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A PROSPECTIVE DOUBLE BLIND STUDY OF 30 CASES OF ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY PERFORMED WITH AND WITHOUT PER-OPERATIVE ANTIBIOTIC.

Surgery

Dr. Aniket Rameshbhai Ganava M. S. Surgery, 510 New PG Medical Hostel, Medical Campus Jamnagar

Dr. Jahnavi Gohel* D. A. M. D, Anesthesia, Tutor, M. P. Shah Medical College *Corresponding Author

KEYWORDS

INTRODUCTION

Laparoscopic surgery it has gained considerable popularity, both among Surgeons and patients as well. Laparoscopic approach has the advantage of being minimally invasive, less post-operative pain and faster recovery and Faster return to normal house hold, social and occupational activities. Moreover, it also has specific role when there is any diagnostic dilemma. It is also more useful when patients are obese or in females especially in the reproductive period or for those who are cosmetically concerned.

Nosocomial infections and rational use of antibiotics are currently highly debated today throughout the world. The cost the society pays due to these infections which are due to irrational use of antibiotics is very high and can be greatly reduced by rational use of antibiotics.

Infection of the post-operative wound site, also known as surgical site Infection is also a common problem faced by most surgeons. Many factors affect the incidence of surgical site Infection, including endogenous and exogenous factors. Irrational use of antibiotics leading to the emergence of resistant strains of Microorganisms has been one of the most important factors as far as surgical site infections are concerned. Irrational use of antibiotics also increases the cost of treatment, both for the hospital as well as the patients in terms of cost of the drug itself, the disposables used and resistant infections, leading to a longer stay in the hospital. As such, when the patient comes for interval cholecystectomy, the patient has already received one course of antibiotics during the initial or recurrent attacks. It is also a common practice to use antibiotics when an interval surgery is performed. The use of a second course of antibiotics during and after this interval surgery, especially when surgery is performed using minimally invasive techniques would add to the incidence of nosocomial infections and also to the cost of treatment.

This study aims to evaluate whether laparoscopic surgery can be performed safely on patients presenting for elective cholecystectomy without antibiotics, thus helping to reduce the incidence of nosocomial infections and also reducing the cost of treatment.

AIMS OF STUDY

In this PROSPECTIVE DOUBLE BLIND study, 30 cases of laparoscopic cholecystectomy will be performed on patients admitted in Guru Gobind Singh Government Hospital in various surgical units in which some will be given antibiotic and some were treated with a placebo per operatively.

The aims of the study are:

1. To study the rate of infection in cases of laparoscopic cholecystectomy with antibiotic and without antibiotics.
2. To reduce unnecessary use of antibiotic during pre and postoperative period.
3. Avoidance of toxicity of antibiotics drug reaction, superinfection, emergence Of resistant strains of micro organisms.
4. Rapid postoperative recovery of the patient, no injection pricks and no Gastro Intestinal Tract complications of antibiotics.
5. Reduce the hospital stay and thus reducing the cost of Hospitalization and reducing economic stress of the patient. We are reducing the chances of cross infection which is major factor of Wound infection.

MATERIAL AND METHODS

all patients undergoing elective laparoscopic cholecystectomy at g g hospital jamanagar will be evaluated for the protocol. 30 patients having elective laparoscopic cholecystectomy will be elected for a double blind randomized prospective study.

Group 1 will receive piperacillin 4.5 g intravenously;

Group 2 will receive 50 ml of isotonic sodium chloride solution.

When the patient will be confirmed for the study, the medical staff and the patient will unaware of the identity of the solution. Patients will be given the study medication by the anesthesiologist or operating room nurse prior to surgery. Laparoscopic cholecystectomy will be planned for all patients. The following data will be collected on each patient: age, sex, duration of operation, american society of anesthesiologists classification, wound infection risk classification, bilespillage, gallbladder histological findings, conversion to open cholecystectomy, length of hospital stay, body mass index, and evidence of infection. All patients will examined by an attending surgeon 7to10 days after surgery and will be followed up for 30days after the procedure. Infections were classified as superficial surgical site, deep surgical site, and distant. A superficial surgical site infection is defined as erythema and/or purulent drainage at the surgical site above the fascia. A deep surgical site infection is defined as purulent material deep to the fascia or near the gallbladder fossa.

