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Research Article

Mesh inguinal hernia repair: to give antibiotic prophylaxis or not?

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Running title: Antibiotic prophylaxis for mesh inguinal hernia repair

ABSTRACT

Background. Inguinal hernia repair is one of the most common procedures performed by general surgeons in which antibiotic prophylaxis is being commonly used but its use is still under debate. This study aimed to compare the outcomes of mesh inguinal hernia repairing with and without antibiotic prophylaxis.
Methods. In this study, 120 patients older than 18 years candidate for inguinal hernia repair with mesh were randomly divided into case and control groups.The case group received 1 gram intravenous Cefazolinhalf an hour before surgery and then every 6 hours for 24 hours. The control group was treated without antibiotic. One week, one month and three months after surgery, erythema, seroma and suture abscess were evaluated in both groups.
Results. Fifty seven patients participated in case group and 55 represented the control group.The mean age of the patients in case and control groupswere48.70±14.97 and 45.25±16.27 years, respectively (p=0.246).One week after the surgery, antibiotic prescription was not associated withseroma (p=0.344), erythema (p=0.545) and stitch abscess (p=0.296). No statistically significant difference was found between seroma, erythema and stitch abscess between males and females of both groups (p=0.962, p=0.201 and p=0.386, respectively). One month and three months following surgery, no case of seroma, erythema and stitch abscess was reported in both groups.
Conclusion. Although antibiotic prophylaxis can be applied in mesh repair of inguinal hernia, but we do not recommend it because routine use of antibiotic prophylaxis maycause bacterial resistance and increase in cost.

Keywords: Mesh, inguinal hernia, antibiotic prophylaxis.

INTRODUCTION

Hernia is a Latin word meaning “rupture” [1]. Inguinal hernia is a common disorder affecting approximately 5-10% of the adult population worldwide[2]. With more than 20 million hernias repaired every year, inguinal hernia repair is one of the most common operations performed in general surgery and tension-freemesh repair has emerged as one of the most popular techniquesused [3]. More than one million inguinal hernia repairs are being performed annually in the USA and Europe [4]. Several methods have been introduced for inguinal hernia repair that focus on reduction of surgery complications and recurrence of the hernia [5]. Although the Lichtenstein repair is apopular mesh repair technique,the prolene hernia system, which is a combination of inlay

and onlay mesh,has gained in popularity in last five years [6].

Infection rates in hernia operations range from 3.3-14% and postoperative wound infection occurs in 0-9% of the patients[7]. However, the risk of developing possible bacterial resistance and super infections can be reduced if the routine use of antibiotic prophylaxis in hernia repairs is avoided [3, 8]. Also, avoiding the routine use of antibiotics decreases the operation costs [9].

Antibiotic prophylaxis is being commonly used in mesh repairs of inguinal hernia but some studies concluded that routine use of prophylactic antibiotics in mesh repairs of inguinal hernia can neither be recommended nor condemned [10, 11]. Many double-blind randomized controlled trials do not confirm therole of antibiotic prophylaxis for decreasing the rate of surgical site infection [12-14]. Due to controversies in recommending antibiotic therapy after mesh hernia repair, we aimed to compare the outcomes of mesh inguinal hernia repairing with and without antibiotic prophylaxis.

MATERIALS AND METHODS

In this randomized clinical trial study without placebo control, 120 patients with age between 18 to 60 years referring to Ayatollah Rohani Hospital of Babolbetween March 2015-2016 who were eligible for inguinal hernia repair with prolene Polypropylene Mesh were randomly divided into two groups of intervention and control. Patientswith BMI >30, recurrent, bilateral, irreducible or strangulated hernia, diabetes, and history of radiotherapy and chemotherapy were excluded from the study[15]. Also, patients allergic to antibiotics or who had received antibiotics less than a week before surgery were excluded.

Both groups underwent surgery with spinal anesthesia and excision of inguinal canal and Prolene Polypropylene Mesh. The intervention group received 1 gram intravenous Cefazolinhalf an hour before the incision and then every 6 hours for 24 hours. The control group was operated without antibiotics. Written informed consent was obtained from the patients.

Surgical procedure

The skin was prepared using povidone-iodine and alcohol and spinal anesthesia was the preferred technique. Preoperative antibiotic prophylaxis with 1 gr intravenous Cefazolin Sodium was given to all patients. After inguinal incision over the hernia,if a tubular structure corresponding to the vermiform appendix was discovered during dissection of the hernia sac, the patient was excluded from the study.

