

Surgical Site Infection in Diabetic and Non-Diabetic Patients Undergoing Laparoscopic Cholecystectomy

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ABSTRACT

Objective: To compare the frequency of surgical site infections in patients with type II diabetes undergoing laparoscopic cholecystectomy as compared with non-diabetic patients.

Study Design: Cohort study.

Place and Duration of Study: Surgical Unit 2, Services Hospital, Lahore, from May to October 2012.

Methodology: Patients were divided into two groups of 60 each, undergoing laparoscopic cholecystectomy. Group A comprised non-diabetic patients and group B comprised type II diabetic patients. Patients were followed postoperatively upto one month for the development of SSIs. Proportion of patients with surgical site infections or otherwise was compared between the groups using chi-square test with significance of $p < 0.05$.

Results: In group A, 35 patients were above the age of 40 years. In group B, 38 patients were above the age of 40 years. Four patients in group A developed a surgical site infection. Seven patients in group B developed SSIs ($p = 0.07$).

Conclusion: Presence of diabetes mellitus did not significantly affect the onset of surgical site infection in patients undergoing laparoscopic cholecystectomy.

Key Words: Cholelithiasis. Diabetes. Laparoscopic cholecystectomy. Surgical site infection.

INTRODUCTION

Laparoscopic cholecystectomy is the gold standard for the treatment of gallbladder disease.¹ Laparoscopic cholecystectomy has reduced the postoperative pain significantly and thus allows a shorter hospital stay and recovery period, which is reflected in patient's earlier return to normal life and work activities.² Laparoscopic surgery carries definite advantages over open surgery in healthy individuals.¹

Poorly controlled type II diabetes is associated with an array of micro-vascular, macro-vascular, and neuropathic complications. Diabetes mellitus is most common due to autoimmune type (Type 1) or adult-onset diabetes (Type 2). Prevalence of diabetes in the Indian subcontinent is estimated to be 12%.³

Diabetes has been associated with a significantly increased rate of wound infection following open surgical procedures. It is also thought to be one of the risk factors of conversion to open laparoscopic procedure and believed to be associated with increased morbidity as compared to non-diabetic patients undergoing the same procedure.⁴ Diabetes is one of the factors that increases a surgical patient's risk for postoperative infection.⁵

Since the size of incision, the operative time, the duration of anesthesia, the tissue handling and dissection, the hospital stay and the period of immobility following laparoscopic surgery is greatly reduced, would suggest that the infection rate in diabetic patients undergoing laparoscopic surgery would be greatly reduced. However, few studies have investigated the outcome of laparoscopic cholecystectomy in diabetic patients as compared to non-diabetics. Majority of previous studies are retrospective observational studies with conflicting results.

In this study, the authors intended to prospectively compare the frequency of surgical site infection after laparoscopic cholecystectomy in type-II diabetic patients with non-diabetic healthy patients to determine if diabetes adds morbidity in patients undergoing laparoscopic cholecystectomy and hence evaluate the safety and efficacy of laparoscopic cholecystectomy in diabetic patients.

METHODOLOGY

A cohort study was conducted at Department of General Surgery, Services Hospital, Lahore, from May to October 2012. A sample size of 120 cases (60 in each group) was calculated with 80% power of test, 5% level of significance and taking expected percentage of infection in both groups, i.e. 14.29% in cases group versus 1.7% in control group, in patients undergoing laparoscopic cholecystectomy.

Inclusion criteria were all consenting patients, above 18 years of age, both male and female, who presented with symptomatic gallstones and were either non-diabetics

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patients who were in physical status category 1 American Society of Anesthesiologist (ASA) or diabetic patients diagnosed as type II diabetic, in physical status category 2, according to World Health Organization (WHO) American Society of Anesthesiologist (ASA). Exclusion criteria were any patients with history of any previous abdominal surgery, any contraindication to general anesthesia, history of recent attack of acute cholecystitis within past 3 weeks or co-morbidities other than diabetes.

After an approval for study from the hospital ethical committee, all patients fulfilling the inclusion criteria were admitted through the outpatient department. Informed consent was taken from each patient for inclusion in the study and the surgical procedure. Two groups (A and B) were made. Group A included non-diabetic patients. Group B included diabetic patients.

Diabetic patients had strict blood glycemic control prior to surgery with fasting blood sugar level on the day of operation < 126 mg/dl. All cases included were operated by consultant surgeons in general anesthesia under strict aseptic conditions. A single prophylactic dose of Cefuroxime 750 mg intravenous was given to all patients at the time of induction. Moreover, all patients were given three doses of intravenous antibiotic Cefuroxime 750 mg postoperatively.

