morbidity and mortality. Our study was designed to reduce the rate of sternal wound infection in open heart surgery patients and the results have shown that the use of vancomycin to the sternal edges with perioperative antibiotics helps to reduce the incidence of sternal wound infection.

Author's Contribution:

Concept & Design of Study:	Iqbal Alam Khan
Drafting:	Jalal-ud-Din
Data Analysis:	Syed Ehsanullah
Revisiting Critically:	Iqbal Alam Khan, Jalal-ud-Din
Final Approval of version:	Iqbal Alam Khan

Conflict of Interest: The study has no conflict of interest to declare by any author.

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