



A COMPARATIVE STUDY OF CEFOTAXIME AND CEFTRIAXONE IN SURGICAL PROPHYLAXIS FOR CLEAN HERNIA SURGERY

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ABSTRACT

Background: The defect in the collagen metabolism is involved in the pathogenesis of hernia which lead to a weakening of the transversalis fascia. Hernia is the most common surgery performed by general surgeons and which have many advantages, such as effectiveness, simplicity, minimal pain, and low recurrence rates, early return to work and a high patient satisfaction. In which Lichtenstein technique is frequently used method. **Objective:** To conduct a comparative study of cefotaxime and ceftriaxone in surgical prophylaxis for clean hernia surgery. **Patient and Methods:** An experimental prospective study

conducted over a period of 8 months from 2017-2018. In which 100 patients were divided into two groups. The cases were compared on the basis of age, ASA grading, gender, comorbidities, radiological assessment which directly or indirectly affect the occurrence of surgical site infections were also considered. Furthermore; Chi-square test has been used to find out the statistical significant relation. **Result:** We found that, 100 patients were divided into two groups. The patients 50-59years(26%) were more prone to hernia than those ranging from <30(11%) years. According to our study male (72%) were to exposed to hernia as compared with female (28%), were as female are more susceptible to SSI's. Out of 100 patients 20 patients(20%) diagnosed with Direct hernia 40 patients (40%) diagnosed with Indirect hernia. Also hernia was located in the right side in 56 patients (93%) whereas 14 (33%) patients had the hernia located in the left side. In our study, surgical site infection in ceftriaxone was 1% and that in cefotaxime was 3%. By using Southampton Wound Assessment Scale. It was found that where erythema is a grade 1A. **Conclusion:** This study

was done to measure incidence of surgical site infection in Open Mesh Hernioplasty using single dose of Ceftriaxone 1g and Cefotaxime 1g. According to southampton wound grading system, where erythema is a grade 1A was observed and it was concluded that ceftriaxone was better as compared to cefotaxime for preventing surgical site infection.

KEYWORD: Cefotaxime, Ceftriaxone, Hernia, Lichtenstein technique.

INTRODUCTION

Hernia is a protrusion of a viscous through an abnormal opening in the walls of its containing cavity. The most common types of hernia are inguinal hernia, Femoral hernia, Umbilical hernia and Incision hernia. 75% of all hernia occurs in groin and inguinal hernia is the most common form of all. Inguinal hernias can be either congenital or acquired. Congenital hernias doesnot occur due to acquired weakness but it is caused when there is impedance in normal developmental process. This is because of patent processus vaginalis (PPV) and this is the reason for higher incidence of congenital hernias in preterm babies. Acquired hernia can be direct, indirect or combination of both hernia. In adult males 65% of inguinal hernias are indirect and 55% of them are seen on the right side.^[1] Inguinal hernia is a condition in which soft tissue bulges through a weak point in the abdomen region. Umbilical hernia is produced in intestine where it protrudes through the abdominal muscle at the belly button. Incisional hernia is a type of hernia which is caused by an incompletely healed surgical wound. Femoral hernia appears as painful lump in the inner upper part of the thigh or groin. epigastric hernia is a hernia which occurs in the abdominal walls.^[2]

