

Role of Intravenous Cefuroxime Antibiotic Prophylaxis in the Prevention of Surgical Site Infection in Open Mesh Inguinal Hernia Repair

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ABSTRACT

Objective: To compare pre-operative intravenous Cefuroxime prophylaxis to no prophylaxis regarding the development of surgical site infection in inguinal hernia mesh repair.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Surgery, Combined Military Hospital, Bahawalnager Pakistan, from Nov 2015 to Nov 2017.

Methodology: A total of 230 patients were included (115 patients in each group). Group-A patients were subjected to pre-operative administration of 1.5 gm intravenous Cefuroxime 1 hour before surgery, while Group B patients were subjected to no antibiotic prophylaxis following mesh repair. Development of post-operative surgical site infection (SSI) was checked till the 30th post-operative day (POD).

Results: Post-operative surgical site infection was comparatively less in Group-A (3.4%) as compared to Group-B (10.4%), which was statistically significant (p -value 0.038).

Conclusion: Pre-operative intravenous Cefuroxime prophylaxis significantly reduces post-operative SSI following mesh inguinal hernia repair.

Keywords: Mesh inguinal hernia repair, Pre-operative cefuroxime administration, Surgical (SSI), Wound Infection (WI).

How to Cite This Article: Khan S, Mehmood A, Khan A, Asad H. Role of Intravenous Cefuroxime Antibiotic Prophylaxis in the Prevention of Surgical Site Infection in Open Mesh Inguinal Hernia Repair. *Pak Armed Forces Med J* 2023; 73(6): 1835-1837. DOI: <https://doi.org/10.51253/pafmj.v73i6.11424>

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INTRODUCTION

Inguinal hernia repair can be done by various means, and it is a clean surgical procedure with a rate of surgical site infection (SSI) of approximately 2%.¹ Commonly, it is considered that antibiotic prophylaxis is not required, but some institutions with a post-operative (SSI) >5% may require antibiotic prophylaxis.² It may reduce the rate of wound infection and can reduce morbidity.³ One of the most common and important post-operative complications is (SSI) of any surgical procedure, including inguinal hernia repair. It is revealed that in clean or contaminated wounds by antibiotic prophylaxis, the risk of (SSI) appears to be reduced by about 60%.⁴ The inguinal hernia elective repair is considered a clean surgical operation, and the post-operative (SSI) wound infection rate should be low. Antibiotic Prophylaxis has shown that in other surgical operations, e.g. trauma and vascular surgery, it reduces (SSI), but on the other hand, in inguinal hernia procedures, it remains uncertain.^{5,6}

Multiple factors regarding patient and surgical site play a role in developing (SSI), and for its

prevention, antibiotic prophylaxis is used.⁷ In surgical practice, surgical site infections (SSI) are commonly presented as complications with a serious outcome in the shape of serious morbidity.⁸ The effectiveness of antibiotic prophylaxis for open inguinal hernia repair is controversial and needs to be checked to reduce post-operative (SSI).⁹ The rationale of our study was to see if prophylactic antibiotic reduces the rate of postoperative surgical site infection in open mesh inguinal hernia, leading to reducing the morbidity of the patient in this study by assessing the role of antibiotics in reducing the rate of SSI will help help the surgeon and patients from many problems in future.

METHODOLOGY

The quasi experimental study was conducted at the Inpatient Surgical Department of Combined Military Hospital Bahawalnager Pakistan, from November 2015 to November 2017 after approval from the Institutional Ethical Committee. The WHO sample size calculator was used to calculate sample size using prevalence in Group A and Group B as 2.8% and 9.4 % respectively.¹⁰

Inclusion Criteria: Patients undergoing mesh repair for inguinal hernia were included.

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Received: 29 Oct 2018; revision received: 01 Mar 2022; accepted: 07 Mar 2022

Exclusion Criteria: Female patients, patients with diabetes mellitus, abdominal malignancy and patients using steroids were excluded.

Informed written consent were obtained from every individual. Sampling was non-probability consecutive sampling, and patients were divided into groups using the lottery method (Figure-1).

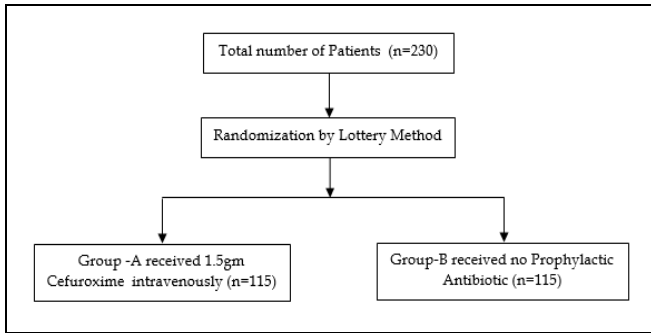


Figure-1: Patient Flow Diagram (n=230)

In Group-A, patients were administered 1.5gm Cefuroxime intravenously 1 hour prior to surgery. Group-B was kept as a Control Group, and no prophylactic antibiotic was administered prior to surgery. In both groups, subcutaneous fat was approximated with interrupted Vicryl 2/0 sutures, and skin was closed with interrupted Prolene 3/0 sutures. Intravenous antibiotics were administered up to 24 hours post-operatively, followed by a three-day course of oral antibiotics. Dressing protocol and techniques for all patients remained the same (Mepore dressing opened 72 hrs post-operatively & onwards changed 24 hrly).

