

## Original Research Article

# Effect of antibiotic prophylaxis in open inguinal hernioplasty (Lichtenstein hernia repair): a study in tertiary care center

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## ABSTRACT

**Background:** Inguinal hernia is one of the most common presenting surgical problems of abdomen and open inguinal hernioplasty (Lichtenstein hernia repair) is one of the most commonly performed general surgeries. Many time hernia repairs may lead to surgical site complication. There are many strong and effective antibiotics available for prophylaxis from these infections. Aims and objectives of the study were to compare rate of wound infection in post-operative cases among antibiotics prophylaxis group and placebo group.

**Methods:** A prospective study was conducted in tertiary care centres with 200 patients enrolled in study. These patients were equally divided in both groups that is antibiotics arm and placebo group. The patients were in between age group of 18-70 years. The study duration was one and half years. Patients were included as per inclusion criteria. Data was entered and analysed using appropriate software.

**Results:** There were total 200 patients recruited in the study with 100 patients in each group. Mean age of patients was  $47.92 \pm 8.32$  years in antibiotic group and  $48.09 \pm 9.12$  years in placebo group. All patients were males and most of the patients belong to rural area. A total of 12 patients develop surgical site infection out of which 6 patients were from antibiotics group and 8 patients from placebo group. Differences between these groups were not significant (0.426).

**Conclusions:** This study showed that there was no clear acceptable benefit of antibiotics in prevention of post-operative wound infection in open inguinal hernioplasty (Lichtenstein hernia repair). Antibiotics administration did not reduce the incidence of wound infections in significant way.

**Keywords:** Wound infection in open inguinal hernioplasty, Role of antibiotics prophylaxis, Superficial surgical site infection

## INTRODUCTION

Hernia is a protrusion of a viscus or part of viscus through a normal or abnormal opening in the walls of its containing cavity.<sup>1</sup> Inguinal hernia surgery is one of the most commonly performed general surgery.<sup>2,3</sup> Open inguinal hernioplasty is considered as one of the clean operative procedure but despite of all these some surgeons still uses antibiotics as a prophylactic dose. It is well known that a required concentration of antibiotics is required at incision site to prevent from infection and as this antibiotics dose is for prevention of infection this is called as prophylactic antibiotics dose.<sup>4</sup> Mesh hernia

repair is a preferred method now a days and Lichtenstein repair, involved placement of polypropylene mesh over the entire floor of the inguinal canal is most frequently performed technique among the open mesh inguinal hernia repair procedures.<sup>5-9</sup> Surgical site infections (SSI) are the most common complications secondary to hernia repairs.<sup>10,11</sup> SSIs are also the most common nosocomial infections and constitute 38% of all infections in surgical patients. These SSI usually occur within 30 days after infection, but can some time occur up to 1 year of surgery. Infections following hernia repair result fourfold increased chance of hernia recurrence particularly in herniorrhaphies.<sup>12,13</sup> Wound infection after surgery is a

challenge to surgeon and threat to patients in term of morbidity and mortality. Many surgeons thought that it's better to avoid wound infections than to treat a post-operative wound infection.<sup>14</sup> Infections in an inguinal hernia wound have been associated with four-fold increase in recurrence rates and therefore may cause sequelae.<sup>15</sup>

Antibiotics prophylaxis has been suggested the most effective way to prevent SSIs.<sup>16</sup> SSI is related with an increase in length of stay and costs and a decrease in quality of life.<sup>17-18</sup> With ongoing use of antibiotics although mortality is decreasing but morbidity is increasing owing emergence of antibiotics resistant bacteria.<sup>2</sup> Antibiotic prophylaxis in inguinal hernia surgery is controversial, especially after the increasing use of mesh implant.<sup>2</sup> Routine use of antibiotic prophylaxis in mesh repair of inguinal hernia can lead to bacterial resistance and increase in hospital costs.<sup>19-22</sup>

Most of the randomized studies and their meta-analysis showed no significant difference in the occurrences of post-operative infectious complications between the prophylactic antibiotic group and no prophylactic group. Thus, they all concluded that prophylactic antibiotics were not needed or warranted for low risk open inguinal hernioplasty.<sup>23-26</sup>

It was found that surgeons were administering broad spectrum prophylactic antibiotics in open inguinal hernia repair despite any advantage as many clinical trials and reviews of literatures had already concluded. Therefore, conducted a prospective randomized controlled study in our hospital to evaluate the role of antibiotic prophylaxis in open inguinal hernioplasty (Lichtenstein hernia repair).

