

“Clinico-morphoradiological factors predicting Difficult Laparoscopic Cholecystectomy in viral marker positive and negative patients-A Hospital Based Comparative Study”

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Abstract: At times Laparoscopic Cholecystectomy becomes difficult. Laparoscopic Cholecystectomy may be rendered difficult by various problems encountered during surgery.

Aims and Objective: To study preoperatively, the Clinical, biochemical and radiological parameters in predicting difficult laparoscopic cholecystectomy.

Material and Methods: This prospective study was conducted on patients of Gallbladder stone disease in the Department of General Surgery of subharti medical college admitted through surgery OPD and emergency or transferred from other department after taking informed consent and clearance from University Ethical Committee on 200 patients out of which 90 are viral marker positive and 110 are viral marker negative. Finally 84 positive and 90 viral negative patients satisfying the inclusion criteria were included in the study (n=174). Patients with Acute (within 72 hours operated) & Chronic Cholecystitis with Cholelithiasis underwent laparoscopic cholecystectomy or conversion to open approach were studied during September 2015 to July 2017 (n = 174, Laparoscopic cholecystectomy = 164 and Open conversion = 10).

Statistical analysis: Univariate analysis was performed using Chi-Square test to determine the factors that are associated with difficult laparoscopic cholecystectomy using SPSS software. Next, a correlation matrix was developed to evaluate correlation between individual parameters.

Results: age (>65 years), obesity (BMI>30), male gender, fever, past history of upper abdominal pain (acute cholecystitis/ pancreatitis), post ercp status, leukocytosis, abnormal LFT and amylase level, increased CRP levels ,ultrasound whole abdomen parameters like thickened gallbladder wall ,gallbladder excessive distension or fibrosed gallbladder, calculi size and numbers, pericholecystic fluid ,hepatomegaly ,cirrhosis of liver, portal hypertension etc. are predictive markers of Difficult Laparoscopic Cholecystectomy both in viral marker positive(HBsAg, HCV, HIV) and negative patients. In 51.72% cases (90 patients) (n=174) laparoscopic cholecystectomy was difficult, out of these 40% (36 patients, n= 90) were viral marker positive patients.

Keywords: Gallstone Pancreatitis, Acute cholecystitis, Empyema Gallbladder, Fibrosed Gallbladder, Difficult Laparoscopic Cholecystectomy.

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I. Introduction

Gallstones are a major cause of morbidity and mortality throughout the world [1]. At least one-fourth women and 10% to 15% men over age of 50 years have gallstones [2], [3]. Gall stones are remarkably common and are a major and expensive health problem. Its prevalence has become more apparent since the introduction of ultrasound. The estimated prevalence of gallstone disease in India has been reported as 2% to 29% [4], [5]. In India, this disease is seven times more common in the North (stone belt) than in South India [6]. Laparoscopic Cholecystectomy may be rendered difficult by various problems encountered during surgery such as difficulties in accessing the peritoneal cavity & creating a pneumo-peritoneum, bleeding, dissection of gallbladder wall, spillage of bile, spillage of stone, and difficulty of gallbladder extraction which may require conversion to open cholecystectomy. These may be due to acute inflammation, aberrant anatomy, adhesions, unexpected operative abnormal findings, iatrogenic injuries, obesity etc.

Several factors have been found to be associated with a difficult case, but no reliable criteria are available yet to identify patients with a difficult laparoscopic cholecystectomy from pre-operative variables in viral marker positive population. Such prediction may allow a surgeon to be better prepared, to take extra precautions to reduce intra-operative complications, and to convert from Laparoscopic Cholecystectomy to Open Cholecystectomy at an earlier stage if Laparoscopic Subtotal Cholecystectomy Type I or Type II is not feasible.

Aim and Objective –To study the Clinical, Biochemical and Radiological parameter in predicting difficult laparoscopic cholecystectomy preoperatively.

II. Material and Methods

This prospective study was conducted in Department of General Surgery, Subharti Medical College, Meerut. Patient with Acute (within 72hours operated) & Chronic Cholecystitis with Cholelithiasis underwent laparoscopic cholecystectomy were included (total 200 no. of patient) in the study between September 2015 to July 2017.

INCLUSION CRITERIA – Patients with Gallbladder stone disease with Viral marker positive status (HBsAg, HCV, HIV) and marker negative status admitted in Subharti Hospital with informed consent during September 2015 to July 2017 (23 months).

EXCLUSION CRITERIA- The patient with suspected CBD stones or dilated CBD on USG, patient having clinical or USG suspected diagnosis of Ca gall bladder, Age below 10 years, Pregnancy, Acute pancreatitis, patients not fit for general anesthesia due to various medical illnesses, Peritonitis cases, patient with supra umbilical abdominal scar (n=26 patients).

INSTRUMENTS REQUIREMENT- Standard set of Laparoscopic Instruments with suture materials, whenever required along with HIV operating kit for operating team in marker positive patients.

