

Port site Infection in laparoscopic cholecystectomy in a tertiary care hospital – a retrospective study

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Article Info

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Abstract

Port site infection (PSI) in laparoscopic surgery is not very uncommon. The main aim of this study was to assess the causes of port site infection and its management. This retrospective descriptive study was conducted on 48 patients from March 2019 to December 2020 who develop port site infection after laparoscopic cholecystectomies. Operation notes were analyzed; and swabs were taken for culture & sensitivity. Exploration and wound debridement with excisional biopsies were done under local anesthesia for all patients. All patients were followed-up for one year postoperatively. Factors as gender, site of infected port, types of microorganism, acute versus chronic cholecystitis, type of infection (superficial or deep infection) and intraoperative spillage of stones, bile or pus were analyzed. Age of the patients ranged from 15 years to 60 years and the mean age was 32.4 years. The female to male ratio is 2.2:1. Among the subjects, 56.25% patients suffered from acute and 43.75% suffered from chronic cholecystitis. 35.42% had a history of spillage of bile or stones in the abdomen. Considering the site of infection, 33.33% had only umbilical port site infection, 18.75% had only epigastric port infection and 47.92% had multiple port infection. 58.33% suffered from superficial infection and others had deep site infections. Histopathology reports showed granulomatous infection in case of 37.5% patients. So, special consideration should be taken in chronic deep surgical site infection as Mycobacterium tuberculosis could be the cause.

Introduction

Laparoscopic techniques have revolutionized the field of surgery. Laparoscopic cholecystectomy is the gold standard treatment for symptomatic gallstones¹. Its advantages include decreased hospital stay post-operatively, earlier return to work, decreased post-operative pain², minimum surgical incisions, better cosmetic results and lesser postoperative complications.

The rapid advancement in charged-coupled device (CCD) cameras and the flexible light sources have made laparoscopic surgery more affordable and widely available. As a result, the use of laparoscopy has expanded to more sophisticated surgeries as well as the management of malignancies.³

The laparoscopic cholecystectomy is still not free of complications. Traumatic injuries related to access and manipulation of laparoscopic instruments, diathermy injuries due to coupling, inadvertent contact with viscera resulting in heat-related injuries, hepatobiliary injuries due to improper traction, unsuitable application of clips and energy sources and port-related

complications like infection, metastasis, bleeding, hypertrophic scar and incisional hernia are the few crucial issues.^{4,5}

Port site infection is not an uncommon entity in laparoscopic cholecystectomy. It has been reported in 1.4 – 6.7% of the cases.^{4,6-8} It may be accredited to the use of reusable trocars, the practice of improper sterilization techniques, associated comorbidities and spillage of bile and stones while retrieving the gallbladder. Nowadays, with the increasing number of performed laparoscopic cholecystectomies, there is an increase in port site infection. It has a significant influence on overall outcomes of laparoscopic cholecystectomy and its final results like delay in return to work, increase cost and bad cosmetic results are disappointing for both patient and surgeon.

Three types of surgical site infection can occur in port site - 1) superficial surgical site infection occurring within 30 days post-surgery and involves only skin and subcutaneous tissues and the patient at least has one of the following i.e. a) purulent

discharge from the superficial incision b) organism isolated from the aseptically obtained culture of fluid or tissue from superficial incision. 2) Deep surgical site infection may presented after 30 days of operation and involves deep soft tissues including fascia and muscles deep to the incision. The patient has at least two of the following i.e. a) purulent drainage from the deep incision b) dehiscence of the deep incision and c) an abscess. 3) Organ/space SSI where infection involves any organ and spaces other than the incision which was opened or manipulated during surgery.⁹⁻¹²

Methods

In this retrospective descriptive qualitative study, 48 patients were taken into account who came from different parts of the country with PSI following laparoscopic cholecystectomy during the period of 1st March 2019 to 31st December 2020. All patients were evaluated by detailed history and thorough physical examination & relevant investigations. Their discharge certificates following laparoscopic cholecystectomy were thoroughly checked for their operative details. Relevant hematological and biochemical examination, x-ray chest, an ultrasonogram of the abdomen were done in all the patients.

