Section: General Surgery

Original Research Article

A PROSPECTIVE STUDY TO COMPARE THE DIFFICULTY IN DISSECTION DURING INDEX AGAINST DELAYED LAPAROSCOPIC CHOLECYSTECTOMY PERFORMED IN PATIENTS WITH PANCREATITIS OF BILIARY ORIGIN

Shilpi Raj[3], Pankaj Bodra[2], RC Besra[3], Binit Bharati[4], Anmol Kujur[5], Marshal Barun Tudu[6]

[1] Junior Resident, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India.
[2]Professor, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, Jharkhand, India
[3]Assistant Professor, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, India.
[4]Senior Resident, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, India.
[5]Senior Resident, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, India.
[6]Senior Resident, Department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi, India.

Received : 02/10/2024
Received in revised form : 16/11/2024
Accepted : 30/11/2024

Keywords:
Gallstones, Pancreatitis, Laparoscopy, Cholecystectomy.

Corresponding Author:
Dr. Shilpi Raj,
Email: dr.shilpiraj@gmail.com

DOI: 10.47009/jamp.2024.6.6.69

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (6); 349-366

Abstract

Background: An inflammatory process in the pancreas which involves adjacent organs or other organ systems is termed as acute pancreatitis. Gallstones can cause temporary obstruction, which increases pressure within pancreas and leads to enzyme activation within it & thus pancreatitis. The aim is to study the impact of timing of cholecystectomy in biliary pancreatitis patients intra Operatively and post operatively. Primary objective is to determine the effect of timing of performing laparoscopic cholecystectomy on rates of difficulty in dissection faced by surgeons. Secondary Objectives ate 1) To determine the rates of cholecystectomy complications like Bleeding, Biliary injuries, SSI. 2) To compare and determine the relation between timing of laparoscopic cholecystectomy and the rate of conversion to open. 3) To compare the average length of hospital stay postoperatively. **Materials and Methods:** This was a tertiary centre hospital based observational comparative study done in the department of General Surgery RIMS Ranchi on the patients of biliary pancreatitis. We considered any laparoscopic cholecystectomy performed during the initial admission, after resolution of initial inflammatory phase, before discharge, assuming within 2 weeks of initial onset of symptoms, as an index case; and Laparoscopic cholecystectomy performed after conservative management, discharge and readmission after 2 weeks of the initial episode/after primary discharge (average 4-6 weeks) as delayed. **Result:** Difficulty in dissection faced by the operating surgeon was significantly more in the index group as compared to the delayed group, probably due to the incomplete resolution of the inflammatory phase. **Conclusion:** Index laparoscopic surgery in mild cases of acute biliary pancreatitis is safe and feasible when performed within 2 weeks, provided that the inflammatory phase has completely resolved with conservative management.

INTRODUCTION

Pancreas is responsible for secreting digestive enzymes and hormones in the human body. An inflammatory process in the pancreas which involves adjacent organs or other organ systems is termed as acute pancreatitis. Pancreatitis can occur due to causes like alcohol, gallstones, trauma, infections etc. Pancreatitis is classified based on the presence of systemic and the local complications.[1]

Obesity, pregnancy, dietary factors, Crohn's disease, terminal ileum resection, gastric surgery, sickle cell disease, and thalassemia increase the risk of developing gallstones. Gallstones can cause temporary obstruction, which increases pressure

ISSN (O): 2687-5365; ISSN (P): 2753-6556

within pancreas and leads to enzyme activation within it & thus pancreatitis.

Pancreatitis can present as acute episodes or chronic consequences and complicate it with acute pancreatic sterile or necrotic collections, pseudocyst or walled off necrosis and many systemic complications.

The definitive treatment to prevent recurrent attacks of acute gallstone pancreatitis is Cholecystectomy, provided if the patient is suitable for surgery.[2] All patients with biliary pancreatitis should be planned for cholecystectomy during index period, preferably within 2 weeks, as guided by Current British Society of Gastroenterology guidelines state.[1,2]

Smaller incisions, comparatively bearable pain, decreased length of hospital stay, faster bowel function recovery, better cosmesis, better postoperative recovery, decreased cause and incidence of surgical site infections and hernia formation at incision site, and decreased overall expenditure, are some of the advantages of invention of laparoscopic cholecystectomy, and therefore, surgeons prefer laparoscopic procedures for various interventions.[2,3] Standard way of laparoscopy involves inflation of peritoneal cavity with CO2, introduction camera & instruments through 4 small incisions and removal of gallbladder. Acute biliary pancreatitis is initially managed with instructions like keeping patient nil per oral (NPO), adequate fluid management via intravenous route, analgesics, antibiotics followed by interval cholecystectomy.[3-7]

Earlier, it was believed that laparoscopic intervention for acute pancreatitis lengthens operative times and converts it to the open procedure more often than the elective setting.

We have considered laparoscopic cholecystectomy done within 2 weeks of admission as index and those performed in later admissions as delayed 2 weeks have been chosen to assess the patient about risks of anaesthesia and surgical complications. Also, mean operative time for laparoscopic cholecystectomy is 30 to 45 minutes.

Hence this observational comparative study aims to compare the duration of operation and overall intra operative and postoperative outcomes of patients after index laparoscopic cholecystectomy vs delayed one, for biliary pancreatitis at tertiary care centres.[8]

Aim & Objectives

Aim: To study the impact of timing of cholecystectomy in biliary pancreatitis patients intra operatively & post operatively.

Primary Objective: To determine the effect of timing of performing laparoscopic cholecystectomy on rates of difficulty in dissection faced by surgeons.

Secondary Objectives

1. To determine the rates of cholecystectomy complications like
- Bleeding
- Biliary injuries
- SSI

2. To compare and determine the relation between timing of laparoscopic cholecystectomy and the rate of conversion to open.
3. To compare the average length of hospital stay postoperatively.

MATERIALS AND METHODS

Study Site: Department of General Surgery, Rajendra Institute of Medical Sciences (RIMS), Ranchi.

Study Duration: The data collection was started after receiving clearance from the institutional ethics committee (IEC) till June 2024.

Design Of Study: Tertiary centre hospital based observation comparative study.

Study Population: All patients with a diagnosis of acute biliary pancreatitis undergoing laparoscopic cholecystectomy at department of general surgery at Rajendra Institute of Medical Sciences, Ranchi (RIMS, Ranchi) as per their inclusion and exclusion criteria as mentioned below.

Sample Size: The rate of difficult dissection in early cholecystectomy groups was found to be 15%.[9] Assuming the error to be 7%, the sample size was calculated as follow for comparing proportions:

The sample size (n) is calculated as follows for comparing proportions:

The sample size (n) is calculated according to the formula

$n = z2p(1-p)/e2$

Where z=1.96 for a confidence level (α) of 95%, p = proportion (expressed as a decimal),

e = margin of error

$1.962 \times 15 (100-15)/ 72$

According to the above formula, n comes out to be 100.

Inclusion criteria:

- Patients admitted in a surgical ward with gallstone pancreatitis and planned for laparoscopic cholecystectomy.
- Patients above 18 years of age and below 60 years of age.
- The patients were included in the study after getting a written informed consent to participate in the study.
- Mild cases of biliary pancreatitis according to revised Atlanta classification.

Exclusion criteria:

- Patients with significant medical diseases rendering them unfit for laparoscopic surgery.
- Patients who were not willing to participate in the study.
- Patients with ASA grade more than 3.
- Patients with local or systemic complications of acute pancreatitis i.e, moderately severe or severe cases according to Atlanta classification.
- Patients with concomitant CBD dilatation, CBD stones.
- Patients with history of previous open upper abdominal surgery with extensive adhesions

ISSN (O): 2687-5365; ISSN (P): 2753-6556

- Pregnant patients
- Patients with co-existing common bile duct (CBD) stones with ductal dilatation, acute cholangitis or acute pancreatitis.
- Severe cardiopulmonary disease
- Patients unable to tolerate general anaesthesia
- Refractory coagulopathy

Case Definitions

1. ACUTE MILD BILIARY PANCREATITIS: Acute biliary pancreatitis was defined as inflammatory disorder of the pancreas characterised by edema, and when severe, necrosis [70]; with following features:

- Severe constant epigastric pain that often radiates through to the mid back and tenderness ± murphy's sign noted on palpation of the epigastrium and/or RHC
- Ultrasound findings suggestive of gallstone induced pancreatitis–bulky and edematous pancreas, thickening of the gallbladder wall to greater than 4 mm and pericholecystic fluid along with one or more gallstones and/or biliary sludge in GB.
- No signs of local or systemic complications fulfilling criterias of mild cases of Atlanta classification.
- 3 times elevation of serum amylase and lipase levels.

2. Index laparoscopic cholecystectomy: Laparoscopic cholecystectomy performed during initial admission, after resolution of initial inflammatory phase, before discharge, early in the disease process, assuming within 2 weeks of initial onset of symptoms. [54,65]

3. Delayed Laparoscopic Cholecystectomy: Laparoscopic cholecystectomy performed after conservative management ,discharge and readmission after 2 weeks of the initial episode/after primary discharge (average 4-6 weeks). [54]

Methodology

Work up of the patient

Patients were planned for early laparoscopic cholecystectomy and delayed laparoscopic cholecystectomy as per operating surgeon's advice, patient's consent, convenience and general status. As per the consent given by the patients, the patient underwent their respective surgeries and the intraoperative and postoperative outcomes were observed.

After obtaining a detailed history, thorough general physical and systemic examination was done for every patient. A complete history of all patients with acute pancreatitis/epigastric pain was taken followed by complete physical examination.

Symptoms suggestive of acute pancreatitis were noted as follows:

- Severe constant epigastric pain that often radiates to the mid back, nausea and vomiting and/or fever.

Physical examinations suggestive of acute pancreatitis were noted as follows:

- tenderness noted on palpation of the epigastric region and/or right upper quadrant or generalised in nature, voluntary cessation of respiration when the examiner exerts constant pressure under the right costal margin (Murphy's sign), guarding in epigastrium and/or the right upper quadrant, raised temperature, tachycardia, hypovolemia. Rarely, pancreatic fluid and bleeding from pancreas into retroperitoneum may present as Cullen's sign or Grey Turner's sign. Tetany may manifest due to hypocalcemia.

Relevant investigations were done, which included serum amylase, serum lipase, complete blood count, differential leucocyte count, arterial blood gas analysis, bleeding time, clotting time, PT-INR, blood urea, serum creatinine, blood sugar, serum electrolytes (sodium, potassium, calcium), liver function test. (Bilirubin levels may be mildly elevated (upto 5 mg/dl)), serology where indicated.

X-ray chest, electrocardiogram, and USG whole abdomen and pelvis was done.

Ultrasound findings suggestive of acute biliary pancreatitis were:-

Ultrasound findings suggestive of gallstone induced pancreatitis–bulky and edematous pancreas, peripancreatic fluid collection, thickening of the gallbladder wall to greater than 4 mm and pericholecystic fluid along with one or more gallstones and/or biliary sludge in GB and/or in bile ducts. Sonographic Murphy sign documenting tenderness specifically over the gallbladder. Additional USG findings suggestive of gallstones were: - echogenic focus with a characteristic shadowing behind the stone which moves on positional changes of the patient suggestive of presence of calculus.

