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Effectiveness of single over triple dose antibiotic prophylaxis in open inguinal hernioplasty

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Abstract

Background: Inguinal hernia is the commonest type of external hernias. Lichtenstein tension free mesh repair is the most favoured technique of inguinal hernia repair nowadays for weakened inguinal wall using polypropylene mesh. The objective of this study is to determine the effectiveness of single versus triple dose antibiotic in reduction of postoperative wound infection in hernioplasty.

Method: This is a prospective study done on patients in General Surgery Department, Sree Mookambika Institute of Medical Science, Kulaseharam, Kanyakumari Dist., India., from 1st June 2018 to 30th November 2020. Total 120 patients were divided into 2 groups of 60 patients each in which Group-A received single dose antibiotic prophylaxis (Inj. Cefotaxim 1gm iv 30mins before surgery) and Group-B received 3 doses of antibiotic therapy (Inj. Cefotaxim 1gm iv 30 mins before surgery, post operatively 2 doses in 12hrs interval).

Results: A total of 120 patients were included. Age of the patients ranged from 18 to 65 (Mean 46.21) years. In Group-A SSI was observed in 5 patients (8.33%) while 55 patients (91.66%) had a healthy scar. In Group-B SSI was seen in 4 patients (6.66%) and 56 patients (93.33%) had healthy scars. The difference between the two groups was not statistically significant ($p=0.72$).

Conclusion: Single dose antibiotic among patients undergoing open mesh repair for inguinal hernia is preferred option to prevent postoperative infection and it is cost effective too.

Keywords: inguinal hernia, open mesh repair, antibiotics, wound infection

Introduction

Inguinal hernia is the most common surgical abdominal entity in adults. Lichtenstein repair since its introduction in 1989 has become the gold standard and most frequently used for treatment of inguinal hernias mainly due to the reduction in recurrences. It is tension free repair of weakened inguinal wall using polypropylene mesh. First mesh repair was used for recurrent hernia [1, 2] and then for all others. Surgical site infection (SSI) has been found to be the most frequent problem faced in mesh repair. It is uncertain whether antibiotic prophylaxis is necessary in all hernia surgeries as the infection rate is very low, even when a foreign body like mesh is used. Among the several complications like inguinodynia, haematoma, seroma, ischemic orchitis, testicular atrophy etc. associated with the surgery, wound infection seems to be the most common of them. Incidence of wound infection post hernioplasty varies from 1- 14 % in several studies [3]. It is clear that antibiotic prophylaxis is necessary for most clean contaminated surgical procedures to prevent infectious complications. For surgeries requiring prosthesis like joint arthroplasty, cataract surgery, cardiac or vascular implant the use of antibiotic prophylaxis is justified. However in hernioplasty, low rates of infection and straight forward treatment in cases of infection may preclude need for prophylaxis. However, Infection in a hernia wound has been reported to be associated with a fourfold increase in the recurrence rate and therefore may cause serious sequelae [4]. Several risk factors for surgical site infection have been identified which includes both intrinsic factors like diabetes, obesity, chronic smoking, steroid use and extrinsic factors like scrubbing technique, pre op skin preparation, ventilation of the OT room, duration of surgery and use of mesh. Since the intrinsic factors cannot be modified, the incidence of surgical site infection can be reduced by influencing the extrinsic factors. SSI can be superficial surgical site infection (SSSI) in the wound or deep surgical site infection (DSSI) in deeper fascio-muscular layers. Wound have been classified in to 4 categories, i.e., clean, clean

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contaminated, contaminated, and dirty [5]. Hernioplasty comes under clean wound.

Material and Methods

This is a prospective study done on patients in Department of General Surgery, Sree Mookambika Institute of Medical Science, Kulaseharam, Kanyakumari Dist., India, from 1st June 2018 to 30th November 2020 after approval of the Hospital Ethical and Research Committee. 120 patients with inguinal hernia were enrolled in the study after taking written informed consent from the patients. All patients presenting at 18 years to 65 year of age both male and female, unilateral or bilateral hernias were included in the study. Patients with Uncontrolled Diabetes, history of intake of steroids in last 2 weeks, obstructed/ strangulated or recurrent hernia, chronic liver disease, Body Mass Index ≥29, and impaired renal functions were excluded from the study. The patients diagnosed as inguinal hernia were taken through OPD and were placed into Group-A with odd number and Group-B with even number. Detailed history was taken and examination, preoperative laboratory investigations like complete blood count, viral serology, blood urea, serum creatinine, bleeding time, clotting time, serum electrolytes, blood sugar, ECG, Chest X-ray were done for all patients. All patients in both groups were put on OT list for the next OT day after following routine and standard preoperative preparations kept uniform for all participants. Patients in Group-A were given a single dose of Inj. Cefotaxim 1gm iv 30mins before surgery and patients in Group-B were given 3 doses of Inj. Cefotaxim 1gm iv – first dose at 30 mins before surgery, 2nd and 3rd dose post operatively in 12hrs interval. All surgical procedures were performed by a single general surgeon. Postoperatively all patients were kept in ward under observation for 2 days and discharged on second postoperative day after examining the wound. Follow-up visit was advised to all patients on 10th postoperative day to detect efficacy in both groups in terms of SSI. All patients were advised at the time of discharge to report to OPD in case they feel any problem with the wound. Pus sent for culture and sensitivity using standard methods. Wound infections were managed conservatively. No mesh rejection was noted in during this study.

