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Comparison of Intraoperative Findings of Acute Cholecystitis in Diabetics Versus Non-Diabetics Patients Undergoing Elective Laparoscopic Cholecystectomy

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ABSTRACT

Background: Laparoscopic cholecystectomy is commonly used as a surgical technique for the removal of the gall bladder in patients affected by acute cholecystitis. The disease mostly involves an inflammatory reaction that has been attributed to the obstruction of the cystic duct by the presence of gallstones. In subjects who suffer from diabetes, the prolonged metabolic imbalance and immunocompromised status may be responsible for a severe inflammatory response that may result in fibrosis during the procedure. **Objective:** To determine and compare the frequency of intraoperative findings in diabetic and non-diabetic patients with acute cholecystitis undergoing elective laparoscopic cholecystectomy. **Study Design:** Cross-sectional comparative study. **Duration and Place of Study:** The study was done from August 2024 to January 2025 at the Department of Surgery Khyber Teaching Hospital Peshawar. **Methodology:** A total of 113 patients aged 18–80 years diagnosed with acute cholecystitis were included. Patients with common bile duct stones, pancreatitis, or malignancy were excluded. Intraoperative findings such as pericholecystic adhesion, thickened wall, contracted gall bladder, duration of surgery, and recovery from anesthesia were documented. **Results:** Pericholecystic adhesion (63.8% vs 36.4%, p=0.004), contracted gall bladder (40.4% vs 15.2%, p=0.002), prolonged surgery exceeding 90 minutes (95.7% vs 31.8%, p<0.001), and delayed recovery from anesthesia (89.4% vs 19.7%, p<0.001) were significantly higher in diabetic patients. **Conclusion:** Diabetic patients undergoing laparoscopic cholecystectomy for acute cholecystitis experience more severe adhesions, thickened and contracted gall bladder, prolonged operation, and delayed recovery compared to non-diabetic patients.

INTRODUCTION

Laparoscopic cholecystectomy is a common surgical method used for removal of gall bladder in patient suffering from acute cholecystitis.[1] Acute cholecystitis is inflammation of gall bladder mostly caused by obstruction of cystic duct with gall stone leading to distension, wall thickening and bacterial infection.[2] It present with right upper quadrant pain, fever, nausea and tenderness on examination.[2] Laparoscopic method is preferred over open method because it is less invasive and provide fast recovery, less postoperative pain and shorter hospital stay.[3] In this surgery small incision is made on abdominal wall and instruments are inserted with camera to visualize gall bladder and separate it from liver bed.[3] However in acute cholecystitis the inflammation and adhesion make the operation more difficult and surgeon need careful dissection to avoid injury to bile duct or nearby structure.[4] Proper identification of Calot triangle and control of cystic artery and duct are important steps during this operation.[5]

In diabetic patients undergoing elective laparoscopic cholecystectomy the intraoperative findings are usually more complicated than non-diabetic patients.[6] Due to long standing metabolic disturbance and poor immune response in diabetic patients, they develop more severe inflammation and fibrosis around the gall bladder.[6] The most common intraoperative finding in them is dense pericholecystic adhesion making the dissection of gall bladder from surrounding tissue more difficult and time consuming.[7] The wall of gall bladder is also found thickened because of repeated infection and poor healing response.[8] This thickened wall makes it hard to grasp and manipulate during procedure.[8] The surgery duration in diabetic patient usually extend more than 90 minutes as surgeon have to proceed slow and cautious to prevent injury.[9] The risk of bleeding and bile duct injury is also higher in this group due to altered tissue plane and friable wall.[9]

Another important observation in diabetic patients is delayed recovery from anesthesia which often take more

than 20 minutes as compared to non-diabetic patient.[10] This may be due to impaired metabolism of anesthetic drugs, neuropathy and poor circulation common in diabetic condition.[10] The gall bladder in diabetic patients is frequently contracted and fibrotic due to chronic infection and reduced gall bladder motility.[11] Such contracted gall bladder is difficult to hold and detach during surgery which further prolong the operative time.[12] In contrast, non-diabetic patients usually show less adhesion, thinner wall and easy identification of anatomy making the procedure shorter and simpler.[13] Therefore, diabetes has clear negative effect on intraoperative findings and surgical outcome in laparoscopic cholecystectomy for acute cholecystitis requiring more expertise, time and postoperative monitoring for safe recovery.

