Original Research Article

# A Comparative Study of Complications of Open Versus Laparoscopic Cysto Gastrostomy in Management of Patients of Pseudo CYST of Pancreas in Tertiary Care Centres of Central India: An Analytical Study

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## Abstract

**Introduction:** The pseudocysts seems to stem from disruptions of the pancreatic duct due to pancreatitis or trauma followed by extravasation of pancreatic secretions. Two thirds of patients with pseudocysts have demonstrable connections between the cyst and the pancreatic duct. In the other third, an inflammatory reaction most likely sealed the connection so that it is not demonstrable.**Materials and methods:** This study was conducted in 50 patients who were admitted in a tertiary care centre in Central India as the diagnosed cases of pseudocyst of pancreas and were being operated for the same with open or laparoscopic cystogastrostomy done with 25 patients in each group of Open and Laparoscopic cystogastrostomy.**Results:** This study, conducted on a group of 50 patients revealed the following observations. These cases were all either hitherto untreated cases or those referred from a primary or a secondary centre for tertiary care, owing to complications at Tertiary care centres of Central India. The majority of patients belonged to the age group of 30-39 yrs which accounted for 40% of the total number of patients. However the number of patients in the age group 20-29 yrs and 40-49 yrs were 18% each which also accounted for a large number. Lowest number of patients were in age group 10-19yrs (2%). The mean age was 38.52 yrs with standard deviation of 11.213 yrs.**Conclusion:** Blood loss is less and the median operating time of LCG (Laparoscopic Cysto-Gastrostomy) is significantly shorter than that of OCG (Open Cysto-Gastrostomy). Complications of LCG (Laparoscopic Cysto-Gastrostomy) are less as compared to OCG (Open Cysto-Gastrostomy). LCG (Laparoscopic Cysto-Gastrostomy) is associated with significantly lower morbidity and with a lower mortality compared to OCG (Open Cysto-Gastrostomy). LCG (Laparoscopic Cysto-Gastrostomy) is also associated with a significantly shorter duration of postoperative hospital stay and patients of LCG returned to normal physiological activity as compared to OCG (Open Cysto-Gastrostomy) patients.

**Keywords:** Pseudocysts, Laparoscopic Cysto-Gastrostomy, Open Cysto-Gastrostomy.



## Introduction

The pseudocysts seems to stem from disruptions of the pancreatic duct due to pancreatitis or trauma followed by extravasation of pancreatic secretions. Two thirds of patients with pseudocysts have demonstrable connections between the cyst and the pancreatic duct. In the other third, an inflammatory reaction most likely sealed the connection so that it is not demonstrable[1].

In case of pseudocyst following an episode of acute pancreatitis, only if the acute fluid collection persists more than 4-6 wk, and is well-defined by a wall of fibrous or granulation tissue, can one say that an acute pseudocyst has appeared. Such a pseudocyst usually contains enzymatic fluid and necrotic debris[2]

The pathogenesis of pseudocyst formation in chronic pancreatitis is less well understood but, at least two mechanisms may be involved, the cyst may develop as a consequence of an acute exacerbation of the underlying disease and/or blockage of a major branch of the pancreatic duct by a protein plug, calculus or localized fibrosis[3-5]

This study comprises of comparison of cysto gastrostomy open and laparoscopic with complications and various intra-operative parameters. Various parameters in this study includes bleeding, operative duration, length of hospital stay, post operative pain, post operative morbidity and mortality.

**Materials and Methods**

This study was conducted in 50 patients who were admitted in a tertiary care centre in Central India as the diagnosed cases of pseudocyst of pancreas and were being operated for the same with open or laparoscopic cystogastrostomy done with 25 patients in each group of Open and Laparoscopic cystogastrostomy.

**Study design**: A Prospective study.
**Study subjects**: Patients Diagnosed with the pseudocyst of pancreas
**Study setting**: Tertiary Care Centres of Central India.
**Study duration**: June 2017- Nov 2019 (30 months).
**Sample size:** 50 patients
**Inclusion Criteria**: All the operated cases of pseudocyst of pancreas with cystogastrostomy done either open or laparoscopic.
**Exclusion Criteria**:

- The patients who are diagnosed with pancreatic pseudocyst but managed conservatively and managed with other modalities like pigtail drainage and endoscopic drainage
- Those who are not willing to participate

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- Patients presenting with pancreatic pseudo cysts were clinically examined and subjected to a proforma in accordance with the inclusion and exclusion criteria of the study.