Result

A total of 120 patients were included. Age of the patients ranged from 18 to 65 (Mean 46.21) years. Out of 120 patients 2 were female and rest were male. The most common side of hernia in both Group A and Group B is right. Indirect hernia was most common in both groups with 60% in Group A and 63.3% in Group B. The post operative wound complications were noted in 9 (7.5%) patients totally. In Group-A SSI was observed in 5 (8.33%) patients while 55 (91.66%) patients had a healthy scar where as in Group-B SSI was seen in 4 (6.66%) patients and 56 (93.33%) patients had healthy scars (Chart-1). Even though incidence of wound infection was slightly higher in Group-A, it was not statistically significant ($p=0.72$) (Table-2). In the group-A, 3 SSSI and 2 DSSI was noted. In the group-B, 3 SSSI and 1 DSSI was noted (Table-3, Chart-2). Postoperative Seroma seen in 3 (5%) patients in both groups. For patients in both group, the Seroma reduced with conservative management in less than a week. Patient with DSSI developed purulent pus discharge from the wound on post op day (POD) 4 and 5, immediate drainage of the wound was done and pus sent of culture sensitivity. Patient was started on antibiotics according to the culture and sensitivity, with daily normal saline dressing. Discharge gradually reduced over time. On follow up there was no recurrence. There was no need for mesh removal.

Table 1: Demographics of the two groups

	Group-A	Group-B
Age(18-65years):	46.56	45.87
Sex: Male/Female	59/1	59/1
Type of hernia: Direct/Indirect/Both	23/36/1	20/38/2
Side: R/L/BL	29/19/12	32/20/8
Anesthesia: GA/RA/LA	3/55/2	4/55/1

R-Right, L-Left, BL-Bilateral, GA-General Anesthesia, RA-Regional Anesthesia, LA-Local Anesthesia

Table 2: Frequency distribution of surgical site infection in both groups

Group	Surgical site Infection		Total	p-value
	Yes	No		
Group-A	5(8.33%)	55(91.66%)	60(100%)	0.72
Group-B	4(6.66%)	56(93.33%)	60(100%)	
Total	9(7.5%)	111(92.5%)	120(100%)	

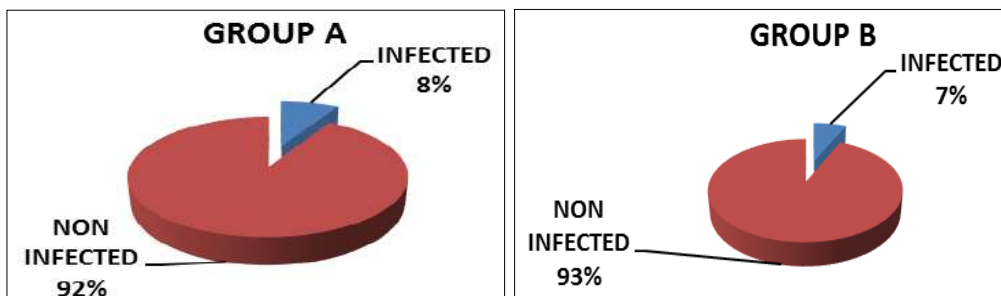


Chart 1: % of wound infection in both the group

Table 3: Postop Complications distribution of patients in two groups studied

Post op Complications	Group-A	Group-B	Total
None	55(91.66%)	56(93.3%)	111(92.5%)
Deep SSI	2(3.33%)	1(1.66%)	3(2.5%)
Superficial SSI	3(5%)	3(5%)	6(5%)
Total	60(100%)	60(100%)	120(100%)

