Original Research Paper

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Surgery

ASSESSMENT OF SURGICAL SITE INFECTIONS IN PATIENTS UNDERGOING ELECTIVE LAPAROSCOPIC CHOLECYSTECTOMY IN TEERTHANKER MAHAVEER MEDICAL COLLEGE & RESEARCH CENTRE

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ABSTRACT **Background:** Worldwide the most common surgical procedure is Laparoscopic Cholecystectomy (LC). SSIs rates following this procedure range between 0.1 and 2%.In both open surgical procedures and MAS procedures, superficial SSIs is the most Common, having staphylococcus aureus with a common isolate whereas the commonest upsetting being in deep SSIs is klebsiella species regardless of the procedure used. **Objective -** To study the risk factors for Surgical Site Infections and the types of pathogen associated with Surgical Site Infection. **Methods:** Study design- Prospective comparative study, Period of study- 18 months, Total number of patients- 100. Proper work up done to study the types of pathogen associated with surgical site infections and its risk factors and Assessment of surgical site infection by using center for disease control and prevention defined criteria. **Result:** The study was done in 100 cases of symptomatic cholelithiasis where 3% showed SSIs. All cases were evaluated for gall bladder spillage, duration of procedure, age of patient, and the port which got infected. According to the wound culture , it was reported that E Coli was isolated in 2 cases(2%) and P.Aeruginosa was isolated in 1(1%) patient. According to the port-wise distribution it was observed that the majority of the cases were reported with infection in Umbilical Port followed by Epigastric Port.

KEYWORDS : Surgical Site Infection, Laparoscopic Cholecystectomies, E.coli.

INTRODUCTION

Worldwide the most common surgical procedure is Laparoscopic Cholecystectomy (LC). It is the second most commonly performed abdominal operation in the general surgery practice[1,2]. Approximatively 1.4 per 1,000 procedures constitutes of a major complications following a laparoscopic procedure[3]. During cholecystectomy, a common intra-operative complication has been reported to occur is Gall bladder perforation (GP). It has been observed with a high incidence of 10%-30% [4] The factors that increase the risk of GP includes an inflamed or no-visualized gallbladder, a history of previous laparotomies or acute cholecystitis, a difficult operation male sex. Stone spillage and bile have been reported to lead to severe problems [5]. Gall stone spillage during laparoscopic cholecystectomy is common. This problem occurs less frequently in open surgery and the spilt stones are easy to retrieve [6]. The spillage of stones can take place during extraction of gall bladder through one of the port sites, tearing with grasping forceps or during dissection of the gall bladder off the liver bed. This is more common in males than in females, patients that are obese and elderly [7].

Surgical site infections are the 2nd cause of hospital acquired infections. They are associated with increased cost of care, with greater morbidity and significant mortality and furthermore specified by a break in the anatomical protection techniques [8]. Despite the high standards of sterility of surgical instruments, dressing and ligatures, improved operating- theater designs and strict aseptic techniques, many patients whose wounds are expected to heal by first intention suffer the discomfort, inconvenience, and sometimes actual danger of a wound infection. [9]. The rate of infectivity vary according to the procedure, less than 3 infections per 100 for clean procedures, up to 4 per 100 for clean contaminated procedures and up to 9 per 100 for grossly contaminated procedures [10]. Advances in infection control practices include improved operative room ventilation, sterilization methods, barriers, surgical techniques, and availability of antimicrobial prophylaxis.Despite these activities, SSTs remain a substantial cause of morbidity and mortality among hospitalized patients. This may be partially explained by the emergence of antimicrobial- resistant pathogens and the increased numbers of surgical patients who are elderly and/or have a wide variety of chronic, debilitating, immunocompromised underlying diseases. There also are increased numbers of prosthetic implant and organ transplant operations performed. Thus, to reduce the risk of SSI, a methodical but realistic approach must be applied with the awareness that this risk is influenced by characteristics of the patient, operation, personnel, and hospital [11] As compared to the incidence of open elective cholecystectomy, the occurrence of SSI after LC is few because of smaller incision line. In patients undergoing laparoscopic cholecystectomy, there is no difference observed in umbilical PSIs by the techniques of entry of the primary port into the peritoneum. SSIs are infections that are seen in the root of operative procedure. Procedures like bone and spinal, breast, cranial and cardiac surgeries, the Surveillance extends to 90 days after surgery (with use of prosthetic material).

