

Evaluation effect of local Cefazolin on postoperative infection in herniorrhaphy with Mesh

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Abstract: Introduction: The efficacy of antibiotic prophylaxis for the prevention of surgical-site infection (SSI) after open tension-free inguinal hernia repair remains controversial. The aim of this study was evaluation the effects of local Cefazolin on postoperative infection in patients underwent inguinal herniorrhaphy with Mesh. **Materials and Methods:** A descriptive-analytical study was performed in the surgery ward of Shahid Mahallati Hospital of Tabriz on 117 patients who had undergone herniorrhaphy of inguinal hernia at 2012-2014. The aim of this study was evaluation and compares the results of local Cefazolin on postoperative infection in herniorrhaphy with Mesh. **Results:** Mean age of patients in case and control groups was 39.66 ± 17.13 and 37.60 ± 14.95 , respectively ($P=0.491$). 85 patients (42 patients of Case-group and 43 patients of Control-group) were male and 32 patients (16 patients of Case-group and 16 patients of Control-group) were female ($P=0.955$). Mean weight of patients in case group was 59.11 ± 12.94 kg and in control group was 55.60 ± 10.63 kg ($P=0.112$). Mean body mass index (BMI) of patients in case group was 22.04 ± 3.25 and in control group was 21.07 ± 3.03 ($P=0.095$). Surgery wound infection was found in 4(6.78%) patients of case group and 13(22.41%) patients of control group. Fever was found in 3(5.08%) patients of case group and 13(10.34%) patients of control group. Mean WBC count in patients with surgery wound infection was 16407.65 ± 4351.50 and in patients without surgery wound infection was 10346.95 ± 1460.62 . **Conclusion:** Frequency of surgery wound infection was significantly lower in patients that use Cefazolin powder on Mesh after hernia repair (Case group) than control group ($P=0.016$). Significantly difference was not found between frequency of fever between two groups of patients underwent inguinal herniorrhaphy with Mesh ($P=0.322$). Mean of white Blood Cell (WBC) in case group patients was significantly lower than control group ($P=0.004$). Mean WBC count in patients with surgery wound infection was significantly higher than patients without surgery wound infection ($P<0.001$). Usage of Cefazolin powder on Mesh after hernia repair was effective in prevention of post operative wound infection in patients underwent inguinal herniorrhaphy. [Seyed Hosseini SV. **Evaluation effect of local Cefazolin on postoperative infection in herniorrhaphy with Mesh.** *N Y Sci J* 2014;7(11):132-137]. (ISSN: 1554-0200). <http://www.sciencepub.net/newyork>. 19

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1. Introduction

All over the globe, about 20 million herniorrhaphy operations are performed. This operation is among the most common operations conducted by general surgeons (Saubu, 2007).

Factors increasing the pressure in the abdominal cavity are bearing heavy objects, coughing as a result of a chronic pulmonary disease, forceful defecation and urination, chronic pulmonary disease, and ascites (Saubu, 2007). Lack of balance in collagens (a reduction in the ratio of type 1 to type 3 collagens) leads to the development of disorders in the anatomic structure of fascia and skin of people suffering from hernia (Townsend, 2008; Michael, 2011). Diagnosis takes place by examining the inguinal region in the supine or standing position. In addition, ultrasound images can also help recognize inguinal hernia. This method is highly sensitive. CT also helps recognize abnormal hernia.

All inguinal hernia cases shall go through surgery because the risk of development of inguinal hernia complications such as strangulation,

incarceration, and ileus is higher than the risk of surgery.

At least 70 methods have been developed to operate inguinal hernia. The most popular method is Liechtenstein which employs polypropylene meshes (Doherty, 2010). One of the most important complications of surgery is surgical wound infection. Surgical wound infections are of two types: surface infection and deep infection.

Surgical wound infection is caused by the following three causes: the microbial contamination of the wound during surgery; duration of surgery; and factors associated with the host such as diabetes, malnutrition, obesity, immunosuppression, and a number of other background diseases.

Surgical wounds are classified based on the chances of bacterial contamination during surgery. Inguinal hernia surgical wound is a neat wound that falls in the class 1 category. These types of wounds rarely become infected. In such cases only the microbial flora of the skin contaminates the wound and no hollow member containing germs is opened (Brunicardi, 2010).

Mis-administration of antibiotics in hospitalized patients is common and leads to a considerable increase in healthcare costs, adverse reactions caused by poisoning and drug allergy, development of new infections such as Clostridium Devicil, development of multi-medicine resistance in hospital pathogens, and development of super-germs that are sensitive to few medicines or are not sensitive to any medicine. On the other hand, surgical wound infection leads to considerable morbidity, mortality, high health care expenses, and pain and suffering for the patient (Tzovaras, 2007).