In a study, among the intraoperative findings the Pericholecystic adhesions was found in 56% and 46.6% in diabetics and non diabetics respectively. Contracted GB was found in 38.60% and 17.30% of individuals with versus without diabetics respectively. The thickened-walled GB was present in 33.30% and 21.30% in diabetics and non diabetics respectively. Duration of surgery (more than 90 minutes) was noted in 69.30% and 36% of patients with versus without diabetes. Recovery from anesthesia (more than 20 minutes) was observed in 60% and 24% in diabetics and non diabetics patients, respectively.[14] Conversion from laparoscopic to open surgery was noted in 6 (13.2%) and 20 (6.9%) in diabetics and non diabetics respectively.[15] Among diabetics and non diabetics the mean surgical time was 103.00 and 78.83 minutes. Moderates to severe adhesions was found in 25% and 12% of individuals with versus without diabetes.[16]

There is strong need to conduct this study in Peshawar because the burden of gall bladder disease is increasing in this region and diabetic population is also high. Many patients come late to hospital with recurrent attack of acute cholecystitis and poor diabetic control which make the operation more difficult. In most hospitals of Peshawar the laparoscopic cholecystectomy is common procedure but there is limited data comparing the intraoperative findings between diabetic and non-diabetic patients. The difference in adhesion, wall thickness, and operative duration may be affected by local diet, lifestyle and delayed presentation of patient which is common in this area.

METHODOLOGY

This cross sectional study was carried out in the Department of Surgery, Khyber Teaching Hospital, Peshawar, from August 2024 to January 2025. The study was started after approval from the ethical review board of the hospital and the research committee of CPSP. A total of 113 patients were included. The number was calculated using WHO calculator at 95% confidence level and 7% precision, taking the expected rate of contracted gall bladder as 17.3%.[14] The participants were selected by non-probability consecutive sampling technique. Patients of both genders, between 18 and 80 years of age, belonging to ASA class I or II, and diagnosed as cases of acute cholecystitis were included. Patients were excluded if they were undergoing emergency cholecystectomy or had common bile duct stones, pancreatitis, or any cancer. A case was considered as acute cholecystitis when the patient had sudden severe pain in the upper right side of the abdomen radiating to the right shoulder or back, along with nausea, vomiting, fever of 101°F or above, yellow discoloration of eyes, and ultrasound showing bright structures with acoustic shadow inside the gall bladder. Diabetes mellitus was marked in those who had a known history of high blood sugar for at least one year and were taking treatment regularly. All patients were examined by the surgical team, and laparoscopic cholecystectomy was performed by an experienced consultant. During operation, different findings were observed and documented. Pericholecystic adhesion was identified when two or more fibrous white bands were seen around the gall bladder during surgery. Gall bladder was labelled as thick-walled when its wall measured more than 5 mm on ultrasound. A contracted gall bladder was noted when the patient had repeated sharp pain in the right upper abdomen and the gall bladder was not properly visible on ultrasound. Surgery lasting for more than 90 minutes was considered prolonged, and recovery from anesthesia taking more than 20 minutes was considered delayed.

All data were entered and analyzed by using SPSS version 25. Qualitative variables were presented as frequencies and percentages. Quantitative variables were presented as mean ± standard deviation. Normality of data was checked by Kolmogorov-Smirnov test. Comparison of intraoperative findings between diabetic and non-diabetic patients was done using Chi-square or Fisher exact test where required. A p-value of less than 0.05 was considered significant.

RESULTS

The study included 113 patients undergoing elective laparoscopic cholecystectomy, with mean age of 51.62±16.00 years, mean height of 1.65±0.08 meters, mean weight of 76.32±11.61 kg, and mean BMI of 28.03±3.04 kg/m^2. The mean gall bladder wall thickness was measured at 5.51±1.22 mm, while mean duration of surgery was 91.47±15.85 minutes and mean recovery from anesthesia was 20.12±6.43 minutes. Among the study population, 47 patients (41.6%) was having T2DM while 66 patients (58.4%) was non-diabetic, and 49 patients (43.4%) was having HTN while 64 patients (56.6%) was not having HTN (as shown in Table-I).

Table I

Patient Demographics

Demographics	Mean ± SD
Age (years)	51.62±16.00
Height (meters)	1.65±0.08
Weight (kg)	76.32±11.61
BMI (kg/m^2)	28.03±3.04
Gall Bladder wall thickness (mm)	5.51±1.22
Duration of surgery (min)	91.47±15.85
Recovery from anesthesia (min)	20.12±6.43
T2DM	
Yes n (%)	47 (41.6%)
No n (%)	66 (58.4%)
HTN	
Yes n (%)	49 (43.4%)
No n (%)	64 (56.6%)

The overall frequency of intraoperative findings showed that thickened wall GB was present in 22 patients

(19.50%), pericholecystic adhesion was found in 54 patients (47.80%), contracted GB was observed in 29 patients (25.70%), duration of surgery more than 90 minutes was seen in 66 patients (58.40%), and recovery time more than 20 minutes was noted in 55 patients (48.70%) (as shown in Table-II).