SSIs are classified as:-1) space/organ SSIs 2) Deep SSIs that involves muscles and fascia layers 3) superficial SSIs which involve subcutaneous and skin tissues.

According to Centre for Disease Control (CDC) wounds are classified as:-

i) **Clean**- A surgical wound that is neither breached the respiratory, gastrointestinal, uninfected Or genital urinary tract nor exposed to any inflamed tissue; ii) **Clean contaminated**- surgical wound where there is controlled entry with few contamination into the uninfected urinary, genital, GI and respiratory tract **iii) Contaminated**- New wounds which are associated with surgical wounds with break in continuity of sterile technique **iv) Dirty or Infected wound** - aged wounds after trauma associated with weaken flesh and operative procedures in the presence of visceral perforation or functional infection.

The clean and contaminated wounds are generally seen in the surgical procedures done by laparoscopy. Infections can be caused in the human body as it hosts a variety of microbes.

Through various regions of world, a variation has been observed in the incidences of SSIs, In a fresh report from Turkey, as compared to CDC National Healthcare Safety Network (NHSN) , the reported occurrence of SSIs were higher. Moreover, SSIs accounts for the majority of the post-operative wound infections.

The patients having the history of steroid, nicotine consumption, malnutrition, diabetes, stay in hospital after surgery, before surgery blood transfusion or before surgery establishment of infection with staphylococcus aureaus.

Usually, Staphylococcus aureaus is harbored by clean surgical wounds. In both open surgical procedures and MAS procedures, superficial SSIs is the most common, having staphylococcus aureaus with a common isolate whereas the commonest upsetting being in deep SSIs is klebseilla species regardless of the procedure used.

Moreover, SSI can double the length of time a patient stays in hospital and thereby increase the costs of health care. The main additional costs are related to re-operation, extra nursing care and interventions, and drug treatment costs. Hence, the present study is conducted for the assessment of SSIs in cases undergoing elective LC. (12,13)

MATERIAL AND METHODS

The study will be conducted on cases reporting to Teerthanker

Mahaveer Medical College, Moradabad in OPD of Department of Surgery.

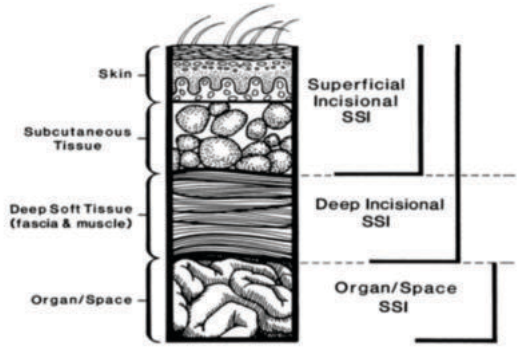


Figure 1: TYPES OF SSI

Study Design - Prospective

Period:-18 months (after the approval of research committee).

Sample Size:-100 Patients (Z2PQ/E2)

The study population will constitute of cases of symptomatic cholelithiasis diagnosed by ultrasonography who will undergo elective LC satisfying the inclusion and exclusion criteria.

Inclusion Criteria:

1. All patients with symptomatic cholelithiasis undergoing elective laparoscopic cholecystectomy including acute cholecystitis within 72hrs. (Proven by ultrasound)
2. Age –18-70 years
3. Sex –Male and Female

Exclusion Criteria:

1. Previous biliary tract surgery or previous ERCP
2. Patients with immunocompromised conditions including viral infections, taking immunosuppressive drugs, steroids and known diabetics etc.
3. Palpable gall bladder lump.
4. Patients with concomitant gall stones (cholelithiasis) with CBD stones and patients with jaundice.
5. Patients who required emergency cholecystectomy example-gall bladder perforation
6. Patients with gall stones detected to be having concomitant gall bladder malignancy

RESULT

Table 1:- Represent Frequency Distribution Of Gender Cases Of The Study Subjects.