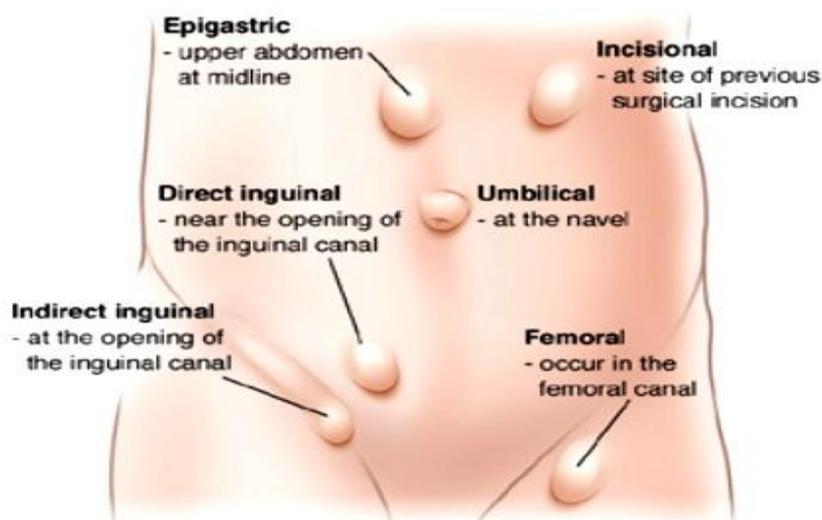


Fig 1: Type of hernia.

It is recently considered as the preferred method for the plastic reconstruction of inguinal region. Although hernia is classified as a clean surgery, the reported incidence of wound infection may vary from 0% to 9%.^[3] In earlier studies, the first randomized control trial on the role of antibiotic prophylaxis in mesh repair of inguinal hernia was done by Yerdel et al., who advocated the prophylactic use antibiotics.^[4] A Cochrane meta-analysis on this topic in 2004 concluded that antibiotic prophylaxis in mesh repair of inguinal hernias can neither be recommended nor discarded.^[5] The most popular technique in the West for inguinal hernia since 1975 the United States and Europe has become Mesh repair. More than ten lakhs hernia surgeries are performed and the figure is nearly equal in India. First mesh repair was used for recurrent hernia and then for the rest.^[6,7,8,9] Lichtenstein technique is the most frequently performed technique among the open mesh repair. This technique for inguinal hernia is a tension free strengthening of posterior inguinal floor using polypropylene mesh. It has also proven that recurrence of hernia is very low with mesh repair. Numerous clinical trials and meta-analysis have concluded that mesh repair has become the “gold standard” in inguinal hernia repair. Infection is one of the most common complications in open inguinal hernioplasty. In case of open hernioplasty the incidence of infection is reported to be very low. Incision site infection has been found to be the frequent problem faced in the technique. Most worrisome problem occurs when following deep surgical site infection. There is a fourfold increased chance of hernia recurrence in infection following repairs, especially with herniorrhaphies. Even though infection rate is very low, even when a foreign body like mesh, Antibiotic prophylaxis is necessary in all hernia surgeries. Antibiotic prophylaxis for open hernioplasty in minimizing wound infection has been a subject of debate since the beginning of mesh repair but in 1975 it has been reported a 10 fold decrease in SSI with antibiotic prophylaxis studies. One study has concluded that antibiotic prophylaxis cannot be discarded blindly or recommended firmly. Unnecessary use of antibiotics is discouraged due to its inherent complications. Bacterial resistance and increase in hospital cost can occur due to routine use of antibiotic prophylaxis in mesh repair of hernia, limiting the indiscriminate use of antibiotic will have greater influence in emergence of drug resistant bacteria, cost benefits and also possibility in reducing toxic or allergic effects of the antibiotics.^[10]

Surgical site infection (SSI) is the most frequent complication in herniorrhaphy. Some studies have identified risk factors for SSI such as age (older than 70 years), sex (greater in women), operative time, co-morbidity, prostheses and routine use of drainage. SSI results in decrease in quality of life, an increase in length of stay and costs. However, current introduction of mesh

hernioplasty and recognition of the free tension herniorrhaphy concept made the use of antibiotic prophylaxis more critical because of the infection risk. It is necessary to conduct randomized clinical trials (RCTs) with large numbers of patients, to determine the effectiveness of antibiotic prophylaxis in these procedures, which are difficult and sometimes unfeasible.^[11]

There is a chance for the development of surgical site infection if there is an omission of antimicrobial prophylaxis. The appropriate use of prophylactic agents reduce post operative complication. The timely use of antimicrobial as prophylaxis may improve the patient care and significant cost savings.

