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COMPARISON OF SURGICAL SITE INFECTIONS BETWEEN LAPAROSCOPY AND OPEN CHOLECYSTECTOMY

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ABSTRACT Surgical site infection (SSI) is the most common healthcare-associated infection and contributes to increased length of hospital stay and healthcare costs . The incidence of SSI is higher after open versus laparoscopic cholecystectomy, with reported SSI rates after open cholecystectomy ranging from 1.1% to 8.4% versus 0.3% to 3.4% after laparoscopic cholecystectomy .

KEYWORDS : laparoscopic cholecystectomy, open cholecystectomy , SSI

INTRODUCTION

Surgical site infection (SSI) is the most common healthcare-associated infection [1, 2] and contributes to increased length of hospital stay and healthcare costs [1, 3]. SSI occurs in 2-5% of patients after clean, extra-abdominal surgical procedures such as thoracic , orthopedic and neuro surgeries (4-9). The infection rate is increased to 20% for patients undergoing intra-abdominal surgeries. Cholecystectomy is the most commonly performed abdominal surgery . The incidence of SSI is higher after open versus laparoscopic cholecystectomy, with reported SSI rates after open cholecystectomy ranging from 1.1% to 8.4% versus 0.3% to 3.4% after laparoscopic cholecystectomy [10]. Older age, male sex, immune and nutritional deficiency, obesity, diabetes, malignancy, inadequate cleaning and sterilizing of surgical site before operations, contaminated surgical instruments or wound, prolonged duration of operations, prolong hospital stay, and antibiotic resistance have all been presented as independent risk factors for SSIs in cholecystectomies pateints. (11-12).

MATERIAL AND METHODS

This prospective study was carried out in the department of General Surgery , Dr. Rajendra Prasad Government Medical College, Tanda from December 2014 to March 2016 after getting clearance from Institutional Ethics Committee . Total 226 patient operated for gall stone related diseases and taken for study.

INCLUSION CRITERIA:

1. All patients admitted under surgery department for elective gall stone surgery.

EXCLUSION CRITERIA:

1. Patients undergoing reoperation.
2. Patients operated for emergency surgical conditions.
3. Patients lost during follow up.
4. Operated for non gall stone diseases.

Preoperative preparation

Preparation of the operative site was done by shaving of hair at surgical site just before surgery. Antibiotic prophylaxis was given in clean and clean contaminated elective surgery. Intravenous cefuroxime was given as prophylactic antibiotic.One dose of prophylactic antibiotic was given within 1hour of surgery. In cases where surgery, lasted longer than four hours or with major blood loss then additional intra-operative doses of antibiotic were given. In contaminated and dirty wounds therapeutic antibiotics were used for 3-5 days after the prophylactic dose.

SURGICAL WOUND CLASSIFICATION

Class	Criteria
Class 1: Clean wounds	An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tract is not entered. In addition clean wounds are primarily closed and, if necessary, drained with closed drainage.
Class 2: Clean Contaminated wo unds	An operative wound in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination. Operations involving biliary tract and appendix are included in this category, provided no evidence of infection or major break in technique is encountered.
Class 3: Contaminated wounds	Open, fresh, accidental wounds. In addition, operations with major break in sterile technique or gross spillage from the gastrointestinal tract, and incisions in which acute, non purulent inflammation is encountered are included in this category.
Class 4: Dirty wounds	Old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organism causing postoperative infection were present in the operative field before the operation.

Superficial incisional SSI (SIS) Infection occurs within 30 days after the operative procedure and involves only skin and subcutaneous tissue of the incision and had at least one of the following:

a. Purulent drainage from the superficial incision.
b. Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.
c. At least one of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness, or heat, and superficial incision is deliberately opened by surgeon and is culture positive or not cultured. A culture-negative finding does not meet this criterion.
d. Diagnosis of superficial incisional SSI by the surgeon or attending physician.

Deep incisional SSI (DIS) Infection occurs within 30 days after the operative procedure if no implant is left in place or within 1 year if implant is in place and the infection appears to be related to the operative procedure and involves deep soft tissues (e.g., fascial and muscle layers) of the incision and patient has at least one of the following:

a. Purulent drainage from the deep incision but not from

organ/space component of the surgical site.

b. Deep incision spontaneously dehisces or is deliberately opened by a surgeon and is culture-positive or not cultured when the patient has at least one of the following signs or symptoms: fever (>38°C) or localized pain or tenderness.

