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Role of Antibiotic Prophylaxis in Totally Extra-Peritoneal Laparoscopic Repair of Inguinal Hernia

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Abstract

Introduction: Inguinal hernia repair is one of the most common surgical procedures worldwide. Postoperative infection is an important potential complication. Evidence regarding role of antibiotic prophylaxis in preventing postoperative infection in inguinal hernia repair is conflicting. Against this background a study was conducted to assess the role of antibiotic prophylaxis in prevention of postoperative infection in Totally Extra-Peritoneal (TEP) laparoscopic inguinal hernia repair.

Methods: A retrospective review of all the patients who underwent totally extra-peritoneal repair of inguinal hernia was done. Two groups were identified based on prophylactic antibiotic administration. Group one included patients who received preoperative antibiotic prophylaxis while group two had patients who did not receive antibiotic prophylaxis. Data was collected for patients' characteristics including age, sex, BMI, ASA and duration of surgery. All patients were followed in the office for any signs of postoperative infection. Patients were also interviewed telephonically 30 days after the surgery to inquire for any signs of infection.

Results: 93 patients were identified to have undergone totally extra-peritoneal laparoscopic inguinal hernia repair. 36 patients received antibiotic prophylaxis while 57 patients did not receive antibiotic prophylaxis. Mean age was 57.1 year. Mean BMI was 26.3 kg/m2 and mean duration of surgery was 101.2 minutes. Patients from both groups were found to be well matched for age, BMI, duration of surgery and ASA score. None of the patients in either group had postoperative infection (0/93).

Conclusion: Preoperative antibiotic prophylaxis does not affect postoperative infection rate in patients undergoing totally extra-peritoneal repair of inguinal hernia.

Keywords: Antibiotic Prophylaxis; Infection; Inguinal Hernia; TEP Repair

Abbreviations

TEP repair	:	Totally extra-peritoneal repair
TAPP repair	:	Transabdominal preperitoneal repair
BMI	:	Body Mass Index
ASA score	:	American Society of Anesthesiologists score

Introduction

Inguinal hernia repair is one of the most common surgical procedures worldwide [1-3]. Postoperative infection is an important potential complication of any surgical procedure [1]. There is no clear consensus on whether or not antibiotic prophylaxis is effective in elective inguinal hernia repair [1]. Prospective randomized trials have identified postoperative infection rates between 0 and 8.9% in the absence of antibiotic prophylaxis and between 0 and 8.8% with administration of antibiotic prophylaxis [4]. Reviewers at the Cochrane Collaboration concluded in 2012 that evidence derived from 17 Randomized Controlled Trials (RCT) regarding the use of antibiotic prophylaxis in inguinal hernia repair both with and without mesh was inconclusive, neither allowing them to encourage nor discourage its use [5]. Another meta-analysis, focused purely on inguinal hernia repair with mesh and included six of the 11 RCTs identified by the Cochrane review concluded that there was a significant decrease in incision infection with antibiotic

prophylaxis [6]. No laparoscopic trial was however included in either of above mentioned meta-analyses. One study published in 2015 concluded that antibiotic prophylaxis had no benefit in laparoscopic inguinal repair [7]. However, in a large case series with 5203 Totally Extra-Peritoneal (TEP) operations involving 3868 patients who had received antibiotic prophylaxis, the wound infection rate was 0.08% and the mesh infection rate 0.02% [8]. In another large case series with 8050 Transabdominal Preperitoneal (TAPP) operations carried out for 6479 patients who had received antibiotic prophylaxis, the wound infection rate was 0.03% and the mesh infection rate 0.1% [9]. Both these series favored antibiotic prophylaxis in laparoscopic inguinal hernia repair.

Against this background a study was conducted in Oswego Hospital New York to assess the role of preoperative antibiotic prophylaxis in prevention of postoperative infection in totally extra-peritoneal laparoscopic inguinal hernia repair.