**Sampling method**: Method of collection of data (including sampling procedure, if any) Analytical cross sectional study will be carried out in Tertiary Care Centres in Central India. Patients admitted with pseudocyst of pancreas will be considered for the study. All patients with pseudocyst of pancreas who are operated with open and lap cystogastrostomy will be sequentially enrolled in the present study. They will be evaluated with detailed history, clinical signs and symptoms, the duration and investigations. Blood and urine investigations,Ultrasonography(USG) Abdomen and/or Computerised Tomography (CT) will be carried out. Abdominal ultrasound and CT scan will be used to determine the number, size, volume, wall thickness, location of pancreatic pseudocyst. Procedure indications, pecularities, complications rates, collection recurrence rate and outcome will be evaluated.

**Statistical Analysis:** Data will be entered in Microsoft excel sheet and analysed using statistical software Epi Info. (7.2.1.0). Appropriate statistical test will be applied. Chi square test will be applied for categorical data. P value < 0.05 will be considered significant. Results were analyzed by using SPSS 26.0 software. Permission was taken from the Head of the department of surgery. The purpose of the study was explained to all the study subjects.

**Results**

This study, conducted on a group of 50 patients revealed the following observations. These cases were all either hitherto untreated cases or those referred from a primary or a secondary centre for tertiary care, owing to complications at Tertiary care centres of Central India.

**Table 1: Age Distribution**

| Age Group | Frequency | Percent |
|---|---|---|
| 10-19 yrs | 1 | 2% |
| 20-29 yrs | 9 | 18% |
| 30-39 yrs | 20 | 40% |
| 40-49 yrs | 9 | 18% |
| 50-59 yrs | 8 | 16% |
| >60 yrs | 3 | 6% |

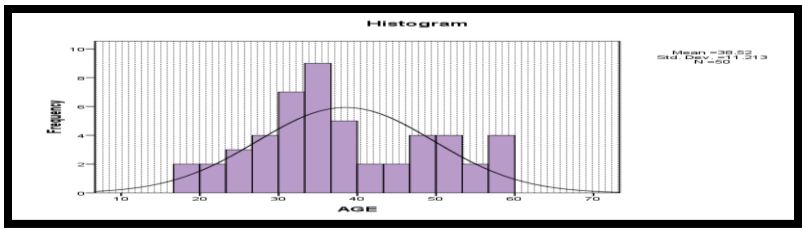


**Fig 1:Histogram**

The majority of patients belonged to the age group of 30-39 yrs which accounted for 40% of the total number of patients.

However the number of patients in the age group 20-29 yrs and 40-49 yrs were 18% each which also accounted for a large number. Lowest number of patients were in age group 10-19yrs (2%). The mean age was 38.52 yrs with standard deviation of 11.213 yrs.

The sex distribution in this study showed a predisposition towards males, 48 patients (96%), as compared to females 2 patients (4%). A male/female ratio of 24:1.

**Table 2: Sex Distribution**

| | Frequency | Percent |
|---|---|---|
| Males | 48 | 96% |
| Females | 2 | 4% |

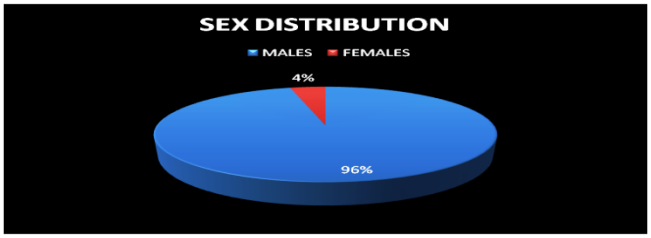


**Fig 2:Sex distribution**

**Table 3: Symptoms**

| Symptom | Frequency | Percent |
|---|---|---|
| Abdominal pain | 49 | 98% |
| Radiation to back | 30 | 60% |
| Increase on food intake | 27 | 54% |
| Vomiting | 19 | 38% |
| Abdominal distension | 11 | 22% |

| | | |
|---|---|---|
| Loss of appetite | 10 | 20% |
| Loss of weight | 9 | 18% |
| Jaundice | 7 | 14% |
| Fever | 6 | 12% |
| Diarrhoea | 2 | 4% |
| Breathlessness | 2 | 4% |