A culture-negative finding does not meet this criterion.

c. An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination.

d. Diagnosis of a deep incisional SSI by a surgeon or attending physician.Wound that has both superficial and deep incisional infection is classified as DIS.

Organ/space SSI Infection occurs within 30 days after the operative procedure if no implant is left in place or within 1 year if implant is in place and the infection appears to be related to the operative procedure and infection involves any part of the body,excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure and patient has at least one of the following:

a. Purulent drainage from a drain that is placed through a stab wound into the organ/space.

b. Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space.

c. An abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination.

d. Diagnosis of an organ/space SSI by a surgeon or attending physician.

After the discharge of patients follow up for SSI was done for 30 days by:

a) Review in OPD. b) Telephonically.

OBSERVATIONS

In this prospective study, we observed 226 patients of elective gall stone surgery from December 2014 to March 2016. The following observations were made.

The sex distribution of the study showed that out of 226 patients, 31(13.7%) were males and 194(86.2%) were females. Female to male ratio of 6.29 :1 (TABLE-1)

Table 1: Sex distribution

Sex	No of Patients	Percentage(%)
Male	31	13.7
Female	194	86.2

Clean contaminated wounds (Class II) and SSI

Out of 226 patients, 9 patients had SSI. Out of 9 ,4 patients were of open cholecystectomy with 3 superficial incisional and 1 deep incisional SSI, 2 cases of open cholecystectomy with choledocholithotomy with 1 deep incisional and other organ space SSI, 1 case of open cholecystectomy with pyloroplasty with superficial incisional SSI, 1 case of open cholecystectomy & cholecysto-colonic fistula closure with superficial incisional SSI, 1 case of laparoscopic cholecystectomy with superficial incisional SSI. (TABLE-2)

Table 2: Clean contaminated wounds (Class II) and SSI

Clean contaminated wounds	No of Cases	No of SSI	Type of SSI
Open cholecystectomy & others (open cholecystectomy- 141, open cholecystectomy with choledocholithotomy-4, open cholecystectomy with cholecystoenteric fistula closure-2, open cholecystectomy with cystogastrostomy-1).	148	8	5 Superficial incisional, 2 Deep incisional & 1 Organ space.
Laparoscopic cholecystectomy	77	1	1 Superficial incisional
TOTAL	225	9	

Contaminated wounds (Class III) and SSI

There was only 1 case of open cholecystectomy for empyema gall bladder. Intraoperatively gall bladder was grossly distended, inflamed and densely adherent to liver bed. During dissection gall bladder got ruptured leading to gross spillage of pus, this patient developed intraabdominal abscess which required percutaneous drainage. (TABLE-3).

Table 3: Contaminated wounds (Class III) and SSI

Contaminated wounds	No of cases	No of SSI	Type of SSI
Open cholecystectomy for empyema gall bladder	1	1	Organ space

Clinical features of SSI

Pus discharge from wound was the commonest (77.7%) clinical feature of SSI in our study followed by pain incision site (55.5%), fever and tenderness (33.3%), redness and wound dehiscence (22.2%), pus discharge drain and swelling (11.1%). (TABLE-4)

Table 4: Clinical features of SSI

	Pus discharge	Pain	Fever	Wound dehiscence	Redness	Swelling	Tenderness	Pus discharge from drain
Superficial (n=6)	5	3	1	-	2	1	1	-
Deep (n=2)	2	2	1	2	-	-	2	-
Organ space (n=1)	-	-	1	-	-	-	-	1
Total N=(9)	**7**	**5**	**3**	**2**	**2**	**1**	**3**	**1**
Percentage	77.7	55.5	33.3	22.2	22.2	11.1	33.3	11.1