Methods

A retrospective chart review of all the patients who underwent laparoscopic inguinal hernia repair between July 2014 and December 2017 at Oswego Hospital, New York was done. To avoid operative variation, procedures done by single surgeon were included in the study. Two groups were identified based on preoperative prophylactic antibiotic administration. Group one included patients who received preoperative antibiotic while group two had patients who did not receive antibiotic prophylaxis. All patients had their abdomen cleaned with chlorhexidine 4% solution on the day of surgery in the holding area. The hair clipper was used to clip the hair either in the holding area on the day of surgery or in the operating room. All procedures were done under general anesthesia. 2% Chlorhexidine preparation was used for skin preparation. Iodine-impregnated incision drape (Ioban) was used in all patients. All patients in group one received single weight based dose of cefazolin within one hour of incision. Patients who underwent totally extra-peritoneal repair were included in the study. Patients who underwent transabdominal preperitoneal hernia repair were excluded from the study to avoid any operative variability. Polypropylene mesh was used in all the patients. Data was collected for patients' characteristics including age, sex, Body Mass Index (BMI), ASA score, duration of surgery, smoking and diabetes status, unilateral versus bilateral hernia, recurrent vs non-recurrent hernia. Patients who were on steroids or had any immunocompromised conditions were excluded from study. All patients were followed in the office and examined by me for any signs of postoperative infection. Patients were examined for any redness, tenderness, induration, drainage, fever, painful fluctuant swelling at the port sites as well as groin. Patients were also interviewed telephonically 30 days after the surgery to inquire for any signs of infection.

Statistical Methods

Group characteristics were compared using Independent two-sample t-test and chi square test as appropriate. Absolute risk reduction test was calculated to study the effectiveness of antibiotic prophylaxis.

Results

Total 104 patients were identified to have undergone laparoscopic inguinal hernia repair however 10 patients had TAPP approach and therefore excluded from the study. Out of 94 patients who had TEP repair one patient was excluded due to being on steroid. Mean age of patients was 57.1 (26-88) year. 89 patients were male and 4 were female. 5.3% patients were found to have diabetes (N=5). Mean BMI was 26.3 kg/m^2 and mean duration of surgery was 101.2 minutes (Table 1).

Total patients (n)	93
Mean age	57.1 (26-88) year
Mean BMI	26.3 (18.2-38.2) kg/m^2
Mean duration of surgery	101.2 (55-175) minutes
Mean duration of follow up	22.7 (13-90) days
Mean ASA	2.2 (1-4)
Diabetes	5 (5.3%)
Smokers	29 (31.1%)
Unilateral	54 (58%)
Bilateral	39 (42%)
Recurrent	6 (6.4%)
Infection	0 (0%)
Antibiotic prophylaxis	36 (38.7%)
No antibiotic prophylaxis	57 (61.2%)

Table 1: Patients characteristics.

36(38.7%) patients received preoperative antibiotic prophylaxis while 57(61.2%) patients did not receive antibiotic prophylaxis. None of the patients in either group had postoperative infection (0/93). Patients in both the groups were well matched for age, BMI, ASA score, duration of procedure and follow up duration (Table 2).

	Group 1 (abx) n=36	Group 2(no abx) n=57	
Mean Age (years)	55.2 (26-88)	58.3(26-80)	P=0.34
Sex (M/F)	34/2	55/2	P=0.63
Mean BMI (kg/m^2)	26 (19.1-38.2)	26.5(18.2-35.4)	P=0.51
Diabetes	2 (5.5%)	3 (5.2%)	P=0.95
Smoking	10 (28.5%)	19 (33.3%)	P=0.57
Recurrent	4	2	P=0.14
Bilateral	18	21	P=0.21

ASA	2.3 (1-4)	2.2 (1-4)	P=0.35
Mean Duration (mins)	106.9 (55-167)	97.7 (60-175)	P=0.21
Mean Follow up (days)	20.7 (13-32)	24 (13-90)	P=0.14
Infection	0	0	

Table 2: Group characteristics.

As no patient had infection in either group the absolute risk reduction of infection after antibiotic prophylaxis was 0% (Table 3).

	Antibiotic prophylaxis (Group 1)	No antibiotic prophylaxis (Group 2)
Infection (n)	0	0
No infection (n)	36	57
Total (n)	36	57
Infection rate (%)	0%	0%

Table 3: Absolute risk reduction.

