



To Determine the Frequency of Diabetics and Compare the Frequency of Port Site Infection in Diabetic Versus Non-Diabetics in Patients Undergoing Laparoscopic Cholecystectomy

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Abstract

Introduction: Port site infection (PSI) is always a concern for the affected. PSI can result in increase in the morbidity, hospital stay and financial loss to the patient. There are certain risk factors that can result in this infection risk and include Diabetes Mellitus (DM), immunocompromised states such as end stage renal or liver disease, immune suppressive drugs and the burden of the infected collection in the abdomen needing surgery.

Objectives: To determine the frequency of diabetics in patients undergoing laparoscopic cholecystectomy and to compare the frequency of port site infection in diabetic versus non-diabetics undergoing laparoscopic Cholecystectomy.

Study design: Descriptive, case series study.

Setting: Department of General Surgery, National Hospital & Medical Centre (NHMC), Lahore.

Study duration: 14th April 2020 to 13th October 2020.

Materials and Methods: A total of 140 cases undergoing laparoscopic cholecystectomy and of ages 20-70 year old were included. Patients with malignancies, sepsis and end stage renal failure were excluded. All patients were optimized before surgery. Then these cases were divided into two equal groups by determining the frequency of DM. All cases were undergone laparoscopic cholecystectomy by a consultant surgeon with at least 1 year or more post fellow ship experience. Then these cases were assessed daily till discharge and were followed up at day 7 and 14.

Results: Age range in this study was from 20 to 70 years with mean age of 41.56 ± 9.11 years. Majority of the patients 95 (67.86%) were between 20 to 45 years of age. Out of 140 patients, 110 (78.57%) were female and 30 (21.43%) were males with male to female ratio 3.7:1. In our study, frequency of diabetics in patients undergoing laparoscopic cholecystectomy was found in 24 (17.14%) patients. Frequency of port site infection in diabetic patients was found in 08 (33.33%) patients versus in 05 (4.31%) non-diabetics undergoing laparoscopic Cholecystectomy.

Conclusion: This study concluded that frequency of diabetics in patients undergoing laparoscopic cholecystectomy was found to be 17.14% with frequency of port site infection in diabetic is significantly high than non-diabetics.

Keywords: Laparoscopic Cholecystectomy; Diabetics; Port Site Infection

Introduction

Rapid growths in health care technology have given the surgeon the power of not only treating diseases surgically but also limiting surgical invasiveness. The greatest example is minimal access surgery (MAS) also commonly termed laparoscopic surgery (LS) or keyhole surgery, which has caused a paradigm shift in the approach to modern surgery, by limiting the access related morbidities [1,2].

LS involves the use of reusable metallic or disposable plastic trocars that are introduced from the portal of entry to and a number of surgical procedures can be carried out by avoiding large incisions and still having the direct and the better view of the surgical fields. The commonly performed surgeries include appendectomy, herniorrhaphy, colonic surgery, gastric surgery, urological and gynecological surgery [2,3]. LS, however, is not spare of complications. These include pain and surgical site infection associated with access while others are associated with insufflation of the introduced gas and its various pressures [4,5].

Gallstones are a commonly pathology occurring due to deposition of bile especially cholesterol in the gall bladder. Age more than 40-year, female gender, weight gain, obesity and pregnancy are associated with increased risk of gall stones. It has been estimated that up to 20% of the population may have gallstones however only 1/3 of these develop symptoms. Laparoscopic cholecystectomy is usually performed for symptomatic gallstones and it has become one of the most commonly performed elective procedures [6].

Diabetics is a common condition. Almost 10% of the world population is believed to suffer from it. It has association with both increased weight and gall stone formation as well is an independent risk factor for SSIs for multiple surgical procedure types [7].

Port site infection (PSI) is always a concern. PSI can result in increase in the morbidity, hospital stay and financial loss to the patient. There are certain risk factors that can result in this infection risk and include Diabetes Mellitus (DM), immunocompromised states like end stage renal or liver disease, immune suppressive drugs and the burden of the infected collection in the abdomen needing surgery [8,9].

Incidence of PSI after elective laparoscopic surgeries is low and has been documented between 1.4%- 6.7%. Few studies have evaluated the incidence in diabetic and non-diabetic patients. According to a study done by Ismat, *et al.* infection was seen in 7 (11.67%) cases with DM and 4 (6.67%) out of 60 cases each with no DM undergoing laparoscopic cholecystectomy [6]. In another study done by Nakamura, *et al.* for laparoscopic colon surgery the infection was seen in 9.3% cases with DM and 3.4 % with no DM [7].