DISCUSSION

This study assessed the causes of infection in cholecystectomy surgeries and compared the infection rates between the open and laparoscopic methods of performing this operation. Majority of patients i.e 86.2.% were females and 13.7% patients were males however in study by Kakati B et al(13) from Uttarakhand India, in their study have reported that 51.5% were males and 48.6% were females. Pathaket al(14) from Ujjain, India has reported that 76% were males and 24% were females. Female to male ratio of 6.29 :1. The rate of SSI was 1.2 % for laparoscopic surgeries and 5.4 % for open surgeries. Previous studies have found infection rates after open cholecystectomy to be from 1.1% to 8.4% and the rates after laparoscopic cholecystectomy to be from 0.3% to 3.4% (10) Bogdanic et al[55](15), have reported lower SSI rate of 0.6% in laparoscopic cholecystectomy in comparison to 6% observed in open cholecystectomy.

CONCLUSION

Surgical site infection is one of the important complication of surgery. It adds to morbidity, delays wound healing, increases hospital stay and increases treatment cost. SSI rate for laparoscopic cholecystectomy was less comparison to open cholecystectomy .

REFERENCES

1. Anderson DJ, Pyatt DG, Weber DJ, et al. Statewide costs of health care-associated infections: estimates for acute care hospitals in North Carolina. Am J Infect Control **2013**; 41:764–8.
2. Magill SS, Edwards JR, Bamberg W, et al. Multistate point-prevalence survey of health care-associated infections. N Engl J Med **2014**; 370:1198–208.
3. Shepard J, Ward W, Milstone A, et al. Financial impact of surgical site infections on hospitals: the hospital management perspective. JAMA Surg **2013**; 148:907–14.

4. Sabiston David C, Kim Lyerly H. Textbook of surgery. *J Am Coll Surg* 1997; 185: 202.
5. David L. Dunn and Gregory J. Beilman. Surgical Infections. In Schwartz's principles of surgery 2005;p:109 28.
6. Wertheim HF, Melles DC, Vos MC, van Leeuwen W, van Belkum A, Verbrugh HA, et al. Nouwen. The role of nasal carriage in Staphylococcus aureus infections. *Lancet Infect Dis* 2005;5:751-62.
7. Hager WD , Larsen JW . Postoperative infections: prevention and management. In: Rock JA, Jones HW. Te Lindes operative gynecology. 10" ed. *Philadephia Lippincott Williams and Wilkins* 2008:190-202.
8. Cunningham FG , Leveno KG , Bloom SL. Hauth JC , Rouse DJ , Spong CY. Williams obstetrics. 23" ed. *New York McGraw Hill* 2010:661-72.
9. Pavlidis TE, Galatianos IN, Papaziogas BT, Lazaridis CN, Atmatzidis KS, Makris JG, et al. Complete dehiscence of the abdominal wound and incriminating factors. *Eur J Surg* 2001;167:351-4; discussion 355.
10. Warren DK, Nickel KB, Wallace AE, Mines D, Tian F, Symons WJ, et al. Risk Factors for Surgical Site Infection After Cholecystectomy. *Open Forum Infect Dis* 2017 22;4:ofx036.
11. Richards C, Edwards J, Culver D, Emori TG, Tolson J, Gaynes R, et al. Does Using a Laparoscopic Approach to Cholecystectomy Decrease the Risk of Surgical Site Infection? *Ann Surg* 2003;237:358-62.
12. Jawien M, Wojkowska-Mach J, Rozanska A, Bulanda M, Heczko P. Surgical site infection following cholecystectomy: comparison of procedures performed with and without a laparoscope. *Int J Infect Control* 2008;4:1.
13. Kakati B, Kumar A, Gupta P, Sachan PK, Thakuria B. Surgical site abdominal wound infections: Experience at a north Indian tertiary care hospital]IJACM 2013; 14(1): 13-9.
14. Pathak A, Saliba EA, Sharma S, Mahadik VK, Shah H, Lundborg CS. Incidence and factors associated with surgical site infections in a teaching hospital in Ujjain, India. American Journal of Infection Control 2014; 42: 11-15.
15. Bogdanic B, Bosnjak Z, Budimir A, Augustin G , Milosevic M, Plecko V et al. Surveillance of Surgical Site Infection after Cholecystectomy Using the Hospital in Europe Link for Infection Control through Surveillance Protocol Surgical infec 2013;14(3): 283-87