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1. All patients scheduled for elective laparoscopic cholecystectomy aged between 18and80 years with biliarycolic
2. Meeting no exclusion criteria.

Exclusion criteria will be

1. All patients younger than 18years and older than 80 years;
2. Pregnant or lactatingwomen ,
3. B-lactam or cephalosporin allergy, sensitivity, or anaphylaxis;
4. Antibiotic therapy within 48 hours prior to surgery;
5. Evidence of cholangitis, or obstructive jaundice; previous biliary tract surgery; evidence of choledocholithiasis;
6. History of prosthetic valves or joints;
7. Contraindication to laparoscopic cholecystectomy as determined by the attending surgeon; and
8. Patients determined to be at increased risk of infection secondary to their medical condition.

GRADE APPEARANCE

0	Normal healing
I	Normal healing with 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 (<2 cm)
IIIb	Along wound (>2 cm)
IIIc	Large volume
IIId	Prolonged (>3 days)

MAJOR COMPLICATIONS

IV	Pus
Iva	At one point only (<2 cm)
IVb	Along wound (>2 cm)
V	Deep or severe wound infection with or without tissue breakdown; haematoma requiring aspiration

THE ASEPSIS WOUND SCORE

CRITERIA	POINTS
Additional treatment	0
Antibiotics for wound infection	10
Drainage of pus under local anaesthesia	5
Debridement of wound under general	10
Serous discharge	Daily 0-5
Erythema	Daily 0-5
Purulent exudates	Daily 0-5
Separation of deep tissue	Daily 0-5
Isolation of bacteria from wound	10
Stay as in-patient prolonged over 14 days as result of wound infection	5

ROLE OF ANTIBIOTICS

Acute chlecystitis is usually associated with a poly-microbial flora, so antibiotics are usually necessary in the treatment of acute appendicitis. The antibiotics used should be such that they should be effective against the most likely organisms. The timing of antibiotics and their dosing should be such that they achieve the required concentration in blood and their concentration throughout the day is maintained.

A large number of studies and randomised control trials have demonstrated that prophylactic antibiotics given at the start of the surgery help to reduce post operative surgical site infection. Most centres currently use a single dose of 3rd generation cephalosporin given just prior to incision for cholecystectomy so that drug concentration in blood will be peak when there are more chances of bacterial inoculation like breach in the skin and while delivering specimen out.

Cholecystectomy is categorized under clean contaminated wounds (Class II) under the modified National Research Council wound classification. In such wounds, the rate of wound infection of around 10% is expected. In such a case, the use of prophylactic antibiotic which would help to reduce the rate of wound infection is definitely beneficial. Because of the above factors laparoscopic cholecystectomy is a cleaner procedure than emergency surgery. The need for antibiotics should therefore be less. We believe that laparoscopic cholecystectomy can be done with use of single dose antibiotics in a selected group of patients, thereby helping to reduce both the cost of treatment and also the emergence of resistant strains of bacteria.

SPECIFIC ORGANISMS AND THERAPEUTIC REGIMENS

Organism-specific therapeutic regimens for cholecystitis are provided below, including those for enterococci, *Bacteroides* species (spp), and *Enterobacteriaceae* spp infections, as well as for perisurgical considerations Factors to be considered in the selection of antibiotics for cholecystitis are targeted organisms and the pharmacokinetics and pharmacodynamics of the drugs. The local antibiogram, as well as the patient's history of antimicrobial usage, renal and hepatic function, history of allergies and other adverse events are also important factors that affect response to antibiotics.

Enterococci

Ampicillin 2 g IV 8 hourly
Vancomycin 1 g IV 12 hourly
Vancomycin-resistant enterococci (VRE)
Daptomycin 6 mg/kg IV 8 hourly for 2-4 weeks **or**
Linezolid 600 mg PO/IV 12 hourly for 14-28 days

Bacteroides spp.

