



## Surgery

## TO COMPARE THE INTRAOPERATIVE DIFFICULTIES FACED IN LAPAROSCOPIC CHOLECYSTECTOMY IN DIABETIC VERSUS NON DIABETIC PATIENTS

<b>Manjot kaur</b>	post graduate student ,department of surgery,AIMSR,bathinda,punjab,india
<b>Naveed anjum qureshi</b>	senior resident,department of surgery,government medical college,jammu,j&k,india
<b>Anshuman chander</b>	assistant professor,department of surgery,maharishi markandeswar college and hospital ,kumarhatti,solan ,H.P India. - Corresponding author
<b>Ankush kaul</b>	senior resident department of surgery,maharishi markandeswar college and hospital,kumarhatti,solan,H.P India.

**ABSTRACT** **Aim and objectives:** - To compare the intraoperative difficulties faced in Laparoscopic cholecystectomy in diabetic versus non diabetic patients.

**MATERIALS AND METHODS-**The present prospective study included ultrasonographically proved 300 patients of symptomatic cholelithiasis, operated as elective cases in district hospital, Burali, Punjab. The patients were selected randomly. Relevant history, clinical examination and investigations were recorded including random blood sugar. Surgery was performed by the consultant of a single unit. The diabetic mellitus patient were defined according to the WHO Diabetes Diagnostic Criteria. Two groups were made for the study purpose-group 1- included patients with gall stone disease with diabetes mellitus and group 2 included patients with gall stone disease without diabetes mellitus (the control group). Difficulty during Laparoscopic Cholecystectomy was assessed using preoperative (USG abdomen, previous attacks, total leucocyte count) and intraoperative measures (conversion rate, identification of Calot's anatomy, time taken, bile spillage, injury to vascular and ductal structures).

**RESULTS AND CONCLUSION-** Out of total 300 patients, 217 were females and 83 were men. 117 patients were diabetic and 183 were nondiabetic/controls. Out of 117 diabetic patients, 83 were females and 34 were men. In the control group, 110 were females and 73 were males. The mean operation time was 81 minutes in control group and the postoperative hospital stay ranged to 5.4 (1-18) days. No conversion rate was reported in control group. In diabetic group only in 3 patients it was not possible to apply the "critical view of safety" resulting in a conversion to open cholecystectomy. The mean operation time was 120 minutes in diabetic group and the postoperative hospital stay ranged to 11 days. Postoperatively an insufficiency of cystic duct, a navel infection, an abdominal wall hematoma, an urinary tract infection and a pneumonia occurred in 10 patients each of diabetic group. A bile duct injury was reported in one patient of diabetic group. Hence it can be concluded that Diabetes mellitus not only increases the incidence of gall bladder disease in patients but also increases the difficulty of operating during Laparoscopic cholecystectomy

**KEYWORDS :** .Diabetes ,Difficult, cholecystectomy ,Laparoscopic. Running title;-management of cholelithiasis in diabetic patient.

### INTRODUCTION:

Diabetes mellitus is considered a risk factor associated with morbidity in patients who undergo laparoscopic cholecystectomy, in comparison with non-diabetics.[1] People with diabetes have more gallstone problems than people in the general population.[2]

- People with diabetes are generally overweight, and obesity is linked to gallstone disease.[3]
- People with diabetes have higher levels of triglycerides and triglycerides themselves encourage gallstone formation.[3]
- Another theory is that stones form because of what is called autonomic neuropathy, or damage from diabetes to the involuntary nerves that control movement of the bowels and gallbladder. According to this line of thought, the bile stored in the gallbladder is not released efficiently because the nerves are damaged, and gallstones form from the resulting sludge.[4]
- Also, recent research on insulin-resistant mice shows that FOXO1, a specific protein involved with diabetes, increases the amount of cholesterol that enters the bile, which may lead to the formation of gallstones. Cholesterol is a major component of most gallstones.[6]
- People with diabetes are usually considered high-risk for any surgery, including Laparoscopic cholecystectomy.[5]
- The present study focuses on assessing the difficulties faced during Laparoscopic cholecystectomy and comparing the same in diabetic patients versus non-diabetic patients.