CECT was done only when required in following conditions –

1. If there is diagnostic uncertainty.
2. In patients with severe acute pancreatitis, to distinguish interstitial from necrotising pancreatitis
3. In patients with organ failure, signs of sepsis or progressive clinical deterioration.
4. When a localised complication is suspected, such as fluid collection, pseudo-cyst or a pseudoaneurysm.

Patients in the early group were given initial conservative treatment till the resolution of the initial inflammatory phase and operated in the next available OT list, within 14 days of onset of symptoms. While patients in the delayed group were treated with intravenous fluids, antibiotics, and analgesics. Patients who responded to conservative treatment were discharged after a complete relief of symptoms. They were called for laparoscopic cholecystectomy after 2 weeks, preferably within 6 weeks, when the acute episode had subsided.

Laparoscopic Cholecystectomy

1. Patients fasted for a minimum of 8 hours prior to the operation.
2. The patient was placed under general anaesthesia.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

3. The surgeon stands to the left of the patient and the first assistant on the patient's right.
4. Trocar placement was done –

- A 10 mm port was placed in the umbilical region. Port creation was created via Hasson's/open method or by closed method using a Veress needle
- a 10-mm laparoscope was inserted into the abdomen through the periumbilical port and the abdominal cavity was visually explored. Any peritoneal collection, saponification or signs of peritoneal inflammation noted.
- The first 5-mm trocar was placed along the right anterior axillary line between the 12th rib and the iliac crest. This trocar was at least 2 finger breadths inferior to the costal margin and as lateral as possible while remaining anterior to the ascending colon.
- A second 5-mm port was inserted in the right subcostal area in the midclavicular line. Grasping forceps are placed through these 2 ports to secure the gallbladder.
- The fourth working port was then inserted through an incision in the midline of the epigastrium. This trocar was inserted approximately 5 cm below the xiphoid process,
- The patient was placed in a reverse Trendelenburg position of 30 degrees while rotating the table to the left by 15 degrees.
- The assistant manipulated the lateral grasping forceps, which was used to grasp the fundus of the gallbladder and elevate the liver in a lateral and cephalad direction, rolling the entire right lobe of the liver cranially.
- The adhesions were lysed bluntly by grasping them with dissecting forceps at their site of attachment to the gallbladder wall and gently stripping them down toward the infundibulum.
- After exposing the infundibulum, blunt grasping forceps held in the surgeon's left hand and placed through the midclavicular trocar was used to grasp and place traction on the neck of the gallbladder placing traction on the gallbladder in a lateral direction to distract the cystic duct from the CBD.
- Maryland was used to dissect away the overlying structures from the infundibulum of the gallbladder. The dissection was started from a known structure, 4 or 5 cm proximal to the neck of the gallbladder and proceeds distally, such that a modified "top-down" technique is employed.

Alternatively, CVS technique or semi to-down technique was used according to operating surgeons choice and intraoperative difficulties faced by him/her. The gallbladder was freed from its bed such that there was a window beneath it through which the liver substance can be seen. This dissection was initiated on the lateral (ie, anatomic right) side of the gallbladder. During this portion of the dissection, the infundibulum was retracted medially and superiorly.

- Blunt dissection was used to create a "window" in the lateral edge of the peritoneum overlying the gallbladder. An L-shaped electrocautery hook was used to open the rest of the lateral peritoneal edge, heading toward the gallbladder fundus, away from the cystic duct and portal structures.
- We then retracted the infundibulum laterally and inferiorly and repeated this process to open the medial peritoneal edge of the gallbladder.
- After both peritoneal edges had been opened, the hepatocystic triangle is maximally opened and converted into a trapezoid shape by retracting the infundibulum of the gallbladder inferiorly and laterally while maintaining the fundus under traction in a superior and medial direction.
- To expose the reverse of the Calot triangle, the infundibulum of the gallbladder was pulled in a superior and medial direction.
- The neck of the gallbladder was thus dissected away from its liver bed, leaving a large window at its base through which the liver parenchyma is visualised. At least one-third of the cystic plate (ie, gallbladder bed) was exposed in this manner. At this point, there were 2, and only 2, structures (the cystic duct and artery) crossing this window—this is the "critical view of safety," which should be demonstrated prior to clipping or cutting any tubular structures.
- The cystic duct was clipped using an endoscopic clip applier and divided using scissors. Two clips were placed distally on the cystic duct, and 1 clip was placed toward the gallbladder. For cystic ducts that are large or friable, a preformed endoloop was preferable for ligating the distal cystic duct.
- After the duct was divided, the cystic artery was dissected from the surrounding tissue for an adequate distance to permit placement of 3 clips and division.
- The ligated stumps of the cystic duct and the artery were examined to ensure that there was no leakage of either bile or blood and that the clips were placed securely and compress the entire lumen of the structures without scissoring or impinging on adjacent tissues.
- A suction-irrigation catheter was used to remove any debris or blood.
- Separation of the gallbladder away from its hepatic bed was then initiated using an electrosurgical probe to coagulate small blood vessels and lymphatics. While maintaining cephalad traction on the fundus of the gallbladder with the auxiliary forceps, the midclavicular forceps pulled the neck of the gallbladder anterosuperiorly and then alternatively medially and laterally to expose and place the tissue connecting the gallbladder to its fossa under tension. An electrocautery spatula or hook was used to coagulate and divide the tissue.
- Dissection of the gallbladder fossa continued from the infundibulum to the fundus,

ISSN (O): 2687-5365; ISSN (P): 2753-6556

progressively moving the midclavicular grasping forceps cephalad to allow maximal countertraction.

- The dissection proceeded until the gallbladder was attached by only a thin bridge of tissue.
- At this point, prior to completely detaching the gallbladder, the hepatic fossa and porta hepatis were once again inspected for hemostasis and bile leakage. Small bleeding points were coagulated, and the right upper quadrant was liberally irrigated and then aspirated dry while checking for any residual bleeding or bile leakage.
- The final attachments of the gallbladder were divided, and the liver edge was again examined for hemostasis.
- A sub hepatic drain was placed via the right anterior axillary port using blunt dissecting forceps through the sub xiphoid port and fixed with nonabsorbable silk sutures in cases where indicated.
- After the cholecystectomy had been performed, the gallbladder was removed from the abdominal cavity. The gallbladder was then placed within an entrapment sac prior to extracting it through the abdominal wall particularly if the gallbladder had been perforated intraoperatively or if the specimen is large.
- If the stone burden was small, the gallbladder was removed at the umbilical port site.
- The laparoscope was removed from the umbilical port and placed through the epigastric port. Large "claw" grasping forceps were introduced through the umbilical port to grasp the infundibulum of the gallbladder.
- The forceps, trocar, and gallbladder neck were then retracted as a unit through the umbilical incision. The neck of the gallbladder was thus exteriorized through the anterior abdominal wall with the fundus remaining within the abdominal cavity. If the gallbladder was not distended with bile or stones, it was simply withdrawn with gentle traction.
- In many cases, a suction catheter introduced through an incision in the gallbladder neck was used to aspirate bile and small stones. Stone forceps could also be used to extract or crush calculi if necessary. Occasionally, the fascial incision was extended to extract larger stones or thick-walled gallbladders.
- Each incision was infiltrated with bupivacaine for postoperative analgesia. The fascia of the umbilical incision was closed with 1 or 2 large absorbable sutures in an interrupted or figure-of-8 fashion.
- The skin of the subxiphoid and umbilical incisions and the 5 mm ports were closed with non-absorbable sutures.
- The patient was transferred to the postanesthesia care unit. Patients were allowed out of bed as soon as they were fit enough to walk. They were allowed orally after 12 hours and ambulation was started.
- Patients were evaluated 1 week following surgery.

Intraoperative Outcomes Measured –

1. Duration of laparoscopic cholecystectomy: Time starting from insertion of umbilical port to extraction of gallbladder.
2. Difficulty in dissection- Intraoperative difficulties in dissection of gallbladder and calot's triangle was assessed according to the Parkland grading system[43].
3. Bile duct injury – Seen as bile in the operative field (with maintained gall bladder continuity and obvious CBD/accessory/sectoral/right or left hepatic duct/hilar injury). Pancreatitis or its sequelae can leave tissues around the hepatobiliary and pancreatic system with friability and/or dense adhesions, thus making it more vulnerable to any kind of iatrogenic injury. Here, it was graded according to Hannover classification.[47]
4. Bleeding (Significant) – As bleeding is obvious in any surgical intervention and determines further prognosis of the patient, it needs separate consideration. Significant bleed is usually when it requires irrigation and suctioning or gauze to clear the field, but it varies surgeon to surgeon. Therefore, in this study it was graded as per VIBe scale [46].
5. Conversion to open cholecystectomy – Requiring conversion to open cholecystectomy anytime in the surgery.

Postoperative Outcomes Measured –

1. Post operative pain – Measured using visual analogue scale
2. Surgical Site Infection - Infections of the skin, subcutaneous tissue, deep soft tissue or any part of the anatomy manipulated during surgery, other than the incision within 30 days of surgery. Signs of inflammation along the wound, serous/purulent discharge from the wound or wound dehiscence is assessed.
3. Duration of stay - Duration of stay from the day of admission to the day of discharge was compared between early and delayed laparoscopic cholecystectomy; due to any possible cause.

The patient was followed up on POD 10 and evaluated for wound site inspection and pain management and for return-to-work status.

The intra operative and postoperative complications and outcomes were observed and evaluated and noted as per the performa given below. The patients will be followed throughout their entire course of treatment.

Data Collection: Data was collected and entered in a predesigned study proforma (Annexure-1) and subsequently in the master chart (Annexure 3) using MS Excel sheet, which included patient's demographics, timing of operation, operative

ISSN (O): 2687-5365; ISSN (P): 2753-6556

findings, operative time, intra or postoperative complications, and the length of hospital stay.

Statistical method: Data were checked for normality before statistical analysis. Categorical variables are expressed as Number of patients and percentage of patients and compared across the groups using Pearson's Chi Square test for Independence of Attributes/ Fisher's Exact Test as appropriate.

Continuous variables are expressed as Mean, Median and Standard Deviation and compared across the groups using Mann-Whitney U test since the data does not follow normal distribution. The statistical software SPSS version 25 has been used for the analysis. An alpha level of 5% has been taken, i.e. if any p value is less than 0.05 it has been considered as significant.

RESULTS

The present study was conducted in the Department of General Surgery, Rajendra Institute of Medical Sciences, RIMS, Ranchi. A total of 100 patients diagnosed with acute mild biliary pancreatitis were included in the study, 42 patients in the early group and 58 patients in the delayed group.