Clindamycin resistance among *Bacteroides* species is significant; therefore, the use of clindamycin is no longer universally recommended. Local antibiotic sensitivity patterns will guide clinicians regarding the efficacy and utility of clindamycin.[7]

- Clindamycin 600 mg IV 8 hourly **or**
- Metronidazole 500 mg IV 8 hourly **or**
- Ampicillin-sulbactam 3 g IV 8 hourly **or**
- Piperacillin-tazobactam 4.5gm iv 12 hourly

Enterobacteriaceae spp.

Note the following regimens:

- Piperacillin-tazobactam 4.5gm iv 12 hourly **or**
- Ciprofloxacin 400 mg IV 12hourly **plus** metronidazole 500 mg IV 8 hourly **or**
- Levofloxacin 750 mg IV OD **plus** metronidazole 500 mg IV 8 hourly **or**
- Moxifloxacin 400 mg IV OD **or**
- Imipenem-cilastatin 250-500 mg IV 8HOURLY **or**
- Ertapenem 1 g IV OD **or**
- Meropenem 0.5-1 g IV 8 hourly **or**
- Doripenem 500 mg IV 8 hourly

The use of ampicillin/sulbactam as monotherapy is no longer recommended because of high rates of resistance to this agent among community-acquired *Escherichia coli.*

ESBL-producing Enterobacteriaceae
See the following regimens:

- Imipenem-cilastatin 250-500 mg IV 8 hourly **or**
- Ertapenem 1 g IV daily **or**
- Meropenem 0.5-1 g IV 8 hourly **or**
- Doripenem 500 mg IV 8 hourly
- Piperacillin-tazobactam 4.5gm iv 12 hourly **or**
- Aminoglycosides (Amikacin 750 mg iv OD)

Pseudomonas aeruginosa

See the following regimens:

- Imipenem-cilastatin 250-500 mg IV 8 hourly **plus** metronidazole 500 mg IV 8 hourly **or**
- Ertapenem 1 g IV daily **plus** metronidazole 500 mg IV 8 hourly **or**
- Meropenem 0.5-1 g IV **plus** metronidazole 500 mg IV 8 hourly **or**
- Doripenem 500 mg IV **plus** metronidazole 500 mg IV 8 hourly **or**
- Piperacillin-tazobactam 4.5 g IV 12 hourly **plus** metronidazole 500 mg IV 8 hourly

Salmonella typhi

See below.

- Ciprofloxacin 400 mg IV 12 hourly

Perioperative considerations

Prophylaxis with piperacillin tazobactum 4.5gm IV within 30 minutes before surgical incision is indicated for routine cholecystectomy in high-risk patients, as well as in high-risk patients in general.

DRUG REVIEW

It is used to reduce the development of drug-resistant bacteria and maintain the effectiveness of piperacillin and tazobactam injection and other antibacterial drugs. Piperacillin and tazobactam is useful as presumptive therapy in the indicated conditions prior to the Operation because of its broad spectrum of bactericidal activity against gram-positive and gram negative aerobic and anaerobic organisms.

DRUG DESCRIPTION

Piperacillin and tazobactam is an injectable antibacterial combination product consisting of the semi synthetic antibiotic piperacillin sodium and the β-lactamase inhibitor tazobactam sodium for intravenous administration.

Piperacillin sodium:

Is derived from D (-) - α -aminobenzyl-penicillin.

The chemical formula is C23H26N5NaO7S.

Tazobactam sodium:

A derivative of the penicillin nucleus, is a penicillanic acid sulfone
The chemical formula is C10H11N4NaO5S.