Onlay mesh was fixed by 2-0 monofilament polypropylene interrupted sutures (Prolene, Ethicon Ltd., India) and the skin was closed using 3-0 interrupted nylon sutures. A drain was not used in any patient and all were discharged one day after surgery.

Follow-up

All wounds were inspected before discharge and one week after the operation, all incisions were carefully re-examined at the time of suture removal. Also, one month and three months after discharge,incisions were inspected for infection criteria including erythema, seroma and suture abscess. Patients were asked to report any wound discharge, pain or redness, to the surgical outpatient clinic after the fourth week.

Statistical analysis

Data for all the patients who entered trial and were operated upon were analyzed by SPSS version 19. Data was analyzed using Fisher's exact test, student's t test or chi square analysis as appropriate and p values less than 0.05 were considered to be statistically significant.

RESULTS

A total of 112 patients were included over a period of one year with strict adherence to the exclusion criteria. Fifty seven patients participated incase group (with antibiotic) and the remaining 55 represented the control group (without antibiotic).

The mean age of the patients in control group (without antibiotic) was 45.25±16.27 years and in case group (with antibiotic) was 48.70±14.97

years and were not statistically different in both groups (p=0.246).

One week after the surgery, no association was found between antibiotic prescription andseroma (p=0.344), erythema (p=0.545) and stitch abscess (p=0.296) (Table 1). No statistically significant difference was found between seroma, erythema and stitch abscess between males and females of both groups (p=0.962, p=0.201 and p=0.386, respectively) (Table 2). One month and three months following surgery, no case of seroma, erythema and stitch abscess was reported in both groups.

DISCUSSION

Antibiotic prophylaxis is administration of a drug before bacteria adhere to host tissues or host proteins in the surgical field or decreasing the number of colonizing bacteria at that site. Itdecreases the intraoperative level of microorganisms to a quantity thatimmune system of the patient can successfully deals with it. It [16, 17].Althoughantibioticprophylaxis is not needed in clean and elective procedures, but the routine use of mesh for inguinal hernia repairs makes its application controversial[17]. This study aimed to compare the outcomes of mesh inguinal hernia repairing with and without antibiotic prophylaxis.

In this study,one week after the surgery, no association was found between antibiotic prescription and seroma,erythema and stitch abscess. In other words, our study did not show any benefit from antibiotic therapy in patients undergoing inguinal hernia repairs like Jain et al.'s study [3].In a randomized controlled trial on 1040 patients, infection rate was 1.6% in the antibiotic prophylaxis group and 1.8% in the placebo group [12]. In another randomized prospective double-blind control trial, patients undergoing inguinal hernia repair using prolene hernia system had no benefit of the routine use of antibiotic prophylaxis in terms of wound infection rate [18]. In a systematic review, the incidence of infection after groin hernia repair in placebo group was twofold of antibiotic group and antibiotic prophylaxis did not significantly reduce or prevent the incidence of wound infection after groin hernia surgery[19]. Contrary to us, results of a meta-analysis by Yin et al. found a protective effect of antibiotic prophylaxis in preventing and reducing surgical site infection after mesh inguinal hernia repair[20].Sanabria et al. concluded that antibiotic prophylaxis significantly reduces surgical site infection [21]. In a prospective double-blind controlled trial by Celdrán et al. on antibiotic prophylaxis in mesh repair of inguinal hernia, a significantly higher infection rate was found in the placebo group [22]. Results of a systematic review and meta-analysis showed that antibiotic prophylaxis significantly reduces the overall incidence of surgical site infectionfrom 4.8 % to 3.2 % but the incidence of deep surgical site infectionwas very low (0-0.7%) and the effect of antibiotic prophylaxis was not significant [23].

In this study, no statistically significant difference was found between seroma, erythema and stitch abscess and gender. Studies have shown that gender could be a factor significantly affecting the surgical site infection rateand the higher rate of infection in women undergoing hernia repair procedures are reported[12, 17]. The reason for nonsignificant result of our study may be few number of women to men ratio (6/106). Further studies with higher sample size is recommended.