Table II

Frequency of Intraoperative Findings

Intraoperative Findings	Frequency	% age
Thickened wall GB	22	19.50%
Pericholecystic adhesion	54	47.80%
Contracted GB	29	25.70%
Duration >90min	66	58.40%
Recovery >20min	55	48.70%

When comparing diabetics versus non-diabetics, thickened wall GB was present in 13 diabetic patients (27.7%) compared to 9 non-diabetic patients (13.6%) with p-value of 0.064, which was not showing statistical significance. Pericholecystic adhesion was significantly more common in diabetics with 30 patients (63.8%) compared to 24 non-diabetic patients (36.4%) with p-value of 0.004. Contracted GB was also significantly higher in diabetic patients with 19 cases (40.4%) versus 10 cases (15.2%) in non-diabetics with p-value of 0.002. Duration of surgery exceeding 90 minutes was markedly more frequent in diabetics with 45 patients (95.7%) compared to only 21 non-diabetic patients (31.8%) with p-value less than 0.001 using Fischer Exact Test. Similarly, recovery time more than 20 minutes was significantly prolonged in diabetic patients with 42 cases (89.4%) compared to 13 non-diabetic patients (19.7%) with p-value less than 0.001 using Fischer Exact Test (as shown in Table-III)

Table III

Comparison of Intraoperative Findings in Diabetics versus Non-Diabetics

Intraoperative Findings	T2DM		P-value
	Yes n(%)	No n(%)	
Thickened wall GB			
Yes	13 (27.7%)	9 (13.6%)	0.064
No	34 (72.3%)	57 (86.4%)	
Pericholecystic adhesion			
Yes	30 (63.8%)	24 (36.4%)	0.004
No	17 (36.2%)	42 (63.6%)	
Contracted GB			
Yes	19 (40.4%)	10 (15.2%)	0.002
No	28 (59.6%)	56 (84.8%)	
Duration >90min			
Yes	45 (95.7%)	21 (31.8%)	<0.001*
No	2 (4.3%)	45 (68.2%)	
Recovery >20min			
Yes	42 (89.4%)	13 (19.7%)	<0.001*
No	5 (10.6%)	53 (80.3%)	

***Fischer Exact Test**

DISCUSSION

The mean age in this study was 51.62 years which showed that the disease was common in older group where body metabolism and gall bladder motility start to reduce. The mean BMI was 28.03 kg/m^2 showing that most patients were overweight, and excess fat increases bile cholesterol saturation which promotes stone formation and gall bladder inflammation.

In this study, pericholecystic adhesion was found in 54 patients (47.8%) and was more frequent in diabetics (63.8%) compared to non-diabetics (36.4%). This may be because diabetes causes chronic low-grade inflammation and poor healing that lead to fibrotic tissue and adhesions around gall bladder. Thickened wall gall bladder was present in 22 patients (19.5%) and was more in diabetics (27.7%) than non-diabetics (13.6%), which may occur due to edema and infiltration of inflammatory cells in diabetic tissue. Contracted gall bladder was seen in 29 patients (25.7%) and was higher in diabetics (40.4%) than non-diabetics (15.2%), which can be explained by diabetic neuropathy that reduces muscle tone and gall bladder emptying, causing shrinkage.

Duration of surgery more than 90 minutes was noted in 66 patients (58.4%) and was very high in diabetics (95.7%) compared to non-diabetics (31.8%), as adhesions and thickened wall make surgery more difficult and time consuming. Recovery from anesthesia more than 20 minutes was noted in 55 patients (48.7%) and was prolonged in diabetics (89.4%) compared to non-diabetics (19.7%), likely due to slow metabolism, impaired drug clearance, and reduced tissue perfusion in diabetic individuals. These results showed that diabetes increase the surgical complexity and delay recovery process in patients with acute cholecystitis.[17]

Our study findings shows several similarities and differences when compared with previous literature on laparoscopic cholecystectomy outcomes in diabetic versus non-diabetic patients. The mean age of patients in our study was 51.62±16.00 years, comparable to age groups in other studies, though Serban D, et al. [15] reported wider age range of 18–91 years.

