

# Comparative Study of Surgical Site Infection in Clean Surgical Procedures between Diabetic and Non-Diabetic Patients

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## ABSTRACT

**Objective:** The objective of this study was to determine the frequency of surgical site infection in clean surgical procedures between diabetic and non-diabetic patients.

**Study Design:** Cohort study

**Place and Duration of Study:** This study was conducted at the Indoor Department of General Surgery, Nishtar Hospital Multan from 01-01-2016 to 02-07-2016

**Materials and Methods:** In this study, One hundred patients of either gender with 20-50 year of age who underwent the laparoscopic cholecystectomy procedure during the sampling period were included in this study. Fifty patients belong to diabetic group or exposed group (both type-I and II) and fifty patients belong to non-diabetic group or unexposed group. All cases included were operated by consultant surgeons under general anesthesia and strict aseptic conditions. A SSI case was distinguished utilizing CDC, USA definition, which expresses that "infection would be viewed as surgical site infection in the event that it happens inside 30 days after surgery and has any one of the accompanying: purulent discharge from the wound, agony or delicacy, confined swelling, redness, malodor, fever". Information with respect to SSI was recorded from both groups.

**Results:** Age range in this study was 20-50 years with mean age of  $33.860 \pm 5.49$  years in diabetic group and  $34.940 \pm 7.29$  years in non-diabetic group. Majority of patients according to age groups were belongs to 20-35 years in both groups and there was more females than males. Seven patients in diabetic group developed surgical site infection. Three patients in non-diabetic group developed SSIs ( $p = 0.182$ ) with relative risk of 2.33.

**Conclusion:** It is concluded that patients experiencing laparoscopic cholecystectomy has no increased risk of surgical site infection in diabetic patients when contrasted with non-diabetic patients..

**Key Words:** Diabetes, Cholecystectomy, Surgical Site Infection

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## INTRODUCTION

Diabetes mellitus is an expanding challenge now a days. About 33% of people with diabetes are unconscious that they have diabetes mellitus.<sup>1</sup> As the population keeps on aging, the predominance will keep on rising. Alarmingly, diabetes mellitus is being diagnosed all the more in more young patients.<sup>2</sup> The rising predominance of diabetes mellitus is a worldwide issue, and it is assessed that there will be 366 million individuals with diabetes mellitus worldwide by the year 2030.<sup>3</sup> The biggest increments will happen in developing countries over that time span.<sup>3</sup> Despite extensive research on best practices and walks in refining surgical methods, innovative advances and

natural enhancements in the operating room, and the utilization of prophylactic preoperative anti-infection agents, contamination at the surgical site remains the second most common adverse event occurring to hospitalized patients and a noteworthy source of morbidity taking after surgical procedures.<sup>4</sup>

Surgical site infection relies on various patient variables, including previous medical conditions, occupant skin bacteria, perioperative glucose levels, center body temperature vacillations, and preoperative, intraoperative and postoperative care. In this way, it is hard to anticipate which wounds will get to be infected.<sup>5</sup>

The relationship of diabetes mellitus with an expanded hazard for SSI has been perceived for a long time. Recently, as showed in the article by Latham et al in this issue, granulocyte capacities, including adherence, chemotaxis, phagocytosis, and bactericidal action, have been appeared to be influenced by hyperglycemia.<sup>6</sup> Others have demonstrated that enhanced glucose control accomplished with an insulin input in the perioperative period can diminish SSI rates in diabetic heart surgery patients when compare to controls.<sup>7</sup> Latham and hi associates tentatively accumulated hemoglobin A1c values on 1,000 diabetic and

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nondiabetic cardiac patients before coronary artery bypass. They affirmed the previously observed increase in SSI rates in diabetics.

They likewise found that 4.2% of the patients had undiscovered diabetes, and the disease rate in these patients was equivalent to the rate in analyzed diabetics. All the more strikingly, they showed that the most serious hazard for SSI associated with postoperative hyperglycemia (blood glucose levels more than 200 mg/dL) instead of with the level of hemoglobin A1c or with pre procedure hyperglycemia.<sup>6</sup>

The reason for this study was to determine the frequency of surgical site infection in clean surgical procedures between diabetic and non-diabetic patients

**MATERIALS AND METHODS**

One hundred patients of either gender and 20-50 year of age who underwent the laparoscopic cholecystectomy procedure during the sampling period were included in this study. Fifty patients belong to diabetic group or exposed group (both type-I and II) and fifty patients belong to non-diabetic group or unexposed group.

Patients with known or found sensitivity to silver or nylon and with history of hypertension were excluded. The determination of diabetes depended on if by lab test demonstrate a fasting plasma glucose level >126 mg/dl (> 7.0 mmol/l) at two occasions. Demographic details from every patient regarding age, gender and length of surgery were recorded.

All cases included were operated by consultant surgeons under general anesthesia and strict aseptic conditions. A solitary prophylactic dose of Cefuroxime 750 mg intravenous was given to all patients at the inclusion. In addition, all patients were given three doses of intravenous anti-microbial Cefuroxime 750 mg postoperatively.

A SSI case was distinguished utilizing CDC, USA definition, which expresses that infection would be viewed as surgical site infection, in the event that it happens inside 30 days after surgery and has any one of the accompanying: purulent discharge from the wound, agony or delicacy, confined swelling, redness, malodor, fever". Information with respect to SSI was recorded from both groups.

Data was analyzed with statistical analysis program (IBM-SPSS version 20). Frequency and percentage was computed for qualitative variables like age groups, gender and SSI. Mean ±SD was presented for quantitative variables like age and duration of procedure. Chi-square test was applied to compare SSI in both groups taken p ≤0.05 as significant. Relative risk was also calculated. Stratification was done with regard to age, gender and duration of procedure to see the effect of these variables on SSI. Post stratification using the chi-square test for both groups, p ≤0.05 was considered statistically significant.