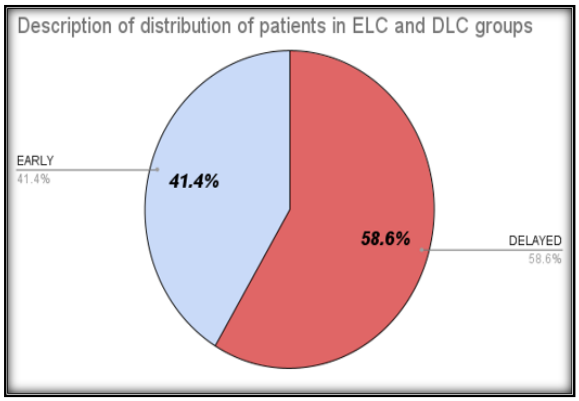

Figure 1: Description of distribution of patients in Early and Delayed groups

Age Distribution

Table shows the comparison of age distribution between the two groups under the study. It was observed that under the Early Laparoscopic Cholecystectomy group 2.38% (1/42) patients were in 21-30 years of age, 21.43% (9/42) were in 31-40 years, 38.1% (16/42) in 41-50 years, 33.33% (14/42) in 51-60 years and 4.76% (2/42) in the 61-70 years age group. Similarly, under the DLC group 0% (0/58) patients were in 21-30 years age group, 10.34% (6/58) were in 31-40 years, 36.21% (21/58) in 41-50 years, 41.38% (24/58) were in 51-60 years, 12.07% (7/58) were in 61-70 years age group.

There was no significant difference in age distribution between the two groups (p value 0.262). It was also observed that the mean age of the Early group was 47.86 ± 8.43 years and mean age of the Delayed group was 51.53 ± 8.50 years.

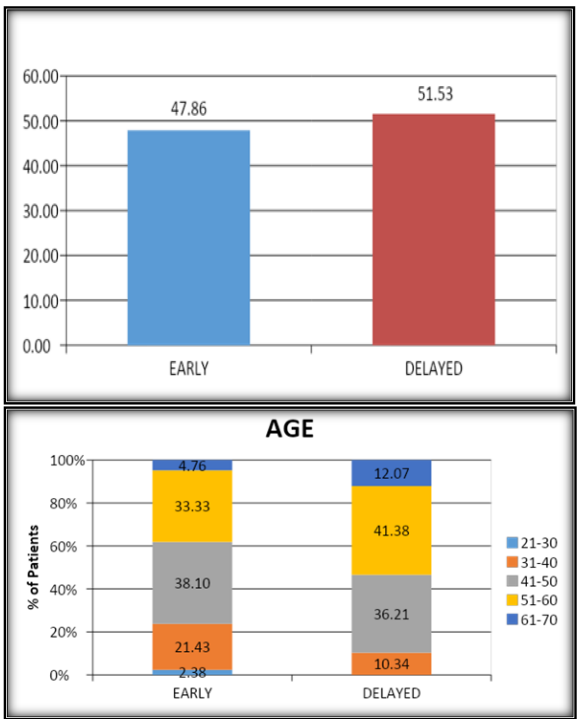

Figure 2: Diagrams explaining comparison of patient's age in Early and Delayed groups

Sex Distribution: Table shows the comparison of sex distribution between the two groups. It was observed that under the Early group 66.67% (28/42) patients were females while 33.33% (14/42) were males. Similarly, under the Delayed group 60.34% (35/58) patients were females while 39.66% (23/58) were males. The distribution of male and female patients undergoing laparoscopic cholecystectomy is 37.4%(37/100) and 62.6%(63/100) respectively. There was no statistically significant difference in sex distribution between the two groups (p value 0.518).

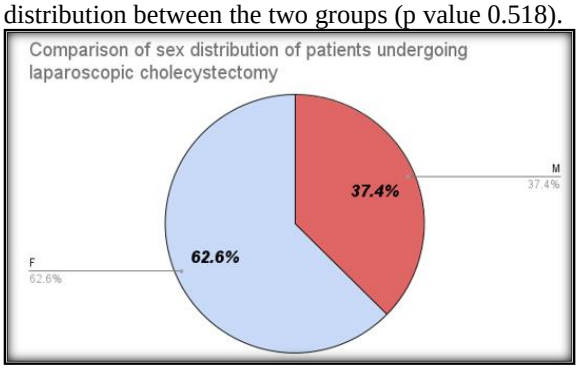

Figure 3: Comparison of sex distribution of patients undergoing laparoscopic cholecystectomy

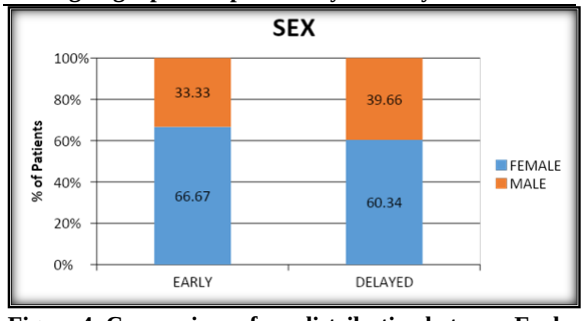

Figure 4: Comparison of sex distribution between Early and Delayed groups

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Duration of Pain (Days) Before Presentation

Table shows the comparison of distribution of patients according to time of presentation between the two groups under the study. It was observed that under the Early group, the mean duration of pain before presentation was 3.57± 1.48 days. Similarly, under the Delayed group, the mean duration of pain before presentation was 3.84 ± 1.48 days. The p value was 0.334 suggestive of no significant statistical difference between the two groups.

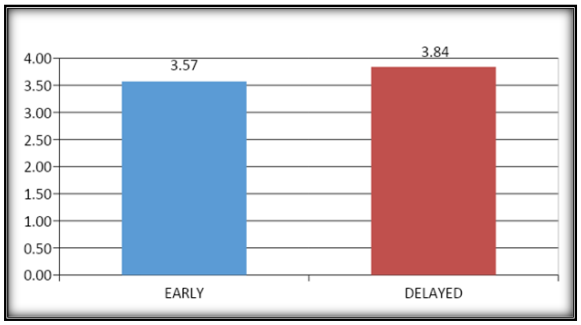

Figure 5: Comparison of SSI between Early and Delayed groups

Previous Episodes

Table shows the comparison of distribution of patients according to the history of previous episodes between the two groups under the study. It was observed that under the Early group, the mean number of patients with history of previous episodes were 16. Similarly, under the Delayed group, the mean number of patients with history of previous episodes were 34. The p value was 0.334 suggestive of significant statistical difference between the two groups.

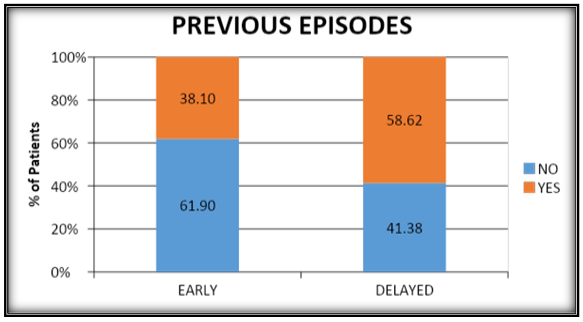

Figure 6: Comparison of previous episodes between Early and Delayed groups

Laboratory Data

Haemoglobin, platelet count and renal function test were normal in all the patients.

Total Leukocyte Count

Table shows the comparison of TLC between the two groups. The normal range of a TLC test typically falls between 4,000 and 11,000 white blood cells per microliter of blood. Thus, dividing the data into three groups: low- <4000,
normal- between 4000-11,000 and
high- >11000

It was observed that under the Early group 2.38% (1/42) patients had TLC < 4000, 69.05% (29/42) patients had TLC in normal range while 28.57% (12/42) had TLC >11,000. Under the Delayed group 0% (0/58) patients had TLC < 4000, 58.62% (34/42) patients had TLC in normal range while 41.38% (24/42) had TLC >11,000. There was no statistically significant difference in TLC between the two groups (p value = 0.233). The mean TLC count in the Early group was 8815.05 ± 3532.49/mm3 and in the delayed group was 9398.28 ± 3372.06/mm3; p value being 0.367 which is statistically insignificant.

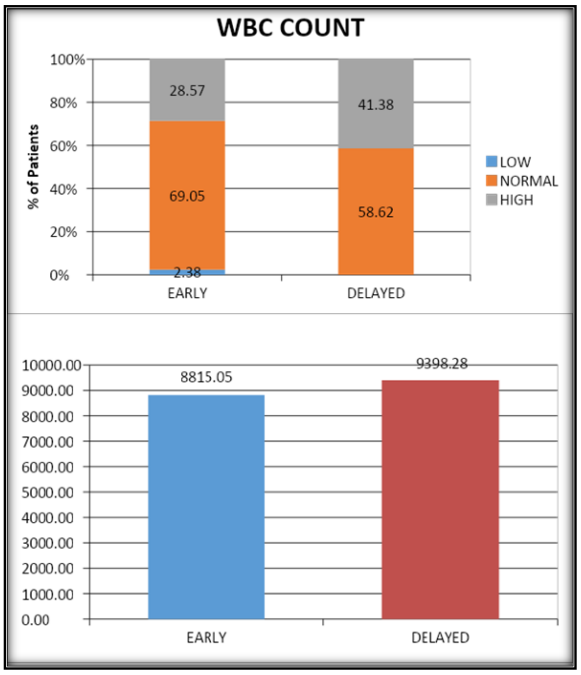

Figure 7: Comparison of TLC in Early and Delayed groups

Liver Function Test

Total Bilirubin: The mean of total bilirubin was 0.86mg/dl in the early group and 0.67 mg/dl in the delayed group. The difference was statistically insignificant (p = 0.399). Percentage of patients with high value of total bilirubin in Early group was 7.14% (3) and in Delayed group was 3.45% (2); p value being 0.403 which is not statistically significant.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

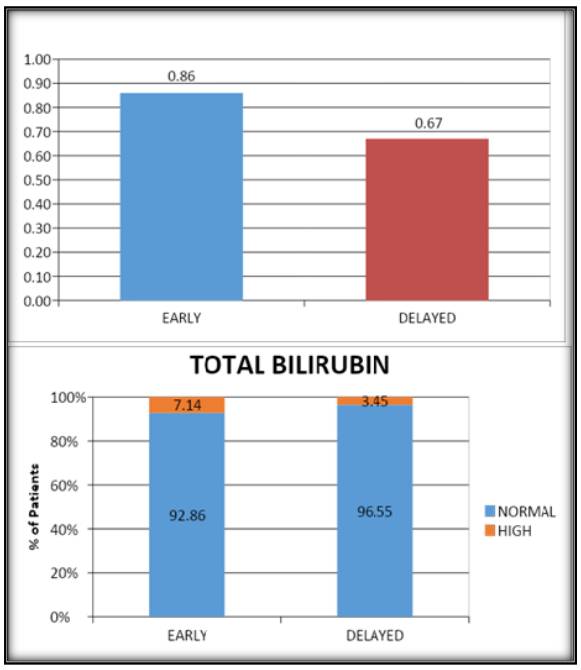

Figure 8: Comparison of total Bilirubin between Early and Delayed groups

Direct Bilirubin: The mean of direct bilirubin was 0.39 mg/dl in the early group and 0.32 mg/dl in the delayed group. The difference was statistically insignificant (p = 0.494). Percentage of patients with high value of direct bilirubin in the Early group was 7.14% (3) and in the Delayed group was 3.45% (2); p value being 0.294 which is not statistically significant.

Indirect Bilirubin: The mean of indirect bilirubin was 0.46 mg/dl in the early group and 0.34 mg/dl in the delayed group. The difference was statistically insignificant (p = 0.760). Percentage of patients with high value of indirect bilirubin in the Early group was 7.14% (3) and in the Delayed group was 3.45% (2); p value being 0.810 which is not statistically significant.