### MATERIALS AND METHODS:

The present prospective study was conducted in the Department of General Surgery district hospital, Punjab and included randomly selected 100 patients of symptomatic gall stone disease and ultrasound

diagnosed gall stone disease, operated as elective cases. Relevant history, clinical examination, routine investigations including random blood sugar and ultrasound abdomen were done. The diabetic mellitus patient were defined according to the WHO Diabetes Diagnostic Criteria.

### Two groups were made for the study purpose-

- :group 1- included patients with gall stone disease with diabetes mellitus
- :group 2- included patients with gall stone disease without diabetes mellitus (control group).

The consent of all the patients was taken. Surgery was performed by the consultant of a single unit.

**INCLUSION CRITERIA:** Patients of both the gender male and female, above 18 years were taken for the study.

**EXCLUSION CRITERIA-** Previous abdominal surgeries.

The difficulties faced during Laparoscopic cholecystectomy were assessed using the following parameters:-

- PREOPERATIVE PARAMETERS:-
- USG Abdomen-GB wall thickness > 4mm
- pericholecystic fluid collection
- contracted GB
- No. Of Attacks Of Cholecystitis
- INTRAOPERATIVE PARAMETERS:-
- Laparoscopic Cholecystectomy converted to open cholecystectomy
- Calot's Triangle identified or not

- Time taken to complete the surgery
- Bile spillage
- Injury to cystic duct/ common bile duct/cystic artery/ any other structures

**OBSERVATION AND RESULTS-**

LC was performed in all the selected 300 patients. Following observations were made:

**1. AGE AND GENDER-** The age of our patients ranged from 23 to 70 years

The age of the female patients ranged from 23 to 62 years. The age of the male patients ranged from 39 to 70 years. Out of total 300 patients, 217 were females and 83 were men. 117 patients were diabetic and 183 were nondiabetic/controls. Out of 117 diabetic patients, 83 were females and 34 were men. In the control group (non diabetic), 110 were females and 73 were males.

DIABETIC GROUP	N	AGE( years)
GENDER		
		RANGE
MALE	34	39-70
FEMALE	83	23-62
TOTAL	117	23-70

**TABLE -1**

CONTROL GROUP	N	AGE( years)
GENDER		
		RANGE
MALE	73	39-70
FEMALE	110	23-62
TOTAL	183	23-70

**TABLE -2**

**TABLE COMPARING AGE IN TWO GROUPS**

TABLE 1	DM	NDM	TOTAL
Group 1 MALE	34 (41.73) [1.43]	73 (65.27) [0.92]	107
Group 2 FEMALE	83 (75.27) [0.79]	110 (117.73) [0.51]	193
<i>Marginal Column Totals</i>	117	183	300 (Grand Total)

The chi-square statistic is 3.6488. The p-value is .056111. This result is not significant at  $p < .05$

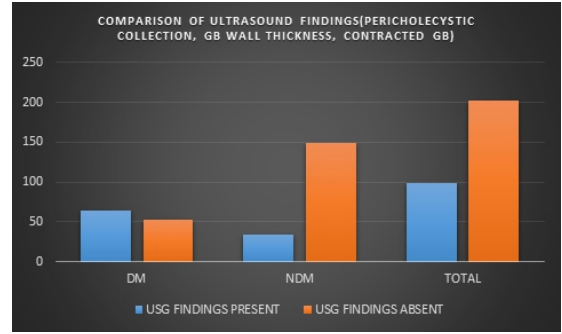
**2. ULTRASOUND FINDINGS**

DIABETIC GROUP	GB WALL THICKNESS>4mm PERICHOLECYSTIC FLUID COLLECTION CONTRACTED GB
GENDER	
MALE	10
FEMALE	54
TOTAL	64

CONTROL GROUP	GB WALL THICKNESS>4mm PERICHOLECYSTIC FLUID COLLECTION CONTRACTED GB
GENDER	
MALE	4
FEMALE	30
TOTAL	34

TABLE 2	USG PRESENT	USG NOT PRESENT	<i>Marginal Row Totals</i>
Group 1 DM	64 (38.22) [17.39]	53 (78.78) [8.44]	117
Group 2 NDM	34 (59.78) [11.12]	149 (123.22) [5.39]	183
<i>Marginal Column Totals</i>	98	202	300 (Grand Total)

The chi-square statistic is 42.3365. The p-value is  $< 0.00001$ . This result is significant at  $p < .05$ .