Patients presenting with abscesses were subjected to drain the abscess and regular dressing of the wound with 10% povidone-iodine solution. Pus from the infected port site was sent for Gram and acid-fast bacillus (AFB) staining and culture sensitivity in both aerobic and anaerobic environments. Broad-spectrum antibiotic was started & changed if needed as per culture sensitivity report.

Exploration under local anaesthesia was done for patients with chronic deep site infections, presented with persistent discharging sinus, wound debridement was done and the wound was left open to heal by secondary intention. Tissues from the Abscess wall or whole of the sinus tract were sent for histopathological studies. Gene Xpert test for Mycobacterium tuberculosis was done as supportive evidence when suspicious of mycobacterial infection. Patients proved to have TB were treated with anti-TB-therapy. All the wounds healed within 2 months.

Factors such as sex, infected port site, type of microorganism, presentation, type of infection (superficial or deep infection) and intraoperative spillage of stones, bile or pus were analyzed in our study.

Results

Total 48 patients who developed PSI following laparoscopic surgery were included in our study. Their ages ranged from 15 years to 60 years and the mean age was 32.4 years. Among 48 patients 68.75% were female and 31.25% were male. The female to male ratio is 2.2:1. (Table-I) Among 48 patients included in this study, 27(56.25%) patients suffered from Acute cholecystitis and 21(43.75%) patients suffered from chronic cholecystitis. (Table-II)

Table-I

Sex distribution (N=48)		
Sex	Number of patients	Percentage
Female	33	68.75
Male	15	31.25

Table-II

Incidence of PSI in relation to the clinical diagnosis of the gallbladder pre-operatively (N=48)		
Condition	Number of patients	Percentage
Acute Cholecystitis	27	56.25
Chronic Cholecystitis	21	43.75

Among 48 patients, 17 (35.42%) patients had a history of spillage of bile or stones in the abdomen. 31 (64.58%) patients had no history of spillage. (Table-III)

Table-III

Incidence of PSI with spillage of bile, stones or pus during operation (N=48)		
PSI	Number of patients	Percentage
With spillage	17	35.42
Without spillage	31	64.58

Among 48 patients, 16 patients had only umbilical port site infection, 9 patients had only epigastric port infection and 23 patients had multiple port infection. (Table-IV, Figure-1 & 2)

Table-IV

Incidence of PSI in different port sites (N=48)		
Port site	Number of patients	Percentage
Umbilical port	16	33.33
Epigastric port	9	18.75
Multiple ports	23	47.92

All patients developed a discharge, 15 patients (31.25%) had history of pain and 9 patients (18.75%) had black pigmentation at the infected site. (Table-V)

Among 48 patients in this study, 28 patients (58.33%) suffered from superficial infection and others had deep infection. (Table-VI)

Table-IV		
Presentations (N=48)		
Presentation	Number of patients	Percentage
Pain	15	31.25
Pigmentation	9	18.75
discharge	48	100

Table-VI		
Types of PSI (N=48)		
PSI	Number of patients	Percentage
Superficial infection	28	58.33
Deep site infection	20	41.67

Among the patients who showed no growth (20 patients) on C/S, 18 patients (37.5%) had granulomatous infection and 2 specimens showed foreign body reactions. (Table-VII)

Table-VII		
Distribution of cases according to the isolated micro-organisms (N=48)		
Micro-organisms	Number of patients	Percentage
Gram positive - Staphylococcus aureus	7	14.58
Gram -ve E. coli	21	43.75
No growth	20	41.67



Figure 1 : Port Site Infection (Epigastric Port)