In this study, in follow-ups of the surgery, no infection was reported in both groups. The surgical site infection rates are influenced by an abdominal operation,prolonged operation, a contaminated or dirty/infected wound classification,recurrence of hernia, old age (> 70 years), immunosuppression, diabetes mellitus, rheumatoid arthritis, and obesity [17, 24, 25].The current resultof our study may be due toexcludingthe high risk patients.The indication for antibiotic prophylaxis depends on the risk of surgical site infection and the potential severity of the infection, which may decrease the outcomes for some surgical procedures [23].

CONCLUSION

Although antibiotic prophylaxis can be applied in mesh repair of inguinal hernia, but we do not recommend it for low risk patients because routine use of antibiotic prophylaxis can lead to

bacterial resistance and increase in cost [3]. Also, perioperativeantibioticprophylaxisis only recommended for patients with higher number of risk factors for infection [26]. The European Hernia Society does not recommend routineantibioticprophylaxisfor elective inguinal hernia repair procedures using a mesh in patients with lowrisk of infection [17, 25]. The surgical technique, haemostasis and postoperative care might contribute to the rate of infection in hernia repair procedures much more than antibiotic prophylaxis alone [17].

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CONflICT OF INTEREST

The authors declare that there is no conflict of interests regarding the publication of this paper.

REFERENCES

1. Darzi AA, Hashemi SR, Noorbaran A, Pasha ARG, Modaress SR, Nikbakhsh N, Farhangi B, Moudi E, Khafri S, Mirzapour M: Electronic Database Annual Report on Abdominal Wall Hernias, 2010-2011, Shahid Beheshti University Hospital, Babol, Iran. *World Applied Sciences Journal* 2013, 21(7):1084-1088.
2. Claus C, Rocha G, Campos A, Bonin E, Dimbarre D, Loureiro M, Coelho J: Prospective, randomized and controlled study of mesh displacement after laparoscopic inguinal repair: fixation versus no fixation of mesh. *Surgical endoscopy* 2016, 30(3):1134-1140.
3. Jain S, Jayant M, Norbu C: The role of antibiotic prophylaxis in mesh repair of primary inguinal hernias using prolene hernia system: a randomized prospective double-blind control trial. *Tropical doctor* 2008, 38(2):80-82.
4. Rutkow IM: Demographic and socioeconomic aspects of hernia repair in the United States in 2003. *Surgical Clinics of North America* 2003, 83(5):1045-1051.
5. Modarres, SR, Gholizadeh Pasha A, Gouran, A, Nourbaran, A, Hashemi, SR, Alijanpour AH, Farhangi, B, Drazi A, Nikbakhsh, N: Comparison of the Outcomes of Inguinal Hernia Repair with Mesh and Non-Mesh Methods. *Journal of Babol University Of Medical Sciences* 2013, 15(1):12-17.
6. Mayagoitia J: Inguinal hernioplasty with the prolene hernia system. *Hernia* 2004, 8(1):64-66.
7. Santos K, Neto GB, Fonseca L, Gontijo Filho P: Incidence surveillance of wound infection in hernia surgery during hospitalization and after discharge in a university hospital. *Journal of Hospital Infection* 1997, 36(3):229-233.
8. Stephenson BM: Complications of open groin hernia repairs. *Surgical Clinics of North America* 2003, 83(5):1255-1278.
9. Waldvogel F, Vaudaux P, Pittet D, Lew P: Perioperative antibiotic prophylaxis of wound and foreign body infections: microbial factors affecting efficacy. *Review of Infectious Diseases* 1991, 13(Supplement 10):S782-S789.
10. Sanchez-Manuel FJ, Lozano-Garcia J, Seco-Gil JL: Antibiotic prophylaxis for hernia repair. *Cochrane Database Syst Rev* 2007, 3.
11. Lazorthes F, Chiotasso P, Massip P, Materre J, Sarkissian M: Local antibiotic prophylaxis in inguinal hernia repair. *Surgery, gynecology & obstetrics* 1992, 175(6):569-570.
12. Aufenacker TJ, van Geldere D, Van Mesdag T, Bossers AN, Dekker B, Scheijde E, van Nieuwenhuizen R, Hiemstra E, Maduro JH, Juttmann J-W: The role of antibiotic prophylaxis in prevention of wound infection after Lichtenstein open mesh repair of primary inguinal hernia: a multicenter double-blind randomized controlled trial. *Annals of surgery* 2004, 240(6):955-961.
13. Othman I: Prospective randomized evaluation of prophylactic antibiotic usage in patients undergoing tension free inguinal hernioplasty. *Hernia* 2011, 15(3):309-313.
14. Shankar VG, Srinivasan K, Sistla SC, Jagdish S: Prophylactic antibiotics in open mesh repair of inguinal hernia–a randomized