Surgical Site Infection (SSI) was defined as any quantity of discharge or pus along the track of surgical procedure that discharges either spontaneously or would require a secondary procedure to drain it and is associated with either erythema, edema, pain and/or fever. Superficial surgical site infection was defined as the infection of superficial surgical wound while deep surgical site infection was defined as infection in musculo-fascial layers. Intra abdominal collection was defined as collection of any infective material in the abdominal cavity associated with symptoms and documented clinically or on ultrasonography within one month of the procedure.

Postoperative infection (during hospital stay, at 1 and 4 weeks) was recorded and compared in both groups of patients.

Data was recorded, collected, organized and analyzed according to prescribed proforma. Statistical analysis for p-values of numerical data was done using SPSS version 10. Numerical variables, i.e. age, were calculated as mean \pm SD. Frequencies and percentages were used for categorical variables, i.e. wound infection. Qualitative variables, like wound infection, were compared by applying chi-square test. P-value \leq 0.05 was taken as significant.

RESULTS

One hundred and twenty patients were divided equally into two groups, group A and group B. with there being

60 patients in each group. Group A included 60 non-diabetic patients. Group B included 60 diabetic patients. Of the 120 patients, 99 (82.5%) were females and 21 (17.5%) were males. Among group A patients, 51 (85%) were female, whereas the remaining 9 (15%) were males. Among group B patients, 48 (80%) were females while 12 (20%) were males. Among group A patients 35 (58.33%) were over the age of 40 years and 25 (41.66%) were below the age of 40 years. Among group B patients, 38 (63.33%) were over the age of 40 years and 22 (36.66%) were below the age of 40 years.

Of the 60 non-diabetic patients included in group A, 3 patients (5%) developed SSSI while their stay in the hospital, whereas 1 patient (1.67%) had developed DSSI which was detected at follow-up one week later. No patient in group A developed Intra Abdominal Collection (IAC) during the course of study. Of the 60 diabetic patients included in group B, 4 patients (6.67%) developed SSSI while their stay in the hospital, whereas 2 patients (3.33%) had developed DSSI which was detected at follow-up one week later. One patient in group B developed IAC which was drained under guidance of ultrasonography and he was put on antibiotics. The patient had an uneventful recovery after that.

Thus, a total of 4 (6.67%) patients in the group A (non-diabetics) developed SSI compared to 7 (11.67%) patients in group B ($p=0.07$).

DISCUSSION

Wound infection has been stated to be higher in diabetic patients. A number of studies involving various surgical procedures have been documented that postoperative complications in diabetic patients are higher as compared to non-diabetic patients.⁶⁻⁸ This is believed to be due to impaired immunity.⁹⁻¹² Most of the trauma of an open procedure is inflicted because the surgeons have a wound large enough to give adequate exposure for safe dissection at the target site. The wound is often the cause of morbidity. With regards to open cholecystectomy, it has been documented that SSI is higher in diabetic patients as compared to non-diabetic patients.¹³

Laparoscopic cholecystectomy offers remarkable advantage of minimal surgical trauma.¹⁴ In comparison to open surgery, laparoscopic surgery has been shown to reduce postoperative wound infection in general patients.¹⁵ Considering the smaller size of incision and the lesser trauma inflicted due to less tissue handling, it is expected that laparoscopic surgery should have no significant additional morbidity in diabetic patients when compared to non-diabetic patients.

SSI rate in diabetic patients in this study was 11.67% which is although more than that of non-diabetics (6.67%) but is not statistically significant. 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.¹⁶ Similarly, in the prospective study comprising 986 patients, Al-Mulhim in 2010 documented that there was no significant difference in the outcome in diabetic and non-diabetic patients undergoing laparoscopic surgery.¹⁷

Previously obtained results are mostly based on retrospective analysis. This study was prospective and sole variable surgical site infection. On the basis of the result of this study, the authors believe that the surgical site infection is not increased with laparoscopic approach in diabetic patients, unlike in open surgery where numerous studies have documented increased surgical site infection. Laparoscopy, therefore, provides a safer alternative to open surgery in diabetic patients undergoing gallbladder surgery.

CONCLUSION

It is concluded that although diabetic patients are at an increased risk of postoperative surgical site infection while undergoing open surgery, laparoscopic cholecystectomy has no increased morbidity in diabetic patients as compared to non-diabetic patients.

Disclosure: This is a dissertation based article.

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