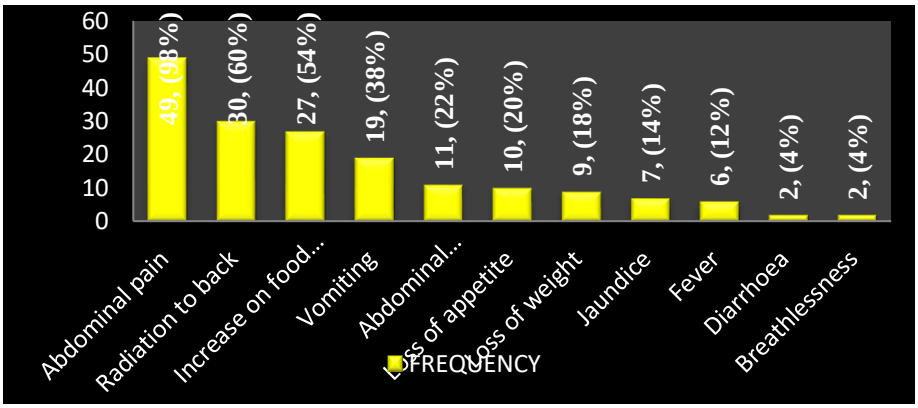


**Fig 3:Frequency distribution**

Abdominal pain was the presenting symptom in 49(98%) patients, with radiation to back in 30 (60%). Pain increased on food intake in 27 (54%) patients. Vomiting was present in 19 (38%) patients. 11 (22%) patients had abdominal distension. 10 (20%) patients experienced loss of appetite and 9 (18%) patients had loss of weight. Jaundice was present in 7 (14%) patients. 6 (12%) patients presented with fever. 2 (4%) patients had diarrhea. 2 (4%) patients had breathlessness on presentation.

**Table 4: Signs**

| | Frequency | Percent |
|---|---|---|
| Pallor | 7 | 14 |
| Icterus | 7 | 14 |
| Fever | 6 | 12 |
| Abdominal tenderness | 31 | 62 |
| Abdominal mass | 23 | 46 |
| Ascites | 6 | 12 |

Abdominal tenderness was present in 31 (62%) of patients. A palpable mass was present in 23 (46%). 6 (12%) patients had ascites on examination.

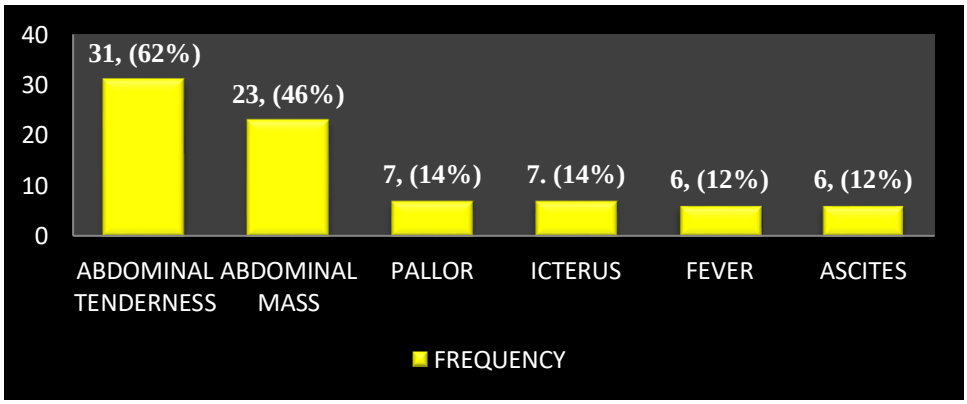


**Fig 4:Frequency distribution**

**Table 5: Etiology**

| | Frequency | Percent |
|---|---|---|
| Alcoholism only | 34 | 68% |
| Gallstones disease only | 6 | 12% |
| Both Gall Stones and alcoholism | 3 | 6% |
| Hypertriglyceridemia | 1 | 2% |
| Idiopathic | 6 | 12% |
| TOTAL | 50 | 100% |

**Table 6:Frequency and percentage**

| | Frequency | Percent |
|---|---|---|
| Acute pancreatitis | 21 | 42% |
| Chronic pancreatitis | 29 | 58% |
| TOTAL | 50 | 100% |