ETIOLOGICAL ORGANISMS

Enterobacteriaceae and obligate anaerobic bacteria infection live harmlessly in the gut plays important role abdominal operations. Staphylococci, are found on the skin, which cause infections of soft tissue, bones. Many surgical infections are caused by a mixed population of bacteria. The choice for therapy is not simple, the combinations may be expensive, and complicated.^[12]

Antibiotic prophylaxis shown to be effective in reducing the incidence of surgical site infections. Selection of an appropriate antimicrobial agent (AMA) depends on the pathogen which cause an infection. Antibiotic prophylaxis is optimal if administered within 30 minutes prior to surgery.^[13]

Antibiotics for prolonged period may be harmful to both individual and hospital colony whether they are given as prophylaxis or for therapy. Administer antibiotics for a period of 7-10days even in clean and clean-contaminated cases after surgery.^[14]

There is a guidelines were developed by the American Society of Health-System Pharmacists (ASHP), the Infectious Diseases Society of America (IDSA), the Surgical Infection Society (SIS), and the Society for Healthcare Epidemiology of America (SHEA). The optimal time for administration is within 60 minutes before surgery. Most of the cases be treated with a single dose.^[15]

Prophylaxis can be characterized as primary prophylaxis, secondary prophylaxis, or eradication. Primary prophylaxis prevent the initial infection. Secondary prophylaxis prevent

the recurrence or reactivation of pre-existing infection. Eradication refers to the elimination of a colonized organism to prevent the development of an infection.^[16]

PATHOLOGY OF SURGICAL SITE INFECTION

Prophylaxis involves the administration of a drug before bacteria adhere to host tissues. The Centres for Disease Control and Prevention (CDC), classify wounds into four classes: clean, clean-contaminated, contaminated, and dirty.

Clean wounds require prophylaxis only in cases if any prosthetic devices or implants is used. Elective hernia repair are a good example for clean surgical procedures.

Risk factors for surgical site infection

The risk rate in SSI is measured with the SENIC and NNIS risk indexes. According to the SENIC (Study of the Efficacy of Nosocomial Infection Control) index, the most important risk are the following: an abdominal operation; an operation lasting more than 2 h; a surgical site wound is either contaminated or dirty/infected. The NNIS (National Nosocomial Infection Surveillance) system index identifies the following risk factors for SSI.

- A surgical site with a wound classification of either contaminated or dirty/infected.
- An operation lasting more than 2 h or more than 75% of the time allocated for the operation.
- The patient's ASA score of more than 3.^[17]

SOUTHAMPTON WOUND - GRADING SYSTEM

(Bailey and love 25th edition)

Grade	Appearance	
0	Normal healing	
I	Normal healing with mild bruising or erythema	
	Ia	Some bruising
	Ib	Considerable bruising
	Ic	Mild erythema
II	Erythema plus other signs of inflammation	
	IIa	At one point
	IIb	Around sutures
	IIc	Along wound
	IId	Around wound
III	Clear or haemoserous discharge	
	IIIa	At one point only (\leq 2cm)
	IIIb	Along wound (>2 cm)
	IIIc	Large volume
	IIId	Prolonged (> 3 days)
IV	Pus	
	Iva	At one point only (\leq 2cm)
	IVb	Along wound (>2 cm)
V	Deep or severe wound infection with or without tissue breakdown; hematoma requiring aspiration	

Fig-2.

The southamptone wound gradeing system shows the sevirity rate of postoperative wound infection from grade1 to grade5¹⁸.

Aim of the study

To conduct a comparative study of cefotaxime and ceftriaxone in surgical prophylaxis for clean hernia surgery.

METHADODOLOGY

Study Site

The study was conducted in government hospital tiruppur

Study Period

The study is an experimental prospective study conducted over a period of 8 months from 2017-2018

Study design

It is based in prospective randomised experimental study

STUDY CRITERIA

Inclusion criteria

- All the patients of various age groups(20-80) who receive any prophylaxis during or before the surgery
- Patients who are undergoing clean hernia surgery
- Patients who are willing to participate in the study are included

Exclusion criteria

- Patients not willing to participate in the study are excluded
- Patients less than 20yrs and more than 80yrs were excluded
- Mentally challenged patients
- Patients who died preoperatively, absconded against the medical advice and referred to higher centres were excluded
- All consecutive patients of either sex including pregnant/lactating mothers undergoing surgery in department of general surgery and obstetrics and gynaecology are not eligible for inclusion.