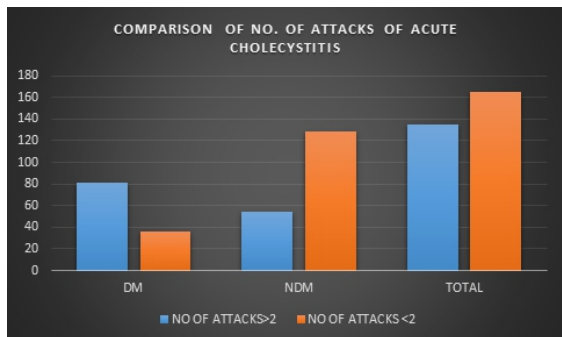
**3. PREVIOUS ATTACKS > 2**

DIABETIC GROUP	N
GENDER	
MALE	14
FEMALE	67
TOTAL	81

CONTROL GROUP	N
GENDER	
MALE	30
FEMALE	24
TOTAL	54

TABLE 3	NO OF ATTACKS PRESENT	NO OF ATTACKS NOT PRESENT	<i>Marginal Row Totals</i>
DM	81 (52.65) [15.27]	36 (64.35) [12.49]	117
NDM	54 (82.35) [9.76]	129 (100.65) [7.99]	183
<i>Marginal Column Totals</i>	135	165	300 (Grand Total)

The chi-square statistic is 45.5004. The p-value is . This result is significant at  $p < .05$ .



**4. LAPAROSCOPIC CHOLECYSTECTOMY CONVERTED TO OPEN CHOLECYSTECTOMY**

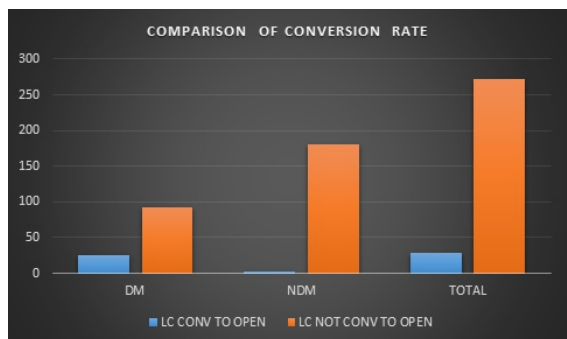
DIABETIC GROUP	N
GENDER	
MALE	15
FEMALE	10
TOTAL	25

CONTROL GROUP	N
GENDER	
MALE	2
FEMALE	1
TOTAL	3

TABL E 4	LC CONV TO OPEN	LC NOT CONV TO OPEN	<i>Marginal Row Totals</i>
DM	25 (10.92) [18.15]	92 (106.08) [1.87]	117
NDM	3 (17.08) [11.61]	180 (165.92) [1.19]	183

<b>Marginal Column Totals</b>	28	272	300 (Grand Total)
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The chi-square statistic is 32.825. The *p*-value is . This result is significant at *p* < .05



**5. CALOTS TRIANGLE IDENTIFIED AND NOT IDENTIFIED**

DIABETIC GROUP	IDENTIFIED	NOT IDENTIFIED
GENDER		
MALE	24	10
FEMALE	69	14
TOTAL	93	24

CONTROL GROUP	IDENTIFIED	NOT IDENTIFIED
GENDER		
MALE	70	3
FEMALE	90	20
TOTAL	160	23

TABLE 5	CT IDENTIFIED	CT NOT IDENTIFIED	Marginal Row Totals
Group 1 DM	93 (98.67) [0.33]	24 (18.33) [1.75]	117
Group 2 NDM	160 (154.33) [0.21]	23 (28.67) [1.12]	183
<b>Marginal Column Totals</b>	253	47	300 (Grand Total)

The chi-square statistic is 3.4094. The *p*-value is .064827. This result is not significant at *p* < .05.