In today's world elective surgeries are usually performed after optimization of the co-morbidities of the patients. Although diabetes is believed to be associated with SSIs, most of these studies didn't involve laparoscopic cases. Only a few studies have evaluated the role of effect of diabetics on post-operative surgical site infection in patients undergoing laparoscopic surgery. Hence, this study was planned to see the outcome in the form of port site infection in cases of laparoscopic cholecystectomy to see the infection rate in cases of DM vs no DM.

Objectives

Objectives and operational definitions

The objective of the study was

- "To determine the frequency of diabetics in patients undergoing laparoscopic cholecystectomy.
- To compare the frequency of port site infection in diabetic versus non-diabetics undergoing laparoscopic Cholecystectomy."

Operational definitions

Port Site Infection (PSI)

It was labelled as yes where any one of these are present within 2 weeks of surgery with

- Fever 100 F or more
- Redness at the site of surgery
- Discharge from the wound
- WBC count more than 11,000 mm³

Diabetes mellitus

The cases with documented history of DM for at least 1 year or more on treatment were included.

Materials and Methods

Study design

Descriptive, case series study.

Setting

Department of General Surgery, National Hospital & Medical Centre (NHMC), Lahore.

Duration of study

14th April 2020 to 13th October 2020.

Sample size

Frequency of DM in patients undergoing laparoscopic cholecystectomy = 10% [7].

Confidence interval = 95%, 5% margin of error.

Sample size was 140 patients.

Sample technique

Non-probability, consecutive sampling.

Sample selection

Inclusion Criteria

- Both genders
- Age 20 to 70 years
- The cases undergoing laparoscopic cholecystectomy at NHMC Lahore for chronic cholelithiasis diagnosed as having pain in right hypochondrium, on and off vomiting and evidence of gallstones on USG.

Exclusion Criteria

- The cases in documented sepsis (assessed by history of fever and medical record).
- The cases malignancy (assessed by history and medical record).
- The documented cases of end stage renal failure.

Data collection procedure

After the acceptance of the synopsis, approval was taken from local ethical review committee of the hospital. The subjects were enrolled according to the inclusion criteria. A written consent was taken to collect the data and detailed clinical

examination was done. All patients were optimized before surgery. Then these cases were divided into two equal groups by determining the frequency of DM. All cases were undergone laparoscopic cholecystectomy by a consultant surgeon with at least 1 year or more post fellow ship experience. Then these cases were assessed daily till discharge and were followed up at day 7 and 14. They were assessed regarding Port site infection as per operational definition. All these results were collected and recorded on the same proforma.

Data analysis procedure

The data was entered and analyzed by using SPSS version 23.0. Quantitative variables like age, BMI and duration of surgery were presented as mean and standard deviation while frequency and percentages were calculated for gender and outcome i.e., DM, port site infection detected as yes or no. Both the groups were compared by using chi square test.

Effect modifiers were also controlled through stratification of gender, age, BMI and duration of surgery to see their effect on outcome variables and post-stratification chi square test was applied and p value equal or less than 0.05 was taken as significant.

Results

Age range in this study was from 20 to 70 years with mean age of 41.56 ± 9.11 years. Majority of the patients 95 (67.86%) were between 20 to 45 years of age as shown in table 1.

Out of 140 patients, 110 (78.57%) were female and 30 (21.43%) were males with male to female ratio 3.7:1 as shown in figure. Mean BMI was 27.49 ± 3.02 kg/m² (Table 2). Mean duration of surgery was 30.82 ± 5.58 minutes (Table 3).

In our study, frequency of diabetics in patients undergoing laparoscopic cholecystectomy was found in 24 (17.14%) patients (Figure 2). Frequency of port site infection in diabetic patients was found in 08 (33.33%) patients versus in 05 (4.31%) non-diabetics undergoing laparoscopic Cholecystectomy (Table 4).

Stratification of DM with respect to age and gender is shown in Table 5,6 respectively. Stratification of DM with respect to BMI and duration of surgery is shown in Table VII & VIII respectively.

| Age (in years) | No. of Patients | %age |
|----------------|-----------------|-------|
| 20-45 | 95 | 67.86 |
| 46-70 | 45 | 32.14 |
| Total | 140 | 100.0 |

Table 1: Distribution of patients according to Age (n = 140).
Mean ± SD = 41.56 ± 9.11 years.