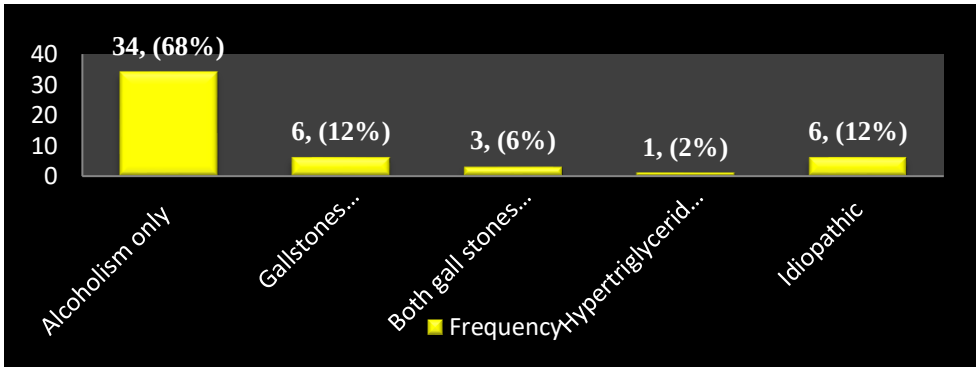


**Fig 5:Frequency distribution**

Out of 50 patients in the study, 37 (74%) patients had history of alcohol abuse. Biliary disease was present in 9 (18%) patients. 2 patients had history of laparoscopic cholecystectomy. 1 (2%) patient had hypertriglyceridemia as a cause on evaluation and 21 (42%) patients had acute pancreatitis, and 29 (58%) patients had chronic pancreatitis.

**Table 7: Laboratory Investigations**

| | Frequency | Percent |
|---|---|---|
| Hemoglobin <10gm/dl | 7 | 14% |
| TLC | | |
| 10,000-20,000/mm3 | 15 | 30% |
| >20,000/mm3 | 1 | 2% |
| Elevated serum bilirubin- direct | 7 | 14% |
| Elevated serum ALP>140 u/l | 12 | 24% |
| Elevated serum amylase | | |
| 100-400 u/l | 21 | 42% |
| 400-1000 u/l | 11 | 22% |
| >1400 u/l | 4 | 8% |
| Elevated serum lipase | | |
| 80-1000 u/l | 28 | 56% |
| >1000 u/l | 4 | 8% |
| Low serum albumin<3.5 mg/dl | 22 | 44% |
| Diabetes mellitus | 10 | 20% |

Leucocytosis was found in 16 (32%) patients. 7 (14%) patients had hemoglobin less than 10 gm/dl. 10 (20%) patients were diabetic. Direct bilirubin was raised in 7 (14%) patients. Serum ALP was elevated in 12 (24%) patients. Serum amylase was elevated in 36 (72%) patients. 32 (64%) patients had raised serum lipase.

**Imaging Modalities**

**Chest X-ray:** Pleural effusion was present in 11 (22%) patients

**Ultrasound of abdomen:** Ultrasonography was performed in 37 (74%) patients, of which pseudocyst was not clearly visualized in 2 cases and became evident on CECT abdomen. USG abdomen was very useful in visualizing pancreatic duct and biliary tree abnormality.

**CECT abdomen:** CECT abdomen was done in 39 (78%) patients, and was useful for details of pseudocyst viz., site, size, adjacent organs, presence of hemorrhage, etc.

**Table 8: Imaging Modalities**

| | Frequency | Percent |
|---|---|---|
| USG only | 11 | 22% |
| CECT only | 13 | 26% |
| Both | 26 | 52% |

**Table 9: Site of Pseudocyst**

| | Frequency | Percent |
|---|---|---|
| Body and tail | 12 | 24% |
| Body | 9 | 18% |
| Head | 9 | 18% |
| Lesser sac | 7 | 14% |

| | | |
|---|---|---|
| Tail | 4 | 8% |
| Body and head | 3 | 6% |
| Body, head and tail | 3 | 6% |
| Body and neck | 2 | 4% |
| Uncinate process | 1 | 2% |
| TOTAL | 50 | 100% |

Most common site for pseudocyst was body and tail, 12 (24%) patients and least common was uncinate process, 1 (2%) patients.