DEFINITION OF VARIABLE- Age was evaluated as both a continuous variable and a dichotomous variable (<65 years versus >65 years). Body mass index was used as a dichotomous variable (obese [body mass index >30 Kg/m²] versus non-obese). Previous abdominal surgery was categorized as none versus any intra-abdominal surgery. The Gallbladder (GB) was defined as contracted or distended depending on the shape and transverse diameter. It will be defined as distended if the transverse diameter is greater than five (5) centimeters. GB wall thickness was estimated by using the maximal obtainable measurement on USG. The calculus size was evaluated as a dichotomous variable for the purpose of analysis (<1 cm versus >1 cm). The number of calculi was classified as a dichotomous variable (solitary versus multiple).

The dependent variables (outcomes) included the following operative parameters: duration of surgery (in minutes), bleeding during surgery, access to peritoneal cavity, GB bed dissection, rupture of gall bladder, difficult extraction, extension of incision for extraction, and conversion to Open Cholecystectomy. Operative time: Duration of surgery (in minutes) [Duration of surgery included the time from insertion of the Veress's needle to closure of the trocar insertion site, and was evaluated as a dichotomous variable, <45 or >45 minutes]. Access to peritoneal cavity: The operating surgeon described the access to peritoneal cavity as 'easy' or 'difficult'. Injury to CBD/ Duodenum/small intestine/large intestine/ omentum/ liver, Bleeding during surgery [Bleeding during surgery was graded as minimal, moderate or severe. Moderate bleeding was defined as bleeding leading to tachycardia of greater than 100/min without drop in blood pressure. Severe bleeding was defined as bleeding leading to tachycardia of greater than 100/min with a greater than 10 mmHg drop in blood pressure]

GB dissection: easy or difficult depending upon difficulty in grasping GB, difficulty in retracting GB, difficulty due to obliterated anatomy of Calot's triangle, difficulty due to adhesions, difficulty due to embedded GB in liver, difficulty due to anatomical variation. Rupture of GB with spillage of stone /bile, Difficult extraction of GB, Extension of incision for extraction of gall bladder, Conversion to open cholecystectomy. The data collected was tabulated and the same was subjected to statistical analysis as per Proforma attached.

PRE-OPERATIVE SCANNING -The patients were worked up thoroughly and subjected to - detailed history and clinical examination, routine hematological investigation :Hb, PT, APTT, INR, TLC, DLC; Biochemical investigation: RFT, S. Amylase, S. Lipase, RBS; Liver function test: Serum Bilirubin, SGOT, SGPT, Serum Alkaline phosphatase; Viral marker :HCV, HBsAG , HIV; Abdominal Ultrasonography (USG) for GB distention, GB Wall thickness, USG Murphy's sign, Pericholecystic fluid, CBD status, Stone: single or multiple, Size of largest stone, Impacted stone at Hartmann's pouch; ECG, Pre-anesthetic check-up.

PRE-OPERATIVE PREPARATION- Cases which underwent laparoscopic cholecystectomy were included in the study. Informed consent was obtained. On pre-operative night tablet alprazolam 0.25mg and bisacodyl (dulcolax) was given. The patients were kept fasting after mid night. On next morning broad spectrum antibiotic i.v.as prophylactic antibiotic measure was given.

OPERATIVE PROCEDURE-Laparoscopic cholecystectomy was done under general anesthesia. Patients were asked to pass urine immediately before going for operation table. Patient was put in supine position on

operation table. Naso-gastric tube was inserted after induction of anesthesia. Patient was now placed in 10 degrees head down position. Pneumo-peritoneum was created using a Veress needle inserted through a small skin incision in the infraumbilical/ supraumbilical region. After creating pneumo-peritoneum and achieving 10mm Hg intra-abdominal pressure, the first port (umbilical 10mm) was inserted. Telescope was inserted through the umbilicus and head end was moved up and operation table was turned to left so right side moves up. Another 10mm port was placed in the midline just below the xiphoid keeping its direction towards the gall bladder. Two 5 mm ports were inserted ,one in the right subcostal region in the midclavicular line and second one at the level of umbilicus in the Right anterior axillary line and subxiphoid port was used as the main operative port. 5mm ports were used for holding gall bladder at the fundus. Dissection was performed in a standard fashion by creating a posterior window and defining the junction between gallbladder and the cystic duct and then the cystic duct was dissected towards the CBD. Cystic artery was identified and dissected. After proper identification of these structures, 3 clips were applied to each of these structures and they were divided between clips. Gall bladder was separated from bed using hooked dissector and electro-cautery. After achieving homeostasis, gall bladder was extracted through the epigastric port. Operative sites were re-examined and checked for any spilled stones, bleeding or any other complication. Closed drain was placed through lateral axillary port in all cases. The trocars were removed under direct vision control. The port site closure was done by applying the sutures. Whenever required, we opted for Laparoscopic Subtotal Cholecystectomy Type I or Type II or a combination of both when GB fossa and Calot's both were difficult for dissection.