GENDER N=100	f (%)
Male	12(12)
Female	88(88)

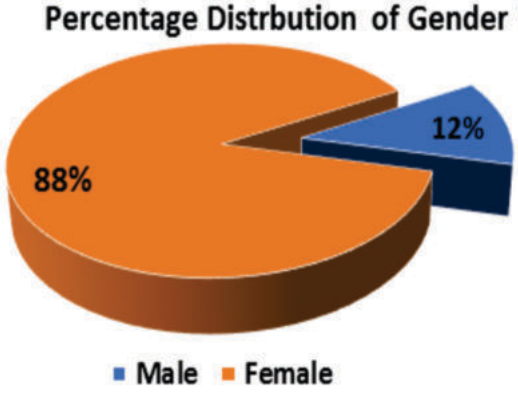


Figure 2 shows the Gender-wise distribution of the study subjects illustrating the frequencies. The prevalence of Female cases (88%) was higher than Male cases (12%).

Table 2:- Variable Wise Frequency Distribution Of The Study Subjects.

VARIABLE	STATUS	MALE f (%)	FEMALE f (%)
ADHESIONS	Present	9(75)	29(33)
	Absent	3(25)	59(67)
SPILLAGE TYPE	STONE	1(8.3)	7(8)
	MUCOUS	1(8.3)	5(5.7)
	Absent	10(83.3)	76(86.4)

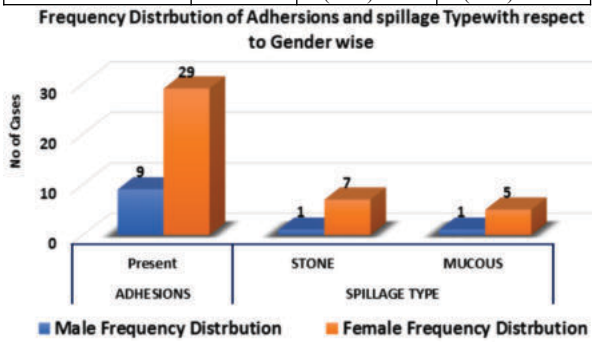


Figure 3 shows the ***ADHESIONS and SPILLAGE TYPE*** case Frequency distribution of the study subjects illustrating the frequencies. The Most frequencies Female cases of ***ADHESIONS*** (29) was higher than Other Female Cases in our Study.

Table 3:- Variable Frequency Distribution Of The Study Subjects.

Variable	Status	f (%)
PAIN	Present	28(28)
	Absent	72(72)
FEVER	Present	10(10)
	Absent	90(90)
REDNESS	Present	3(3)
	Absent	97(97)
DISCHARGE	Present	3(3)
	Absent	97(97)
WOUND GAPPING	Present	3(3)
	Absent	97(97)

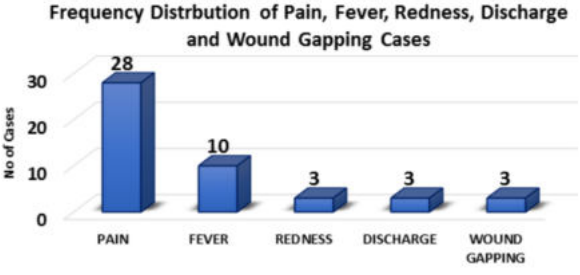


Figure 4 shows the **Variable** case Frequency distribution of the study subjects illustrating the frequencies. The prevalence of ***PAIN*** Cases (28%) was higher than *Other Variable* cases in our Study.

Table 4:- Represent Frequency Distribution Of DURATION OF SURGURY Cases Of The Study Subjects.