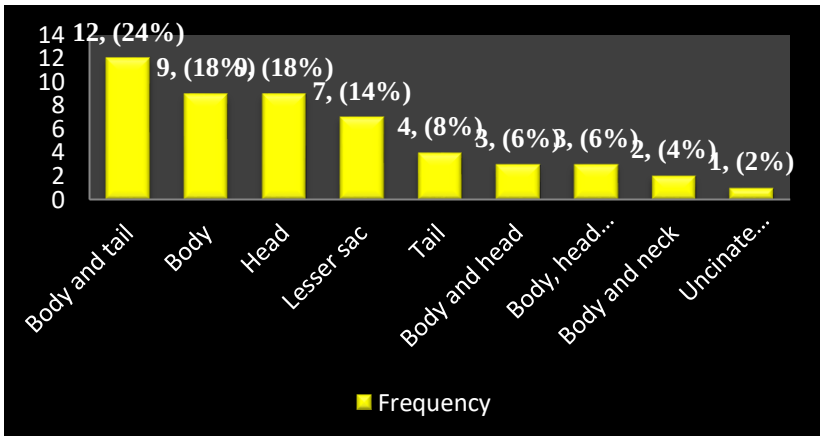


**Fig 6:Frequency distribution**

**Number Of Pseudocysts**

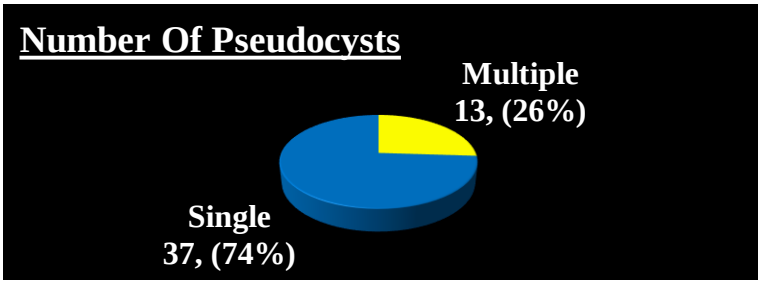


**Fig 7:Number of pseudocysts**

Around 13 (23%) patients had multiple pseudocysts.

**Size of Pseudocyst**

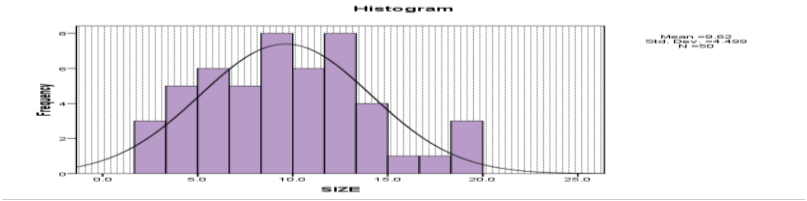


**Fig 8:Histogram**

The mean size of pseudocyst was 9.62 cms. The standard deviation was 4.499 cms. The smallest pseudocyst was 1.9 cms. The largest was 20 cms.

**Table 10: CECT/USG abdomen findings**

| CECT/USG findings | Frequency | Percent |
|---|---|---|
| Gall stones | 7 | 14% |
| CBD dilatation | 1 | 2% |
| Pancreatic duct calculi | 3 | 6% |
| Pancreatic duct dilatation | 13 | 26% |

In the study, 5 (10%) patients had gall stones. 1 (2%) had CBD dilatation. Pancreatic duct calculi were found in 3 (6%) patients and 13 (26%) patients showed pancreatic duct dilatation.

**Table 11: Intra-Operative Findings**

| | Laparoscopic CG = 25 | Open CG = 25 | P Value |
|---|---|---|---|
| Number of cyst * | Single - 21<br>Multiple – 4 | Single -20<br>Multiple – 5 | 0.35 |
| Intraoperative bleeding in ml # (mean ± SD) | 64 ± 8 | 110 ± 14 | < 0.000 |
| Blood Transfusion | 2(not because of intra-operative loss) | 4 patients(not because of intra-operative loss) | |
| Drained Fluid * | Sterile - 23<br>Infected – 2 | Sterile - 21<br>Infected – 4 | 0.19 |
| Operative time in minutes # (mean ± SD) | 70 ± 16 | 91 ± 22 | 0.000 |
| Length of stay in days (mean ± SD) | 4.92 ± 0.57 | 8.04 ± 0.61 | < 0.000 |

Blood loss in both groups was minimal (less than 130 ml per procedure) and none required blood transfusion. The median operating time of LCG (Laparoscopic Cysto-Gastrostomy) was significantly shorter than that of OCG (Open Cysto-Gastrostomy).

There were two conversions (6.7%) to open surgery due to uncontrolled intraoperative bleeding from the PP.