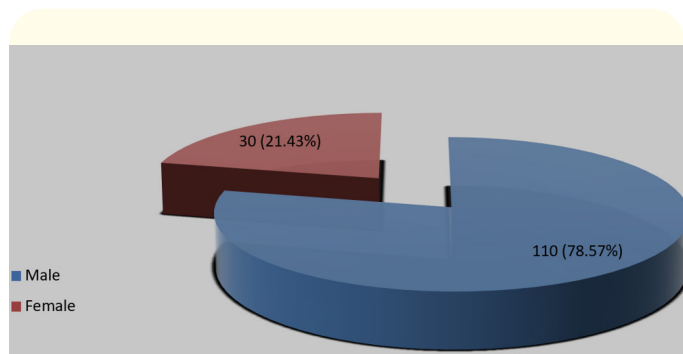


Figure 1: Distribution of patients according to gender (n = 140).

| BMI (in kg/m ²) | No. of Patients | %age |
|-----------------------------|-----------------|-------|
| <27 | 72 | 51.43 |
| ≥27 | 68 | 48.57 |

Table 2: Distribution of patients according to BMI (n = 140).

| Duration (min) | No. of Patients | %age |
|----------------|-----------------|-------|
| ≤30 | 64 | 45.71 |
| >30 | 76 | 54.29 |
| Total | 140 | 100.0 |

Table 3: Distribution of patients according to duration of surgery (n = 140).
Mean ± SD = 30.82 ± 5.58 minutes

| DM | port site infection | | p-value |
|-----|---------------------|--------------|---------|
| | Yes | No | |
| Yes | 08 (33.33%) | 16 (66.67%) | 0.0001 |
| No | 05 (4.31%) | 111 (95.69%) | |

Table 4: Comparison of the frequency of port site infection in diabetic versus non-diabetics undergoing laparoscopic Cholecystectomy.

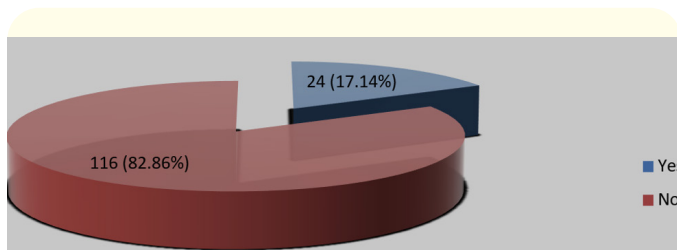


Figure 2: Frequency of diabetics in patients undergoing laparoscopic cholecystectomy (n = 140).

| DM | port site infection | | p-value |
|-----|---------------------|--------------|---------|
| | Yes | No | |
| Yes | 08 (33.33%) | 16 (66.67%) | 0.0001 |
| No | 05 (4.31%) | 111 (95.69%) | |

Table 4: Comparison of the frequency of port site infection in diabetic versus non-diabetics undergoing laparoscopic Cholecystectomy.

| Age (years) | DM | | p-value |
|-------------|-------------|-------------|---------|
| | Yes | No | |
| 20-45 | 19 (20.0%) | 76 (80.0%) | 0.193 |
| 46-70 | 05 (11.11%) | 40 (88.89%) | |

Table 5: Stratification of DM with respect to age groups.

| Gender | DM | | p-value |
|--------|-------------|-------------|---------|
| | Yes | No | |
| Male | 04 (13.33%) | 26 (86.67%) | 0.532 |
| Female | 20 (18.18%) | 90 (81.82%) | |

Table 6: Stratification of DM with respect to gender.

| BMI (kg/m ²) | DM | | p-value |
|--------------------------|-------------|-------------|---------|
| | Yes | No | |
| ≤27 | 19 (26.39%) | 53 (73.61%) | 0.003 |
| >27 | 05 (7.35%) | 63 (92.65%) | |

Table 7: Stratification of DM with respect to BMI.

| Duration of surgery (min) | DM | | p-value |
|---------------------------|-------------|-------------|---------|
| | Yes | No | |
| ≤30 | 14 (21.88%) | 50 (78.12%) | 0.173 |
| >30 | 10 (13.16%) | 66 (86.84%) | |

Table 8: Stratification of DM with respect to duration of surgery.