DURATION OF SURGURY	f (%)
(0<60) Mints	78(78)
(60<120) Mints	22(22)

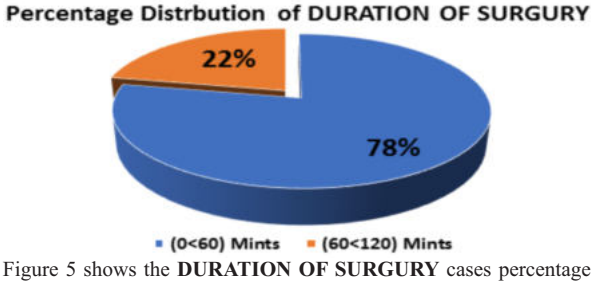


Figure 5 shows the **DURATION OF SURGURY** cases percentage distribution of the study subjects illustrating the frequencies. The prevalence of interval of **DURATION OF SURGURY** ***(0<60) Mints*** Cases (78%) was higher than interval of **DURATION OF SURGURY** ***(60<120) Mints*** Cases (22%) in our Study.

Table 5:- Variable Wise Frequency Distribution Of The Study Subjects.

VARIABLE	STATUS	Age(18-36)	Age(37-54)	Age(55-70)
		f (%)	f (%)	f (%)
WOUND CULTURE REPORT	E.COLI.	0(0)	2(5.4)	0(0)
	PSEUDOMONAS AERUGINOSA	1(2.3)	0(0)	0(0)
	Absent	43(97.7)	35(94.6)	19(100)
BILE CULTURE REPORT	E.COLI.	0(0)	2(5.4)	0(0)
	PSEUDOMONAS AERUGINOSA	1(2.3)	0(0)	0(0)
	Absent	43(97.7)	35(94.6)	19(100)

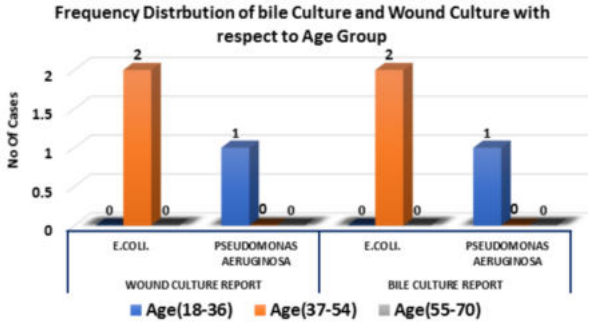
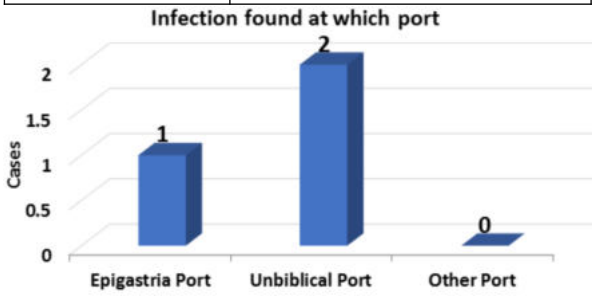


Figure 6 shows the Relationship between variables of ***WOUND CULTURE REPORT*** and ***BILE CULTURE REPORT*** with Age Interval in our Study.

Table 6:- Variable Wise Frequency Distribution Of The Study Subjects.

Variable	Infection Found At Witch Port N=100
Epigastric Port	1
Umbilical Port	2
Other Port	0



DISCUSSION

According to the gender wise distribution of the cases it was recorded that the majority of the cases were female (88%) followed by male cases (12%). According to a study conducted by William G. Cheadle, [14] it has been reported that SSIs are developed in approximately 5% of the patients undergoing surgery which might cause much morbidity and might be sometimes fatal. In relevant to our study, a study conducted by Makadia JM et al.[15] recruited a total of 273 patients of cholecystitis undergoing cholecystectomies for Surveillance of surgical site infections. Female preponderance was reported in their findings. Moreover, it was revealed that all the patients who had developed SSIs were males. On the other hand, study conducted by Saddlinga et al. [16] reported that the incidence of infections among females was higher than in males. Out of 100 cases, it was observed that there were 80 male cases followed by female cases (20 cases). Our study showed that the majority of the cases were recorded without any spillage whereas there were 8% cases observed with stones followed by 6% cases with mucous. Frequently surgeons prefer to remove the gallbladder via retrieval bags as it reduces the extent of SSI which .[17-19] On the other hand, the USG findings by Altuntas et al. showed that gallbladder stones can lead to a risk for gallbladder perforation during elective cholecystectomy [20]