**Table 12: Post-OP Complications According To Dindo-Clavien Classification**

| Dc Classification | No. Of Patients | Complication | Management |
|---|---|---|---|
| 1 | OCG n=4 | Abdominal Pain | Analgesics |
| 2 | OCG (n=7)<br>LCG (n=2) | COPD exacerbation 1<br>Pneumonia 1<br>Hematemesis 1<br>Low hemoglobin 6 | Medical therapy<br>IV Antibiotics<br>Conservative<br>Blood Transfusion |
| 3a | 0 | | |
| 3b | 0 | | |
| 4a | 0 | | |
| 4b | 0 | | |
| 5 | OCG n=1 | ARDS | Death in PACU |

**Table 13: Post-Operative Parameters**

| | LCG(n=25) | OCG(n=25) | P value |
|---|---|---|---|
| Post operative fever * | Present-3<br>Absent-22 | Present-4<br>Absent-21 | 0.34 |
| Pain * | Yes-1<br>No-24 | Yes-6<br>No-19 | 0.02 |
| Bleeding | No | No | |
| Leak | No | No | |
| Recurrence | No | No | |
| Fistula | No | No | |
| Death | 0 | 1 | |

# t Test – to compare the means between 2 groups

* Chi square test

- LCG was associated with significantly lower morbidity and with a lower mortality compared to OCG. There was only one death in the entire cohort of patients in a 52-year-old man who underwent OCG for a PP that complicated alcoholic pancreatitis and subsequently developed an acute respiratory distress syndrome on the 10th POD.
- The details of the postoperative complications are listed in Table.
- LCG was also associated with a significantly shorter duration of postoperative hospital stay.

**Table 14: Follow Up Summary**

| | LCG | OCG |
|---|---|---|
| Patients Who Attended (NO.) | 25 | 24 |
| Follow-Up Duration | 6 weeks | 6 weeks |
| Cyst Resolution (NO.) | 25 | 24 |
| Recurrent Symptomatic PP | 0 | 0 |

All patients were followed up on OPD basis with durations described above. For follow up, clinical examination and USG abdomen was done in every patient. There was cyst resolution in all patients of each group.

**Discussion**

In most of the series, pseudocysts were seen in 4th and 5th decades, and the mean age was around 40-47 yrs. In our present series, majority of patients belonged to the age group of 30-40 yrs and the mean age was 38.52 yrs.The youngest patient was of age 17 yrs and oldest were of 60 yrs (3 patients). However, cysts have been described at extremes of life. Raliton described a huge pseudocyst in 6 months old boy.As compared to other studies, marked male predominance was seen in our study, in the ratio of 24:1 (male: female) and may be attributed to the fact that alcoholism is less common in females in India.Abdominal pain is a consistent finding and is usually located in the epigastrium and upper abdominal quadrants often associated with radiation to back. Frequently patients present with mass abdomen or sometimes with nausea, vomiting, anorexia, jaundice. Weight loss is a common feature but is more marked in neoplastic cysts.In our present study also pain abdomen was the commonest complaint being present in 98%, with radiation to back in 60%. Other symptoms like vomiting, anorexia, weight loss were also present in a significant number of patients.Physical examination in our study reveals abdominal tenderness in 62% of patients and a palpable mass in 46% of patients. Fever, ascites and jaundice were present in some patients.In many other series, tenderness was not a very common clinical finding, whereas a palpable mass was reported in 75% of cases.Various western countries revealed alcoholism as the commonest cause of pancreatitis leading to pseudocyst formation (65-80%), by biliary tract disease in about (6-20%) cases and trauma as the cause in (3-10%). Others were classified as idiopathic cases (6-20%). Our present study shows alcohol intake as the commonest etiology (68%)[6]

**Laboratory Values**

Serum tests have limited utility. Amylase and lipase levels are often elevated, but may be within reference ranges. The serum bilirubin and liver chemistries may be elevated if the bile duct is obstructed from stone, extrinsic compression from the pseudocyst or from underlying liver disorder (e.g. alcoholic hepatitis). Some laboratory tests may provide clues to the underlying etiology of pancreatitis (e.g. elevated triglycerides or calcium level). Elevated liver chemistries raise the suspicion for biliary pancreatitis[7]In our present study, serum amylase was raised in 72% patients with 8% of patients having serum amylase more than 1000 u/l. Serum lipase was elevated in 64% of patients.Leucocytosis was present in 32% patients. Hemoglobin of less than 10gm/dl was found in 14% patients. Raised direct bilirubin was seen in 14% patients and raised serum alkaline phosphatase was seen in 24% patients. 20% cases were diabetic, signifying pancreatic destruction.

