THE FREQUENCY OF PORT-SITE INFECTION IN LAPAROSCOPIC CHOLECYSTECTOMIES

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ABSTRACT

Objective: *To study the frequency of port-site infection (PSI) in cases of laparoscopic cholecystectomies reusing disposable ports.*

Material and Methods: *Record of all patients undergoing laparoscopic cholecystectomy in Surgical A Unit; LRH between 2007-1994 was retrospectively analyzed for PSI. Out of 300 cases, 6 cases were converted to open cholecystectomy and excluded from the study. All patients were admitted a day before surgery and were given 3 shots of ceftriaxone 1gm (Inj. Rocephin, Roche, UK); one before and two after the surgery. The patients were monitored for port site using standard National Nosocomial Infections Surveillance (NNIS) System definitions given by the Centers for Disease Control and Prevention (CDC). All infected wounds were treated by local washes and oral antibiotics.*

Results: *Out of 294 cases, 17 (5.78%) developed PSI. Out of these 17 infected cases 12 (70.5%) had superficial infection while 5 (29.4%) had deep surgical site infection (SSI). Epigastric port-site was infected in 15 (88.2%) cases followed by the umbilical port-site in 2 (11.8%) cases. Two (11.8%) patients with port-site infection had operation lasting < 1 hour while in 15 (88.2%) cases the surgery lasted for >1hr. Main operative findings were acute cholecystitis in 7 (41.1%) patients, empyema gall bladder in 4 (23.5%), adhesions in 3 (17.6%).*

Conclusion: *Laparoscopic cholecystectomy is associated with a low risk of PSI, which in most cases is only superficial and responds to local measures. It is most commonly the trocar site of gall bladder extraction that is infected.*

Key words: *Laparoscopic cholecystectomy, Port-site infection.*

INTRODUCTION

Wound infection has probably always been a major complication of surgery and trauma.[1] Historically, the control of would infection depended upon aseptic techniques directed at coping with the infecting organisms. Wound infection had devastating consequences and a measurable mortality until 19th century and early 20th century.[2] With changing times, the goal of modern wound care shifted from mere prevention of infection to the timely restoration of the body to a previous state of normal form and function.[3] It is the very same goal that has led to the development of laparoscopic surgery. Laparoscopic surgery has been rapidly gaining popularity due to its advantages of minimal wound pain, short hospital stay, good cosmesis and early return to work.[4] Laparoscopic cholecystectomy (LC) performed for the first time in 1987 by Movret in France is now the gold standard for the treatment of symptomatic gall stones.[5,6] It has replaced the open technique for the majority of 770,000 cholecystectomies performed in US each year.[7] Although frequency and risk factors for wound infection following conventional open cholecystectomy have extensively been studied in literature, they have not yet been thoroughly evaluated for laparoscopic cholecystectomy. However the available data strongly suggests that the overall rate of such septic complications is extremely low.[8] The CDC classification of Surgical Site Infection (SSI) includes *"incisional"* (which may be "superficial,"

REASONS FOR CONVERSION TO OPEN CHOLECYSTECTOMY

Reasons for conversion	Frequency (n=300)	% age
Haemorrhage	3	1.0%
Bile Leak	2	0.6%
Thick fibrous adhesions	1	0.3%

Table 1

involving only skin and subcutaneous tissue, or "deep," involving fascia and muscle) and "organ/space" infections.[9,10] In the context of port-site infection in laparoscopic cholecystectomy only the incisional category with its two subtypes is applicable and has been used. In this study we analyzed our experience regarding port-site infection in laparoscopic cholecystectomy reusing disposable ports.