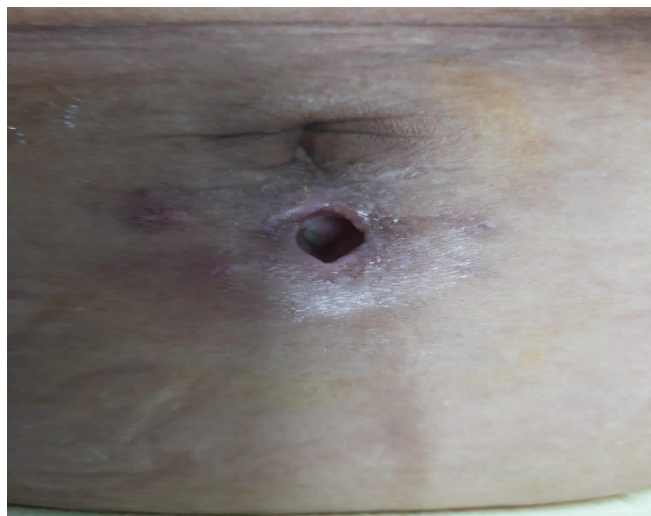


Figure 2 : Port Site Infection (Umbilical Port)

Discussion

Laparoscopic surgery has a tremendous positive impact on patients and the healthcare system because Patients have less pain, less morbidity and early return to their daily activities. The number of laparoscopic procedure continues to rise each year. But laparoscopic surgeries also have complications. Among them, Port site infection is a major concern. The rate of wound infection after laparoscopic cholecystectomy is lower because laparoscopic procedures are minimally invasive techniques and have less impact on the immune system than an open one.¹³ The incidence of port-site infection varies in different studies ranging from 2.4% to 6.7%.^{14,15} Incidence varies in different hospital settings. It may be due to differences in environment, population and sterilization technique which could be different from one hospital to another and there may be rapid turnover at the expense of adequate sterilization.

Among 48 patients of PSI, 27(56.25%) suffered from Acute cholecystitis and 21(43.75%) suffered from chronic cholecystitis. In another study shows 65% of cases were suffering from acute condition and 35% were from chronic cholecystitis.¹⁶ This may be due to increased probability of perforation of gallbladder and spillage of bile, stones or pus as a result of difficult manipulation, tensely distended gallbladder with thickened oedematous wall.¹⁷ Inflammation makes laparoscopic cholecystectomy difficult. When inflammation extends to the porta-hepatis, great care must be taken in proceeding with operations, as normally thin minimally adhesive tissue that invests cystic duct and artery is markedly thickened and oedematous and may not readily be separated by usual blind dissection.¹⁸ In our study, 17(35.42%) patients had a history of spillage of bile or stones in the abdomen. Laparoscopic cholecystectomy is associated with spillage of gallstones in 5% to 40%^{18,19} of procedures and perforation of the gallbladder

during surgery occur frequently at a rate of 10% to 40%²⁰ and may occur secondary to traction applied by grasping forceps or because of electro-surgical thermal injury during removal of the gallbladder from its bed¹⁷. Escaped stones composed primarily of cholesterol pose little threat of infection, however, pigment stones frequently harbour viable bacteria and may potentially lead to subsequent infections if allowed to remain in the peritoneal cavity.¹⁷ But in our study, 31 patients (64.58) with PSI do not have a history of spillage. Port site infection was noticed in 9 patients (18.75%) in the epigastric port and 16 patients (33.33%) in the umbilical port and 23 patients (47.92%) at the multiple ports. Two studies reported about PSI in 27 patients who had undergone laparoscopic cholecystectomy and all of their gallbladders were extracted from the epigastric port^{5,21} although all the infections were not at the epigastric port site. It was thought that due to the extraction of the gall bladder through a port, there is the seeding of microorganisms in the tract. But it may not be completely true in most cases because in our study highest incidence of PSI was in the umbilical port, whereas extraction of the gallbladder was from the epigastric port. Probably umbilical port is the most commonly affected port due to the huge load of local microbes harboring in the umbilicus which was not removed properly by antiseptic cleaning. However, using an endobag could prevent PSI further, which was shown in one study that had a higher incidence of PSI when endobags were not used (5.28%) compared to when endobags were used (0.2%).²² Recently sterile disposable ports are used that greatly help in reducing PSI.