SGPT: The mean SGPT was 46.57 ± 35.39 IU/l in the early group and 47.21± 44.88 IU/l in the delayed group. The difference was statistically insignificant (p = 0.711). Percentage of patients with a high value of SGPT in the Early group was 35.71% (15) and in the Delayed group was 37.93% (22); p value being 0.821 which is not statistically significant.

SGOT: The mean of SGOT was 53.52 ± 55.13 IU/l in the early group and 38.94 ± 29.88 IU/l in the delayed group. The difference was statistically insignificant (p = 0.942). Percentage of patients with a high value of SGOT in the Early group was 30.95% (13) and in the Delayed group was 29.31% (17); p value being 0.860 which is not statistically significant.

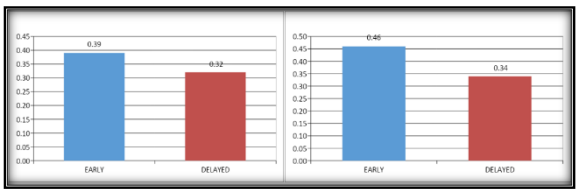

Figure 9: Comparison of (a) direct bilirubin and (b) indirect bilirubin between Early and Delayed groups.

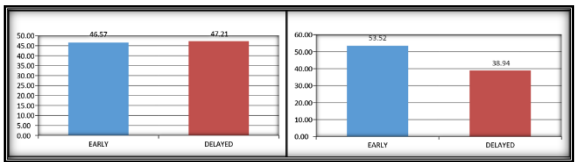

Figure 10: Comparison of (a) SGPT and (b) SGOT between Early and Delayed groups

Serum Amylase

The mean serum amylase was 1676.19 ± 953.46 IU/l in the early group and 1538.79 ± 889.14 IU/l in the delayed group. The difference was statistically insignificant (p = 0.465).

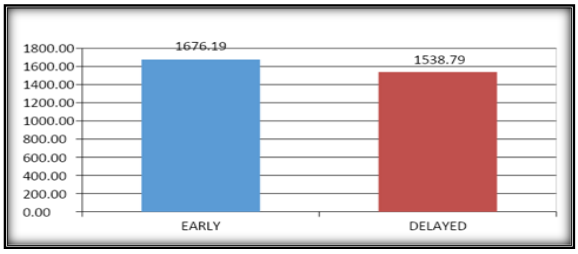

Figure 11: Comparison of serum amylase between Early and Delayed groups

Serum Lipase

The mean serum lipase was 1140.36 ± 574.53 IU/l in the early group and 1046.38 ± 529.19 IU/l in the delayed group. The difference was statistically insignificant (p = 0.321).

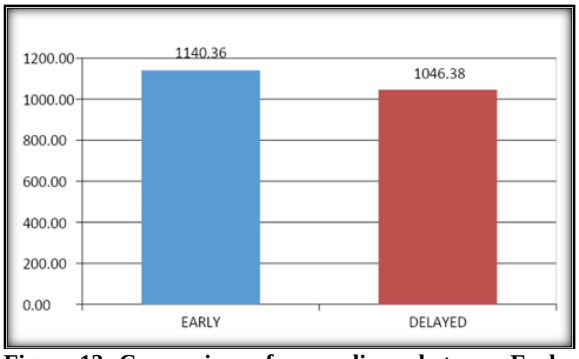

Figure 12: Comparison of serum lipase between Early and Delayed groups

Ultrasonographic Findings Gallbladder Stone

One of the importance of ultrasound in biliary pancreatitis is diagnosing aetiology of pancreatitis i.e, gallstones. In this study, gallstones are diagnosed of various sizes, single or multiple and in the form of sludge at times. Very often, Gallbladder walls showed thickening .The mean gallstone size in the early group was 11.50 ± 4.73 mm in the early group

ISSN (O): 2687-5365; ISSN (P): 2753-6556

and 14.66 ± 9mm in the delayed group. The difference was statistically insignificant (p = 0.063).

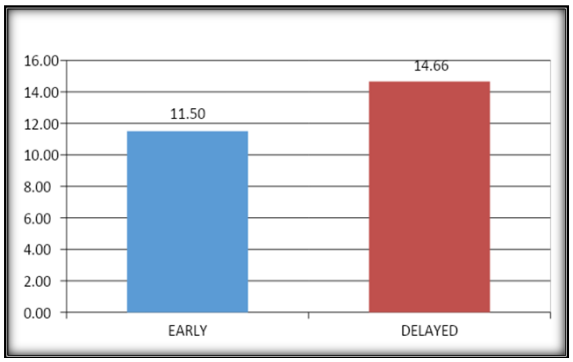

Figure 13: Comparison of USG finding about Gallbladder stone between Early and Delayed groups

Pancreas: While enlarged and edematous pancreas are classic sonographic features of acute pancreatitis, the pancreas may appear sonographically normal in the setting of acute pancreatitis. Sonographic findings of acute pancreatitis can be subtle and include changes in pancreatic echogenicity, glandular enlargement, pancreatic duct dilation and complications of pancreatitis such as peripancreatic fluid collections. Enlargement of the pancreas as well as hypoechoic or heterogeneous echotexture is caused by associated interstitial edema. Venous thrombosis, or arterial pseudoaneurysm can be identified with careful and focused ultrasound examination. Following is a figure summarising the various USG comments which helped in diagnosing pancreatitis and percentage of patients having them:

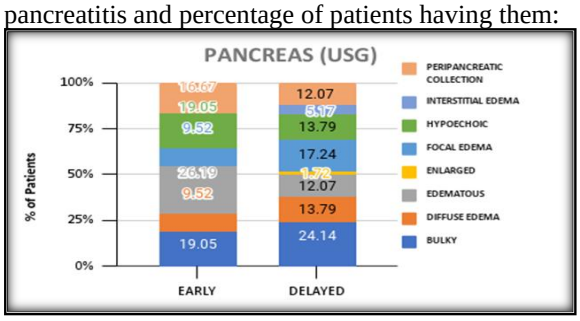

Figure 14: Comparison of USG findings about pancreas between Early and Delayed groups

Bile Duct Injury: Table shows the comparison of Bile Duct Injury between the two groups. It was observed that under the index group 16.66% (7/42) had bile duct injury and 5.17% (3/58) of the patients under the delayed group had bile duct injury. The calculated p value = 0.122, implied no significant statistical difference between the two groups. The bile duct injury was secondary to friable anatomy and was evidenced as bile in the sub hepatic drain in the postoperative period. However, it was managed conservatively, and the drain output gradually reduced to zero and the drain was removed.

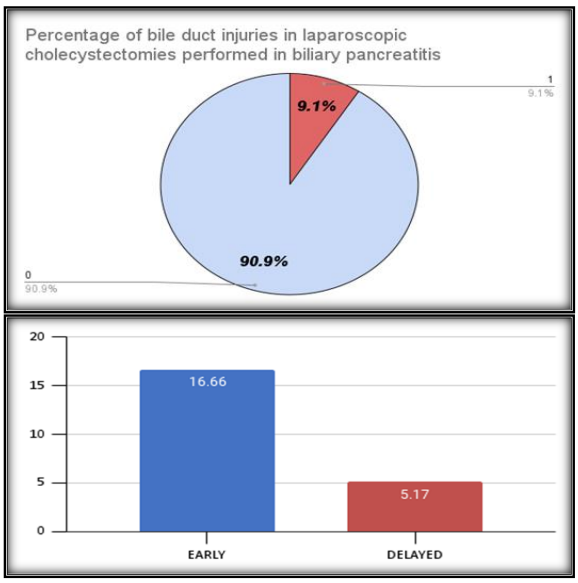

Figure 15: Comparison of bile duct injuries between Early and Delayed groups

Incidence of bleeding: Table shows the comparison of incidence of bleeding between the two groups. Bleeding was assessed according to VIBe (Validated Intraoperative Bleeding) Scale [46]. It was observed that under the early group 16.67% (7/42) had 0 grade bleeding, 21.43% (9/42) had 1 grade, 33.33% (14/42) had 2 grade and 28.57% (12/42) had 3 grade bleeding. Under the Delayed group 37.93% (22/58) had grade 0 bleeding, 50% (29/58) had grade 1 bleeding, 10.34% (6/58) had 2 grade bleed and 1.72% (1/58) had grade 3 bleeding. The p value is <0.001 and is statistically significant. The bleeding in the index group was secondary to the friable anatomy and in the Delayed group was secondary to the dense adhesions and frozen calot's triangle anatomy. And was measured in terms of bleeding requiring gauze for optimal visualisation and/or requiring irrigation and suction.

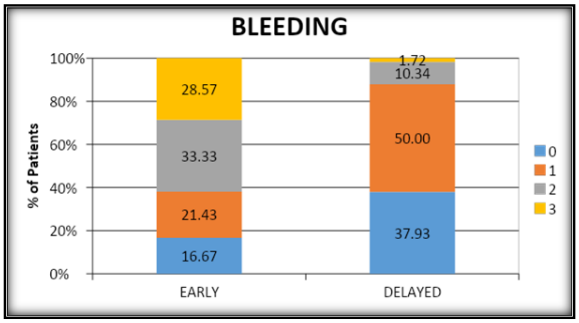

Figure 16: Comparison of bleeding between Early and Delayed groups

Conversion Rate: Table shows the comparison of conversion including open cholecystectomy and subtotal cholecystectomy between the two groups. It was observed that under the Early group 23.81% (10/42) had conversion while under the Delayed group 12.07% (7/58) of the patients had conversion. Patients in Delayed underwent conversion mostly due to frozen calot's triangle and difficult and unclear

ISSN (O): 2687-5365; ISSN (P): 2753-6556

anatomy. Among the Early group, cause was friable anatomy and bleeding. It was observed that there was no significant difference in the conversion rate between the two groups (p value 0.123).