MATERIAL AND METHODS

It is a retrospective study from the record of patients having had laparoscopic cholecystectomy between 1994 to 2007 in Surgical A unit of LRH. A total of 300 laparoscopic cholecystectomies were performed out of which 6 had to be converted due to various indications given in table 1. These patients were excluded from the study. All patients were admitted a day before surgery and were given one shot of ceftriaxone 1 gm (Inj. Rocephin, Roche, UK); at the time of induction, and two subsequently 12 hours apart. Most of the patients were discharged on the second post-op day. The patients were monitored for port site infection using standard National Nosocomial Infections Surveillance (NNIS) System definitions for SSI given by The Centers for Disease Control and Prevention (CDC) that defines SSIs as those occurring within 30 days of an operation.[9, 10] Wounds were assessed clinically a week after surgery and in case infection had occurred; once weekly until 4 weeks in the out-patients clinic. All wound infections were treated with regular local washes and oral antibiotics empirically. The frequency of port site infection was studied in relation to frequency, extent of infection, duration of surgery, operative findings andf the site of the port that was infected. However it could not be studied in context to the gender, age, American Society of Anaesthesiologists (ASA) grade and body mass index (BMI) which have been considered as risk factors for SSI in available literature because the patients selected to undergo LC with us did not show much variation in these variables.

RESULTS

Out of the 300 laparoscopic cholecystectomies done 6 were converted to open and hence excluded from the study. Out of the 294, 17 (5.78%) developed some form of port site infection.

THE PORT-SITE AFFECTED IN THE CASES WITH INFECTION

Port-Site	Frequency (n=17)	% age
Epigastric Port	15	88.2%
Umblical Port	2	11.7%

Table 2

Out of these 17 infected cases 12 (70.5%) had superficial infection while 5 (29.4%) had deep surgical site infection (SSI). The epigastric port-site from which the gall bladder was extracted was the most frequent (88.2%) site to be infected followed by the umbilical port-site (Table 2). Two (11.8%) patients with port-site infection had operation lasting $\leq$ 1 hour while in 15 (88.2%) cases the surgery lasted for >1hr. Thus the duration of surgical procedure appeared to be a factor involved in predicting the risk of port-site infection. The operative findings of the cases that developed port-site infection included acute cholecystitis in 7 (41.1%) patients, empyema gall bladder in 4 (23.5%) cases and adhesions in 3 (17.6%) cases (Table 3).

DISCUSSION

Any surgical procedure conducted has some risks and complications. Abdominal surgical site infections are among the most common complications of inpatient admissions and have serious consequences for outcomes and costs. Technologic advances in surgery include a trend toward less invasive procedures, driven by potential benefits to patients. Since its introduction in 1987, Laparoscopic cholecystectomy rapidly gained popularity in modern times to the extent that it is now being regarded as the gold standard for treating symptomatic gallstones disease.[5, 6,11, 12.] Its safety is so well documented that it is now even being suggested as a safe out-patients procedure.[13] Large series document a reduced incidence of port site infection and other wound-related complications following laparoscopic surgery.[14]

In this study we found the frequency of port site infection in LC to be 5.07%. Our results are comparable with many other studies. Den Hoed PT etal in 1998 found the incidence of port site infection to be 5.3%[15] while it was found to be as high at 6.3% by Shindholimath VV et al[16]. There are other studies that show the incidence to be much lower than these figures. An Israeli study conducted in 1997 shows this incidence to be

OPERATIVE FINDINGS IN CASES OF LAPAROSCOPIC CHOLECYSTECTOMY WITH PORT-SITE INFECTION

Operative Finding	Frequency (n=17)	% age
Acute Cholecystitis	7	41.1%
Empyema	4	23.5%
Adhesions	3	17.6%
Mucocele Gall Bladder	2	11.7%
Thick walled Gall Bladder	1	5.88%

Table 3

2.3%.[17] A national study published in 2006 shows the incidence to be 2% in comparison to 6% in open cholecystectomy.[18] In a prospective study done by Colizza et al in 2004 the incidence of infection was found to be < 2%.[19] In a recent national study an incidence of 2.23% has been reported.[20] One of the reasons that can explain the incidence to be higher in comparison to other studies probably is that we are re-using disposable ports after sterilization since the cost of new ports for each case is not affordable by both the patient and the hospital.