INTRA-OPERATIVE ANALYSIS-During the procedure careful note was made of, operative time, operating technique. The intra-operative difficulties and complication were analyzed with points as follows – (1)Difficulty in accessing the peritoneal cavity- Difficulty in lifting abdominal wall, Injury due to veress needle, Trocar related injury;(2) Difficulty during gall bladder dissection- Difficulty in grasping GB, Difficulty in retracting GB, Difficulty due to obliterated anatomy of Calot's triangle, Difficulty due to adhesions, Difficulty due to embedded GB in liver, Difficulty due to anatomical variation, Gall bladder perforation, Spillage of bile, Spillage of stone, Retrieval of stones completely or loss of stones in peritoneal cavity, Injury to CBD/ Duodenum/small intestine/large intestine/omentum/ liver, Bleeding during surgery and site of bleeding; (3)Difficulty in extraction of gall bladder and Extension of incision for extraction of gall bladder; (4)Technical problems or instrument failure; (5)Any conversion to standard open cholecystectomy and its reasons were noted.

POST OPERATIVE CARE-Abdominal complications were assessed on the basis of postoperative abdominal pain, vomiting, distension, fever, raised TLC, DLC, ultrasonography abdomen if required. Oral fluids were allowed after 6-10 hours, if there was no nausea or vomiting. Patients were made ambulatory in the 8-12hours after surgery. Normal light breakfast was allowed from the next morning. Drain was removed, if the nature of discharge was serous and the amount is less than 30 ml. Band aid was applied on the port site sutures on next morning All specimen of gall bladder were sent for histo-pathological examination in pathology department.

DISCHARGE: The patients were discharged after assessment, if they had adequate pain control, were self-ambulatory, had postoperative voiding of urine and oral intake without vomiting. Patients not meeting the criteria were kept admitted and discharged when found suitable. Still our policy was to keep patients admitted for 2-3 days postoperatively just to prevent any postoperative un-eventuality which could be missed.

STATISTICAL ANALYSIS-Univariate analysis was performed using Chi-Square test to determine the factors that are associated with difficult laparoscopic cholecystectomy was calculated using SPSS software. Next, a correlation matrix was developed to evaluate correlation between individual parameters. Conclusion regarding role of various factors in predicting difficult laparoscopic cholecystectomy was drawn.

III. Results And Discussion

The advent of laparoscopic era led to revolution in minimally invasive surgery for intra-abdominal pathology. No organ system has seen more progress in the treatment of disease than the biliary tract. Cholecystectomy is procedure of choice for symptomatic gallstones. The traditional open cholecystectomy performed for the first time in 1882 by Carl August Langerbach ^[7] has been replaced by Laparoscopic Cholecystectomy which has revolutionized the treatment of gall bladder disease and is now the gold standard for the treatment of gallstones and the commonest operation performed laparoscopically worldwide. In India T.E. Udwardia performed the first Laparoscopic Cholecystectomy in 1989 at J.J. Hospital, Bombay ^[8]. The first Laparoscopic Cholecystectomy was performed by Muhe in 1985 ^[9]. In Subharti Medical College we have introduced first laparoscopic cholecystectomy in year 2003 and after that almost all gall bladder are removed laparoscopically.

Laparoscopic Cholecystectomy may be rendered difficult by various problems encountered during surgery such as difficulties in accessing the peritoneal cavity & creating a pneumo-peritoneum, bleeding, dissection of gallbladder wall, spillage of bile, spillage of stone, and difficulty of gallbladder extraction which may require conversion to open cholecystectomy. These may be due to acute inflammation, aberrant anatomy,

adhesions, unexpected operative abnormal findings, iatrogenic injuries, obesity, a need for ductal exploration, and equipment failure.

Several factors have been found to be associated with a difficult case, but no reliable criteria are available yet to identify patients with a difficult laparoscopic cholecystectomy from pre-operative variables. This prospective study was conducted in the Department of General Surgery of subharti medical college on 164 patients who satisfying the selection and exclusion criteria underwent laparoscopic cholecystectomy and pre-operative factors that predict the difficult laparoscopic cholecystectomy were analysed.

Age-In the our study the mean age of patients who underwent Laparoscopic Cholecystectomy was 45.43±15.04 years showing that Cholelithiasis is more common in the age group of forty plus. Total patient(n =174) out of which 84(48%) patient are viral marker positive and 90(52%) patient are viral negative. Maximum patient is from 36-45(43%) year age group followed by 26-36(24%) year age group (TABLE NO.1)

Series and year	Mean age (in years)
Present study	45.43 ± 15.04
Nachnani and supe et al(2005) ^[11]	40
Gurkan yetkin et al(2009) ^[10]	75.02 ± 4.0
Gabriel R et al (2009) ^[12]	48.3
Baki Nabil AA et al(2006) ^[13]	42.5 ± 11.7

The influence of age on the conversion rate remains controversial. **Gurkan yetkin et al (2009)**^[10] reported that in patients aged 80 or older the rate of acute cholecystitis, conversion to open surgery and post-operative complications were significantly higher than in other group (p>0.05) due to failure to adequately visualize the biliary tract anatomy due to intense fibrosis around the gallbladder and Calot’s triangle. **Nachnani and supe et al (2005)**^[11] have observed no correlation between the two. The present study shows that age >65 years had no impact on conversion rate and operative time due to small sample size and most of the patients 89% are under < 65 years age group.