Table Abbreviations

BMI - Body Mass Index; ASA score - American Society of Anesthesiologists score

Absolute infection rate in group 1 - 0%

Absolute infection rate in group 2 - 0%

Absolute risk reduction (infection reduction rate) - 0%

Discussion

Inguinal hernia repair is one of the most common surgical procedures worldwide [1-3]. Postoperative infection is an important potential complication of any surgical procedure [1]. There is no clear consensus on whether or not antibiotic prophylaxis is effective in elective inguinal hernia repair [1]. 12 prospective randomized trials including open hernia repair were analyzed by Bittner et al and huge variation was found in infection rates between antibiotic prophylaxis and no antibiotic prophylaxis groups [4]. Postoperative infection rates varied between 0 and 8.9% in the absence of antibiotic prophylaxis and between 0 and 8.8% with administration of antibiotic prophylaxis [4]. Cochrane review in 2012 showed that the infection rates were 3.1% and 4.5% in the prophylaxis and control groups, respectively (OR 0.64, 95% CI 0.50 - 0.82). In patients who had hernia repair without mesh the infection rates were 3.5% and 4.9% in the prophylaxis and control groups, respectively (OR 0.71, 95% CI 0.51 - 1.00). The subgroup of patients with mesh hernia repair had infection rates of 2.4% and 4.2% in the prophylaxis and control groups, respectively (OR 0.56, 95% CI 0.38 - 0.81) [5]. The results were inconclusive regarding use of antibiotic prophylaxis in inguinal hernia repair [5]. Another meta-analysis by Li J et al focused on inguinal hernia repair with mesh and included six of the 11 RCTs identified by the Cochrane review [6]. The study showed 1.7% (19/1119) infection rates in antibiotic prophylaxis group vs 3.67% (42/1116) infection rates in no antibiotic group [6]. The meta-analysis concluded that there was a significant decrease in incision infection with antibiotic prophylaxis [6]. No laparoscopic trial was however included in either of these meta-analyses. Guidelines of the European Hernia Society and the International Endohernia Society do not contain any clear-cut recommendations for antibiotic prophylaxis for laparoscopic inguinal hernia repair [4,10]. Eklund et al compared TEP with Lichtenstein hernia repair and used antibiotic prophylaxis in Lichtenstein hernia repair and no antibiotic prophylaxis in TEP group [11]. The study identified infection rates of 1.4% (8/665) in TEP group vs 0.7% (4/706) in open Lichtenstein group [11]. Even without antibiotic prophylaxis the infection rates were low in TEP group however without control group it could not be concluded that antibiotic prophylaxis would not have been beneficial. Kockerling et al. reported preventative effects of laparoscopic inguinal hernia repair for postoperative infection. In that analysis only 0.1% patients had postoperative infection after laparoscopic inguinal hernia surgery [7].

The analysis revealed that the influence exerted by the laparoscopic technique on postoperative infectious complications had a more preventive effect than that of antibiotic prophylaxis [7]. However, in a large case series with 5203 TEP operations involving 3868 patients who had received antibiotic prophylaxis, the wound infection rate was 0.08 % and the mesh infection rate 0.02% [8]. In another large case series with 8050 TAPP operations carried out for 6479 patients who had received antibiotic prophylaxis, the wound infection rate was 0.03% and the mesh infection rate 0.1% [9]. Both these series favored antibiotic prophylaxis in laparoscopic inguinal hernia repair. In both these studies there were no control groups for comparison and therefore low infection rates could not be attributed to antibiotic prophylaxis. The current study showed no infection rate in antibiotic prophylaxis or no antibiotic prophylaxis group. None of the 57 patients from non-antibiotic group had postoperative infection. Absolute infection reduction rate with antibiotic prophylaxis was 0%. Patients in both groups were pretty well matched for age, BMI, ASA score and duration of surgery. Inguinal hernia repair is one of the most commonly performed operations with more than 1 million repairs being done in the United states and Europe annually [12]. Therefore, any improvement in their management could have a significant medical and economic impact [12]. Postoperative infection is one of the most common surgical complications [5] and associated with a longer length of hospital stay, increased costs and decrease in quality of life [6]. The use of antibiotic prophylaxis to avoid infectious complications of surgery is very common in surgical

practice. However, indiscriminate use of antibiotics can lead to problems including increased costs, emergence of resistant micro-organisms and superinfections [5]. The current study showed that antibiotic prophylaxis had no impact on postoperative infection in totally extra-peritoneal repair of inguinal hernia. Hence, antibiotic prophylaxis should be avoided for totally extra-peritoneal laparoscopic inguinal hernia surgery. Kockerling, et al. reported that minimally invasive inguinal hernia repair made a greater contribution to the prevention of postoperative infection than antibiotic prophylaxis [7]. Avoiding indiscriminate use of antibiotic prophylaxis in inguinal hernia repair could reduce the risks of toxic and allergic side effects, the possible development of bacterial resistance, superinfections and reduced costs [12]. One of the limitations of current study is retrospective nature of data collection and lack of proper randomization. However, patients in both groups were found to be well matched for their characteristics. The other limitation is a relatively smaller sample size and therefore future prospective randomized controlled studies involving larger sample size are required to reinforce the findings of current study.

Conclusion

Based on 0% absolute reduction rate of infection, the study concluded that preoperative antibiotic prophylaxis does not affect postoperative infection rate in patients undergoing totally extra-peritoneal repair of inguinal hernia. Future prospective randomized controlled studies involving larger sample size are recommended to reinforce the findings of current study.

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