RESULTS

Table 1: Age Wise Classification.

S.NO	Age	No of patients (N)	Percentage (%)
1.	<30	11	11%
2.	30-39	24	24%
3.	40-49	21	21%
4.	50-59	26	26%
5.	>60	18	18%

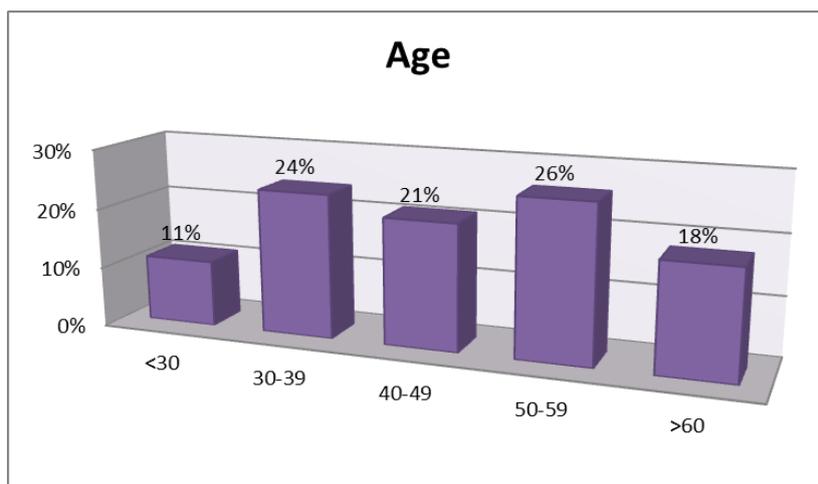


Fig -4.

Table 2: Gender Wise Classification.

S.NO	SEX	No of patients (N)	Percentage (%)
1.	Female	28	28%
2.	Male	72	72%

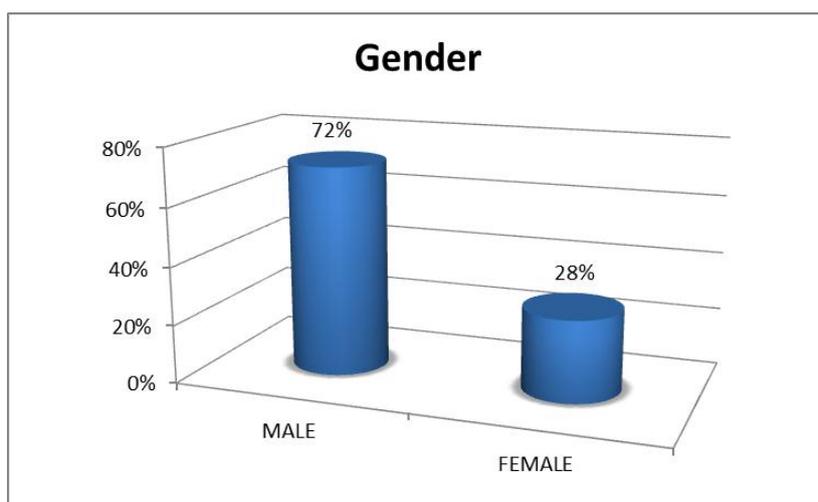


Fig -5.

Table -3: Type Of Hernia

S.NO	Type of hernia	No of patients (N)	Percentage (%)
1.	Inguinalhernia	70	70%
2.	Umbilicalhernia	22	22%
3.	Femoralhernia	1	1%
4.	Incisionalhernia	6	6%
5.	Epigastrichernia	1	1%