According to the literature, the possibility of development of wound infection after hernioplasty is 1-5.4%. Moreover, in order to use prophylaxis antibiotics to prevent surgical wound infection, it is explicitly recommended to use single doses and an anti-microbial agent before inguinal hernia operation with mesh (Brunicardi, 2010).

In different studies, the rate of outbreak of wound infection in elective inguinal hernioplasty with mesh is reported to be 1.17-10.2% (Tzovaras, 2007). According to references this rate varies between 1-5.4% (Tzovaras, 2007).

Since inguinal hernia wound is considered a neat wound. It seems that the discrepancy in the reports on the outbreak of wound infection results from the difference in the conditions in which patients are prepared for surgery. For example the method used to shave the operation area, bathing before surgery and differences in the selection of patients (based on age group, background diseases, administration of drugs, and the status of the immunity system) all determine the differences.

The aim of this study was evaluation and compares the results of local Cefazolin on postoperative infection in herniorrhaphy with Mesh.

2. Material and Methods

A descriptive-analytical study was performed in the surgery ward of Shahid Mahallati Hospital of Tabriz on 117 patients who had undergone herniorrhaphy of inguinal hernia at 2012-2014. The aim of this study was evaluation and compares the results of local Cefazolin on postoperative infection in herniorrhaphy with Mesh.

In this study, 59 patients in Case-Group and 58 patients in Control-Group that underwent herniorrhaphy with Mesh were enrolled in to study. The demographic parameters, surgery information, laboratory findings and post operative infection of patients in both groups evaluated and collected. All patients underwent herniorrhaphy with Mesh by single surgeon.

In Case group, used Cefazolin powder (1gr) locally and end of surgery on Mesh for prophylaxis of

infection and also in control group, Cefazolin powder don't used.

In all patients in both group, Ampoule Cefazolin 1 gr/Q12h at during of admission and continued by capsule Cephalexin 500 mg/Q6h for seven days after discharge.

All patients follow-up for compilations of surgery such as infection by surgeon at one month after surgery.

Statistical Analysis:

The collected data were analyzed by SPSS-17 statistical software. The collected data were expressed as percentage and mean \pm SD. Continuous (quantitative) variables were compared by Independent samples and Paired t test. Categorical (qualitative) variables were compared by contingency tables and Chi-square test or Fisher's exact test. P-value ≤ 0.05 was considered statistically significant.

Ethical Considerations

Before including the patients in the study, the treatment methods along with its side effects and advantages were described to the patients. Therefore, the patients participated in the study with full awareness after their informed consent was obtained.

3. Results

In this study, the operation results and complications of 117 patients with inguinal hernia who were candidates for elective herniorrhaphy with Mesh were examined. The following results were obtained:

The mean age of patients was 49.90 ± 10.37 year (Chart I). Mean age of patients in case and control groups was 39.66 ± 17.13 and 37.60 ± 14.95 , respectively. Therefore, there was no significant different between the age of patients in the two groups ($P=0.491$). 85 patients (42 patients of Case-group and 43 patients of Control-group) were male and 32 patients (16 patients of Case-group and 16 patients of Control-group) were female ($P=0.955$).

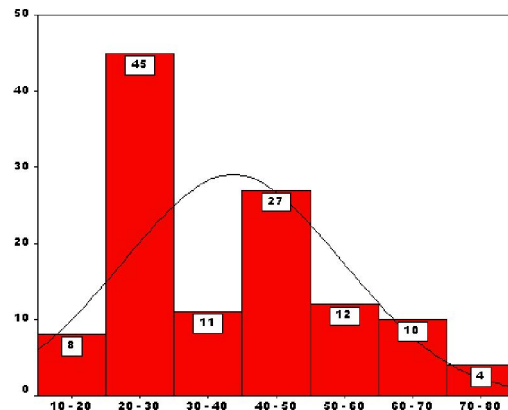


Chart I: Age distribution of patients in two groups

Table I: Laboratory finding of patients in two groups

	Group		P
	Case	Control	
Blood Sugar	122.39 ± 19.22	122.24 ± 27.49	0.973
Blood Urea Nitrogen	31.56 ± 8.55	32.18 ± 9.14	0.704
Creatinine	.92 ± .29	.91 ± .13	0.752
White Blood Cell	10448.73 ± 2149.78	12019.83 ± 3523.47	0.004*
Hemoglobin	13.19 ± 1.86	13.69 ± 3.19	0.309
Platelet	281.25 ± 74.00	256.17 ± 64.49	0.053
Sodium (Na ⁺)	144.97 ± 1.74	145.88 ± 2.52	0.451
Potassium(K ⁺)	4.19 ± .40	4.27 ± .45	0.305
PT	13.39 ± .57	13.38 ± .60	0.923
PTT	32.85 ± 2.60	32.12 ± 2.01	0.094
INR	1.09 ± .11	1.12 ± .13	0.133

*_Significant

Mean weight of patients in case group was 59.11 ± 12.94 kg and in control group was 55.60 ± 10.63 kg. Significantly difference was not found between mean weight of patients in two groups (P=0.112).