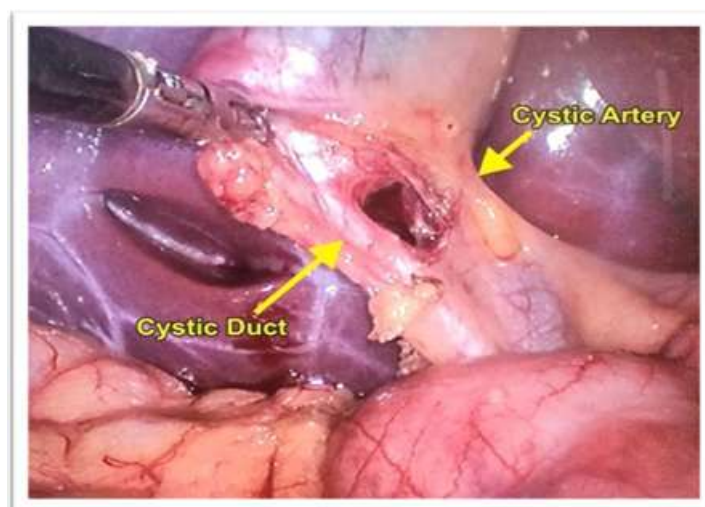


Fig. 13: Calot's Triangle, showing cystic duct and cystic artery.

Sex-In our study majority of patients were female 98(56%) out of which 32 are viral marker positive and 66 are viral marker negative and male were only 76 (44%) among these 52 (68%) were viral marker positive and 24(32%) are viral marker negative showing that females have more prevalence of Gall stone disease and males are more prone for viral positive infection. (TABLE NO. 2)

Series and year	Female: male
Prashant S Dhake et al(2014) ^[14]	78:27
Nabil A. Abdel baki(2006) ^[13]	90:10
Gabriel R et al (2009) ^[12]	138:96
Gupta G et al(2015) ^[15]	4:1
Present study	56:44

In present study male gender is associated with difficult dissection of gall bladder due to adhesions obscuring the anatomy, longer duration of surgery and higher rate of conversion to open cholecystectomy. **Gupta G et al(2015)**^[15] reports have identified the male gender as a risk factor for conversion, probably

because male patients have more intense inflammation or fibrosis resulting in more difficult dissection both in the Calot's triangle and through the plane between the gallbladder and liver. **Prashant S Dhake et al (2014)**^[14] have found no significant correlation between two.

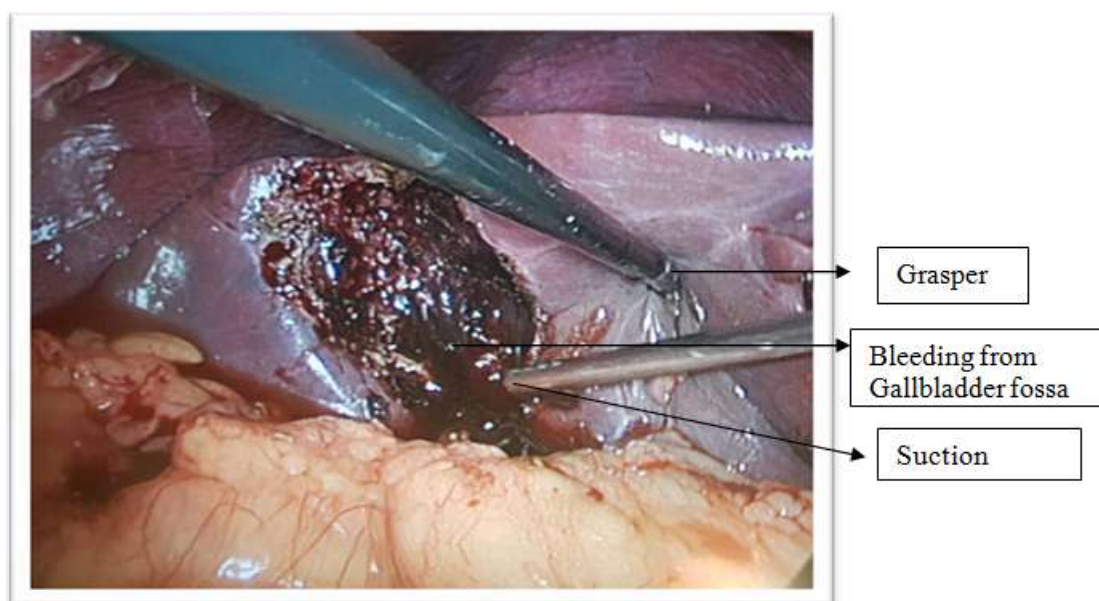


Fig. 14: Bleeding from Gall Bladder Fossa.