According to the bile culture and wound culture of the study subjects in our study, it was reported that E Coli was isolated in 2 cases(2%) and Pseudomonas Aeruginosa was isolated in 1(1%) patient whereas in 97 of the cases, none of the organisms was isolated. On the other hand, the findings by Saddalinga et al[16] revealed that out of the total cases, the majority of the cases were observed with the isolated organism Pseudomonas (40%) followed by the other organisms like Staphylococci (26.6%), E Colli (20%), and Klebseilla (13.5%). Umesh S Kamal [21] also revealed in their findings that Pseudomonas was the most common isolated organism followed by the other organisms. In abdominal surgeries organisms such as coliforms, gram negative anaerobes are endemic, easily spreadable and more resistant to common antiseptics used in hospitals to avoid SSI. Among the complications, post op Pain was seen in most of the cases. It was reported that pain was observed in 28% of the cases followed by the other clinical presentations like fever (10%), redness (3%), discharge (3%), and wound grapping (3%). However, it has been reported by several studies that the typical presentations in non-mycobacterial infection are erythema and Wound discharge. These generally occurs in a week of procedure and mostly restricted till subcutaneous tissue and skin. Local flesh inflammation with low grade fever, tenderness or pain are sometimes present. [22,23,24]

According to the age-wise distribution of the study subjects, it was observed that the most common age group in our study, with the majority of the cases was 18-36 years (44%), followed by the age groups between 37-54 years (37%) and 55-70 years (19%). However, Siddalinga et al. in his findings reported that the most common age group was 71-80 years that was observed with 50% of the cases. Our study also reported that the majority of the patients (78%) had the duration of the surgery 0<60 minutes followed by 22% with the duration of surgery 60<120 minutes. However, Siddalinga et al. reported that the least number of the cases had the duration of surgery <1.5 hrs (7.69%) whereas the remaining cases (28.5%) with the duration of surgery between 1.5 to 4 hours. In surgeries of less than the duration of 30 minutes, a nil infection rate was reported by Lilani et al. [23] . Moreover, our study showed that age and duration of surgery was significantly correlated with gender. Moreover, according to the port-wise distribution of the study subjects it was observed that the majority of the cases were reported with the infection in Unbiblical Port followed by Epigastria Port. However, in relevant to our findings, Ashwani Kumar et al. [24] in his findings reported that umbilical port was the most common site for all the infections. On the other hand, in case of sepsis following laparoscopic cholecystectomy, the umbilicus is the commonest site according to Gaur & Pujahari.[25] On contrary to our findings, Karthik et al., the most common port was Umbilical that was observed with the majority of SSIs. Our study reported that the cases were observed with the direct removal of gall bladder by the method of laparoscopic cholecystectomy. However, the gallbladder content spillage in the study conducted by Kimura et al. was 26.3%. [26]

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Conflict Of Interest: None declared

Ethical Approval: The study was approved by the Institutional Ethics Committee

CONCLUSION

In laparoscopic surgeries, Surgical Site Infections, although infrequent, can be frustrating complications both for the surgeon as well as for the patients. By strongly following the rules of sanitization, purification of the procedure tools with suitable sanitizing methods, complications will be reduced.

However, if appropriate measures are taken pre-operatively, intra-operatively and post-operatively then these infections are preventable. With timely recognition and suitable treatment, SSIs can also be treated non-surgically.

The study was done in 100 cases of symptomatic cholelithiasis where 3% showed SSIs. All cases were evaluated for gall bladder spillage, duration of procedure, age of patient, and the port which got infected. After statistical analysis significant association were found between them.

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