**RESULTS**

Age range in this study was 20-50 years with mean age of 33.860 ± 6.49 years in diabetic group and 34.940 ± 7.29 years in non-diabetic group. Majority of patients according to age groups were belongs to 20-35 years in both groups and there was more females than males as shown in Table-I.

Seven patients in diabetic group developed surgical site infection. Three patients in non-diabetic group developed SSIs (p = 0.182) with relative risk of 2.33 as shown in Table-2.

Stratification of SSI with respect to age groups, gender and duration of procedure in diabetic and non-diabetic-group are shown in Table-3, 4 and 5 respectively.

**Table No.I: Demographics of both groups**

Demographics	Diabetic Group	Non-diabetic Group
Mean Age (years)	33.860±6.49	34.940±7.29
Mean Duration of procedure (hours)	1.70±0.77	1.600±0.67
Age groups		
20-35	34(68%)	26(52%)
36-50	16(32%)	24(48%)
Total	50(100%)	50(100%)
Gender		
Male	14(28%)	21(42%)
Female	36(72%)	29(58%)
Total	50(100%)	50(100%)

**Table No.2: Surgical Site Infection in both groups**

Skin Structure Infection	Diabetic Group	Non-diabetic Group	P Value	RR
Yes	7(14%)	3(6%)	0.182	2.3
No	43(86%)	47(94%)		
Total	50(100%)	50(100%)		

**Table No.3: Stratification of SSI with respect to age groups in diabetic and non-diabetic-group**

Age Group 20-35 years			
Skin Structure Infection	Yes	No	P Value
Diabetic Group	4(11.8%)	30(88.2%)	0.602
Non-diabetic Group	2(7.7%)	24(92.3%)	
Age Group 36-50 years			
Skin Structure Infection	Yes	No	P Value
Diabetic Group	3(18.8%)	13(81.2%)	0.132
Non-diabetic Group	1(4.2%)	23(95.8%)	

**Table No.4: Stratification of SSI with respect to gender in diabetic and non-diabetic-group**

Male			
Skin Structure Infection	Yes	No	P Value
Diabetic Group	4(28.6%)	10(71.4%)	0.143
Non-diabetic Group	2(9.5%)	19(90.5%)	
Female			
Skin Structure Infection	Yes	No	P Value
Diabetic Group	3(8.3%)	33(91.7%)	0.415
Non-diabetic Group	1(3.4%)	28(96.6%)	

**Table No.5: Stratification of SSI with respect to duration of procedure in diabetic and non-diabetic-group**

1-2 hours			
Skin Structure Infection	Yes	No	P Value
Diabetic Group	2(4.5%)	42(95.5%)	0.148
Non-diabetic Group	0(0%)	45(100%)	
> 2 hours			
Skin Structure Infection	Yes	No	P Value
Diabetic Group	5(83.3%)	1(16.7%)	0.386
Non-diabetic Group	3(60%)	2(40%)	

## DISCUSSION

Wound infection is a noteworthy intricacy in diabetic patients. This study demonstrates that diabetic patients are 2.3 times more prone to infection when contrasted with non-diabetics. Solangi et al. in 2004 reported that utilization of prophylactic antibiotic in every single clean technique ought to be avoided as they couldn't watch any impact of prophylactic anti-infection utilization and skin structure infection rates in clean methodology in diabetic patients.<sup>8</sup>

Laparoscopic cholecystectomy (LC) was firstly viewed as the highest quality level operation for gallstone disease in 1992, basically as a result of the preferences realized by the insignificantly obtrusive strategies it started to employ.<sup>9</sup> In contrast with open surgery, laparoscopic surgery has been appeared to lessen postoperative SSI in all patients.<sup>10</sup> Due to the littler size of cut and the lesser injury perpetrated because of less tissue involvement, it is conjectured that laparoscopic surgery ought to have no critical extra morbidity in diabetic patients.

SSI rate in diabetic patients in this study was 14% which is more than that of non-diabetics (6%) yet is not significant ( $p=0.182$ ). In a study it is accounted for the SSI rate in diabetic patients experiencing laparoscopic cholecystectomy to be 14.29% involving the operation

in local setup.<sup>11</sup> Similarly, in the another planned study involving 986 patients, recorded that there was no huge contrast in the result in diabetic and non-diabetic patients experiencing laparoscopic surgery.<sup>12</sup>

Previously research done on this topic were review analysis. This research was prospective and main variable was SSI. On the premise of the consequence of this study, we believe that the SSI is not expanded with laparoscopic approach in diabetic patients, not at all like in open surgery where various studies have reported expanded surgical site infection. It is important that every surgical patient be assessed preoperatively for undiscovered or potentially uncontrolled diabetes.

Patients confronting surgery ought to have fasting serum glucose (FSG) and Hemoglobin A1c (HbA1c) attracted to assess the pre-existing diabetes. Assuming either or both of these tests demonstrate uncontrolled as well as pre-existing diabetes (FSG>110 mg/dL or HbA1c>7%), then the patient ought to be set on a medical intervention to help in controlling serum glucose if executed and followed.<sup>13,14</sup>

## CONCLUSION

It is concluded that patients experiencing laparoscopic cholecystectomy has no expanded morbidity in diabetic patients when contrasted with non-diabetic patients. A persistent long haul observation framework ought to be built up to recognize more risk factors, alongside advancement of healing facility contamination control councils and officers who ought to take a gander at these everyday issues of disease and give essential rules in regards to wellbeing measures for decreasing SSI.

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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