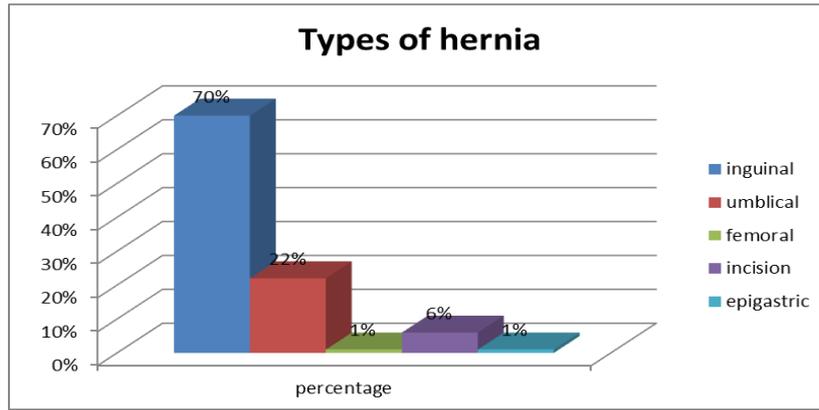


Fig- 6.

Table -4: Type Of Inguinal Hernia

S.NO	Type of inguinal hernia	No of patients(N)	Percentage(%)
1.	Direct	20	33%
2.	Indirect	40	67%

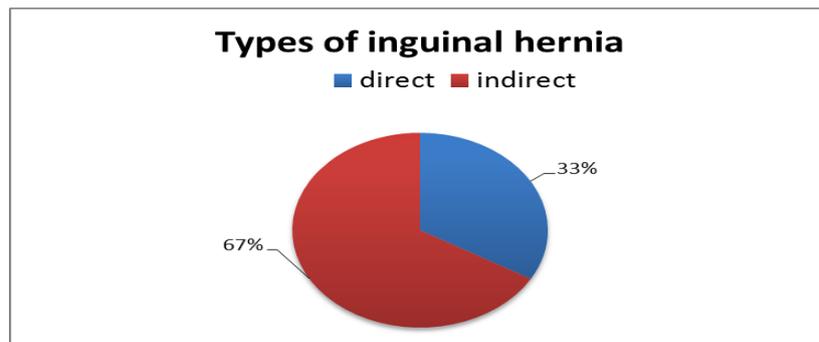


Fig -7.

Table -5: Location Wise Classification.

S.NO	Location	No of patients (N)	Percentage(%)
1.	Left	14	33%
2.	Right	56	93%

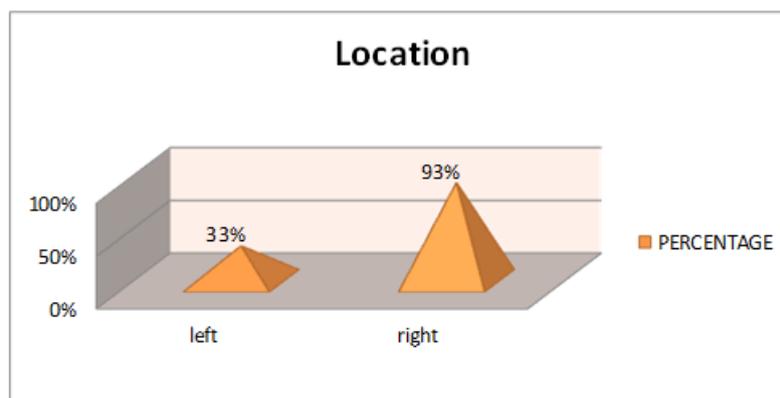


Fig-8.

Table -6: Asa Wise Classification

S.NO	ASA	No of patients (N)	Percentage (%)
1.	ASA grade 1	87	87%
2.	ASA grade 2	13	13%

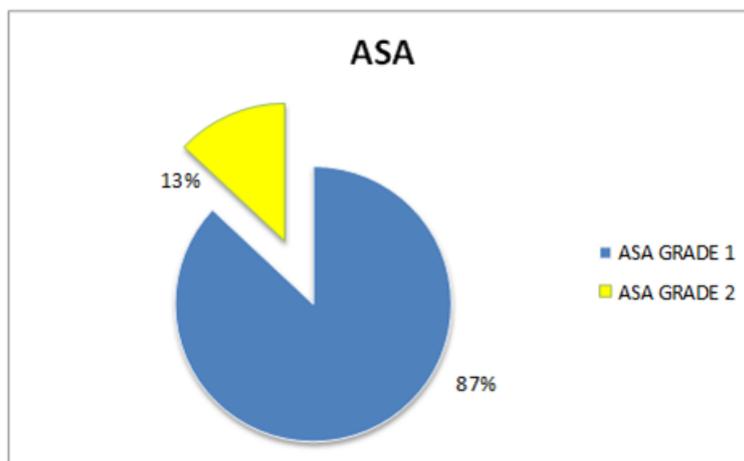


Fig-9.