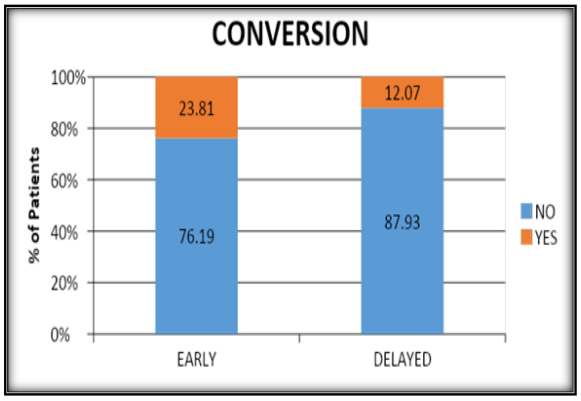

Figure 17: Comparison of conversion rate between Early and Delayed groups

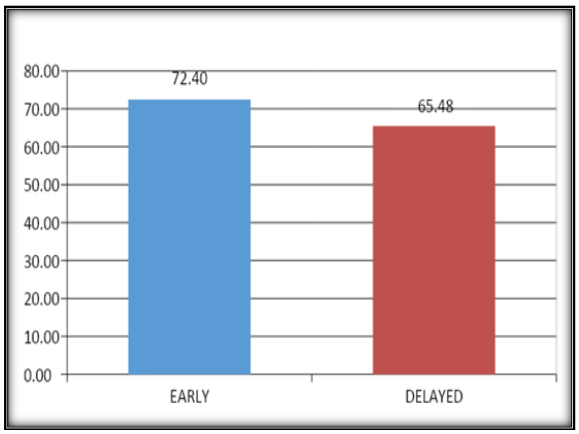

Figure 18: Comparison of Duration of surgery between index/early and Delayed groups

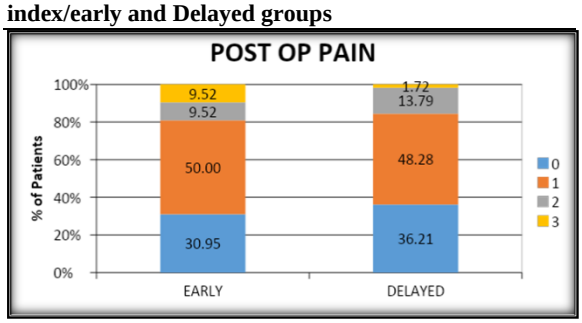

Figure 19: Comparison of pain score between index and Dealyed groups

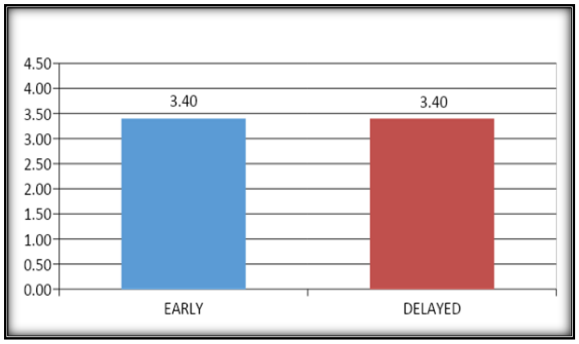

Figure 20: Comparison of Length of hospital stay between ELC and DLC groups

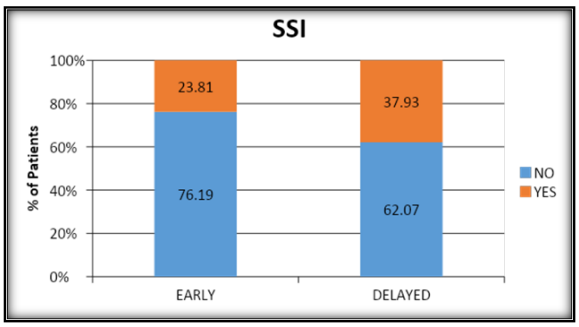

Figure 21: Comparison of SSI between ELC and DLC groups

Comparison of Pain Scores: Table shows a comparison of VAS scores at 24 hours between the two groups. VAS score on 100 mm scale was interpreted as: 0- 0 to 4mm- no pain
1- 5 to 44mm- mild pain
2-45 to 74 mm- moderate pain
3-75 to 100 mm- severe pain
It was observed that under the index group, VAS score at 24 hr was 0 in 30.95% (13/42), 1 in 50% (21/42), 2 in 9.52% (4/42) and 3 in 9.52% (4/42) patients . Similarly, for the Delayed group VAS score at 24 hr was 0 in 36.21% (21/58), 1 in 48.28% (28/58), 2 in 13.79% (8/58) and 3 in 1.72% (1/58). There was no significant difference in VAS scores (p value of 0.315) when compared between two groups.
Length of Hospital Stay: Table shows the Length of Hospital Stay between the two groups. It was observed that under the index group mean hospital stay was 3.40 ± 1.74 days while in the Delayed group it was 3.40 ± 1.23 days. Further it was observed that there was no statistical significance between the two groups (p value = 0.234).
Surgical Site Infection (SSI): Table shows the SSI between the two groups. It was observed that under the index group SSI was in 23.81% (10/42) cases while in the Delayed group it was in 37.93% (22/58) cases. Further it was observed that there was no statistical significance between the two groups (p value = 0.135).
Difficulty in Dissection: Table shows the intra operative difficulty in laparoscopic cholecystectomy faced by the operating surgeon between the two groups. It was assessed by Parkland grading scale [44][45]. It was observed that under the index group Difficulty in dissection was grade 0 in 0% (0/42), grade 1 in 16.67% (7/42), grade 2 in 26.19% (11/42), grade 3 in 40.48% (17/42) and in 16.67% (7/42) cases, while in the Delayed group Difficulty in dissection was grade 0 in 1.72% (1/58), grade 1 in 39.66% (23/58), grade 2 in 48.28% (28/58), grade 3 in 8.62% (5/58) and grade 4 in 1.72% (1/58) cases. Further it was observed that there was statistical significance between the two groups (p value <0.001).

ISSN (O): 2687-5365; ISSN (P): 2753-6556

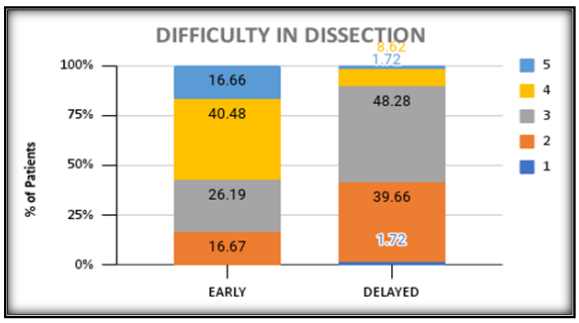

Figure 22: Comparison of difficulty in dissection between index and delayed groups

Table 1: Description of distribution of patients in Early and D groups.

Groups	Frequency	%
Early Laparoscopic Cholecystectomy	42	41.4
Delayed Laparoscopic Cholecystectomy	58	58.6
Total	100	100

Table 2: Comparison of age distribution between Early and Delayed groups

		Operation		Total		
		Index/early	Delayed		P value	Significance
AGE (IN YR)	21-30	1(2.38)	0(0)	1(1)	0.262	Not Significant
	31-40	9(21.43)	6(10.34)	15(15)		
	41-50	16(38.1)	21(36.21)	37(37)		
	51-60	14(33.33)	24(41.38)	38(38)		
	61-70	2(4.76)	7(12.07)	9(9)		
Total		42(100)	58(100)	100(100)		
MEAN ± SD		47.86±8.43 YR	51.53±8.50 YR			

Table 3: Comparison of sex distribution of patients undergoing laparoscopic cholecystectomy

Sex	Frequency	Percent
Female	63	62.6%
Male	37	37.4%
Total	100	100%

Table 4: Comparison of sex distribution between Early and Delayed groups

		Operation		Total		
		Index/ early	Delayed		P value	Significance
Sex	Female	28(66.67)	35(60.34)	63(63)	0.518	Not significant
	Male	14(33.33)	23(39.66)	37(37)		
Total		42(100)	58(100)	100(100)		

Table 5: Comparison of duration of pain between Early and Delayed groups

	Cholecystectomies						P value	Significance
	Early			Delayed				
	Mean	Median	Sd	Mean	Median	Sd		
Duration of pain (days)	3.57	4.00	1.48	3.84	4.00	1.48	0.334	Not significant

Table 6: Comparison of Previous episodes between Early and Delayed groups

		Operation		Total		
		Index/ early	Delayed		P value	Significance
PREVIOUS EPISODES	NO	26(61.9)	24(41.38)	50(50)	0.043	Significant
	YES	16(38.1)	34(58.62)	50(50)		
Total		42(100)	58(100)	100(100)		

Table 7: Comparison of TLC in Early and Delayed groups

		Operation		Total		
		Index/ early	Delayed		P value	Significance
WBC COUNT	Low	1(2.38)	0(0)	1(1)	0.233	Not Significant
	Normal	29(69.05)	34(58.62)	63(63)		
	High	12(28.57)	24(41.38)	36(36)		
Total		42(100)	58(100)	100(100)		

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Table 8: Comparison of total bilirubin between Early and Delayed groups

		Operation		Total		
		Index/early	Delayed		P value	Significance
Total bilirubin	Normal	39(92.86)	56(96.55)	95(95)	0.403	Not significant
	High	3(7.14)	2(3.45)	5(5)		
Total		42(100)	58(100)	100(100)		

Table 9: Comparison of direct bilirubin between Early and Delayed groups

		Operation		Total		
		Index/ early	Delayed		P value	Significance
Direct bilirubin	Normal	3(7.14)	8(13.79)	11(11)	0.294	Not significant
	High	39(92.86)	50(86.21)	89(89)		
Total		42(100)	58(100)	100(100)		

Table 10: Comparison of indirect bilirubin between Early and Delayed groups

		Operation		Total		
		Index/ early	Delayed		P value	Significance
INDIRECT BILIRUBIN	LOW	10(23.81)	11(18.97)	21(21)	0.810	Not Significant
	NORMAL	31(73.81)	46(79.31)	77(77)		
	HIGH	1(2.38)	1(1.72)	2(2)		
Total		42(100)	58(100)	100(100)		

Table 11: Comparison of SGPT between Early and Delayed groups

		Operation		Total		
		Index/ early	Delayed		P value	Significance
SGPT	Normal	27(64.29)	36(62.07)	63(63)	0.821	Not significant
	High	15(35.71)	22(37.93)	37(37)		
Total		42(100)	58(100)	100(100)		

Table 12: Comparison of SGOT between Early and DLC groups

		Operation		Total		
		Index/ early	Delayed		P value	Significance
SGPT	Normal	29(69.05)	41(70.69)	70(70)	0.860	Not significant
	High	13(30.95)	17(29.31)	30(30)		
Total		42(100)	58(100)	100(100)		

Table 13: Comparison of Bile duct injury between index and delayed groups

		Operation		Total		
		Index/ early	Delayed		P value	Significance
SGPT	Normal	7(16.66)	3(5.17)	10(10)	0.122	Not significant
	High	35(83.33)	55(94.82)	90(90)		
Total		42(100)	58(100)	100(100)		

Table 14 : Comparison of bleeding between index and Delayed groups

		Operation		Total		
		Index/early	Delayed		p Value	Significance
Bleeding	0	7(16.67)	22(37.93)	29(29)	<0.001	Significant
	1	9(21.43)	29(50)	38(38)		
	2	14(33.33)	6(10.34)	20(20)		
	3	12(28.57)	1(1.72)	13(13)		
Total		42(100)	58(100)	100(100)		

Table 15: Comparison of conversion rate between Early and Delayed groups

		Operation		Total		
		Early/ index	Delayed		P value	Significance
Conversion	No	32(76.19)	51(87.93)	83(83)	0.123	Not significant
	Yes	10(23.81)	7(12.07)	17(17)		
Total		42(100)	58(100)	100(100)		

Table 16: Comparison of duration of surgery between index and Delayed groups

	Index/early (mean ± sd)	Delayed (mean± sd)	P value
Duration of surgery (min)	72.40 ± 30.71	65.48 ± 33.01	0.133

Table 17: Comparison of pain score between ELC and DLC groups

		Operation		Total		
		Index/early	Delayed		P value	Significance
Post op pain	0	13(30.95)	21(36.21)	34(34)	0.315	Not significant
	1	21(50)	28(48.28)	49(49)		

ISSN (O): 2687-5365; ISSN (P): 2753-6556

	2	4(9.52)	8(13.79)	12(12)		
	3	4(9.52)	1(1.72)	5(5)		
Total		42(100)	58(100)	100(100)		

Table 18: Comparison of length of hospital stay between index and Delayed groups

	Index/early (mean ± sd)	Delayed (mean± sd)	P value
Length of hospital stay (days)	3.40 ± 1.74	3.40 ± 1.23	0.234