**6. TIME TAKEN TO COMPLETE THE SURGERY**

DIABETIC GROUP	MEAN TIME
GENDER	
MALE	110 min
FEMALE	101 min

CONTROL GROUP	MEAN TIME
GENDER	
MALE	69
FEMALE	90

**7. Bile spillage**

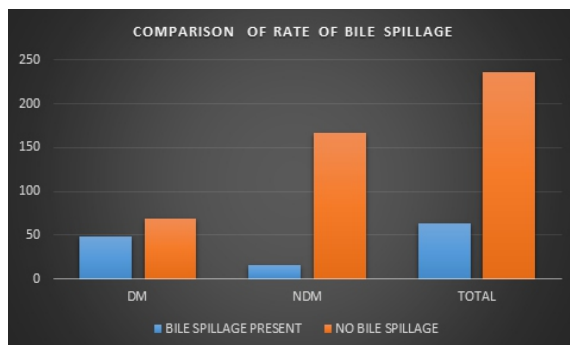
DIABETIC GROUP	N
GENDER	
MALE	15
FEMALE	33
TOTAL	48

CONTROL GROUP	N
GENDER	
MALE	6
FEMALE	10
TOTAL	16

TABLE 6	bile spillage present	no bile spillage	Marginal Row Totals
Group 1 DM	48 (24.96) [21.27]	69 (92.04) [5.77]	117
Group 2 NDM	16 (39.04) [13.6]	167 (143.96) [3.69]	183

<b>Marginal Column Totals</b>	64	236	300 (Grand Total)
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The chi-square statistic is 44.32. The *p*-value is . This result is significant at *p* < .05.



**8. INJURY TO CYSTIC DUCT/ COMMON BILE DUCT/CYSTIC ARTERY/ANY OTHER STRUCTURES**

DIABETIC GROUP	N
GENDER	
MALE	12
FEMALE	16
TOTAL	28

CONTROL GROUP	N
GENDER	
MALE	8
FEMALE	10
TOTAL	18

TABLE 7	INJURY PRESENT	NO INJURY	Marginal Row Totals
Group 1 DM	28 (17.94) [5.64]	89 (99.06) [1.02]	117
Group 2 NDM	18 (28.06) [3.61]	165 (154.94) [0.65]	183
<b>Marginal Column Totals</b>	46	254	300 (Grand Total)

The chi-square statistic is 10.9227. The *p*-value is .00095. This result is significant at *p* < .05.

GROUP1= GSD+DM		GROUP 2= GSD WITHOUT DM	
N= 117		N= 183	
Male=34		Male=73	
Female=83		Female=110	
age group=23-70		age group= 23-70	
USG	64	USG	34
Gb wall thickness >4mm		Gb wall thickness >4mm	
Perichole cystic fluid collection		Perichole cystic fluid collection	
Contracted GB		Contracted GB	
NO. OF ATTACKS >2	81	54	
LAPAROSCOPIC CHOLECYSTECTOMY CONVERTED TO OPEN CHOLECYSTECTOMY	25	3	
CALOT'S TRIANGLE IDENTIFIED	24	CALOT'S TRIANGLE IDENTIFIED	23
NOT IDENTIFIED		NOT IDENTIFIED	
IDENTIFIED	93	IDENTIFIED	160

TIME TAKEN TO COMPLETE SURGERY	105.5 min	79.5 min
BILE SPILLAGE	48	16
INJURY TO CYSTIC ARTERY/ CBD INJURY/ INJURY TO OTHER STRUCTURES	28	18

### DISCUSSION:-

Diabetes mellitus is considered a risk factor associated with morbidity in patients who undergo laparoscopic cholecystectomy (LC), in comparison with nondiabetic. Diabetic patients with GSD had a higher incidence of cholecystectomy than the nondiabetic controls. In addition, the overall incidence of cholecystectomy was associated with increasing age, irrespective of the diabetic status and sex. An increasing number of studies on animals and humans suggest that insulin resistance and diabetes are associated with organ dysfunction. A combination of diabetes and GSD is a severe condition that requires special care. The pathophysiological features of gallstone formation in patients with diabetes are unclear. Diabetic patients exhibit an increased cholesterol index and reduced gallbladder motility compared with nondiabetic individuals. Furthermore, hyperinsulinemia is associated with an increased prevalence of GSD. Insulin resistance and elevated fasting glucose levels have been associated with gallbladder dysmotility in nondiabetic people, possibly resulting in acalculous cholecystitis or gallstone formation. Consequently, some reports have recommended early cholecystectomy for diabetic patients with asymptomatic gallstones to prevent subsequent serious infection.