Presenting sign/ symptoms, Blood Investigations, Co-Morbidities- In our study patients symptoms/sign resulted as significant value with total patient (n=174) where assessed out of which 153 patient present with upper abdominal pain (89.0%) among which viral positive were 81(53%) and 72(47%) were viral negative. Only 47(27%) patient present with fever out of n=174. Viral positive present with fever were 22(47%) (TABLE NO.3/4/5) Similarly 18(43%) positive viral marker patient present with murphy's sign among 42(24%), out of n=174 and biochemically 50(29%), patient found out of n=174 among them 38(78%) are viral marker positive and only 12(24%), were viral negative patient are associated with difficult laparoscopic cholecystectomy and need for conversion. This might be due to the firmly adhesions that made dissection difficult and lack of plane of cleavage between gallbladder and liver bed. **Nachnani and supe (2005)**^[11] analysed and correlate the relation between prior attacks of acute cholecystitis and acute pancreatitis with difficulty in laparoscopic dissection due to dense adhesion and fibrotic gallbladder. **C. Simopoulos et al(2005)**^[16] in there study found that the conversion rate increased to 10 fold in patients with acute inflammation of gallbladder when associated with fever, increased WBC count and deranged LFT. **Gabriel R et al (2009)**^[12] correlate duration of biliary colic and positive murphy's sign with highest rate of conversion resulting from difficult dissection and poor visualizing the proper anatomy. **Cpt. Andrew J. Shapiro et al(1999)**^[17] predict that male patients with rising temperature and LDH level while on intravenous antibiotics require conversion at increased frequency.

Ultra-Sonographic Findings: In our study ultrasonography was done of all the patient (n=174) to assess certain findings in patient of cholelithiasis. Among total patient these are the findings of viral marker positive patient which are highly significant to assess the difficulty in comparison to viral negative patient, 42(24%) patient with contracted GB, 33(19%) with distended GB, 9(5%) with normal GB, 70(40%) patient have >3mm of GB wall thickness patient with GB wall thickness >3mm were difficult to dissect and operate, pericholecystic fluid is present among 37(21%) patient only, while 35(20%) patient present with single stone and 49(28%) present with multiple stone on ultrasound report. 57(33%) patient have stone size more >1cm. 54(31%) patient got impacted stone at Hartman's pouch. Single stone with size >1cm and impacted stone sometimes needs extension of incision. All these assessment were associated with bleeding, difficult dissection, difficult extraction of gallbladder with more operative time and conversion rate. (TABLE NO.6). **Gupta G et al (2015)**^[15] proved significantly association between gallbladder wall thickness, gallbladder stone size, impacted stone with difficult laparoscopic cholecystectomy and conversion, **Nachnani and supe (2005)**^[11] reported significant relation between difficult in gallbladder dissection, extraction of stone with gallbladder wall thickness and stone size >10mm and not with number of stones. **Nabil A. Abdel baki (2006)**^[13] statistically proved significance between solitary large stone, gallbladder wall thickness >3mm with prolonged operative time due to difficulty during grasping of gallbladder and gallbladder dissection. **M. Tayab et al (2005)**^[18] presents the multivariate model of risk factors independently associated with conversion. Patients with ultrasonographic signs of inflammation (gall bladder wall thickness > 3 mm, oedematous wall, pericholecystic fluid, and ultrasonographic

Murphy's sign) were 8.5 times more likely to be converted to Open Cholecystectomy compared to the patients who underwent successful Laparoscopic Cholecystectomy.

Fig. 15: Ultrasound Showing Impacted Gallstone.



Fig. 16: Ultrasound showing Peri Cholecystic Fluid and Thick G B Wall.



Fig. 17: Ultrasound Showing Distended Gall Bladder with Distal Acoustic Shadow.



Fig. 18: Ultrasound Showing Distended Gall Bladder with Multiple Distal Acoustic Shadow.

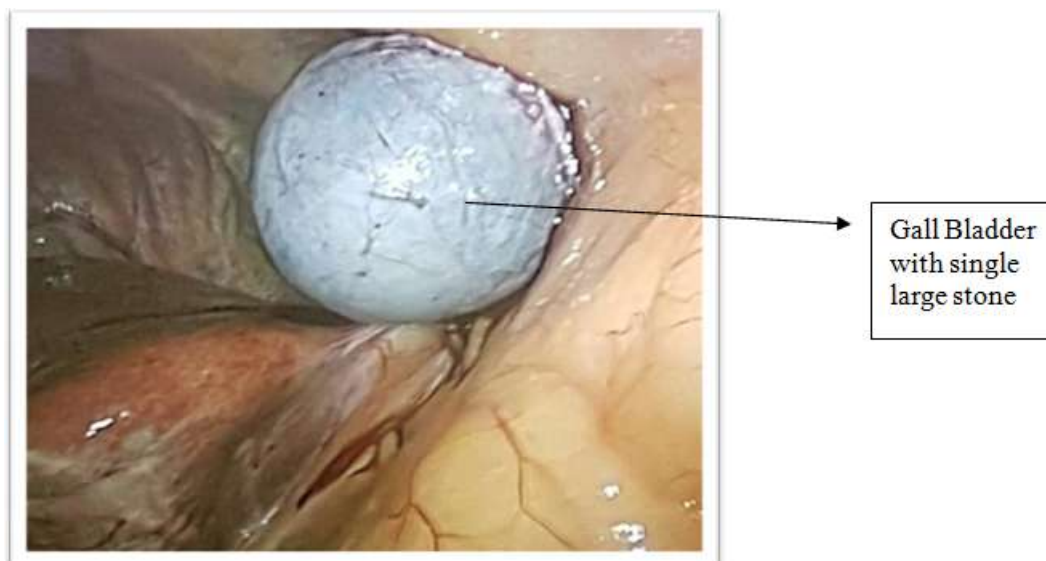


Fig. 19: Single Large Calculi Showing Difficulty in Gall Bladder Extraction.