Table 19: Comparison of SSI between INDEX and DELAYED groups

		Operation		Total		
		Index/early	Delayed		P value	Significance
Ssi	No	32(76.19)	36(62.07)	68(68)	0.135	Not significant
	Yes	10(23.81)	22(37.93)	32(32)		
Total		42(100)	58(100)	100(100)		

Table 20: Comparison of difficulty in dissection between index and Delayed groups

		Operation		Total		
		Index/early	Delayed		P value	Significance
Difficulty in dissection	1	0(0)	1(1.72)	1(1)	<0.001	Significant
	2	7(16.67)	23(39.66)	30(30)		
	3	11(26.19)	28(48.28)	39(39)		
	4	17(40.48)	5(8.62)	22(22)		
	5	7(16.67)	1(1.72)	8(8)		
Total		42(100)	58(100)	100(100)		

DISCUSSION

Laparoscopic cholecystectomy is a minimally invasive surgical procedure used for the removal of gallbladder which is the etiological factor of biliary pancreatitis. Since the early 1990s, this technique has largely replaced the open technique for cholecystectomies. Adopting laparoscopic cholecystectomy in a treatment of symptomatic biliary pancreatitis introduced a new spectrum of associated intraoperative and postoperative complications. Pancreatitis, one of the most feared diseases in surgical as well as medical field, has seen many advances in its mode of management ranging from conservative to invasive to minimally invasive. During this process, the exacerbation of inflammatory processes in the body, leaving the patient on the verge of death, is the most important concern for surgeons. Also, minor complications (biliary and non-biliary) are usually treated conservatively. Major complications (biliary and vascular) are life threatening and increase mortality rate, therefore creating the need for conversion to open surgical approach in order to treat them. Despite the vast variety of possible complications, the risk for complications decreases with the increasing experience in laparoscopic procedures of the operating surgeon. Thus, due to the minimal morbidity and mortality and increasing safety, laparoscopic procedures including laparoscopic cholecystectomy have emerged as gold standard procedures. Therefore, the aim of this study was to compare the safety, feasibility and outcome of early (done within the same admission setting and 14 days of onset of symptoms) versus Delayed (done after2 weeks and within 6 weeks of initial conservative management).

Age Distribution: Age was not statistically significant between the two groups (47.86 ± 8.43 years vs 51.53 ± 8.50 years, p value 0.262). In the early group maximum number of individuals were found in the age group 41-50 years while in the delayed group maximum individuals were in between 51-60 years. In comparison, in other studies the following average age of patients in the index and Delayed group was noted respectively, Chandak U et al,[50] had an average age of 42.55±15.57 years in Early and 48.52±17.71 years in Delayed group, Eğin S et al,[35] had an average age of 54.3±17 years and 51.9±15.4 years respectively, Demir U et al,[56] had an average age of 57.6±14.3 years and 58.2±14.7 years respectively, Cho NY et al,[57] had an average age of 53 years and 56 years respectively, Jee SL et L,[58] had an average age of 42.5 years and 42.5 years respectively, Sharma A et al,[61] had an average age of 56±19 years and 58±18 years respectively and Başkent A et al,[66] had an average age of 56 years each.

Sex Distribution: Females were more susceptible to Acute biliary pancreatitis with a ratio of approx 2:1 (F:M) in index and approx 1.52:1 (F:M) in the Delayed group. Women are more predicted to develop gallstones and hence its complications. Thus, the higher percentage of women as compared to men in the study group. Similar findings were found in many other studies on comparison of female:male ratio. Chandak U et al,[50] had a female:male ratio of 0.007:1 and 0.46:1 in Early and Delayed group respectively, Eğin S et al,[35] had a ratio of 3.7:1 and 2.65:1 respectively, Jee SL et L,[58] had a ratio of 1.11:1 and 1.61:1 respectively, Demir U et al[56] had a ratio of 2:1 and 2.307:1 respectively and Cho NY et al,[57] had a ratio of 1.95:1 and 1.88:1 respectively.

Bile Duct Injury: It was observed that under the index group 16.66% (7/42) had bile duct injury and 5.17% (3/58) of the patients under the Delayed group had bile duct injury. The bile duct injury was not evident intra operatively and postoperatively

ISSN (O): 2687-5365; ISSN (P): 2753-6556

presented as presence of bile in sub hepatic drain. However, it was a minor duct injury which resolved spontaneously and did not require any additional intervention. Walayat S et al,[64] reported risk difference for biliary complications was higher by 10.76% (95%CI: 8.51 to 13.01) in the delayed cholecystectomy group as compared to those who underwent early cholecystectomy. Jee SL et L,[58] had 2.94% (1/34) of patients in Delayed who had perioperative complication in the form of minor biliary injury secondary to fibrosis. In the study of Zhong et al,[51] ten studies involving 1646 patients evaluated the association on gallstone-related events between Early and Delayed. There was a significant difference between the 2 groups (RR = 0.17; 95% CI = 0.07–0.44; P = .0003; Fig. 7). Eğin S et al,[35] reported that two patients in group 2 (Delayed) developed bile leakage: in one patient, the leakage was identified as originating from a cystic duct stump and treated with a bile duct stent, whereas in the other patient, a diagnostic laparoscopy with biloma drainage was performed followed by ERCP and bile duct stenting on postoperative day 13. Chandak U et al,[50] stated that one patient who was among the late group (38 total in Delayed) i.e 2.63% patients in Delayed experienced biliary leak.

Conversion Rate: It was observed that under the index group 23.81% (10/42) had conversion while under the Delayed group 12.07% (7/58) of the patients had conversion. Patients in DLC underwent conversion mostly due to frozen calot's triangle and difficult and unclear anatomy. Among the early group, cause was friable anatomy and bleeding. Similarly various other studies reported a higher conversion rate in the early group, but the difference was statistically insignificant. They found the most common cause of conversion was unclear and distorted anatomy of ductal and vascular structures in Calot's triangle due to dense adhesions, edema, and exudates. Bisht A et al,[68] reported that the conversion rate in the Early group was 2.77%(1/36) due to friable and oedematous gallbladder which tore when grasped. While there was no conversion in the Delayed group. Başkent A et al [66] found conversion rate of 13.6% (3/22) in Early group and 8.7% (2/23) in Delayed group. The rates of conversion to open cholecystectomy in other studies are as follows – Soomro IA et al,[55] reported higher rates in Early and Delayed of 10% (5/50) and 60% (3/50) respectively, Demir U et al,[56] reported rates of 31.3% (5/16) and 12.5% (4/32) respectively, Zhong et al,[51] reported nineteen studies evaluated the association between Early and Delayed groups in terms of the rate of conversion to open cholecystectomy. There was no significant difference between the 2 groups (RR=1.00; 95% CI=0.75–1.33; P=.99. Jee SL et L,[58] reported rates of 4/38 (10.53%) in Early and 4/34 (11.76%) in delay respectively. Decision to convert the procedure to open cholecystectomy is upon the surgeon's discretion and is an appropriate alternative option in case of inability to proceed further in the procedure in case of either major bile duct injury, unclear anatomy or uncontrolled bleeding. It is observed that as more recent studies are undertaken, the increase in the surgeon's experience also increases the threshold of conversion to open cholecystectomy.

Duration of Surgery: In the present study duration of surgery was significantly higher in the index group as compared to the delayed group (72.40 ± 30.71 minutes vs 65.48 ± 33.01 minutes, p value 0.133). The increased duration of surgery in index was due to increased friability, difficulty in grasping, increased bleeding etc. The duration of surgery in the early group includes the time required for the longer learning curve associated with surgery in acute biliary pancreatitis. Jee SL et L,[58] had 80 minutes for Early groups and 85 minutes for Delayed groups. In study done by Zhong et al,[51] nine studies involving 1431 patients evaluated the association on operative time between the Early and Delayed groups. There was no significant difference between the 2 groups (MD = 1.60; 95% CI = 1.36 to 4.56; P = .29). Soomro IA et al,[55] reported 55 minutes in Early duration of surgery and 40 minutes in Delayed duration of surgery. Eğin S et al,[35] reported increased time of Early group 77.4±34.8 minutes as compared to Delayed group 76.7±33.4 minutes. Başkent A et al,[66] reported 57.8 min for Early groups and 45.7 minutes for Delayed groups. Bisht A et al,[68] reported 56.72±19.51 minutes in Early and 53.22±23.92 minutes in Delayed. Sharma A et al,[61] reported that among Group Early patients, operative time ranged from 19-40 minutes with a mean of 28.2±5.38 minutes. Among Group Delayed patients, operative time ranged from 18-36 minutes with a mean of 27.28±4.80 minutes.Walayat S et al.[64] showed the duration of surgery to be prolonged in the delayed cholecystectomy group by 39.11 min (95%CI: 37.44 to 40.77) as compared to the early group. Chandak U et al,[50] compared the duration of surgery in both the groups and observed that mean duration of the Surgery was significantly higher in the late group (82.10±6.93 minutes) as compared to the early group (71.84±9.47minutes). The p value for the same was <0.0001suggesting to be highly significant.

Bleeding: Table shows the comparison of incidence of bleeding between the two groups. Bleeding was assessed according to VIBe (Validated Intraoperative Bleeding) Scale.[46] It was observed that under the index group 16.67% (7/42) had 0 grade bleeding, 21.43% (9/42) had 1 grade, 33.33% (14/42) had 2 grade and 28.57% (12/42) had 3 grade bleeding. Under the delayed group 37.93% (22/58) had grade 0 bleeding, 50% (29/58) had grade 1 bleeding, 10.34% (6/58) had 2 grade bleed and 1.72% (1/58) had grade 3 bleeding. The p value is <0.001 and is statistically significant. The bleeding in the index group was secondary to the friable anatomy and in the Delayed group was secondary to the dense adhesions and frozen calot's triangle anatomy. Bleeding was considered significant when it required gauze for optimal visualisation and/or required irrigation and suction for clearing the operative field. Bleeding was

ISSN (O): 2687-5365; ISSN (P): 2753-6556

also measured in the study by Sharma A et al,[61] which reported that in Group Early, approximate intraoperative blood loss ranged from 10-50ml, however in Group Delayed, it ranged from 10-40 ml. In the study by Eğin S et al,[35] bleeding was encountered in 1/84 patients in the Delayed group, secondary to dense adhesions and none in early group. Walayat S et al,[64] reported that in the pooled patient population, the proportion of patients with intra-op bleeding was higher in the late cholecystectomy group by 0.41% (95%CI: -1.58 to 0.75) as compared to the early group. B. Devkaran et al,[65] reported the mean blood loss was 22.6 ml in Early and 18 ml in Delayed. Chandak U et al,[50] found bleeding among 8% of study subjects of the Early group while that in the study subjects of the late group was 47.37%. The p value on comparison was 0.029.

Postoperative Pain Scores: It was observed that under the index group, VAS score at 24 hr was 0 in 30.95% (13/42), 1 in 50% (21/42), 2 in 9.52% (4/42) and 3 in 9.52% (4/42) patients. Similarly, for the dealyed group VAS score at 24 hr was 0 in 36.21% (21/58), 1 in 48.28% (28/58), 2 in 13.79% (8/58) and 3 in 1.72% (1/58). Sharma A et al,[61] found that in postoperative analgesia requirement 3-7 injections of Aceclofenac were required in early Group, whereas 2-7 injections of Aceclofenac were required in delayed Group. The dose of analgesia requirement was calculated according to Visual Analogue Scale (VAS). Chandak U et al,[50] stated that postoperative increased pain in the abdomen was statistically significant; 5/38 (13.16%) in early and 17/38 (44.47%) in delayed.