## METHODS

The hospital based prospective study was conducted in surgery department of tertiary care center located at western region of India. All the patients between age group of 18 to 70 years required open inguinal hernioplasty (Lichtenstein hernia repair) were selected for study. A total of 200 cases were included in study. Study duration was one and half year starting from April 2017 to August 2018. 100 cases were in antibiotics group and another 100 cases were included in non-antibiotics group. A purposive sampling was used for selection of patients. All cases reported in a surgery department and required open inguinal hernioplasty (Lichtenstein hernia repair) for inguinal hernia were included in study while patients who were pregnant or with incision site infections like tinea cruris, complicated hernia (obstructed and strangulated) or with immune-compromised status like with steroid medication, malignancy, diabetes mellitus, cirrhosis, HIV etc. or with antibiotic intake owing other reasons and not willing to participate were excluded in the study. Study procedure included after admission, informed written consent was obtained from patients fulfilling the inclusion criteria. The findings of history,

clinical examination, and demographic characteristics were noted for each patient. All patients were evaluated by thorough clinical examination, followed by routine investigations including hemogram, renal function tests, liver function tests, chest X-ray, thyroid function tests and, FNAC. Open inguinal hernioplasty (Lichtenstein hernia repair) was done after overnight fasting. The groin of the patient was prepared by trimming or clipping of the groin hair in previous night. The surgical site was prepared by painting povidone iodine solution (10%) for 3-5 minutes before surgery. The operation was performed by faculty or by resident assisted by a senior surgeon in supine position of the patient. A standard open Lichtenstein hernia repair was performed as described by Lichtenstein hernia institute.<sup>14</sup> A monofilament polypropylene flat mesh was sutured in place using monofilament polypropylene (prolene). Types of skin closure and anesthesia were not standardized. The patients were to be randomized in two groups of equal size with simple randomization technique (Lottery method). Patients in the antibiotic's prophylaxis group (Group A) were given a total of three 1 gm doses of intravenous ceftriaxone; the first, just before skin incision, and the second and the third at 12 hours and 24 hours respectively, after the operation. Patients in the no antibiotics prophylaxis group (Group B) were received no antibiotics. Data collection was done using a pre-structured pre-tested Proforma. Microsoft excel and statistical software SPSS was used for data analysis and data was presented with the help of frequencies, figures, proportions, measures of central tendency, appropriate statistical test.

## RESULTS

This study was conducted in 200 patients coming to surgery department over a period of one and half years. The aim of study was to assess effect of prophylactic antibiotics in occurrence of post-operative wound infection. All patients were in age between 18 to 70 years. Mean age of patients was  $47.92 \pm 8.32$  years in antibiotic group and  $48.09 \pm 9.12$  years in placebo group. Age group wise distribution showed that majority of patients in each group was above 40 years of age, in antibiotics arm 26% patient at age group of 51-60 years while in placebo arm, 26% were belong to 41-50 years of age. 76% patients in antibiotics arm were belonging to rural area while 80% of placebo arm belong to rural area. In antibiotics arm 60% had right side hernia and 30% had left side hernia while 10% had bilateral hernia. In placebo group, 48, 46 and 6% had right, left and bilateral inguinal hernia respectively. 58% in antibiotics group and 64% in placebo group had indirect hernia. Direct hernia was found in 40 and 34% in antibiotics and placebo group respectively. In antibiotics group six patients got wound infection while in placebo group eight patients got wound infection. In antibiotics group, five patients had superficial surgical site infection and one patient had deep surgical site infection. While in placebo group six patients had superficial and three patients had deep

surgical site infection. All infection was developed beyond 4 days' time. Superficial infection can easily be improved with antibiotics therapy and there is no need for incision and drainage, on follow-up there was no recurrence or extension of the infection to deep space. The patient with deep infection in both groups developed purulent pus discharge from the wound on 10<sup>th</sup> post-

operative day (POD) and immediate drainage of the wound was done and pus sent of culture sensitivity. Patients were treated with appropriate antibiotics depend on results of culture and sensitivity. Discharge gradually reduced over time and the wound healed over the 3 months period. There was no need of mesh removal.

