

## Role of Prophylactic Antibiotics in Open Mesh Inguinal Hernia Repair

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### Abstract

**Introduction:** The role of prophylactic antibiotics in open mesh repair of inguinal hernia is still controversial. The dogmatic hernia specialists are always in favour of no use of antibiotics in case of inguinal hernia repair on contrary, many others favour the use of prophylactic antibiotics.

**Objective:** To determine the role of prophylactic antibiotics in case of open mesh inguinal hernia surgery.

**Materials and Methods:** This prospective randomized interventional study was conducted from March 2017 to December 2017 at Combined Military Hospital, Chattogram. Total 40 patients selected for open inguinal hernia surgery were grouped as Group-A and Group-B containing 20 in each group on the basis of systematic random sampling. The Group-A and Group-B patients were treated with a single dose of prophylactic antibiotic (1.5gm Cefuroxime) and a similar quantity of normal saline respectively. Data were recorded, compiled, edited and analyzed by Statistical Package for Social Sciences (SPSS) version 23.

**Results:** The mean age of Group-A and B respondents were 53.16±7.76 and 52.39±5.69 years respectively. Mean duration of surgery was 59.76±2.1 and 54.56±18.3 minutes in Group-A and B respectively. Surgical site infection was present in 2(10%) cases of Group-A and 5(25%) of Group-B. Though it was little higher in Group-B but the difference was not statistically significant ( $p>0.05$ ). Staphylococcus was most prevalent in Group-A and multiple organisms in Group-B.

**Conclusion:** Prophylactic antibiotic is not able to significantly decrease the rate of surgical site infection.

**Key-words:** Prophylactic antibiotics, surgical site infection, Open mesh inguinal hernia repair.

### Introduction

An inguinal hernia is a surgical scenario frequently observed in general surgery wards. It may either present in outpatient department for elective surgery or in an emergency as an obstructed case for immediate management. Hernia is regarded as systemic disease now a days. The lifetime risk of developing inguinal hernia is 27% for male and 3% for female<sup>1</sup>. Among all operations in general surgery, the frequency of inguinal hernia surgery is not less than 10-15%<sup>2</sup>. There are various modalities of inguinal hernia repair like Lichtenstein tension-free repair, Shouldice, Darning, Stoppa, Desarda and so on. Among them, Lichtenstein tension-free mesh hernioplasty is the most popular technique.

Inguinal hernias are more common on the right side than on the left. They are ten times more common in man than in woman<sup>3</sup>. The annual frequency of groin hernia repair was found to increase consistently with age from 0.25% at 18 years of age to 4.2% at 75 to 80 years of age<sup>4</sup>. Among all post operative complications, surgical site infection (SSI) may be the most dreadful one in case of Lichtenstein tension-free repair where commonly prosthetic mesh is used. Generally, inguinal hernia surgery is a clean surgery, though SSI may deteriorate the outcome if surgical asepsis is compromised in any step.

The role of antibiotic prophylaxis to avoid SSI is common in surgical practice. However, irrational use can lead to some problems including an increase in treatment cost and the emergence of resistant micro-organisms. But the use of antibiotic in a 'clean' surgery is still controversial. Currently, with the use of prophylactic antibiotic for elective open mesh inguinal hernia repair<sup>5</sup> the incidence of infection following mesh hernioplasty has been observed as 0% to 9%<sup>6</sup>. Such a wide range on SSI rates is due to the cause of differences in various aspects like study design, surveillance methods, the definition of wound infection, duration of follow-up, type of operation and so on<sup>7</sup>.

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For that reason, it is mostly emphasized to administer at least one dose of intravenous prophylactic antibiotic. This dose is usually given before the contamination or infection has occurred in surgical patients, these are usually administered just before or during the surgery or during induction of anesthesia<sup>5</sup>. After the study of Haley et al, it is believed that SSI prolongs hospitalization for approximately one week and increases at least 20-30% hospital expenditure<sup>6</sup>. The efficacy of antibiotic prophylaxis in hernioplasty remains disputable and same surgeons still feel that antibiotic prophylaxis is not necessary, even for procedures with a mesh<sup>7</sup>.

The rationale of this study is firstly, there is no such study documented regarding prophylactic antibiotic uses in open inguinal hernia surgery in this aspect. Secondly, surgeons are now invariably using antibiotics as prophylaxis and in postoperative period also. It is important to find out the justification of rational use of antibiotic in case of open inguinal hernia surgery.

### Materials and Methods

This prospective randomized interventional study was done in CMH, Chattogram from March to December 2017. Total 40 patients admitted for open inguinal hernia repair were enrolled in the study by purposive sampling. Patients who presented with emergency condition like obstructed and strangulated inguinal hernia and patients with a history of previous same surgery were excluded from the study. Patients with local skin infection, systemic infection, diabetes mellitus or history of antibiotic use within previous week due to any reason, patients taking immunosuppressive drugs like chemotherapeutic agents, steroids, methotrexates were also excluded. All patients underwent a thorough clinical examination and relevant investigations. After a proper pre-anaesthetic check up the patients were divided into 2 groups according to the last digit of their registration number in hospital each having 20 patients. The patients bearing odd numbers were grouped as Group-A and the patients bearing even numbers were grouped as Group-B. Group-A was given IV injection of 1.5gm Cefuroxime in 10ml distilled water just before surgery, while the other group was given 10ml of normal saline as placebo. Thereafter, Lichtenstein tension-free mesh hernioplasty was done in each and every patient of Group-A and B. Postoperatively, the same management was given in both the groups and patients were discharged after 2 days. Permission for study was obtained from hospital authority and informed written consent was taken from all the patients before included in the study.