We administered antibiotics to all patients at the time of induction and then two doses subsequently but the role of antibiotic prophylaxis in LC is still controversial in literature. While its use has been regarded as one of the most significant predictor of wound infection and has been encouraged by some studies, there are others that regard its use being questionable.[15,16, 21, 22]

Out of the 17 cases of port-site infection in 70.5% it was superficial, involving only the skin and subcutaneous tissues while it involved the deeper fascia and muscle layers in 29.4%. The finding that superficial skin infection is far more common than deeper ones has also been appreciated by a study published from the Centers for Disease Control and Prevention, Atlanta, Georgia in 2003.[23] Various factors can be involved in the direct contamination of the port site and thus leading to infection. We did not get any cases of chronic discharging sinuses.

We were able to see a significant relationship between the duration of surgery and the frequency of port site infection. Of the 17 total infected, 14 (82.3 %) were the one in whom surgery lasted for longer than 1 hour. The literature shows that with the duration of above 2 hours, the risk of SSI increases.[24] We however kept our time range to be less than or 1 hr and more than 1 hour. Duration of operation longer than one hour of operation and in acute condition have also been found to be statistically significant risk factors for wound infection.[25]

Acute cholecystitis was the most common operative finding that we came across on reviewing the cases with port-site infection i.e. 7 (41.1%) out of 17, second being empyema that was seen in 4 (23.5%) patients. 3 (17.6%) patients had bad adhesions, while mucocele and thick walled gall bladder with stones was found in 2 (11.6%) and 1 (5.8%) patients respectively. Acute cholecystitis as a risk factor for SSI has been recognized by other workers as well.[26] Tocchi et al have also reported higher incidence of port-site infection in cases of acute cholecystitis[27]. Similarly, wound infection was found to be three times more common in acute cholecystitis/ empyema gall bladder in both open and laparoscopic cholecystectomy in a national study where no wound infection was seen in cases of chronic cholecystitis. The operative findings are related to the wound sepsis not only directly by contamination but also by modifying duration of intervention.

Although in literature there has been great consideration of the increased frequency of umbilical port infection and the role of umbilical flora in the development of port site, we in contrast found the epigastric port which was the site of gall bladder extraction to be the most commonly infected.[19,27] The direct relationship of bactibilia and bile cultures has been studied in relationship to port-site infection by many workers. Hamzaoglu I et al[28] in their study conducted in 2004 rejected both the flora and the bile to be the source of SSI. Similarly infective complications were not found to correlate with the presence of bacteria in the bile or gallbladder wall by Al-Abassi AA.[29] Contrary to these workers bactibilia has been regarded as a significant predictor of wound infection in other studies where positive cultures have been shown to be related with infective complications.[16,30] Based on our experience we have found that the trocar site of gall-bladder extraction is more commonly infected. Furthermore with the use prophylactic antibiotics the removal of gall bladder may be attempted from the umbilical port and in case of wound soiling it should be left open.

We were unable to study various patients characteristics considered as potential risk factors for SSI in literature including age, gender, BMI and ASA score because of the reason that laparoscopic cholecystectomy although being frequently done yet is still only being offered to a limited number of patients who are considered most feasible for this procedure. The patients that we selected were younger, less likely to be male and less likely to have an ASA score of 3 or more and the surgery had always been elective.

We recommend that LC should be offered to a wider variety of patients, of both genders and all age groups so that wider data is available to study the various patient factors involved. In cases where there is obvious spillage and contamination or the trocar site with bile, the wounds should be left open rather than closing the wound.

CONCLUSIONS

Laparoscopic cholecystectomy is associated with a low risk of port-site infection which in most the cases is only superficial responding to local measures. It is most of commonly the trocar site of gallbladder extraction that is infected. Longer duration of surgery and acute cholecystitis may have a bearing on port-site infection.

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