**Table 1: Distribution of patients according to their age.**

Variables	Distribution	Group A (n=100)	Group B (n=100)
Age group (Year)	18-30	24	12
	31-40	20	22
	41-50	14	26
	51-60	26	10
	60-70	16	18
Area	Rural	76	80
	Urban	24	20
Side of hernia	Right	60	48
	Left	30	46
	Bilateral	10	6
Types of inguinal hernia	Indirect	58	64
	Direct	40	34
	Pantaloon	2	2
Wound infection	Wound infection	6	8
	No infection	94	92

**Table 2: Comparison of duration of surgery in both groups of patients.**

Variable	Group A (n=50)	Group B (n=50)	P value
Mean time	49.41±7.63	45.93±6.18	0.314

## DISCUSSION

This study was conducted with the aim to compare the rate of post-operative wound infections in patients with antibiotic prophylaxis and no antibiotic prophylaxis/placebo group. Open inguinal hernioplasty (Lichtenstein hernia repair) is a very common surgical procedure done in general surgical units. 100 cases were included in each group. All patients were in age between 18 to 70 years. Mean age of patients was 47.92±8.32 years in antibiotic group and 48.09±9.12 years in placebo group. This was similar to finding of other studies.<sup>27-29</sup> In antibiotics arm 60% had right side hernia and 30% had left side hernia while 10% had bilateral hernia. In placebo group, 48, 46 and 6% had right, left and bilateral inguinal hernia respectively. This finding correlated with other previous studies.<sup>29</sup> 58% in antibiotics group and 64% in placebo group had indirect hernia. Many studies didn't mention the type of hernia or showed similar findings.<sup>27,28</sup>

Hernia repair is a clean operative procedure along with thyroid and breast surgery, but some surgeons assumed due to the use of a mesh as a synthetic material that may increase SSI.<sup>30-31</sup> On elective mesh inguinal hernioplasty, clinically using Southampton wound assessment scale, no SSI was found on the post-operative wound. They consider erythema as a normal wound healing. This was

similar to the results achieved by other authors, which stated that prophylactic antibiotics were not mandatory for such cases.<sup>4,9,30-31</sup>

Study mentioned that six patients in antibiotics group and eight patients in placebo group had surgical site infection. The difference in each group was statistically non-significant with p value of 0.627. All these infections reported beyond 3 days after surgery. Deep surgical site infections were controlled with the help of broad-spectrum antibiotics. This finding was similar to various studies did in different part of country; they mentioned a non-significant relation in antibiotics and placebo arm.<sup>9,26,32-36</sup>

Rate of wound infection was found to be 6 and 8 percent in antibiotics and placebo group respectively. This was quite larger than finding of different studies done in different parts.<sup>9,26,32</sup> but this was less than study done by Thakur and Wang et al.<sup>34,37</sup> The meta-analysis done by Sanchez-Manuel et al concluded that administration of prophylactic antibiotics in elective hernia repair could not be universally recommended, as this only be recommended where high rate of infection was observed.<sup>38</sup>

This study along with many other studies concluded that selection of prophylactic antibiotics should be depending on previous experiences of surgeon at their own site.<sup>34,39</sup> This also is depending on balance between beneficial effect of prophylactic dose against possible adverse effect and antibiotics resistance. There will be only four sources of infection during any surgical procedure; these are medical staff, sterilization techniques, environment, and patient risk factors. If surgeon tried to minimize such factors like clean operative procedure with no mistake in sterilization and no leaks in internal organs, chances of getting infection will be minimal. Antibiotics should not be used to replace proper aseptic and antiseptic methods; along with good surgical techniques and proper tissue handling, infections can be prevented.<sup>40</sup>

### Limitations

The major limitation of study was low sample size. Larger sample size may be required to get a significant difference between both groups. Occurrence of complication is also rare so chances of getting them will reduce significantly. Follow up period for this study was 4 weeks but as per many foreign guidelines, follow up period should be one year. This study could not select this because development of complication after four-week duration is rare.

### CONCLUSION

This study was conducted in tertiary care centre of western India. Both the case and control arm were assessed for risk factors and co-morbid conditions. All patients were treated with Lichtenstein mesh hernioplasty with polypropylene mesh under strict aseptic precaution. Both groups were observed for post-operative wound infection till 4-week duration. This study clearly depicted that there is no effect of prophylactic antibiotics in occurrence of post-operative wound infection. This means that prophylactic antibiotics treatment could not reduce the occurrence of infections.

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