INTRA-OPERATIVE FINDINGS

Adhesions- Non visualization of gall bladder and Calot's due to dense adhesions in peri-hepatobiliary region is a significant reason for bleeding in our study due to difficult dissection of gall bladder and Calot's triangle. Adhesion were more common in viral marker positive patient in our study(n=174) structures usually adhered were omentum 34(20%) most commonly out of which 26(77%) were viral marker positive patient and duodenum in 22(13%) among these 16(73%) were viral positive patients. (TABLE NO.12). **Ghnam et al (2012)**^[19]Intraoperative finding of a chronically inflamed contracted gallbladder with a thickened wall during LC was associated with an increased conversion rate. In these cases, the dense adhesions signified chronic inflammation and were certainly due to the repeated attacks of acute cholecystitis. **Gaurav Gupta et al (2015)**^[20]In 50 consecutive patients who underwent Laparoscopic Cholecystectomy during 2013 to 2014 patient's characteristics, clinical history, ultrasonography results and intraoperative details were prospectively analysed to determine predictors of difficult laparoscopic cholecystectomy. Of which 50 patients 3 (06%) required conversion to open cholecystectomy. Significant predictors of conversion were obscured anatomy of Calot's due to adhesions, sessile gall bladder, male gender and GB wall thickness >3 mm.

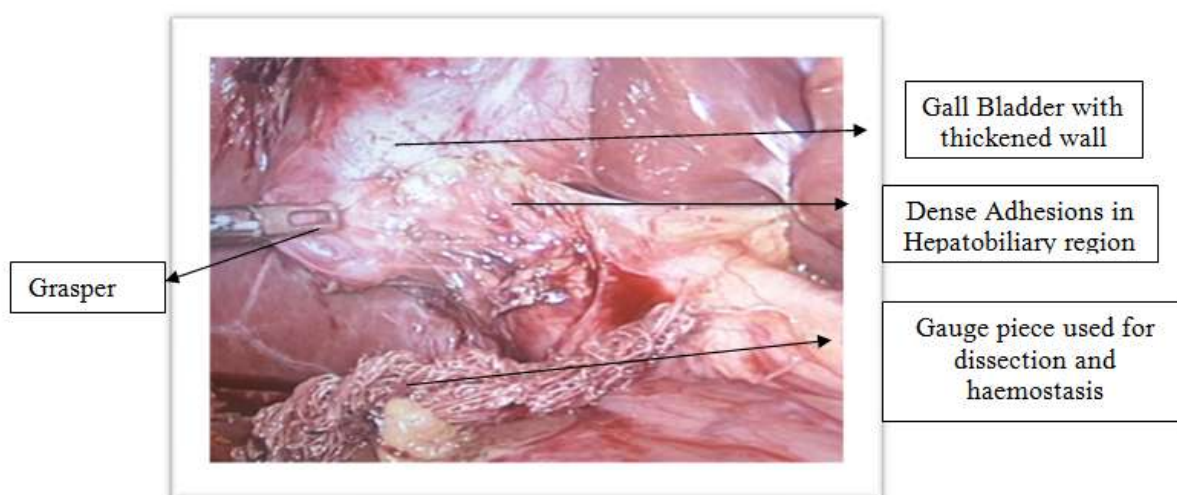


Fig.20 Dense adhesions in Hepatobiliary region

Intra-Op Bleeding- Minimal bleeding is present in all cases in our study along with cases with moderate bleeding which is another cause for difficulty and conversion. Moderate bleed was present in 34% (n=59) of viral positive cases out of total cases (n= 174) while only 18(10%) patient had moderate bleeding in viral negative group ,most commonly due to adhesions and deranged liver function(TABLE NO.12). **N O Machado et al (2012)**^[21]Laparoscopic Cholecystectomy with and without cirrhosis, revealed higher conversion rate, longer operative time, higher bleeding complications, and overall increased morbidity in patients with cirrhosis.

Iqbal et al (2008) ^[22] Out of 340 patients 32 (9.4%) required conversion to open procedure. Factors responsible for these conversion were dense adhesions in 8(2.4%), empyema gall bladder in 4(1.2%), contracted gall bladder in 3(0.9%), haemorrhage in 3(0.9%), and CBD injury and carcinoma gall bladder in 2(0.6%) each. **Kapoor M, Yasir M et al (2013)** ^[19] Intraoperative and postoperative complications, hospital stay, mortality and time taken to return to normal activity on 300 patients. Complication noted are conversion to open cholecystectomy(3%), CBD and bowl injury(2.6%), stone spillage(2%), Postoperative bile leak(2.3%)/colonic fistula(0.3%)/biliary fistula(0.3%)/haemorrhage(0.3%).