Discussion

Laparoscopic surgery, also called minimally invasive surgery, was first introduced in the 18th century, and thereafter became the preferred surgical procedure for multiple surgeries. Laparoscopic cholecystectomy is now a preferred option for patients with symptoms of gallstones. Its benefits include reduced hospital stay after surgery, early return to work, reduced postoperative pain, less surgical evaluation and better outcomes for cosmetic and minor postoperative complications. Therefore, it not only replaces open cholecystectomy but also almost endless attempts to control the insufficiency of gallstones, extracorporeal shock wave, and treatment of bile salts. Often, many surgical procedures can end in complications. One of these problems is surgical site infection (SSI). The infection may be internal and/or external as the human body allows survival of a variety of insects that may be infected as a result of surgical intervention. Bacterial strains of a patient may be invasive and cause infection in special circumstances. This may occur in both open and partial surgery on a single laparoscopic. It is true that laparoscopic cholecystectomy associated with a few SSIs is more open than cholecystectomy. In cholecystectomy, there is an increasing number of port base infections, although they do occur frequently, but they have a major impact on the overall effects of laparoscopic cholecystectomy and its end effects such as delayed return to work, increased costs and adverse cosmetic side effects.

I have conducted this study to determine the frequency of diabetics in patients undergoing laparoscopic cholecystectomy and to compare the frequency of port site infection in diabetic versus non-diabetics undergoing laparoscopic Cholecystectomy. In our study, frequency of diabetics in patients undergoing laparoscopic cholecystectomy was found in 24 (17.14%) patients. Frequency of port site infection in diabetic patients was found in 08 (33.33%) patients versus in

05 (4.31%) non-diabetics undergoing laparoscopic Cholecystectomy. According to a study done by Ismat., *et al.* infection was seen in 7 (11.67%) cases with DM and 4 (6.67%) out of 60 cases each with no DM undergoing laparoscopic cholecystectomy.⁶ In another study done by Nakamura., *et al.* for laparoscopic colon surgery the infection was seen in 9.3% cases with DM and 3.4 % with no DM [7].

Akram., *et al.* in 2009 reported the SSI rate in diabetic patients undergoing laparoscopic cholecystectomy to be 14.29% involving the procedure in local setup. Similarly, in the prospective study comprising 986 patients, Al-Mulhim in 2010 documented that there was no significant difference in the outcome of diabetic and non-diabetic patients undergoing laparoscopic surgery. Al Mulhim., *et al.* in his study found no significant association of complication with diabetes mellitus, as only 8.70% diabetics in comparison to 8.77% in non-diabetics developed complication.

A systematic review published in 2009 included only five studies and aimed to verify the relationship between glycaemic control and the incidence of surgical site infections, mortality and length of hospital stay. It found a lack of evidence, demonstrating that glycaemic control is sufficient for the prevention of SSIs, especially given the poor sampling of included studies and inconsistencies in the definitions of outcomes and methodological quality.

Mean age of the patients was 41.56 ± 9.11 years. Out of 90 patients of gallstone, port site infections were found in 13 (9.29%) patients. Two age groups (20-45 years and 46-70 years) created. A total of 95 (67.86%) patients were between 20-45 years while 45 (32.14%) patients were between 46-70 years. Association of port site infection with age group was not significant. 110 (78.57%) were female and 30 (21.43%) were males with male to female ratio 3.7:1. Association of port site infection with gender was not significant. In study of Alam., *et al.* total 108 Cholecystectomies were performed (16 males and 92 females), port site infection was developed in 12 (11%) patients (1 male and 11 females). Age range was 20-75 years. Most of the patients belonged to 3rd decade. In another study by Al-Naser., *et al.* rate of port site infections after laparoscopic cholecystectomy was 4.5% of which most of the patients were males.

A study by Taj, *et al.* conducted in Islamabad, total 492 patients underwent laparoscopic cholecystectomy, total 5.48% patients found with port site infection. In study by Usman, *et al.* total 200 patients were operated, of which 17% males and 83% females. Total of 6% patients were found with port site infection of which, 33.33% males and 66.66% females were infected. Shindholimath, *et al.* reported incidence of port site infection as 6.3% while Den Hoed, *et al.* and Jan, *et al.* reported as 5.78% and 5.07% respectively in their studies. In one study by Rehman, *et al.*, Sport site infection was found in 5.5% patients after performing Cholecystectomy. In another study by Mir, *et al.*, frequency of port site infection was 6.7%. Similarly an Indian study reported frequency of port site infection after laparoscopic cholecystectomy as 6.4%.

Conclusion

This study concluded that the frequency of diabetics in patients undergoing laparoscopic cholecystectomy was found to be 17.14% with frequency of port site infection in diabetic is significantly high than non-diabetics. So, we recommend that special care should be taken in diabetics in order to decrease wound infection.

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