Table-7: Radiological Classification.

S.NO	Radiological assessment	No of patients (N)	Percentage(%)
1.	ECG	92	92%
2.	ECHO	3	3%
3.	Both	5	5%

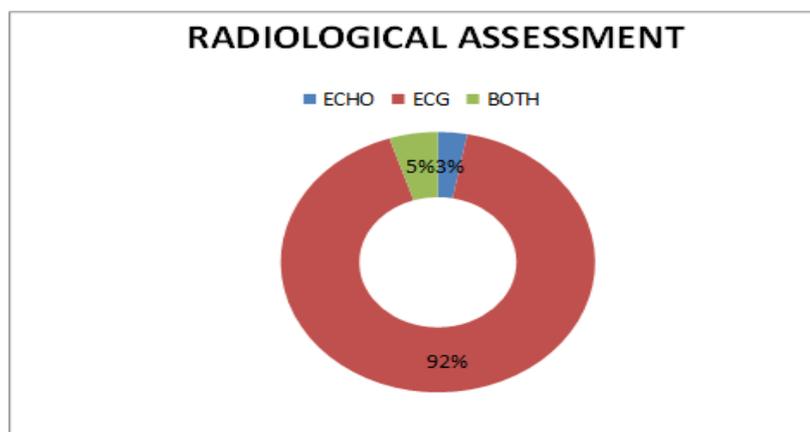


Fig-10.

Table-8: Comorbidity.

S.NO	Comorbidities	No of patients (N)	Percentage (%)
1.	Systemic hypertension	40	40%
2.	Diabetes mellitus	35	35%
3.	Hyperlipidemia	20	20%
4.	Others	10	10%

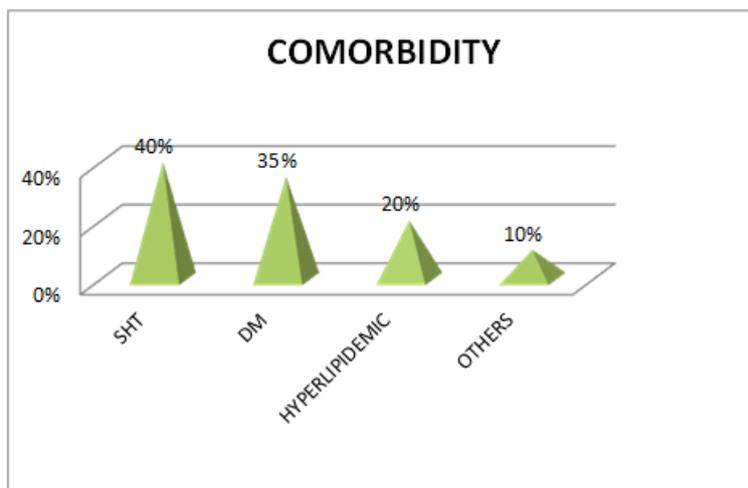


Fig-11.

REDUCIBILITY

Table-9.

S.NO	Reducibility	No of patients (N)	Percentage (%)
1.	Reducible	35	36.8%
2.	Unreducible	57	61.9%

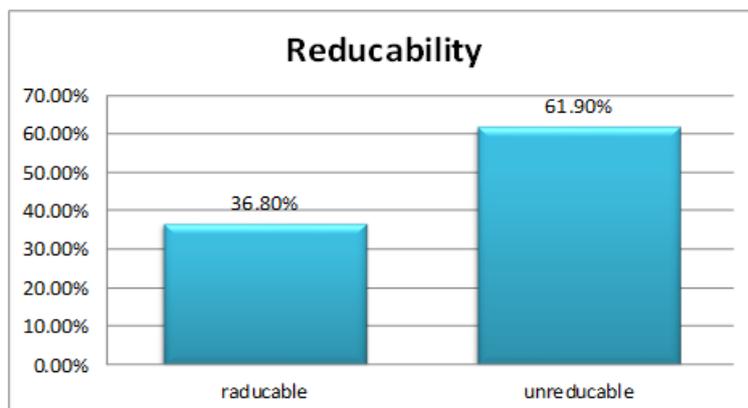


Fig-12.