controlled trial. *International journal of surgery* 2010, 8(6):444-447.
15. Chennamsetty A, Hafron J, Edwards L, Pew S, Poushanchi B, Hollander J, Killinger KA, Coffey MP, Peters KM: Predictors of incisional hernia after robotic assisted radical prostatectomy. *Advances in urology* 2015, 2015:457305.
16. Hryniewicz W, Kulig J, Ozorowski T, Kulig P, Wąchol D: Stosowanie antybiotyków w profilaktyce okołooperacyjnej. *Narodowy Instytut Leków, Warsaw* 2011:1-27.
17. Zamkowski MT, Makarewicz W, Ropel J, Bobowicz M, Kakol M, Smietanski M: Antibiotic prophylaxis in open inguinal hernia repair: a literature review and summary of current knowledge. *Wideochir Inne Tech Maloinwazyjne* 2016, 11(3):127-136.
18. Taylor EW, Byrne DJ, Leaper DJ, Karran SJ, Browne MK, Mitchell KJ: Antibiotic prophylaxis and open groin hernia repair. *World journal of surgery* 1997, 21(8):811-815.
19. Aufenacker T, Koelemay M, Gouma D, Simons M: Systematic review and meta-analysis of the effectiveness of antibiotic prophylaxis in prevention of wound infection after mesh repair of abdominal wall hernia. *British journal of surgery* 2006, 93(1):5-10.
20. Yin Y, Song T, Liao B, Luo Q, Zhou Z: Antibiotic prophylaxis in patients undergoing open mesh repair of inguinal hernia: a meta-analysis. *The American surgeon* 2012, 78(3):359-365.
21. Sanabria A, Domínguez LC, Valdivieso E, Gómez G: Prophylactic antibiotics for mesh inguinal hernioplasty: a meta-analysis. In.: LWW; 2007.
22. Celdrán A, Frieyro O, Juan C, Souto JL, Esteban J, Rubio JM, Señarís JF: The role of antibiotic prophylaxis on wound infection after mesh hernia repair under local anesthesia on an ambulatory basis. *Hernia* 2004, 8(1):20-22.
23. Erdas E, Medas F, Pisano G, Nicolosi A, Calo PG: Antibiotic prophylaxis for open mesh repair of groin hernia: systematic review and meta-analysis. *Hernia* 2016, 20(6):765-776.
24. Mangram AJ, Horan TC, Pearson ML, Silver LC, Jarvis WR, Committee HICPA: Guideline for prevention of surgical site infection, 1999. *American journal of infection control* 1999, 27(2):97-134.
25. Simons M, Aufenacker T, Bay-Nielsen M, Bouillot J, Campanelli G, Conze J, De Lange D, Fortelny R, Heikkinen T, Kingsnorth A: European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. In.: Springer; 2009.
26. Weyhe D: [New worldwide guidelines for treatment of inguinal hernia : The most important recommendations from HerniaSurge]. *Chirurg* 2017.

Table 1. Infection criteria one week after the surgery

	Case	Control	P value
Seroma +	48(87.3%)	46(80.7%)	0.344
Seroma –	7(12.7%)	11(19.3%)	
Erythema +	13(22.8%)	10(18.2%)	0.545
Erythema -	44(77.2%)	45(81.8%)	
Stitch abscess +	9(15.8%)	13(23.6%)	0.296
Stitch abscess -	48(84.2%)	42(76.4%)	

Table 2. Infection criteria based on gender one week after the surgery

	Male	Female	P value
Seroma +	17(16.0%)	1(16.7%)	0.967
Seroma –	89(84.0%)	5(83.3%)	
Erythema +	23(21.7%)	0(0.0%)	0.201
Erythema -	83(78.3%)	6(100.0%)	
Stitch abscess +	20(18.9%)	2(33.3%)	0.386
Stitch abscess -	86(81.1%)	4(66.7%)	