Mechanism Of Action

Piperacillin antibiotic can kill the susceptible bacteria. Bacterial cell wall is essential for its normal growth. Peptidoglycan is

heteropolymeric component of the cell wall that provides rigid mechanical stability by virtue of its highly cross-linked latticework structure and it is formed in three stages. The third and final stage involves completion of the cross-link. This accomplished by transpeptidation reaction catalyzed by transpeptidase enzyme. Piperacillin inhibit this enzyme and thus inhibit the cell wall synthesis, cell wall deficient forms are produced --- swell and burst because of intrinsic hyperrosmolality of bacteria--- bacterial lysis and ultimately kill the bacteria

However, some bacteria form the enzyme, beta lactamase. There are four types of beta lactamases. Which destroy the beta lactam antibiotic, piperacillin. Tazobactam inhibits the class A and class D beta lactamase enzymes. So when given in combination with piperacillin, they achieve wider spectrum of organisms.

Spectrum of Activity

Piperacillin/tazobactam has been shown to be active against most isolates of the following microorganisms both *in vitro* and in clinical infections

Gram-positive Bacteria

- *Staphylococcus aureus* (methicillin susceptible isolates only)

Gram-negative Bacteria

- *Acinetobacter baumannii*
- *Escherichiacoli*
- *Haemophilus influenzae* (excluding β-lactamase negative, ampicillinresistantisolates) *Klebsiella pneumoniae*
- Pseudomonas aeruginosa (given in combination with an aminoglycoside to which the isolate is susceptible)

Anaerobic Bacteria

- *Bacteroides fragilis* group (*B. fragilis, B. ovatus, B. thetaiotaomicron,* and *B.vulgatus*)

The following *in vitro* data are available, but their clinical significance is unknown. At least 90% of the following microorganisms exhibit an in vitro minimum inhibitory concentration (MIC) less than or equal to the susceptible breakpoint for piperacillin/tazobactam. However, the safety and effectiveness of piperacillin/tazobactam in treating clinical infections due to these bacteria have not been established in adequate and well-controlled clinical trials.

Gram-positive Bacteria

- Enterococcus faecalis (ampicillin or penicillin-susceptible isolates only)
- Staphylococcus epidermidis (methicillin susceptible isolates only)
- Streptococcus agalactiae2
- Streptococcus pneumoniae2 (penicillin-susceptible isolates only)
- Streptococcus pyogenes*2*
- Viridans group streptococci2

Gram-negative Bacteria

- Citrobacter koseri
- Moraxella catarrhalis
- Morganella morganii
- Neisseria gonorrhoeae
- Proteus mirabilis
- Proteus vulgaris
- Serratia marcescens
- Providencia stuartii
- Providencia rettgeri
- Salmonella enterica

Anaerobic Bacteria

- Clostridium perfringens
- Bacteroides distasonis
- Prevotella melaninogenica

These are not β-lactamase producing bacteria and, therefore, are susceptible to piperacillin alone.

PHARMACOKINETIC

Peak plasma concentrations of piperacillin and tazobactam are attained immediately after completion of an intravenous infusion. Piperacillin plasma concentrations, following Infusion of Piperacillin and tazobactam, were similar to those attained when equivalent doses of piperacillin were administered alone. Steady state plasma concentrations of piperacillin and tazobactam were similar to those attained after the first dose. In healthy subjects, the plasma half life of piperacillin and of tazobactam ranged from 0.7 to 1.2 hours and was unaffected by dose or duration of infusion. Piperacillin is metabolized to a minor microbiologically active desethyl metabolite. Tazobactam is metabolized to a single metabolite that lacks pharmacological and antibacterial activities. Both piperacillin and tazobactam are eliminated via the kidney by glomerular filtration and tubular secretion. Piperacillin is excreted rapidly as unchanged drug with 68% of the administered dose excreted in the urine. Tazobactam and its metabolite are eliminated primarily by renal excretion with 80% of the administered dose excreted as unchanged drug and the remainder as the single metabolite.