All the necessary data were collected in a structured sheet. Data regarding socio-demographic, clinical, surgical and outcome variables were compiled, edited and analyzed using Statistical Packages for Social Science (SPSS) version 23. The mean and standard deviations, frequency, percentages of different variables were determined. Data analyses were done by chi-square test and p <0.05 was considered significant.

### Results

In this study out of 20 patients in each group 65% and 50% belonged to 51-60 years in Group-A and B respectively. The mean age in Group-A was 53.16±7.76 years whereas in Group-B was 52.39±5.69 years (Table-I).

**Table-I:** Distribution of patients according to age

Age group (in years)	Group-A (n=20)	Group-B (n=20)
<20	0 (0%)	2 (10%)
21 - 30	0 (0%)	1 (5%)
31 - 40	1 (5%)	4 (20%)
41 - 50	5 (25%)	1 (5%)
51 - 60	13 (65%)	10 (50%)
>60	1 (5%)	2 (10%)
Mean±SD	53.16±7.76	52.39±5.69
Age range	32 - 69	18 - 78

Indirect inguinal hernia was 55% and 80% in Group-A and B respectively. Only 1 patient in Group-A was found as bilateral inguinal hernia. The hernial sac content was bowel in 90% and 85% cases in Group-A and B respectively. Only 1 (5%) case in Group-B was found irreducible inguinal hernia (Table-II). The mean duration of surgery in Group-A and B were 59.76±2.1 and 54.56±18.3 minutes respectively.

**Table-II:** Distribution of patients according to the hernia type

Type of Hernia		Group-A (n=20)	Group-B (n=20)
Hernia Direction	Direct	9 (45%)	4 (20%)
	Indirect	11 (55%)	16 (80%)
Side	Unilateral	19 (95%)	20 (100%)
	Bilateral	1 (5%)	0 (0%)
Content	Enterocoele	18 (90%)	17 (85%)
	Omentocoele	2 (10%)	3 (15%)
Reducibility	Reducible	20 (100%)	19 (95%)
	Irreducible	0 (0%)	1 (5%)

In Group-A receiving injectable antibiotic only 2(10%) cases were diagnosed as SSI (cellulitis variety). On the contrary, 5(25%) patients in Group-B were diagnosed as SSI. Among these 5 patients of Group-B, 3 had cellulitis and 1 had mesh infection and 1 had pus discharge (Table-III). Growth of Staphylococcus aureus was found in 2 cases among Group-A and 1 case among Group-B (Table-IV).

**Table-III:** Distribution of patients according to SSI status

Surgical site infection		Group-A (n=20) Frequency (%)	Group-B (n=20) Frequency (%)
Absent		18 (90)	15 (75)
Present	Cellulitis	2 (10)	3 (60)
	Mesh infection	0 (0)	1 (20)
	Pus discharge	0 (0)	1 (20)
	Total	2 (10)	5 (25)

Chi-square test was done;  $p > 0.05$

**Table-IV:** Microorganisms in culture positive SSI

Microorganism	Group-A (n=20)	Group-B (n=20)
<i>Staphylococcus aureus</i>	2	1
<i>Klebsiella pneumoniae</i>	0	1
<i>E. coli</i>	0	1
Multiple organisms	0	2

### Discussion

In this study, the overall infection rate was 17.5%. Such a high rate was observed may be due to very small sample size. But separately, in antibiotic-treated patients the SSI rate was 10% whereas in the control group it was higher (25%) and this difference was not statistically significant. In the recent studies among evaluated patients of hernioplasty subgroup showed that the antibiotic prophylaxis shows reduction of SSI rates<sup>8-10</sup>. Recently published two meta-analyses had shown the beneficial role of prophylactic antibiotics in reducing SSI<sup>11</sup>. A previous study<sup>12</sup> revealed an SSI rate of 8%. There was no reliable data regarding the wound infection rates in the hospitals of developing world and given the fact that few trials<sup>13</sup> even in the developed world have reported 8 to 9% SSI rates. Yerdel et al documented a significant decrease in the overall wound infection rate of 9% to 0.7% when a single dose, intravenous Ampicillin Sulbactam was used during Lichtenstein hernia repair<sup>2</sup>. On the contrary, the results of this study were higher in comparison to other studies; small sample size might be the cause of this difference.

Platt et al<sup>14</sup> reported a randomized, double-blind, placebo, controlled trial of 1218 patients undergoing hernia repair and found infection occurred in 2.3% of those given prophylactic antibiotics. The risk ratio was 0.55 with a 95% confidence interval 0.2–1.38. Though the wound infection rate was twice as high in the placebo group yet it was not statistically significant. Taylor et al<sup>15</sup> conducted a prospective randomized double-blind, multicentre study on 619 patients in six hospitals in England and Scotland and found there was no statistically significant difference between antibiotics and placebo group in each centre. And the result was consistent with this study.

Gervino et al reported a study of 1254 patients undergoing hernia repair where no wound infections were noted using single dose 1 gm Ceftriaxone<sup>16</sup>. All the SSI reported in the studies done by Celdran et al<sup>13</sup> and Tzovaras et al<sup>17</sup> were superficial SSI. Cefuroxime was used in all patients of this study. It was chosen due to its efficacy against common organisms, longer duration of action and low cost. The economic impact of SSI was not assessed in this study. However, since 93% of infections were Superficial SSIs, the cost-effectiveness of antibiotic prophylaxis in the absence of conclusive benefit is questionable.

### Conclusion

In open mesh inguinal hernia repair prophylactic antibiotic not able to decrease the rate of surgical site infection significantly.

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