**Radiological Studies**

Radiological studies are extremely helpful in making the diagnosis. Chest x-ray may show the evidence of pleural effusion. Our study revealed pleural effusion in 22% of patients[10]Pancreatic pseudocyst appears as an echoic structure associated with distal acoustic enhancement on USG examination. They are well defined and round or oval, and they are contained within a smooth wall. During the early phases of their development, pseudocysts can appear more complex, with varying degrees of internal echoes. Usually, this appearance results from the presence of necrotic debris and is more common in pseudocysts that form as a result of acute necrotizing pancreatitis than in chronic pancreatitis related pseudocysts. The debris is cleared over time in most cases. The pseudocyst can appear more complex in two other instances: when hemorrhage occurs into the cyst or when infection of the cyst complicates the clinical course[11] Sensitivity rates for US in the detection of pancreatic pseudocysts are 75% to 90%. Therefore, USG is inferior to CT, which has a sensitivity of 90% to 100%[12]USG has several limitations, as compared with CT, in the initial diagnosis of a pseudocyst: the presence of overlying bowel gas decreases the sensitivity of US, and unlike CT, US examinations are highly operator dependent[13]The identification of a thick-walled, rounded, fluid-filled mass adjacent to the pancreas on an abdominal CT scan in a patient with a history of acute or chronic pancreatitis is virtually pathognomonic for pancreatic pseudocyst. Positive CT findings in this clinical situation do not require confirmation with another diagnostic modality[14]. In the acute setting, a CT scan is the better choice because significant amounts of bowel gas resulting from ileus or obstruction decrease the sensitivity of US. In addition, CT scans provide more detailed information regarding the surrounding anatomy and can demonstrate additional pathology, including pancreatic duct dilatation and calcifications, common bile duct dilatation, and extension of the pseudocyst outside the lesser sac. The major weakness of CT scanning is the relative inability to differentiate pseudocyst from cystic neoplasm, especially mucinous cystadenomas and intraductal papillary mucinous neoplasm (IPMN). Furthermore, the intravenous contrast administered at the time of CT can precipitate or worsen kidney dysfunction[15]In our study, Ultrasonography was performed in 37 (74%) patients and CECT abdomen was done in 39 (78%) patients.Various intra-operative parameters and post-operative outcomes were compared between present study and similar study conducted by Yazan S. Khaled et al. The outcomes are comparable and are shown in the tables.In present study, the intra-operative bleeding was 64 ± 8 ml in LCG and 110 ± 14 ml in OCG while in the study carried out by Yazan S. Khaled et al it was around LCG-91 ml (50-120).In present study, Blood transfusion was given to 6 patients of which 2 LCG patients and 4 OCG patients while in Yazan S. Khaled's similar study none required blood transfusion.In present study, median operative time for LCG was around 70 ± 16 min while for OCG was 91 ± 22 min while Yazan S. Khaled study, it was LCG-62 min OCG-95 min.In present study, the average length of hospital stay in LCG was 4 days while in OCG it was 8 days while in Yazan S. Khaled's study, it was LCG-6 days and OCG-11 days.In Present study, post op morbidity was seen in 3 patients of LCG group while 4 patients of OCG group while in the study carried by Yazan S. Khaled et al, post op morbidity was less in LCG group than OCG group.Pain was significantly less in LCG group in both studies. Recurrence was not seen in both groups in present study while it was seen in LCG group in Yazan S. Khaled et al's study.

**Conclusion**

Blood loss is less and the median operating time of LCG (Laparoscopic Cysto-Gastrostomy) is significantly shorter than that of OCG (Open Cysto-Gastrostomy). Complications of LCG (Laparoscopic Cysto-Gastrostomy) are less as compared to OCG (Open Cysto-Gastrostomy). LCG (Laparoscopic Cysto-Gastrostomy) is associated with significantly lower morbidity and with a lower mortality compared to OCG (Open Cysto-Gastrostomy).

LCG (Laparoscopic Cysto-Gastrostomy) is also associated with a significantly shorter duration of postoperative hospital stay and patients of LCG returned to normal physiological activity as compared to OCG (Open Cysto-Gastrostomy) patients.

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