Total Hospital Stay: In this study, it was observed that under the index group mean hospital stay was 3.40 ± 1.74 days while in the delayed group it was 3.40 ± 1.23 days. Many studies state that longer duration of total hospital stay in the delayed group was due to readmission, one for the conservative management during the acute episode and another for the definitive treatment and due to postoperative pain. In our study there was no readmission in the delayed group due to failure of conservative management. Sharma A et al,[61] found that hospital Stay in Group early patients ranged from 2-6 days with a mean of 3.04 days, whereas in Group II, it was from 1-5 days with a mean of 3.08 days. Başkent A et al,[66] stated that average length of hospital stay was 13.18 days in Group 1 and 8.3 days in Group 2. Eğin S et al,[35] found that average length of hospital stay was 7.6±3.0 days in early, 10.7±8.3 days in delayed. Soomro IA et al,[55] Postoperative hospital stay (days) 2+0.5 early, 2+1.5 delayed. Demir U et al,[56] found the average length of hospital stay 6.8 days in early, 9.4 days in delayed. Zhong et al,[51] found that in comparison with the delayed group, the early group was significantly correlated with lower length of stay (MD = 2.01; 95% CI = 3.15 to 0.87; P = .0006. Jee SL et al,[58] found that the total length of stay (LOS) is longer in the delayed group compared with the early group. In the delayed group, median total LOS is 9 days whereas it is 8 days in the early group. Riquelme F et al,[67] stated that the median LOS was significantly shorter in patients undergoing early as compared with the delayed group (58 vs. 167 h). Walayat S et al,[64] showed the late laparoscopic cholecystectomy group was associated with an increased length of stay by 88.96 h (95%CI: 86.31 to 91.62) as compared to early cholecystectomy group. Devkaran et al,[65] stated that mean hospital stay was 3.04 days in Group early and 3.02 days in Group delayed. Bisht A et al,[68] found that there was a significant difference in the total length of hospital stay (P <0.05) which was found to be prolonged in patients who had a delayed cholecystectomy (mean±SD: 10.44±2.55 days) as compared to cholecystectomy performed on index admission (mean±SD: 6.48±5.09 days). Sharma R et al,[63] found the respective length of stay: immediate, 4 days; versus early, 6 days; late, 19 days. Chandak U et al,[50] observed that mean duration of hospital stays for early group study subjects (7.55±2.77) was significantly lower as compared to the Late group study subjects (15.39±6.74).

Difficulty in dissection: It was assessed by Parkland grading scale.[44,45] It was observed that under the index group Difficulty in dissection was grade 0 in 0% (0/42), grade 1 in 16.67% (7/42), grade 2 in 26.19% (11/42), grade 3 in 40.48% (17/42) and in 16.67% (7/42) cases, while in the delayed group Difficulty in dissection was grade 0 in 1.72% (1/58), grade 1 in 39.66% (23/58), grade 2 in 48.28% (28/58), grade 3 in 8.62% (5/58) and grade 4 in 1.72% (1/58) cases. It was studied by many others. Sharma A et al,[61] reported that Calot's Triangle anatomy was clear in 20/25 (80%) patients in Group early and 21/25 (84%) patients in Group delayed. Bisht A et al,[68] reported difficulty in dissection in 9/36 patients in the early group and in 2/10 patients in the delayed group. Başkent A et al,[66] stated that the cause of difficult dissection in Group 1 (early) was excessive inflammation and inability to fully reveal the anatomical structures. Jee SL et L,[58] included five patients who were found to have severe inflammatory adhesions that precluded safe dissection of the Calot's triangle, 4/34 in delayed and 1/38 in early. B. Devkaran et al,[65] reported that Calot's triangle anatomy was unclear in 40 (20%) cases in Group A i.e early and 32 (16%) cases in Group B i.e delayed Chandak U et al,[50] stated that difficult dissection was found in 15.79% of the early group subjects and in 18.42% of the late group subjects.

SSI: In this study, it was observed that under the index group SSI was in 23.81% (10/42) cases while in the delayed group it was in 37.93% (22/58) cases. Further it was observed that there was no statistical significance between the two groups (p value = 0.135). Demir U et al,[56] reported wound infection 3/48 in early Group and wound infection 5/43 in delayed Group.

Limitation

1. Long term follow up of patients was not done.
2. Sample size is small thus reduces the power.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

3. Being a comparative study, randomisation was not done.

CONCLUSION

This comparative observational study was conducted in the Department of General Surgery, RIMS, Ranchi to evaluate the clinical outcome of index laparoscopic cholecystectomy versus delayed laparoscopic cholecystectomy in acute biliary pancreatitis.

- The study included 100 patients of age 18-60 years, who were to receive either Index Laparoscopic Cholecystectomy within 2 weeks of admission (index group, n= 42) or initial conservative treatment followed by delayed laparoscopic cholecystectomy after 2 weeks and within 6 weeks (delayed group, n = 58). Following observations were made:
- Age was comparable between the two groups (47.86 years vs 51.53 years, p=0.262). In the index group maximum numbers of individuals were found in the age group 41-50 years while in the delayed group maximum individuals were in between 51-60 years.
- Females were more susceptible to acute biliary pancreatitis with a ratio of 2:1 (F:M) in index group and 1.5:1 in delayed groups.
- Intraoperative bile duct injury occurred in 16.66% cases of index group and 5.17% cases of delayed group. The difference was statistically insignificant (p=1.22).
- Although conversion rate was higher in the index group 23.81% as compared to delayed 12.07%, but the difference was statistically not significant.(p value 0.123)
- Total duration of surgery was more in index group (72.40 min) as compared to the delayed group (65.48 min). the difference was statistically insignificant (p value 0.133)
- There was postoperative complication in the form of wound infection in index group in 10/42 patient (23.81%) and in 22/58 of delayed group (37.93%), making the p value 0.135 and statistically insignificant.
- Total hospital stay was on an average equal for both the groups i.e 3.40 days.
- Difficulty in dissection faced by the operating surgeon was significantly more in the index group as compared to the delayed group (p <0.001). It was probably due to the incomplete resolution of the inflammatory phase of pancreatitis leading to fragility of tissues and obscure anatomy.
- Bleeding was significantly more noted in the index group as compared to the delayed group. (<0.001)
- In our study, failure of conservative management was not reported in any case of delayed group.
- No mortality was reported in either group.

Conclusion

1. Index laparoscopic surgery in mild cases of acute biliary pancreatitis is safe and feasible when performed within 2 weeks, provided that the inflammatory phase has completely resolved with conservative management.
2. Index laparoscopic surgery was not associated with any significant difference in the bile duct injury, gallbladder perforation, conversion to open cholecystectomy and postoperative complications as compared to delayed surgery.
3. Although index laparoscopic surgery was associated with greater operating duration, the total hospital stay was comparable to the delayed group, hence it is more cost effective.

REFERENCES

1. Acute biliary pancreatitis: an experience in a tertiary level hospital of Nepal. Manandhar S, Giri S, Poudel P, Bhandari RS, Lakhey PJ, Vaidya P. Indian J Surg. 2013;75:449–453.
2. Sabiston DC. St. Louis, MO: Elsevier; 2021. Sabiston Textbook of Surgery: The Biological Basis of Modern Surgical Practice; pp. 1533–1541.
3. A study on demographic and clinicopathological characteristics of severe acute pancreatitis in a tertiary-level intensive care unit in Nepal. Khanal K, Poudel S, Ghimire A, et al. J Adv Intern Med. 2023;12:1–4.
4. Acute biliary pancreatitis: an experience in a tertiary level hospital of Nepal. Manandhar S, Giri S, Poudel P, Bhandari RS, Lakhey PJ, Vaidya P. Indian J Surg. 2013;75:449–453.
5. Management guidelines for gallstone pancreatitis. Are the targets achievable? Sanjay P, Yeeting S, Whigham C, Judson HK, Kulli C, Polignano FM, Tait IS. J Pancreas. 2009;10:43–47.
6. Gallstone pancreatitis without cholecystectomy. Hwang SS, Li BH, Haigh PI. JAMA Surg. 2013;148:867–872.
7. Puolakkainen P, Kylänpää L. Etiology of acute pancreatitis. Duodecim. 2016;132(19):1773-9. PMID: 29188969.
8. Kamal AK, A P, Kumar K, Kumar K, Gaurav K, N V, P R. A Descriptive Study of the Demographic and Clinicopathological Characteristics of Individuals With Gallstone-Induced Pancreatitis in a Tertiary-Level Hospital in Ranchi, Jharkhand. Cureus. 2024 Apr 9;16(4):e57906. doi: 10.7759/cureus.57906. PMID: 38725782; PMCID: PMC11081082.
9. Working Group IAP/APA Acute Pancreatitis Guidelines. IAP/APA evidence-based guidelines for the management of acute pancreatitis. Pancreatology. 2013;13:e1–e15.
10. Tenner S, Baillie J, DeWitt J, Vege SS. American College of Gastroenterology guideline: management of acute pancreatitis. Am J Gastroenterol. 2013;108:1400–115; 1416.
11. Tenner S, Baillie J, DeWitt J, Vege SS. American College of Gastroenterology guideline: management of acute pancreatitis. Am J Gastroenterol. 2013;108:1400–115; 1416.
12. Working Party of the British Society of Gastroenterology; Association of Surgeons of Great Britain and Ireland; Pancreatic Society of Great Britain and Ireland; Association of Upper GI Surgeons of Great Britain and Ireland. UK guidelines for the management of acute pancreatitis. Gut. 2005;54 Suppl 3:iii1–iii9.
13. Tenner S, Baillie J, Dewitt J and Vege SS. American College of Gastroenterology Guideline: Management of Acute Pancreatitis. Am J Gastroenterol 108(9):1400-1415, 2013.
14. Forsmark CE, Baillie J. AGA Institute technical review on acute pancreatitis. Gastroenterology. 2007;132:2022–2044.
15. Frossard JL, Hadengue A, Amouyal G, Choury A, Marty O, Giostra E, Sivignon F, Sosa L, Amouyal P. Choledocholithiasis: a prospective study of spontaneous common bile duct stone migration. Gastrointest Endosc. 2000;51:175–179.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