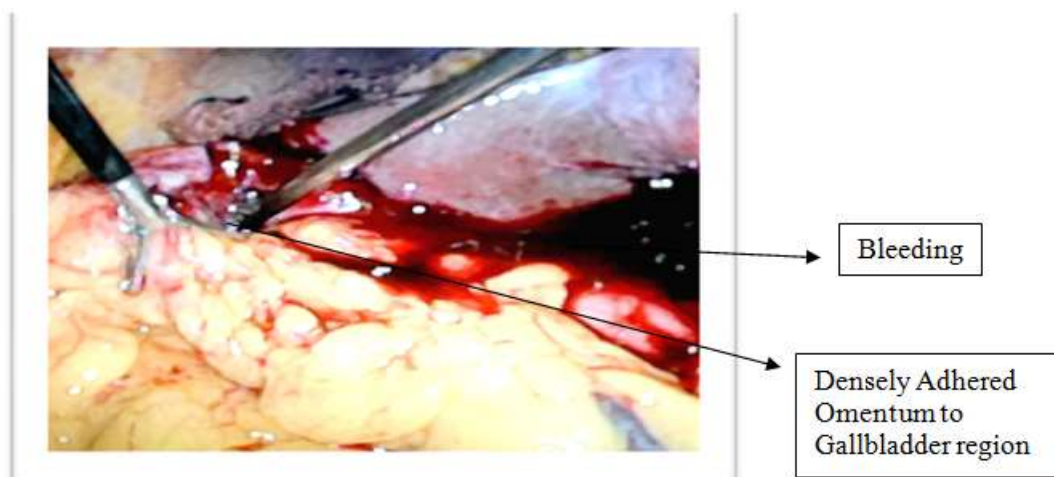


Fig 21.Bleeding from adhered omentum

Conversion- Conversion rate was 6 % (10; n=174).Among 10 only 8(80%) patient were viral marker positive and 2(20%) patient were viral negative with mortality rate 0% in this study. (TABLE NO.13)

Series and year	Conversion rate
Gupta G et al (2015) ^[13]	6%
Gabriel et al (2009) ^[23]	26.1%
Anand A et al (2007) ^[24]	11.93%
Nabil A.Abdel baki(2006) ^[13]	7.5%
Nachmani and supe(2005) ^[11]	11.4%
C. Simopoulos et al(2005) ^[16]	5.2%
Present study	6%

In present study conversion rate is comparable with most of other series reported. Dense adhesion with obscured anatomy is the most common cause of conversion. Bleeding that was not controlled by pressure and electro-coagulation Laparoscopic cholecystectomy lead to conversion. Conversion to open cholecystectomy is significantly associated with male gender, previous surgery, obesity, contracted gall bladder, gall bladder wall thickness > 3 mm and pericholecystic fluid on USG . Conversion to open cholecystectomy is not a failure of technique, but is a sign of sound judgment in the interest of safety of the patient ^[11]. In present study conversion rate is low due to experience of surgeon towards laparoscopic surgery was good enough with selection of right cases.

OPERATIVE TIME- The operative time was calculated from skin incision for verses needle insertion to closure of wound. The mean operative time was 34.90 minutes, with range being 15-80 minutes. Total 78(48%) patient had duration more than 45 min out of total cases (n=164) as 10 patient under gone conversion to open. 60(37%) viral marker positive patient and only 18(11%) patient were viral negative.(TABLE NO.14)

Series and year	Mean operative time (in minutes)
Schirmer et al (1991) ^[25]	138 ± 4
M R Cox (1993) ^[26]	105
B.J Ammori et al (2001) ^[27]	134 ± 43
M. Hussain et al(2002) ^[28]	97.6
Baki Nabil AA et al(2006) ^[13]	51 ± 10.2
Present study	34.9 ± 7

Since its introduction almost 26 years ago, laparoscopic cholecystectomy has been considered a mature and safe operation.

The Operative time is reduced as the learning curve has overcome. Duration of surgery included the time from insertion of the Verses’ needle to closure of the trocar insertion site, and was evaluated as a dichotomous variable. <45 or >45 minutes. It is apparent from present study that surgery last for longer duration in male, contracted GB, GB wall thickness >3mm, pericholecystic fluid on USG and BMI>30 kg/m²,

It is also evident from the literature that elderly age, male gender, obesity, acute cholecystitis, single large stone, thick gallbladder wall, liver fibrosis and technical problem are associated with prolonged intra-operative time

Cox (1993)^[26].Conversion to open surgery is at times perceived as a “failure” of the laparoscopic procedure, and surgeon’s enthusiasm to keep the conversion rate low may lead to unwanted biliary tract injuries and complications. If laparoscopic cholecystectomy is extended for more than 2 hours, the risk of peri-operative complications is four times higher than that with a surgery which lasts between 30 to 60 minutes ^[29].