Piperacillin, tazobactam and desethyl piperacillin are also secreted into the bile. Both piperacillin and tazobactam are approximately 30% bound to plasma proteins. The protein binding of either piperacillin or tazobactam is unaffected by the presence of the other compound. Protein binding of the tazobactam metabolite is negligible. Piperacillin and tazobactam are widely distributed into tissues and body fluids including intestinal mucosa, gallbladder, lung, female reproductive tissues (uterus, ovary, and fallopian tube), interstitial fluid, and bile. Mean tissue concentrations are generally 50% to 100% of those in plasma. Distribution of piperacillin and tazobactam into cerebrospinal fluid is low in subjects with noninflamed meninges, as with other penicillins. The half-life of piperacillin and of tazobactam increases with decreasing creatinine clearance. At creatinine clearance below 20 mL/min, the increase in half-life is twofold for piperacillin and fourfold for tazobactam compared to subjects with normal renal function.

DOSAGE AND ADMINISTRATION

Piperacillin and tazobactam should be administered by intravenous infusion.

The usual total daily dose for adults is 3.375 g every six hours totaling 13.5 g (12.0 g piperacillin/1.5 g tazobactam).

Paediatric Patients

For children 9 months of age or older 100 mg piperacillin/12.5 mg tazobactam per kilogram of body weight, every 8 hours.

For pediatric patients between 2 months and 9 months of age 80 mg piperacillin/10 mg tazobactam per kilogram of body weight, every 8 hours

SIDE EFFECTS

Gastrointestinal

- Nausea
- Vomiting
- Diarrhoea
- Hepatitis
- Cholestatic jaundice
- Melena
- Flatulence
- Gastritis
- Hiccough,
- Ulcerative stomatitis
- Pseudomembranous colitis

Hematologic

- Hemolytic anemia
- Anemia
- Thrombocytosis
- Agranulocytosis
- Pancytopenia

Immune

- Hypersensitivity reactions
- Anaphylactic/anaphylactoid reactions (including shock)

Skin

- Erythema multiforme
- Stevens - Johnson syndrome,
- Toxic epidermal necrolysis
- Rash

- Pruritus;
- Phlebitis
- Thrombophlebitis
- Oedema

Renal
- Interstitial nephritis
- Renal failure

Hematologic
- Thrombocytopenia,
- Leukopenia, neutropenia
- Positive direct coombs' test
- Prolonged prothrombin time,
- Prolonged partial thromboplastin time
- Transient elevations of AST (aspertate amino transferase), ALT (alanine amino transferase)
- Increases in serum creatinine

Metabolic and Nutrition
- Symptomatic hypoglycaemia
- Thirst

Musculoskeletal
- Myalgia
- Arthralgia

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14. History of prosthetic valves or joints;
15. Contraindication to laparoscopic cholecystectomy as determined by the attending surgeon; and
16. Patients determined to be at increased risk of infection secondary to their medical condition.

All routine investigations, blood reports and ultrasound of abdomen done. After that patient post for the laproscopic cholecystectomy.

OBSERVATIONS & DISCUSSION

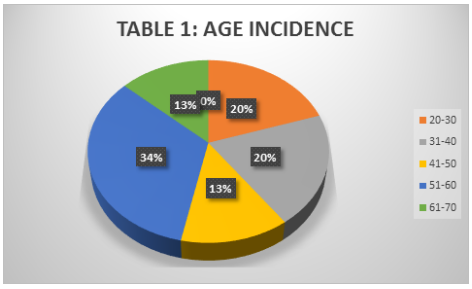
This is a prospective double blind study of 30 cases of elective laparoscopic cholecystectomy performed with and without per-operative antibiotic in our hospital in various surgical units from year 2016-17. We have included cases of interval laparoscopic cholecystectomy.