16. Garrow D, Miller S, Sinha D, Conway J, Hoffman BJ, Hawes RH, Romagnuolo J. Endoscopic ultrasound: a meta-analysis of test performance in suspected biliary obstruction. Clin Gastroenterol Hepatol. 2007;5:616–623.
17. Romagnuolo J, Bardou M, Rahme E, Joseph L, Reinhold C, Barkun AN. Magnetic resonance cholangiopancreatography: a meta-analysis of test performance in suspected biliary disease. Ann Intern Med. 2003;139:547–557.
18. Uhl W, Müller CA, Krähenbühl L, Schmid SW, Schölzel S, Büchler MW. Acute gallstone pancreatitis: timing of laparoscopic cholecystectomy in mild and severe disease. Surg Endosc. 1999;13:1070–1076.
19. Nealon WH, Bawduniak J, Walser EM. Appropriate timing of cholecystectomy in patients who present with moderate to severe gallstone-associated acute pancreatitis with peripancreatic fluid collections. Ann Surg. 2004;239:741–749; discussion 749-751.
20. Schachter P, Peleg T, Cohen O. Interval laparoscopic cholecystectomy in the management of acute biliary pancreatitis. HPB Surg. 2000;11:319–322; discussion 322-323.
21. Sanjay P, Yeeting S, Whigham C, Judson H, Polignano FM, Tait IS. Endoscopic sphincterotomy and interval cholecystectomy are reasonable alternatives to index cholecystectomy in severe acute gallstone pancreatitis (GSP) Surg Endosc. 2008;22:1832–1837.
22. Busnardo AC, DiDio LJ, Tidrick RT, Thomford NR. History of the pancreas. Am J Surg. 1983 Nov;146(5):539-50. doi: 10.1016/0002-9610(83)90286-6. PMID: 6356946.
23. Drake L. Liver and gallbladder.In: Veeramani R, Chand S, Chumber S, eds. Gray's Anatomy for students. Mumbai: Livingstone C Elsvier; 2017: 367.
24. Drake L. Liver and gallbladder.In: Veeramani R, Chand S, Chumber S, eds. Gray's Anatomy for students. Mumbai: Livingstone C Elsvier; 2017: 371.
25. Drake L. Liver and gallbladder.In: Veeramani R, Chand S, Chumber S, eds. Gray's Anatomy for students. Mumbai: Livingstone C Elsvier; 2017: 372.
26. Drake L. Liver and gallbladder.In: Veeramani R, Chand S, Chumber S, eds. Gray's Anatomy for students. Mumbai: Livingstone C Elsvier; 2017: 367.
27. Litynski GS. Highlights in the History of Laparoscopy. Frankfurt, Germany: Barbara Bernert Verlag; 1996:165–168
28. Steichen FM, Ravitch MM. Stapling in Surgery. Illinois: Year Book Medical Publishers, Inc.; 1984
29. Mühe E. Long-term follow-up after laparoscopic cholecystectomy.. Endoscopy 1992; 24:754–758
30. Papi C, Catarci M, D'Ambrosio L, Gili L, Koch M, Grassi GB, Capurso L. Timing of cholecystectomy for acute calculous cholecystitis: a meta-analysis. Am J Gastroenterol. 2004;99(1):147–155.
31. Tang SC, Stain G, Tang EF, Berne TV. Management of Acute pancreatitis: from surgery to interventional intensive care. Gut. 2005;54:426–436.
32. Schacter P, Peleg T, Cohen O. Interval laparoscopic cholecystectomy in the management of acute biliary pancreatitis. HPB Surg. 2000;11(5):319–323.
33. Ranson JH. The timing of biliary surgery in acute pancreatitis. Ann Surg. 1979;189(5):654–663.
34. Nealon WH, Bawduniak J, Walser EM. Appropriate timing of cholecystectomy in patients who present with moderate to severe gallstone associated acute pancreatitis with peripancreatic fluid collections. Ann Surg. 2004;23:741–751.
35. Shrestha A, Bhattarai A, Tamrakar KK, Chand M, Yonjan Tamang S, Adhikari S, Neupane HC. Utility of the Parkland Grading Scale to determine intraoperative challenges during laparoscopic cholecystectomy: a validation study on 206 patients at an academic medical center in Nepal. Patient Saf Surg. 2023 May 24;17(1):12. doi: 10.1186/s13037-023-00364-x.
36.
37. Jha PK, Chandran R, Jaiswal P,Seema K. A clinical study of risk factors of acute pancreatitis in a tertiary care centre in North India. IntSurg J 2017;4:1878-83.
38. Chandak U, Pind V, Mitra A, Bansod PY, Gaikwad U, Ramteke P. Early versus late laparoscopic cholecystectomy in acute biliary pancreatitis: a prospective randomised study. Int Surg J 2022;9:1558-1565.
39. Zhong Fp, Wang K, Tan Xq, Nie J, Huang Wf, Wang Xf. The optimal timing of laparoscopic cholecystectomy in patients with mild gallstone pancreatitis. Medicine 2019;98:40(e17429).
40. Rafiq I, Muhammad S, Ali MA. OUTCOME OF LAPAROSCOPIC CHOLECYSTECTOMY IN MILD GALLSTONE PANCREATITIS. wjpmr, 2019,5(3), 232-235
41. Alburakan AA, Alshunaifi AI, AlRabah RN, Alshammari SA, Aloraini AM, Nouh TA, AlShahwan NA. Early versus delayed cholecystectomy in biliary pancreatitis: Experience from a Local Acute Care Surgery Unit in Saudi Arabia. Medicine 2023;102:48(e36491).
42. Eğin S, M.D.,Yeşiltaş M, M.D.,Gökçek B, M.D., Tezer H, M.D., Karahan SR, M.D. Early laparoscopic cholecystectomy following acute biliary pancreatitis expedites recovery. Ulus Travma Acil Cerrahi Derg 2017;23(6):495–500 doi: 10.5505/tjtes.2017.50128
43. Soomro IA, Rafiq S, Otho S, Hayat M, Alam I, Rehman A. MILD TO MODERATE ACUTE GALLSTONE PANCREATITIS: A COMPARATIVE STUDY OF EARLY VERSUS DELAYED CHOLECYSTECTOMY. 10.53555/jptcp.v31i1.4153. Vol. 31 No. 01 (2024): JPTCP (1215-1220)
44. Demir U, Yazıcı P, Bostancı O, Kaya C, Köksal H, Işıl G, Bozdağ E, Mihmanlı M. Timing of cholecystectomy in biliary pancreatitis treatment. Ulusal Cer Derg 2014; 30: 10-13 DOI: 10.5152/UCD.2014.2401
45. Cho YN, BS, Chervu NL, MD, MS, Sakowitz S, MS, MPH, Verma A, BS, Kronen E, Orellana M, MD, Virgilio CD, MD, Benharash P, MD. Effect of surgical timing on outcomes after cholecystectomy for mild gallstone pancreatitis. Elsevier Inc.doi10.1016/j.surg.2023.05.009
46. Jee LS,, Jarmin R, Lim KF, Raman K. Outcomes of early versus delayed cholecystectomy in patients with mild to moderate acute biliary pancreatitis: A randomized prospective study.Asian Journal of Surgery (2018) 41, 47e54. doi.org/10.1016/j.asjsur.2016.07.010
47. Bouwense AS, Besselink MG, Brunschot SV, Bakker OJ, Santvoort HC, SchepersNJ, Boermeester MA, Bollen TL, Bosscha K, Brink MA, Bruno MJ, Consten EC, Dejong CH, Duijvendijk P, Eijck CH, Gerritsen JJ, Goor H, Heisterkamp J, Hingh IH, Kruyt PM, Molenaar IQ, Nieuwenhuijs VB, Rosman C, Schaapherder AF, Scheepers JJ, Spanier MBW, Timmer R, Weusten BL, Witteman BJ, Ramshorst B, Gooszen HG, Boerma D. Pancreatitis of biliary origin, optimal timing of cholecystectomy (PONCHO trial): study protocol for a randomized controlled trial. Bouwense et al. Trials 2012, 13:225. DOI: 10.1186/1745-6215-13-225
48. Wilson C, moya MA. CholeCysteCtomy for aCute gallstone panCreatitis: early vs delayed approaCh. Scandinavian Journal of Surgery 99: 81–85, 2010.
49. Sharma A, Madapu A, Rakholiya J, Sharma S, Jha A. Early Versus Late Laparoscopic Cholecystectomy in Patients with Acute Gallstone Pancreatitis. SN Comprehensive Clinical Medicine (2021) 3:590–599. doi.org/10.1007/s42399-021-00765-y
50. HUSSAIN M, ALAM J, ULLAH M, ZAHID MJ, WAHID U. Outcomes of Early Vs. Delayed Laparoscopic Cholecystectomy in Acute Biliary Stone-Induced Pancreatitis a Prospective Observational Study. P J M H S Vol. 17, No. 01, January, 2023. DOI:10.53350/pjmhs2023171704
51. Sharma R, Devkaran B, Sharma. S, Ohri A, Chaudhary R. Early Versus Delayed Laparoscopic Cholecystectomy In Patients With Mild AcuteBiliary Pancreatitis. Ann. Int. Med. Den. Res. 2018; 4(6):SG05-SG09.
52. Walayat S, Baig M, Puli SR. Early vs late cholecystectomy in mild gall stone pancreatitis: An updated meta-analysis and review of literature. World J Clin Cases 2021; 9(13): 3038-3047
53. and Meta-Analysis. World J. Surg., 46: 1359-1375 1. https://doi.org/10.1007/s00268-022-06501-4
54. Hallensleben ND, Timmerhuis HC, Hollemans RA, Pocornie S, van Grinsven J, van Brunschot S, Bakker OJ, van der Sluijs R, Schwartz MP, van Duijvendijk P, Römkens T, Stommel MWJ, Verdonk RC, Besselink MG, Bouwense SAW, Bollen

ISSN (O): 2687-5365; ISSN (P): 2753-6556

TL, van Santvoort HC, Bruno MJ; Dutch Pancreatitis Study Group. Optimal timing of cholecystectomy after necrotising biliary pancreatitis. Gut. 2022 May 17(5):974-982. doi: 10.1136/gutjnl-2021-324239. Epub 2021 Jul 16. PMID: 34272261.

55. Yang DJ, Lu HM, Guo Q, Lu S, Zhang L, Hu WM. Timing of Laparoscopic Cholecystectomy After Mild Biliary Pancreatitis: A Systematic Review and Meta-Analysis. J Laparoendosc Adv Surg Tech A. 2018 Apr;28(4):379-388. doi: 10.1089/lap.2017.0527. Epub 2017 Dec 22. PMID: 29271689.
56. Lyu YX, Cheng YX, Jin HF, Jin X, Cheng B, Lu D. Same-admission versus delayed cholecystectomy for mild acute biliary pancreatitis: a systematic review and meta-analysis. BMC Surg. 2018 Nov 29;18(1):111. doi: 10.1186/s12893-018-0445-9. PMID: 30486807; PMCID: PMC6263067.
57. van Baal MC, Besselink MG, Bakker OJ, van Santvoort HC, Schaapherder AF, Nieuwenhuijs VB, Gooszen HG, van Ramshorst B, Boerma D; Dutch Pancreatitis Study Group. Timing of cholecystectomy after mild biliary pancreatitis: a systematic review. Ann Surg. 2012 May;255(5):860-6. doi: 10.1097/SLA.0b013e3182507646. PMID: 22470079.
58. E M Targarona, C Balague, P Viella, J Martinez, M Trias, W Y Lau, A K C Li, Laparoscopic cholecystectomy for biliary pancreatitis, British Journal of Surgery, Volume 81, Issue 11, November 1994, Pages 1694–1696
59. Stone HH, Fabian TC, Dunlop WE. Gallstone pancreatitis: biliary tract pathology in relation to time of operation. Ann Surg. 1981 Sep;194(3):305-12. doi: 10.1097/00000658-198109000-00008. PMID: 6168240; PMCID: PMC1345356.

ISSN (O): 2687-5365; ISSN (P): 2753-6556