Regarding presentation, all patients developed a discharge, 15 patients (31.25%) complained of Pain and 9 patients (18.75%) had black pigmentation at the infected site.

Most of the patients presented with PSI in our study had superficial infection (58.33%). Superficial infection is more common than deep infection reported by a study (87.7% for superficial infection compared with 13.3% for deep infection)¹⁵. The superficial PSI occurred within 7-10 days of the surgery. They were successfully managed by standard wound care and appropriate antibiotics. Among the total patients of 48, microorganisms were identified in 28 patients (58.33%). In 20 patients (41.67%), C/S showed no growth. Of the patients who showed no growth on C/S, 18 patients (37.5%) had caseating granulomatous infection and 2 specimens showed foreign body reactions. Genexpert detects Mycobacterium Tuberculosis in 72.2% of cases (13/18). They got 4 drug regimens of anti TB and all got cured. Empirical treatment with ATT was given in the rest 5 cases which showed an overwhelming response. An article from India reported a series of eight cases of port site tuberculosis after laparoscopy caused by *M. tuberculosis*.²³ In our study, tubercular infection is higher.

Prevention of PSI is important. The endogenous source of infection cannot be avoided. But the incidence of PSIs after LS due to the endogenous cause can be reduced by using sterile endobag for specimen retrieval. The exogenous source of infection, however, is avoidable. A breach in sterilization protocol of laparoscopic instruments is the most common cause of PSI with atypical mycobacteria.²⁴ The infection with atypical

mycobacteria is usually limited to the laparoscopic procedure, as most laparoscopic instruments are not autoclavable because of the heat-sensitive outer insulation sheath. Moreover, as most of the laparoscopic instruments have multiple joints and crevices, where blood and tissue can accumulate. Frequent use of the instrument without optimal cleaning potentially results in contamination with organisms such as atypical mycobacteria. Endospores in the contaminated instrument get deposited in the subcutaneous tissue and germinate in three to four weeks to produce clinical signs and symptoms.²⁵

For prevention of PSI, the following recommendations are suggested²⁶⁻²⁹ i.e. (1) Use of disposable trocars and instruments, and adequate availability of properly sterilized reusable trocars to cover all the surgical procedures in a day; (2) Use of autoclavable laparoscopic hand instruments; (3) Use of instruments with good ergonomics, limited joints, and facility for proper cleaning of the debris collected in its crevices; (4) A proper cleaning of the instrument is best achieved by ultrasonic technology. Use of autoclaved water for cleaning the instruments after dismantling; (5) Proper guidelines should be followed regarding the concentration, contact time, and cycles of use for instrument sterilization with liquid sterilizing agents; (6) Use of plasma sterilizer or ethylene oxide in between the consecutive surgery for instrument sterilization; (7) Avoiding inter-departmental sharing of instruments, such as using instruments used for gynecological or urological procedures; (8) Avoiding spillage of bile or gut content in the operative area or the port site; (9) Use of non-porous specimen retrieval bags for retrieving the specimen & (10) Thorough irrigation and cleaning of the port site before wound closure.

Conclusion

PSI, is a frustrating complication in laparoscopy, both for the patient as well as for the surgeon. Laparoscopic surgery demands a meticulous strategy regarding sterilization of laparoscopic instruments. The emerging tuberculous mycobacteria are a new threat to the surgical fraternity. The complication can be best avoided by strictly following the commandments of cleaning and sterilization of the laparoscopic instruments with appropriate sterilizing agent.

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