Mean body mass index (BMI) of patients in case group was 22.04 ± 3.25 and in control group was 21.07 ± 3.03.

Significantly difference was not found between mean BMI of patients in two groups (P=0.095).

Surgery wound infection was found in 4(6.78%) patients of case group and 13(22.41%) patients of control group.

Frequency of surgery wound infection was significantly lower in patients that use Cefazolin powder on Mesh after hernia repair (Case group) than control group (P=0.016).

Fever was found in 3(5.08%) patients of case group and 13(10.34%) patients of control group. Significantly difference was not found between frequency of fever between two groups of patients underwent inguinal herniorrhaphy with Mesh (P=0.322).

Laboratory finding of patients in two groups were shown in table I. Mean of white Blood Cell (WBC) in case group patients was significantly lower than control group(P=0.004).

Mean WBC count in patients with surgery wound infection was 16407.65 ± 4351.50 and in patients without surgery wound infection was 10346.95 ± 1460.62.

Mean WBC count in patients with surgery wound infection was significantly higher than patients without surgery wound infection (P<0.001).

Distribution of WBC in patients with and without surgery wound infection was shown in chart II.

4. Discussions

One of the most common nosocomial infections is surgical wound infection (Kirby, 2009; Matthaiou,

2009; Klevens, 2007). More than 2-5% of patients undergoing extra-abdominal surgery and more than 20% of patients undergoing abdominal surgery suffer surgical wound infections (Leaper, 2004; Barie, 2002).

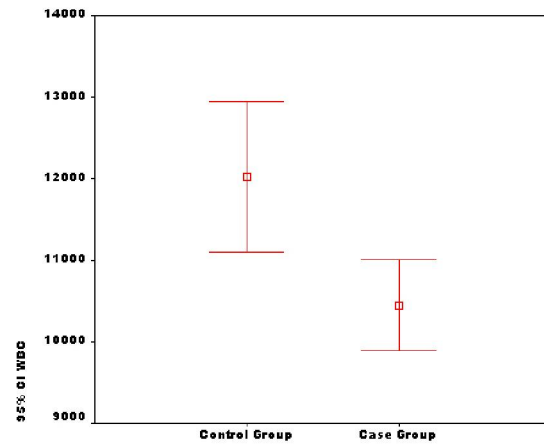


Chart II: Distribution of WBC count of patients underwent inguinal herniorrhaphy in two groups

Surgical wound infection leads to an increase in mortality, costs and duration of hospitalization of patients (Owens, 2008; Webb, 2006).

Compared to patients without surgical wound infection, patients with surgical wound infection are hospitalized 60% in ICU. The chances of re-hospitalization of these patients are 5 times patients without surgical wound infection. Moreover, the rate of mortality in patients with surgical wound infection is two times that of patients without such infections (Kirkland, 1999). As a result of all of these conditions that result from wound infection expenses escalate (Fry, 2002).

Although prophylaxis antibiotics reduce post-operative infection, improper administration of such

antibiotics to patients undergoing surgery causes problems such as outbreak of pharmaceutical interference, spread of bacteria-resistant infections, and unnecessary expenses imposed on hospital systems (Owens, 2008).

Prescription of prophylaxis antibiotic before surgery is one of the factors contributing to the reduction in the development of surgical wounds. Proper administration of this medicine (if necessary), proper choice of medicine, proper consumption intervals and dosage, method of prescription, proper time for the first usage, and proper duration of consumption are the factors that help attain this goal.

For the short run, prophylaxis antibiotic is prescribed for at most 3 dosages. The best time for administration of prophylaxis antibiotic is at the time of anesthesia induction and 1 or 2 hours before operation (Askarian, 2007; Al-Momany, 2009; Saxer, 2009).

Because of ethical concerns, all patients were given antibiotic prophylaxis. In all patients, surgical wound infection rate was 17.52%, which is similar to the results of the above studies. Efficacy of antibiotic prophylaxis for the prevention of surgical site infection (SSI) after open tension-free hernia repair remains controversial. The use of antibiotic prophylaxis for hernia repair is currently a controversial issue given the disparity among study results in this area.

In the study by Neumayer it was stated that administration of prophylaxis antibiotic in hernioplasty with mesh leads to a 50% reduction in wound infection (Neumayer, 2007).

