

Comparison of Surgical Site Infection Rate in Case of Penetrating Hollow Viscus Injury after Perioperative Antibiotics use for 24 Hours versus 5 days

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ABSTRACT

Aim: To compare surgical site infection rate in patients receiving I/V antibiotics for 24 hours versus those receiving for 5 days in penetrating abdominal hollow viscus injury.

Methods: This randomized control trial study was carried out at Department of general surgery unit II; Jinnah Hospital, Lahore over a period of twelve months from 1st July 2014 to 30th June 2015. All subjects were selected from emergency department were divided into two groups by using alternate method (first patient give 24 hour antibiotics and second patient give 5 days' antibiotics). After informed consent all patients were given prophylactic broad spectrum I/V antibiotics. Post operatively, patients were treated according to their groups. Group A patients were administered two doses of I/V antibiotics while in group B patients were administered I/V antibiotics for 5 days. Surgical site Infection rate was compared in both groups.

Results: Two hundred and twenty patients were randomly divided in two groups. Only 25 patients (11.4%) out of 220 patients were having surgical site infection. 18 patients (16.4%) belonged to 24 hours antibiotic use group while 7(6.4%) were from 5 days antibiotic use group. The resultant difference was statistically significant (p value=0.01). Younger age and male gender were more prone to surgical site infection in 24 hours antibiotic use group.

Conclusion: It is concluded that at current sample size we reject the null hypothesis that the rate of surgical site infection is same in patient with 24 hours use of intravenous antibiotics versus 5 days in penetrating abdominal hollow viscus injury.

Keywords: Prophylactic antibiotics, Trauma, Hollow viscus injury, Surgical site infection

INTRODUCTION

Penetrating abdominal trauma results in a spectrum of injuries associated with various degree of microbial contamination of the peritoneal cavity and tissues¹. Even after the acute phase of injury has been treated, infection remains as one of the most common causes of morbidity and mortality². Antibiotics are given to prevent infection after surgery or instrumentation and should be used when local wound defence is not established.³ Prophylactic antibiotics are used most often to prevent infection of a surgical incision. Preoperative antibiotic prophylaxis is proved to reduce the risk of postoperative surgical site infections in many circumstances⁴ Perioperative antibiotic therapy is the mainstay for penetrating traumatic injury to prevent subsequent surgical site infection as well as intra-abdominal infections⁵. Antibiotics should be started prior to surgery, and

based on several prospective randomized trials continued for no more than 24 hour⁵ Historical data from civilian trauma centers have demonstrated that postoperative infectious complications can range from 30% with general intra-abdominal injuries to 70% when the colon is injured and antibiotics are administered postoperatively only⁶.

Even with preoperative dosing, Thadepalli et al⁶ in 1973, highlighted the need for broad-spectrum antibiotics (including anaerobic coverage) to reduce the risk of postoperative infection rate from 27% to 10%. In a recent review of all combat injuries, a multidisciplinary panel recommended that implementation of broad-spectrum antibiotics to include anaerobic activity should be instituted on arrival after identification of a hollow visceral injury and continued after definitive control of all gross spillage⁶.

According to one international study it is concluded that there was no reduction in infection rates when antibiotics were administered for 5 days (18 of 76 vs. 3 of 21; p = 0.273). Furthermore, patients were stratified according to high and low risk for infection.¹ In the 78 low-risk patients, there was no difference in infection rates when the antimicrobials

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were stopped after 24 hours (1[6%] of 18 vs. 10[17%] of 60, $p = 0.219$). Furthermore the high-risk patients, there was no significant difference observed in infection rates¹. Excessive use of antibiotics for long period of time may hamper the microbiological milieu of the body and has financial and social implications. It seems scientific to decrease the length of stay, prevent infections, decrease misery of the patient by using antibiotics judiciously and effectively, 24 hour regime fulfil these criteria. In this research we will gather evidence to prove that 24 hour regime is better than 5 days.

PATIENTS AND METHODS

This randomized control trial study was carried out at Department of general surgery unit II; Jinnah Hospital, Lahore over a period of twelve months from 1st July 2014 to 30th June 2015. All subjects were divided into two groups by using alternate method (first patient give 24 hour antibiotics and second patient give 5 days’ antibiotics). Single penetrating abdominal wound as per operational definition about 11 cm in size in either of four quadrants of abdomen, both genders with age ranges from 15 to 50 years and injuries presenting within 6 hours of infliction were included. Generalized peritonitis e.g. tense, tender abdomen, board like rigid abdomen, fever, dehydration etc. diabetic patients and previous abdominal surgery were excluded.

