

OCCURRENCES OF WOUND INFECTION IN LAPAROSCOPIC VERSUS OPEN CHOLECYSTECTOMY — A COMPARATIVE STUDY

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ABSTRACT

Background: This pieces of work was an experimental study with the aim to compare the occurrences of wound infection in laparoscopic as well as in open cholecystectomy.

Material & Methods: In this study 200 patients were taken who had undergone elective cholecystectomy for symptomatic gallstones. These 200 patients were divided in the two groups each of 100 patients by simple random technique. The first group of 100 patients was operated by OC while the second group of 100 patients by LC. The patients were then followed up for four to five weeks in order to pick up signs of wound infection. During the observation period of these weeks, infection cases, the degree of infection and the remedial measures were done and documented while the results were analyzed by using the percentage statistics.

Results: In first group which was operated through OC had four cases of wound infection which is 4% of the total 100 patients and out of these, two were of class-II and two of class-III wound infection respectively while there were only two cases of Class- II wound infection in case of patients operated through LC which is 2% of the total 100 patients in this group.

Conclusion: In both LC and OC groups there was no wound infection in cases of chronic cholecystitis, the frequency of occurrence of wound infection was three times as common in OC as compared to LC in acute cholecystitis / empyema.

KEY WORDS: Chronic cholecystitis; Technique; Laparoscopic; Symptomatic gallstones.

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INTRODUCTION

Gall bladder disease is one of the most common problems affecting the digestive tract.¹ The occurrence of gall stone is connected to many factors. Gall stones are one of the major causes of morbidity in the society. Cholecystectomy is one of the most recurrently performed operations.² At the end of 1980 open cholecystectomy was the gold standard management for the stones in the gall bladder. Actually laparoscopic cholecystectomy was introduced in 1985 and swiftly become the method

of preference for surgical removal of gall bladder. No other surgical procedure has had such a dramatic and essential impact on abdominal surgery as LC.³ Since its introduction LC is well thought-out as the gold standard operation for symptomatic cholelithiasis. But in the last two decades laparoscopic cholecystectomy (LC) has challenged its position.⁴ Although both LC and OC procedures are quite well tolerated, wound infection remains the commonest postoperative complication which not only prolongs the hospital stay of the patient, increases cost of treatment but can also lead to septicemia and long term complications like incisional hernia. Therefore in order to decrease the morbidity and mortality of the postoperative patients new surgical innovations must be explored and developed.⁵

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The indications of LC are same as that of for OC. The compensation to the patients in terms of pain stay in the hospital, revival time, costs and aesthetic results are substantial.⁶ With escalating reputation of LC the surgical community became worried about increase in complications that were even more marked with less surgical experience and training. The effect of laparoscopic surgery on wound infection has not been addressed in the field of surgical literature although it has the prospective to decrease the occurrence of infectious complications^{6,7} and modify their characteristics certain aspects of laparoscopic surgery that may reduce the occurrence of surgical infections includes a minimal impact on immune system, minimal exposure to external environment, carbon dioxide pneumoperitoneum, better hallucination of tissues for dissection and hemostasis.⁸ The re-utilizable LC instruments on the other hand increase the danger of infection.⁹ We had the intension to address the impact of all these factors that causing infectious complications by comparing the frequency of wound infection between OC and LC. Our results will also put forward measures to perk up the said facet of patient trouble.

MATERIAL AND METHODS

This study was conducted in surgical department of multiple hospitals and compares the results, Civil Hospital Naushahro Feroze, JPMC and Dow University Hospital, OJHA Campus, Karachi, from March 2014 to Feb 2015. The patients with symptomatic gallstones having age group from 21 to 80 years were admitted. These patients were admitted in the ward both from emergency and outpatient department. We have taken 200 patients after the following investigations were completed in order to establish the diagnosis; serum bilirubin, abdominal ultrasound, alanine aminotransferase (ALT), alkaline phosphatase, aspartate aminotransferase (AST). Patients were diagnosed and prepared for surgery because all of them were fit for general anesthesia. These two hundreds patients were randomly divided into two groups who were undergone elective cholecystectomy and were studied in such a way that 100 were operated through each procedure of LC and OC respectively. The patient’s profile was maintained in the performa and patients found suffering from jaundice, pregnancy, coagulopathy, choledocholithiasis, portal hypertension, diabetes mellitus or any other immunosuppressive disorder were excluded from the study. The patients allocated to both groups had more or less similar clinical features. The operations of the patients under study were performed by consultant surgeons and senior residents under their direct supervision who have sufficient skill and experience in both LC and OC procedures. After the operation all the patients were followed for four to five weeks and complications particularly wound

infection, jaundice, biloma formation, intra-abdominal abscess and port site hernia were the targets remained under consideration.

RESULTS

In our study we have taken 200 patients, out of these 100 were operated through the procedure of LC and 100 were operated through OC. Both the groups were analogous in age and sex distribution as well as percentage of difficult cases like acute cholecystitis, empyema and mucocele. The age groups of population under study were from 21 to 80 and most of the patients were in age group between 30 to 40 years as shown in Table 2. For LC procedure the mean age was 46.59+16.18 years and for OC, it was 44.51+14.33 years. Similarly male to female ratio in case of LC was 1:7.3 and this ratio for OC was 1:5. The commonest appearance was chronic cholecystitis in both groups. As it is shown in Table 3 that 52 patients (52%) in laparoscopic and 44 patients (44%) in OC group. The hospital stay for LC was 1-3 days and for OC 4-6 days. We found no

Table 1: Wound infection classification and their possible treatments.