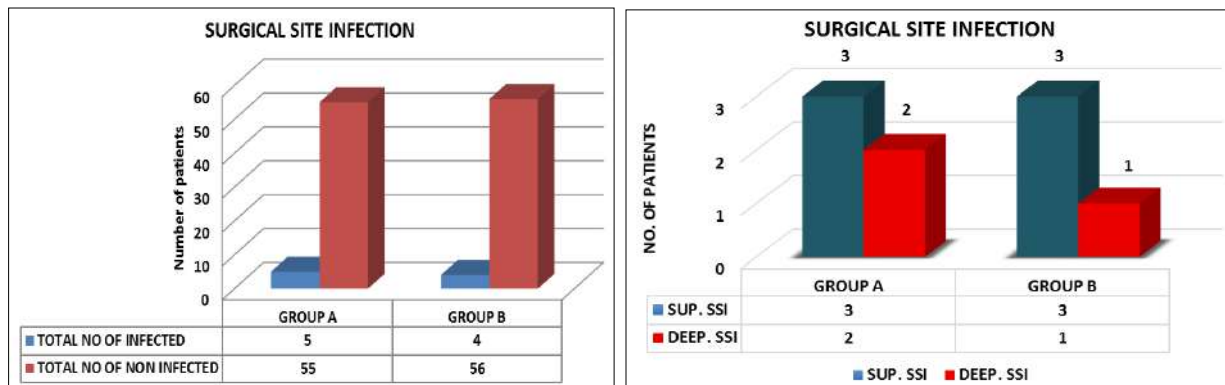


Chart 2: Surgical site infection

Discussion

Hernia is the most common surgery performed by a general surgeons. Post operative wound infection is the most common complication of this surgery. In our study the overall incidence of surgical site infection was found to be 7.5% (9 patients totally), in which 8.3% (5 patients) incidence noted in patients who had single dose of Inj. Cefotaxim 1gm i.v preoperatively and 6.6% (4 patients) incidence in the patients who had received 3 doses of Inj. Cefotaxim 1gm i.v in pre and postoperative period respectively. Hence, according to my study single dose of antibiotic is sufficient than giving 3 doses of antibiotics for open inguinal hernioplasty. There are many other studies which also implies the same.

Mehmet A. Yerdel *et al.* [3] has documented a significant (10-fold) decrease in overall wound infections when single-dose, intravenous Ampicillin and sulbactam (AS) was used during Lichtenstein hernia repair. Deep infections and wound infection-related readmissions were also reduced by the use of AS. Proponents of mesh repairs may therefore be advised to use prophylactic single-dose intravenous antibiotic coverage in the light of the results of this trial. AS proved to be an effective antimicrobial agent.

Abdul Rashid Surahio *et al.* [6]. Has conclude in his study that over all wound infection rate after single dose antibiotic prophylaxis was 4% in both procedures (clean-contaminated and contaminated procedures) and 8% after 3- dose antibiotic therapy, hence single dose antibiotic prophylaxis is as effective as 3-dose therapy in clean and clean contaminated procedures to prevent wound infection.

Arvind Diwaker *et al.* [7] has conclude in his study that the incidence of surgical site infection (SSI) is quite similar in single dose antibiotic-group A (2%) as compare to multiple dose antibiotic-group B (0%), and there was no significant difference in surgical site infection (SSI) between both groups (P value =0.315). Average cost of antibiotics was Rs. 1100 among multiple dose patients and Rs. 135 among single dose patients (P value=0.0001) which was statistically significant difference in cost of antibiotics in both groups. Single doses antibiotic prophylaxis is as effective as multiple doses antibiotic and potentially cost effective.

Sreekaraswamy *et al.* [8] conducted a study in which single dose antibiotic group, total post-operative infection rate was 8% and that in multiple dose groups was found to be 0%. Data was analyzed with Chi- square test and the difference in the rate of SSI in both the groups was found statistically insignificant. So the rate of post-operative SSI after single dose antibiotic intravenously at induction of anaesthesia is comparable with that of multiple dose antibiotics. So single dose antibiotic regimen can be safely practiced in anterior abdominal wall hernia.

K. Saravanan *et al.* [9] says that in uncomplicated surgeries, single dose antibiotics before 30 minutes of surgery may benefit in preventing SSI.

Basant RK *et al.* [10] has concluded that single dose antibiotic prophylaxis is sufficient for clean and clean contaminated surgeries because there was no difference found in SSI either using single dose pre-operative antibiotic prophylaxis or using five days conventional post-operative antibiotic therapy with the added advantage of significant reduction in hospital stay and savings in resources.

Bakhtiar Ullah *et al.* [11] conducted a study in which total of 166 cases of inguinal hernia mesh repair patients were recorded during the study period - 83 patients were recruited in each group. Surgical site infection was found in 6 (7.2%) in Group-A and in Group B it was 15 (18.1%). The difference being statistically significant ($p=0.036$). Hence he that the antibiotic prophylaxis is a preferred option for mesh plasty.

R. Plat *et al.* [12] conducted a randomized, double-blind trial of 1218 patients undergoing herniorrhaphy or surgery involving the breast. With single dose of antibiotic there were comparable reductions in the numbers of definite wound infections and there were also comparable reductions in the need for postoperative antibiotic therapy.

V. Gomathi Shankar *et al.* [13] conducted Cochrane meta-analysis in 2005 and found that the incidence of wound infection was 10.5% in the control group and 7.0% in the antibiotic group. Even though the incidence of wound infection was higher in the control group, it was not statistically significant ($p = 0.344$).

Conclusion

Single dose antibiotic among patients undergoing open mesh repair for inguinal hernia is preferred option to prevent postoperative infection and it is cost effective too.

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