Following Observation Have Been Made From This Study

TABLE 1: AGE INCIDENCE

Age years	Cases (30)		SSI
	GROUP 1 (n-15)	GROUP 2 (n-15)	
20-30	03	02	0
31-40	03	02	1
41-50	02	03	2
51-60	05	05	0
61-70	02	03	

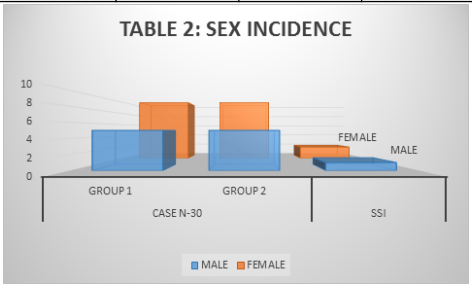
*SSI Surgical Site Infection



Although CHOLECYSTITIS can affect any age group, it is most common in the 2nd and the 3rd decade of life. In our study 80% of the cases occurred in the 2nd and the 3rd decade of life. The median age was 25 years. In our study, wound infection is mainly seen in elderly patients, in 4th decade.

Table 2: Sex Incidence

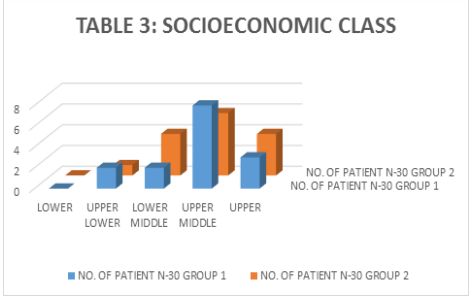
SEX	CASE N-30		SSI
	Group 1	Group 2	
MALE	5	5	1
FEMALE	10	10	2



In this study we found that cholecystitis predominantly occurs in females.

Table 3: Socioeconomic Class (kuppuswamy's S .ocioeconomic Status Scale)

SOCIO ECONOMIC CLASS	NO. OF PATIENT N-30		SSI
	GROUP 1	GROUP 2	
LOWER	0	0	2
UPPER LOWER	2	1	0
LOWER MIDDLE	2	4	1
UPPER MIDDLE	8	6	0
UPPER	3	4	0



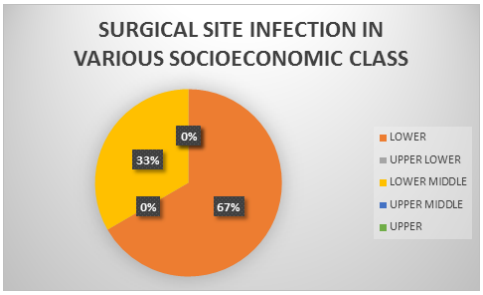
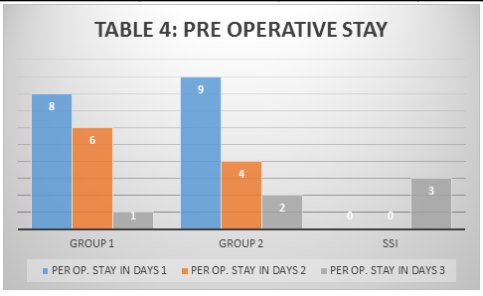


TABLE 4: PRE OPERATIVE STAY

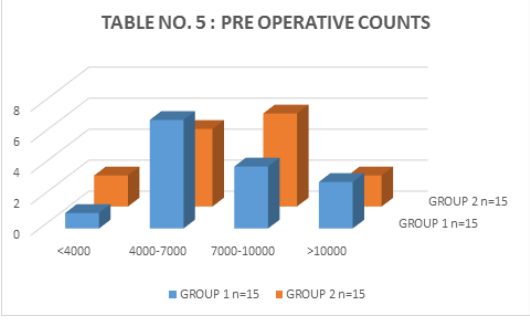
PER OPERATIVE STAY IN DAYS	NO. OF PATIENT N-30		SSI
	GROUP 1	GROUP 2	
1	8	9	0
2	6	4	0
3	1	2	3



All of the patients had a preoperative stay of only 1 – 2 days. Increasing the hospital stay has been shown to increase the risk of post operative wound infection. Hence preoperative stay should be kept to minimum, only enough for the patient to become slightly familiar with the surroundings and the staff. This is of great use in the post operative period. Those patients who could not be accommodated on the operating lists soon after admission were usually sent home after the required investigations and then called back on the day before surgery. Reducing the hospital stay preoperatively definitely reduces the risk of postoperative wound infection.