Class-I	No infection	No treatment
Class-II	Skin infection, Superficial sub-cutaneous tissue infection	Amputation of stitches/wound dressing
Class-III	Skin, Superficial Subcutaneous tissue infection needed antibiotics while long hospital stay of the patients	Amputation of stitches/ drain age of pus and secretions/oral administration of antibiotics/C&S of discharge.
Class-IV	Extensive or systemic infection.	Hospitalization and intravenous antibiotics

Table 2: Age distribution of laparoscopic cholecystectomy (LC) & open cholecystectomy (OC) patients.

Age in years	Total No. of patients n=200	OC n=100	LC n=100
21-30	44	25(25%)	19(19%)
31-40	60	28(28%)	32(32%)
41-50	38	23(23%)	15(15%)
51-60	24	10(5%)	14(7%)
61-70	32	14(7%)	18(9%)
71-80	2	00(0%)	02(2%)

Table 3: Clinical presentation/appearance.

Clinical presentation	Laparoscopic Cholecystectomy n=100	Open Cholecystectomy n=100
Chronic Cholecystitis	52(52%)	44(44%)
Acute Cholecystitis	28(28%)	36(36%)
Empyema	13(13%)	15(15%)
Mucocele	07(07%)	05(05%)

Table 4: Following were the characteristics of patients developing wound infection in laparoscopic cholecystectomy (LC) & open cholecystectomy (OC)

S. No.	Group	Sex	Age years	Clinical presentation	Class of wound infections
1.	LC	F	42	Acute Cholecystitis	II
2.	LC	F	45	Empyema	II
3.	OC	M	50	Acute Cholecystitis	III
4.	OC	M	37	Acute Cholecystitis	II
5.	OC	F	51	Empyema	III
6.	OC	F	35	Empyema	II

wound infection in any case of chronic cholecystitis. In case of LC group there were only two of Class-II wound infection in the infra umbilical incision of a 42 and 45 years female suffering from empyema and acute cholecystitis respectively as shown in Table 4. The wound infections were resolved by dressings on OPD basis. In case of OC there were four cases of wound infection which makes 4% and among these, two were of class-II and two of Class-III infection as shown in Table 4. In both the cases Class-II infections were treated by wound dressings on OPD basis while class III wounds were treated by elimination of stitches, drainage of pus and through oral administration of antibiotics. In one of the case wound debridement was also necessary. The patient's characteristics are shown

in Table 4. In this group of population under study we have seen no case of extra hepatic biliary injury and no mortality.

DISCUSSION

Gall bladder should be removed not because it contains stones, but because it forms them.¹⁰ The objective of both laparoscopic and open techniques is to safely eliminate the gall bladder with low mortality, little morbidity and timely recovery.¹¹ There are so many facts of laparoscopic surgery that may manipulate surgical infection as for example affect on the immune system, influence of pneumoperitoneum and gas on peritoneal inflammatory response, use of antibiotic prophylaxis, pneumoperitoneum as a catalyst of infection, technical aspects related to sterilization of instruments etc.¹² Surgical intervention triggers a series of alterations in the immune system and therefore in the inflammatory response.¹³ It is fact that immune suppression taking place after trauma is associated to an increase in the frequency of septic complications.¹⁴ LC is a minimal invasive procedure where by gall bladder is removed using laparoscopic technique. It is currently conventional that the immune system is better preserved following laparoscopic than open surgery.¹⁵ This is confirmed by the diminished release of various markers including Interleukin (IL) 6 and C-reactive protein (CRP).¹⁶ With the increase in expertise and introduction of newer armamentarium, difficult gallbladders are being subsequently dealt with. However, before dealing with the difficult gallbladders, the skill of the surgeon, experience in laparoscopic techniques and thorough knowledge of risk factors are collectively important for a safe outcome.¹⁷ The decreased immune response results from a significantly smaller tissue injury have analyzed this topic thoroughly, describing the effect that laparoscopic surgery has on different components of the immune system, such as T-cell lymphocytes and delayed hypersensitivity, mononuclear phagocytic neutrophils, polymorphonuclear elastase and anion superoxide.¹⁸ All exhibit greater alterations following open surgery. Surgical infection primarily develops in the peritoneal cavity pneumoperitoneum directly affects the peritoneal defense system. An increased number and greater viability of peritoneal macrophages in carbon dioxide pneumoperitoneum has opposed to conventional open surgery¹⁹ while it is also found that the amount of cytokines and nitrous oxide released was less in the laparoscopy group shows the consequence of greater cellular stress during open surgery.²⁰ A decrease in phagocyte activity with open surgery in comparison to laparoscopy was found. As a result the peritoneal cell mechanisms display better preservation during laparoscopic than open surgery. This safeguarding of immune system is a main reason for a lower occurrence of wound infection.²¹ With the

advancement in equipment and gaining experiences in laparoscopy, most of the difficult gallbladder can be dealt laparoscopically. Preoperative risk factors can help to predict difficult gallbladder and conversion to OC.²² Male gender, single large stone, thick-walled gallbladder, previous abdominal surgery and contracted gallbladder are the factors that proved to be significant in surgery and postoperative wound infection.²³

CONCLUSION

Extensive postoperative care of both LC and OC patients should be exercised while the incidence of infection in LC group was restricted to empyema and acute cholecystitis so in these cases gallbladder must be extracted in a pouch and normal saline should be used for irrigation of wound. Avoid unnecessary treatment at the infra umbilical port during gall bladder extraction by enlarging the incision to deliver edematous gall bladder. Prophylactic antibiotic must be given to both the patients regardless operated through the procedure of LC or OC especially in cases of chronic cholelithiasis.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.