1. Age and gender:- the age of our patients ranged from 23 to 70 years. the maximum number of patients were in the age group of 32-65 years which is comparable with the study of Kama et al.[7]
2. In our study conversion rates from LC to open were more in diabetic group as compared to non diabetic group (25>3) which were similar to study done by Paajanen et al[8] where Conversion to open surgery was required in 16% of the diabetic patients undergoing LC compared with 7% in the nondiabetic controls (p < 0.0001)
3. Regarding the operative time which was higher in diabetic group (105.5min) > non diabetic group(79.5min) in our study however Bedirli[9] et al reported no significant variation in their study. Al-Mulhim AR[10] et al also reported no significant difference in their study owing to Careful preoperative preparations, meticulous intraoperative surgical technique, and cautious postoperative care.
4. Bile spillage and injury to other structures were higher In our study in patients with GSD (48vs16) and (28 vs 18) whereas .Aldaqal et al[11] reported Gall bladder perforation with intraperitoneal bile leak occurred in 16 cases (14.3%), of which 5 were diabetics, and 11 non-diabetics (27.8% and 12% respectively with a P- value of 0.135.
5. Non Identification of calots triangle due to adhesions were 24 in diabetic versus 23 in non diabetics which was contrary to the results of Ziaee SA[12]

Who reported significant increase in the risk of adhesion (28.6% vs 6.2%).

Diabetic patient present with more complicated disease as compared to non-diabetics in the form of Empyema and gangrene. Some reports have indicated that acute cholecystitis is often more fulminant in men than in women, and the higher mortality rate in men than in women may reflect the unwillingness of men to seek medical attention until the disease is at an advanced stage. A recent study reported that men have a higher percentage and conversion rate of acute cholecystitis than women do because of inflammation or bacterial adherence. Women usually exhibit a greater willingness to seek medical attention for mild biliary symptoms than men. Landau et al stated that the higher pain threshold in men compared with women results from delayed presentation at an advanced stage of the disease, and the delay may be caused by psychological and social factors. This finding was further supported by results regarding inflammation and fibrosis in patients with acute cholecystitis, which is more severe in men than in women. Whether the sex-based differences are biological, behavioral, or both, the implications for patient management should be self-evident. An aggressive GSD management approach for men and timely

intervention before the need for emergency surgery are recommended. Additional studies are required for further investigation of these differences, which can increase the awareness of the GSD-associated problems and their occurrence in men.

**RESULTS AND CONCLUSION-** Out of total 300 patients, 217 were females and 83 were men. 117 patients were diabetic and 183 were nondiabetic/controls. Out of 117 diabetic patients, 83 were females and 34 were men. In the control group, 110 were females and 73 were males. The mean operation time was 79.5 minutes in control group and the postoperative hospital stay ranged to 5.4 (1-18) days. 3 cases were converted to open in control group. In diabetic group in 25 patients it was not possible to apply the "critical view of safety" resulting in a conversion to open cholecystectomy. The mean operation time was 105.5 minutes in diabetic group and the postoperative hospital stay ranged to 11 days .Postoperatively an insufficiency of cystic duct, a navel infection, an abdominal wall hematoma, an urinary tract infection and a pneumonia occurred in 10 patients each of diabetic group. A bile duct injury was reported in one patient of diabetic group. 34 cases of empyema, 5 cases of gangrenous gall bladder was seen in diabetic group whereas only 10 patients had empyema and 1 gangrenous gall bladder was reported in control group. In both the groups the number of female patients were more as compared to men

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