TABLE NO. 5 : PRE OPERATIVE COUNTS

PREOP COUNTS	GROUP 1 n=15	GROUP 2 n=15	SSI
<4000	1	2	0
4000-7000	7	5	1
7000-10000	4	6	2
>10000	3	2	0



Most of our patients had normal preoperative WBC counts. Higher counts suggest the presence of inflammation and hence the requirement of antibiotics. Ideally all the counts should be considered against a normal count (if any available) in a healthy state. Amongst the 3 patients in our study who suffered wound infection, 2 had counts more than 10000 cells / mm3. In their cases, higher count may suggest the presence of infection in the body.

TABLE NO. 6 : ASA GRADE

ASA GRADE	NO. OF PATIENT N-30		SSI
	GROUP 1	GROUP 2	
1	0	0	00
2	7	9	01
3	8	6	02

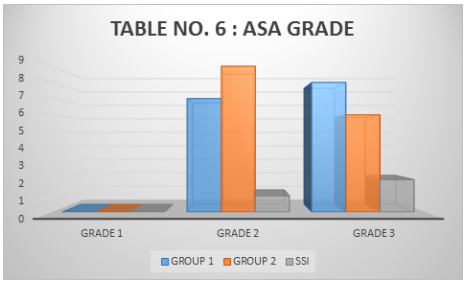
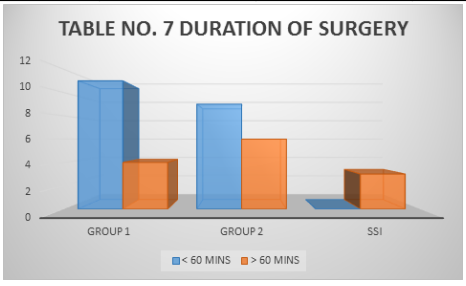


TABLE NO. 7 DURATION OF SURGERY

DURATION	NO. OF PATIENT N-30		SSI
	GROUP 1	GROUP 2	
< 60 MINS	11	9	00
> 60 MINS	4	6	03



With increasing duration of surgery, there is increased risk of infection and hence surgeries with prolonged operating times require antibiotic prophylaxis. Moreover, increased operating time usually imply an increased time required for dissection of the gall bladder. Since there is maximum chance of infection while handling the gall bladder, such surgeries have an added risk for wound infection apart from the time required for surgery. In our study the 3 patients who suffered from wound infection had operating times varying from 40 – 50 minutes. This suggests that in those cases in which the operating times are longer, more chances of infection.

TABLE 8. INFECTED WITH BILE

BILE SPILLAGE DURING SURGERY	NO. OF PATIENT N-30		SSI
	GROUP 1	GROUP 2	
NO	13	14	00
YES	1	2	03

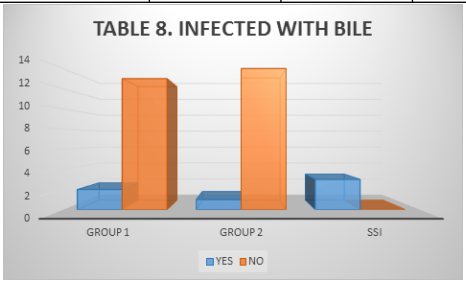
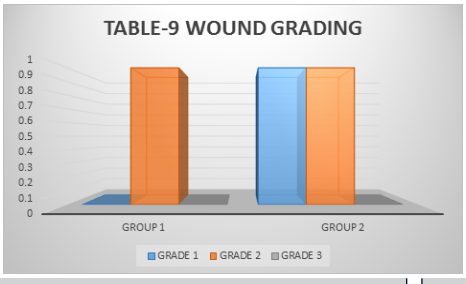