After informed consent all patients were given prophylactic broad spectrum I/V antibiotics 1 gm (Sulbactam + Cefoperazone), 500mg (Metronidazole) one hour before surgery. Post operatively patients were given antibiotics according to their groups, now Group A patient were administered two doses of I/V antibiotics 1 gm (Sulbactam + Cefoperazone), 500mg (Metronidazole) X 8 hourly. While in group B patient were administered I/V antibiotics for 5 days. The data was collected by myself. Predictable bias and confounding factors like age, diabetic patient, multiple gut injuries were controlled by restriction (inclusion and exclusion criteria) and randomization. Rest was addressed during final analysis. Surgical site Infection rate was compared in groups. All the data was entered and analyzed by using SPSS version 19.0. Chi-square was used to compare the infection rate in both groups. Data was stratified for age and gender. P value ≤ 0.05 was considered as significant.

RESULTS

One hundred and sixty five patients (75%) were below 40 years of age whereas remaining 55 patients (25%) above 40 years with mean age of 33.05 ± 8.521 ranged from 24 to 50 years of age. One hundred and

sixteen patients (52.7%) were males and 104 patients (47.3%) were females. Only 25 patients (11.4%) out of 220 patients were having surgical site infection (Table 1). When the surgical site infection results came up with statistically significant ($p < 0.019$), surgical site infection was not equally distributed among study group with different duration of antibiotic use (Table 2). In male patients, surgical site infection showed significant results for study group with p value 0.006 however in female patients results were non-significant (Table 3) On statistical analysis of sampled population, surgical site infection with different duration of antibiotic dose showed significant results in both age groups (Table 4).

Table 1: Demographic information of the patients

| Variable | No. | % |
|--------------------------------|-----|------|
| Age (years) | | |
| < 40 | 165 | 75.0 |
| > 40 | 55 | 25.0 |
| Gender | | |
| Male | 116 | 52.7 |
| Female | 104 | 47.3 |
| Surgical site infection | | |
| Yes | 25 | 11.4 |
| No | 195 | 88.6 |

Table 2: Comparison of surgical site infection according antibiotic use

| Antibiotic use | Surgical site infection | |
|----------------|-------------------------|-------------|
| | Yes (%) | No |
| 24 hours | 18 (16.4%) | 92 (83.6%) |
| 5 days | 7 (6.4%) | 103 (93.6%) |

Pearson Chi-Square = 0.019

Table 3: Comparison of surgical site infection according gender by antibiotic use

| Gender | Antibiotic use | Surgical site infection | | P value |
|--------|----------------|-------------------------|----|---------|
| | | Yes | No | |
| Male | 24 hours | 10 | 38 | .006 |
| | 5 days | 3 | 65 | |
| Female | 24 hours | 8 | 54 | .458 |
| | 5 days | 4 | 38 | |

Table 4: Comparison of surgical site infection according age by antibiotic use

| Age (years) | Antibiotic use | Surgical site infection | | P value |
|-------------|----------------|-------------------------|----|---------|
| | | Yes | No | |
| < 40 | 24 hours | 14 | 63 | .04 |
| | 5 days | 7 | 81 | |
| > 40 | 24 hours | 4 | 29 | .09 |
| | 5 days | - | 22 | |

DISCUSSION

Antibiotics are given to prevent infection after surgery or instrumentation and should be used when local wound defense is not established.³ Prophylactic antibiotics are used most often to prevent infection of a surgical incision. Preoperative antibiotic prophylaxis is proved to reduce the risk of postoperative surgical site infections in many circumstances.⁴ In the present study, only 25 patients developed surgical site infection according to operational definition. It shows good results and implies that surgical team in our emergency departments follows the protocols of infection control. 18 patients (16.4%) belonged to 24 hours antibiotic use group while 7 (6.4%) were from 5 days antibiotic use group. The resultant difference was statistically significant (p value=0.01).

Our results contradicts previous studies. According to one international study it was concluded that there was no reduction in infection rates when antibiotics were administered for 5 days (18 of 76 vs. 3 of 21; p value = 0.273). Furthermore, patients were stratified according to high and low risk for infection.¹ In another study of 78 low-risk patients, there was no difference in infection rates when the antimicrobials were stopped after 24 hours (1 [6%] of 18 vs. 10 [17%] of 60, p value= 0.219).¹ the resultant percentages are comparable with our results. To see whether this difference is true or secondary to age or gender, we cross tabulated gender and age groups across the allocated groups. The difference in infection rate in male gender and age below 40 years was statistically significant. Younger age and male gender were more prone to surgical site infection in 24 hours antibiotic use group.

CONCLUSION

It is concluded that at current sample size we reject the null hypothesis that the rate of surgical site infection is same in patient with 24 hours use of intravenous antibiotics versus 5 days in penetrating abdominal hollow viscus injury. Patients of younger age and male gender were more prone to surgical site infection in 24 hours antibiotic use group.

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