DISCUSSION

This study was conducted to compare the effect of antibiotic prophylaxis in clean hernia surgery patients. The case sheet was analysed and the data was entered into the proforma which included the demographic details, comorbidities, lab investigations, and so on.

Hernia repair is a 'clean' operations which may require antibiotic coverage as prophylaxis. This practice was widely used after the introduction of the tension-free mesh repair technique for hernia repair, because of the fear of infection due to the introduced foreign body. The prophylactic antibiotics may inhibit the their growth rates and adherence of bacteria to the

prosthesis. SSIs remain a common problem in terms of mortality, morbidity, time spent in hospital.

This study measures the incidence of surgical site infection in Open Mesh Hernioplasty using Prophylactic antibiotic. The prophylactic antibiotic chosen was Ceftriaxone 1g and Cefotaxime 1g having broad spectrum activity, long t_{1/2} and good post antibiotic effect. Patients in whom ceftriaxone was used had lower rate of wound infection as compared to that with Cefotaxime.

100 patients were divided into two groups. The patients 50-59years(26%) were more prone to hernia than those ranging from <30(11%) years. According to our study male (72%) were exposed to hernia as compared with female (28%), were as female are more susceptible to SSI's.

Out of 100 patients 20 patients(20%) diagnosed with Direct hernia 40 patients (40%) diagnosed with Indirect hernia. Also hernia was located in the right side in 56 patients (93%) whereas 14 (33%) patients had the hernia located in the left side.

The cases were compared on the basis of age, ASA grading, gender. Also other factors such as comorbidities, radiological assessment which directly or indirectly affect the occurrence of surgical site infections were also considered to minimize and eliminate various confounding factors that would affect the results of the trial.

The patients were administered I.V. injection Ceftriaxone 1g and Cefotaxime 1g 30-60 mins before surgery for effective results.

The primary cause of infection of surgical wound is the endogenous bacteria harboured on the patients skin. These bacteria are source of infection and thus practice of shaving, pre-operative bath and pre-operative cleansing have major effect on the infection rates in various surgeries. Pre-operative bath was taken by almost all patients.

Xylocaine infiltration at the incision site may result in transient local ischemia and hence creates a local environment that adversely affects healing.

In present study, surgical site infection in ceftraxone was 1% and that in cefotaxime was 3%. Surahio AR et al^[21] conducted a prospective study to determine the effectiveness of

preoperative antibiotic prophylaxis in reduction of postoperative wound infection in clean and clean contaminated hernia and compared the cost of antibiotic prophylaxis. It was concluded that Infection is a great problem in surgery and is encountered by all surgeons according to the nature of their craft; they invariably impair the first line of host defence. Bacteria may enter the wound and may be of endogenous or exogenous in nature.

Clinical assessment of post-operative wound was made by using Southampton Wound Assessment Scale. It was found that where erythema is a grade 1A, subjects are healed primarily. The results in both the groups as determined by incidence of surgical site infection.

CONCLUSION

Hernia repair is a clean operations which may require antibiotic coverage. Many surgeons have continued to give antibiotics empirically as a prophylaxis. It has been shown that administration of prophylactic antibiotics may subsequently their growth rates and inhibit the adherence of bacteria to the prosthesis.

This study was done to measure incidence of surgical site infection in Open Mesh Hernioplasty using single dose of Ceftriaxone 1g and Cefotaxime1g. According to southamptone wound gradeing system, where erythema is a grade 1A was observed and it was concluded that ceftriaxone was better as compared to cefotaxime for preventing surgical site infection.

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