For pericholecystic adhesions, the observational findings of the present research revealed a considerably higher incidence in diabetics at 63.8% as opposed to 36.4% for non_diabetics with a significance value of 0.004. This finding received strong support from Kumari K, et al. [18] who found 76.2% as against 38.4% with significance value <0.01. Similarly, Malik M, et al. [19] found it to be 83.3% against 46.7% with significance value of <0.01. Interestingly enough, Rahman ZA, et al. [20] found it to be 46.7% against 34.7%, though nonsignificant.

Contracted gall bladder was significantly more common in diabetics (40.4%) patients versus non-diabetics (15.2%) patients with p=0.002, reflecting chronic inflammatory changes. This was in agreement with Kumari K, et al. [18] who reported thickened wall in 71.4% diabetics versus 30.7% non-diabetics (p<0.01). Our mean wall thickness was 5.51±1.22 mm, and thickened wall GB was present in 27.7% diabetics versus 13.6% non-diabetics (p=0.064), which did not reach significance possibly due to smaller sample size.

Duration exceeding 90 minutes was markedly higher in our diabetics (95.7%) versus non-diabetics (31.8%) with p<0.001, with mean duration 91.47±15.85 minutes. This was consistent with Malik M, et al.[19] (77.96 vs 68.50 minutes, p<0.01), Kumari K, et al.[18] (73.4±12.6 vs 59.1±10.4 minutes, p<0.01), and Elahi A, et al.[21] (48.6±10.2 vs 42.3±9.5 minutes, p=0.01). Prolonged operative time results from dense adhesions, thickened wall, and difficult dissection requiring careful technique. Recovery time exceeding 20 minutes was significantly prolonged in our diabetics (89.4%) versus non-diabetics (19.7%) with p<0.001, with mean recovery 20.12±6.43

minutes. This delayed recovery may relate to altered pharmacokinetics, poor perfusion, and diabetic autonomic neuropathy. Though other studies did not measure anesthesia recovery, Malik M, et al.[19] reported longer hospital stay in diabetics (6.19 vs 4.73 days, p<0.01), and Elahi A, et al.[21] found 3.8±1.2 versus 2.9±0.9 days (p=0.02), supporting slower overall recovery in diabetics.

Conversion to open surgery was not analyzed in our study, but others reported higher rates in diabetics: Malik M, et al.[19] found 13.3% versus 0% (p=0.038), Serban D, et al.[15] reported 13.2% versus 6.9%, Kumari K, et al.[18] found 9.5% versus 1.5%, and Mostafa ABM, et al.[22] reported 15% overall. Higher conversion results from severe adhesions, difficult anatomy, and bleeding complications.

Postoperative complications particularly SSI was more frequent in diabetics: Malik M, et al.[19] found 26.7% versus 10%, Elahi A, et al.[21] reported 24.4% versus 8.9% (p=0.04), and Mostafa ABM, et al.[22] showed good glycemic control (HbA1c<7%) resulted in 90% with no complications versus 60% in poorly controlled diabetics. The systematic review by Łącka M, et al.[23] including over 1.3 million patients confirmed significantly higher infections, perforation, and mortality (11.6% vs 4.8%, OR 2.55), emphasizing importance of glycemic control and perioperative management.

Prevalence of T2DM in the current study at 41.6% represented an increased burden of disease. The higher incidence of comorbidities within diabetics as found by Serban D, et al.[15] with 34.78% having 3+ conditions that affect CVD events (p=0.013) emphasizes the significance of comprehensive management of HTN identified at 43.4%.

In aggregate, the consequences of diabetes are quite substantial for the success of laparoscopic cholecystectomy in that it produces complications of chronic inflammation/healing as well as microvascular complications that often result in adhesions. Careful consideration should be given to better preparing these patients preoperatively as well as monitoring them postoperatively.

However, there were a few limitations to the research. The research being carried out at a single center may not represent the population pattern. The sample size being comparatively smaller may also affect the outcome. The duration of research being short may not represent long-term complications. Variables such as control of blood sugar levels, duration of diabetes, and type of medications may not have been included. The research being carried out at a single tertiary care center may not represent surgical expertise at various centers. The findings of the research should thus be viewed critically. More research needs to be carried out at various centers with a bigger sample size to represent these outcomes.

CONCLUSION

Our research work has found that the surgical conditions of diabetic patients undergoing elective laparoscopic cholecystectomy due to acute cholecystitis are tougher than those of non-diabetic ones. The main factors contributing to these tougher conditions were increased adhesions, retraction of the contracted gall bladder due to fibrosis, increased duration of surgery, and increased recovery time from anesthesia. All these factors indicate that due to both inflammation and poor healing of tissues, diabetes increases the surgical difficulties.

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