In the study by Just, which lasted for 17 years, administration of prophylaxis antibiotic led to a decrease in the possibility of development of wound infection from 1.2% to 0.2% (Just, 2010). In the study by Mehmet, use of single-dose of ampicillin/sulbactam prior to surgery leads to a reduction in wound infection from 9% in the control group to 0.7% in the antibiotic group (Mehmet, 2001). In the study by Sanabria and Deysine, administration of prophylaxis antibiotic led to a 50% reduction in the possibility of wound infection development (Sanabria, 2007; Deysine, 2005). Seemingly, the reason for the effectiveness of prophylactic antibiotics for development of surgical wounds in such patients was the concurrent presence of high-risk patients and low-risk patients in the study population (based on the defined criteria).

Osvaldo Iribaren carried out a study in which he classified patients in three groups based on ASA. Afterwards, he made a comparison between the rates of development of infection in such patients. The rate of development of infection in the prophylaxis group and placebo group from class ASA-I was 7.3% and

10.3%, respectively ($P=0.40$). In class ASA2&3 the rate of development of infection in the prophylaxis group and the placebo group was 10.5% and 30%, respectively ($P=0.03$). Patients under study stated that administration of antimicrobial prophylaxis with cephalosporins to patients in class ASA2&3 (who undergo clean surgery) can prevent the outbreak of surgical wound infection. However, in patients of class ASA-1 (who are low-risk patients), administration of prophylaxis antibiotic does not help prevent surgical wound infection (Osvaldo, 2006). In the study by Aufenacker, it was recommended not to use prophylaxis antibiotic for low-risk patients. In addition, it was reported that since inguinal hernia surgery is usually prescribed for low-risk patients, lack of administration of prophylactic antibiotic can lead to a 10 million euro reduction in annual costs of United States and European countries (Aufenacker, 2004). In the study by Othman, Thakur and Peraz, the rates of development of surgical wound infection in the groups receiving prophylaxis antibiotic and placebo did not differ significantly (Perez, 2005; Thakur, 2010; Thman, 2011).

Post Mesh Herniorrhaphy Infection [PMHI] occurs between 3 to 4% of inguinal and 8 to 14% of ventral herniorrhaphies producing an unacceptably high morbidity (Deysine, 2009).

Ergul and colleagues demonstrate that the most effective way to reduce the incidence of infection in prosthetic repair may be a specific center for treatment of abdominal wall hernias (Ergul, 2012).

The efficacy of antibiotic prophylaxis for the prevention of surgical-site infection (SSI) after open tension-free inguinal hernia repair remains controversial (Mazaki, 2014). The study of Mazaki, indicates that antibiotic prophylaxis is effective for the prevention of SSI after open mesh-plug hernia repair (Mazaki, 2014).

Shankar and colleagues show that the antibiotic prophylaxis was associated with decreased incidence of wound infection when compared to control group, but the difference was not statistically significant (Shankar, 2010).

In the study of Yin and colleagues, incidence of surgical site infection was 39 of 1642 (2.38%) in the antibiotic group and 70 of 1676 (4.18%) in the control group. Antibiotics showed a protective effect in preventing SSI after mesh inguinal hernia repair (odds ratio: 0.61, 95% confidence interval: 0.40-0.92, I(2): 0%).

Antibiotic prophylaxis did reduce the incidence of SSI in hernia patients undergoing mesh hernioplasty (Yin, 2012).

Mazaki and colleagues suggests that antibiotic prophylaxis is efficacious for the prevention of SSI after open mesh hernia repair (Mazaki, 2013). Based on

the results of Sanchez-Manuel and colleagues study, the administration of antibiotic prophylaxis for elective inguinal hernia repair cannot be universally recommended.

Nevertheless, its administration cannot either be recommended against when high rates of wound infection are observed (Sanchez-Manuel, 2007). The results of Aufenacker and colleagues study show that, in Lichtenstein inguinal primary hernia repair, antibiotic prophylaxis is not indicated in low-risk patients (Aufenacker, 2004).

In our study, topical application of Cefazolin significantly reduced the rate of postoperative wound infection.

Finding results demonstrate topical application of Cefazolin in herniorrhaphy was effective.

Surgery wound infection in patients with inguinal hernia that received local Cefazolin four fold less than patients in control group (6.77% vs 22.41%).

Conclusion:

Frequency of surgery wound infection was significantly lower in patients that use Cefazolin powder on Mesh after hernia repair (Case group) than control group ($P=0.016$). Significant difference was not found between frequency of fever between two groups of patients underwent inguinal herniorrhaphy with Mesh ($P=0.322$). Mean of white Blood Cell (WBC) in case group patients was significantly lower than control group ($P=0.004$). Mean WBC count in patients with surgery wound infection was significantly higher than patients without surgery wound infection ($P<0.001$).

Usage of Cefazolin powder on Mesh after hernia repair was effective in prevention of post operative wound infection in patients underwent inguinal herniorrhaphy.

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