The same surgical team performed all the surgeries, and patients were followed up 30 days post-operatively to look for the development of SSI. Wounds were graded per the Southampton wound grading system (Figure-2), and wounds fulfilling Class II and above criteria were considered positive for SSIs. Contact numbers of patients were taken, and all data was entered in the data collection proforma.

Grade	Appearance
0	Normal healing
I Normal healing with mild bruising or erythema:	
A	Some bruising
B	Considerable bruising
C	Mild erythema
II Erythema plus other signs of inflammation:	
A	At one point
B	Around sutures
C	Along wound
D	Around wound
III Clear or haemorrhagic discharge:	
A	At one point only (<2cm)
B	Along wound (>2cm)
C	Large volume
D	Prolonged (>3 days)
Major complication	
IV Pus:	
A	At one point only (<2cm)
B	Along wound (>2cm)
V Deep or severe wound infection with or without tissue breakdown; haematoma requiring aspiration.	

Figure-2: Southampton Wound Grading System

Statistical Package for Social Sciences (SPSS) version 20.0 was used for the data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency & percentages. Chi-square test was applied to explore the inferential statistics. The p-value lower than or up to 0.05 was considered as significant.

RESULTS

A total of 230 patients undergoing mesh repair for inguinal hernia were recruited and randomly divided into two equal groups of 115 each. The minimum age of the patients was 16 years (n=4), and the maximum was 72 years (n=1), with a mean age of 41.09±13.01 years. The mean age in Group-A was 40.65±13.34 years, while Group-B's was 41.53±12.71 years. SSIs were checked until the 30th post-op day. The overall rate of SSI was found to be 6.9% (n=16). Group-A revealed 3.4% (n=4) SSI rate compared to group B, which was 10.43% (n=12). The groups had a statistically significant difference in the frequency of SSI (p-value 0.038). A comparison between frequencies is given in Table.

Table: Comparison of IV cefuroxime group with no antibiotic group in terms of frequency of surgical site infection (n=230)

Surgical Site Infection	Study Groups		p-value
	Group-A n(%)	Group-B n(%)	
Yes	4 (3.4)	12(10.4)	0.038
No	111(96.6)	103(89.6)	
Total	115(100)	115(100)	

DISCUSSION

Inguinal hernia is included in surgical conditions commonly present in surgical outpatient departments, and they commonly undergo surgical procedures¹. Inguinal hernia is a very common problem. Currently, it is being treated by surgical repair. On the other hand, asymptomatic or minimally symptomatic patients with hernias may be managed by watchful waiting. Postoperatively surgery surgical site infections (SSI) are very common and can result in increased cost and morbidity. It demands early treatment in order to improve results.¹⁰

For surgeons, post-operative wound infection is a challenge and needs to be addressed specifically.¹¹ Worldwide Surgical site infections (SSI) are one of the important challenges for surgeons and can change the outcome. Important steps are in trial to prevent these complications.¹² We examined the link between

multiple risk factors, including environmental factors, and SSI for prevention management.¹³ Antibiotic-impregnated sutures for abdominal fascial closure prevent post-operative surgical site infections, hernias, and/or dehiscence.¹⁴ Local application of gentamicin significantly reduced the incidence of wound infection.¹⁵

Surgical procedures are an important piece of a dermatologist's daily practice. Therefore, the optimisation of post-surgical wound healing is an area of utmost importance and interest. Although low risk, one notable barrier to proper wound healing is surgical site infection.¹⁶ One study was to find out the role of antibiotic prophylaxis in inguinal hernia. This study concluded that antibiotic prophylaxis does not prevent surgical site infection postoperatively.¹⁷ A study was carried out to assess the efficacy of antibiotics in preventing (SSI) in open mesh hernia repair, which answers this question by revealing that antibiotics reduce (SSI) in open hernia repair.¹⁸ Our study revealed that I/v single dose of 1.5 grams reduces post-operative surgical site infection.

CONCLUSION

The study showed a tendency for less frequent wound infection rates in patients administered pre-operative intravenous Cefuroxime versus no antibiotic prophylaxis. Thus, intravenous Cefuroxime prophylaxis significantly reduces the chances of the development of SSI.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SK & AM: Conception, study design, drafting the manuscript, approval of the final version to be published.

RK & HA: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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