TABLE-9 WOUND GRADING SOUTHAMPTON WOUND GRADING SYSTEM

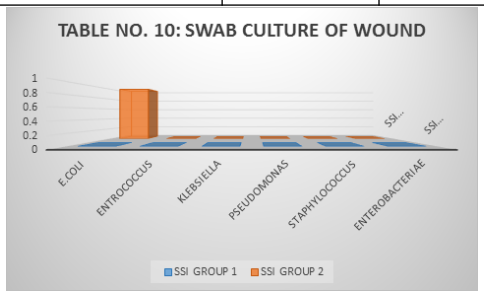
WOUND GRADE	SSI	
	GROUP 1	GROUP 2
1	00	01
2	01	01
3	00	00



Only 3 of the patients had wound infection. None of the patients had any sort of discharge (Grade 3 or 4 wound infections) or wound gap. 2 out of the 3 patients having wound infection had only erythema which was cured without the use of any antibiotics. The only patient with Grade 2 wound infection had mild tenderness and required the use of oral antibiotics. The stitch removal was delayed for 2 days in this case.

TABLE NO. 10: SWAB CULTURE OF WOUND

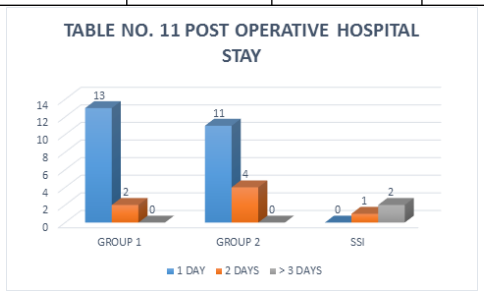
ORGANIZM	SSI	
	GROUP 1	GROUP 2
E.COLI	00	01
ENTROCOCCUS	00	00
KLEBSIELLA	00	00
PSEUDOMONAS	00	00
STAPHYLOCOCCUS	00	00
ENTEROBACTERIAE	00	00



In our study the 3 patients who suffered from wound infection were subjected to culture examination to find out the causative organisms. 2 out of the 3 patients had wound cultures negative for any organisms; the only single patient infection had E.Coli identified from her culture examination. It was sensitive to ciprofloxacin and the infection responded to a 3 – day course of oral ciprofloxacin 500mg bd. In this case the stitch removal was delayed by 2 days

TABLE NO. 11 POST OPERATIVE HOSPITAL STAY

POST OP. HOSPITAL STAY	PATIENTS N-30		SSI
	GROUP 1	GROUP 2	
1	13	11	0
2	02	04	1
3	00	00	2



Most of the patients were kept in the hospital only till they required injectable analgesics for pain relief. As soon as they were relieved of pain and passed stool or flatus and started taking orally, they were sent at home. They were then called back on the 7th day for stitch removal. The remaining required hospitalization In our study, three fifth of the patients required hospitalization for only one post operative day and among them only 3 patient get infected.

SUMMARY AND CONCLUSION

In this study of 30 cases of elective laparoscopic cholecystectomy performed in Guru Gobind singh government hospital in various surgical units using single dose antibiotic and a placebo. Following conclusions are made:

- Cholecystitis is more common at 3rd and 4th decade of life.
- Cholecystitis is more common in females.
- More common in upper socioeconomic class.
- Patients who had raised leucocytes counts are more prone to get SSI.
- Patients whose American society of anaesthesia grading were more than 3 are high risk for getting SSI.
- Average operating time is <60 mins, as it decreases exposure of anaesthetic agent to patient and increases recovery time.
- Post operative pain was noted in few patients which was relieved by just simple nsaids.
- Reducing per operative stay and post operative stay helps reducing risk of wound infections.
- Wound infection is present in 10% cases.
- Thus it can be concluded that laparoscopic cholecystectomy is
- safe and effective alternative to open surgery. It can be done with the use of single dose antibiotic in selected group of patients if certain criteria's are fulfilled.
- Restricting the unnecessary use of antibiotic would definitely
- help to reduce the emergence of resistant strains of microorganisms.
- The rate of infusion site thrombo-phlebitis is reduced, and thus
- the associated pain and morbidity is also less.
- The post operative hospital stay of the patients decreases.
- Reduced post operative stay helps to reduce the rate of hospital acquired infections.
- It also reduces the cost of treatment to patients as well as decreases the economic burden on society.

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