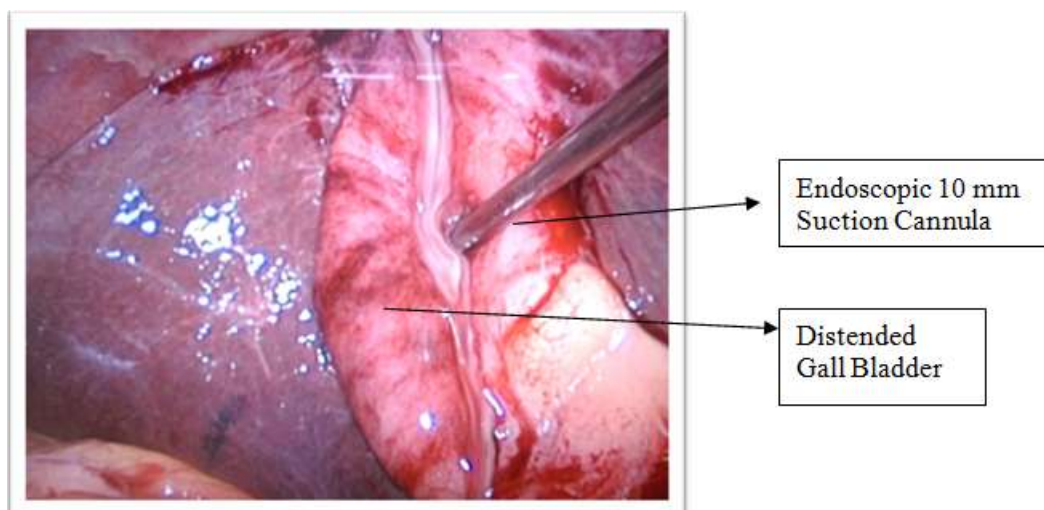


Fig. 22 Empyema of Gall Bladder with thick Gall Bladder Wall.

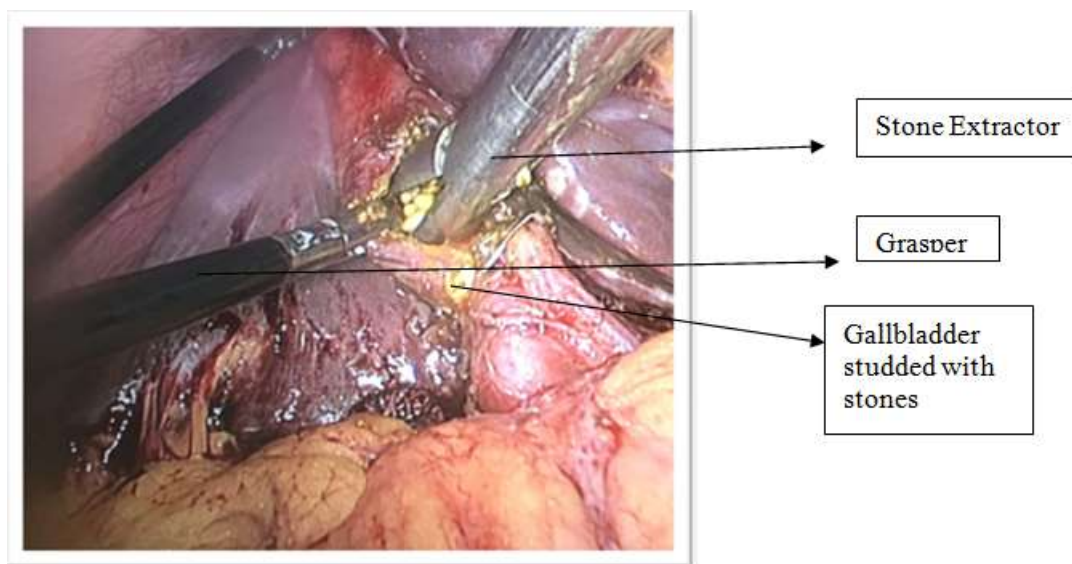


Fig. 23: Extraction of Gall Stone from Perforated Gall Bladder.

Hospital stay and Follow up

Patient with positive marker had longer stay due to delayed healing, port site infection due to spillage of bile or stone and extension of incision due to multiple stone, large size stone, co-morbidities. In our study (n=164) 10 cases excluded due to conversion there were 53(30%) positive patient and 16(9%) were viral negative patient among 69. We have seen that viral marker positive patient have longer hospital stay. (TABLE NO.15/16). **Mohammad Tayeb et al (2008)** ^[18]Thirty patients, including 21 females (median age: 42 years) underwent LC during the study period There was no incidence of bile duct injury, but two patients (6.7%) required conversion to open procedure Mean hospital stay was 3 ± 2.7 days. **Shaikh et al (2009)** ^[34] of 250

patients undergoing laparoscopic cholecystectomy, 20 (12.5%) were cirrhotic. Thirty percent were hepatitis B positive, and 70% were hepatitis C positive. Preoperative diagnosis of cirrhosis was possible in 80% of cases, and 20% were diagnosed during surgery. Morbidity rate was 15% and mortality rate was 0%. Two patients developed postoperative ascites, and mean hospital stay was 2.8 ± 0.1 days.

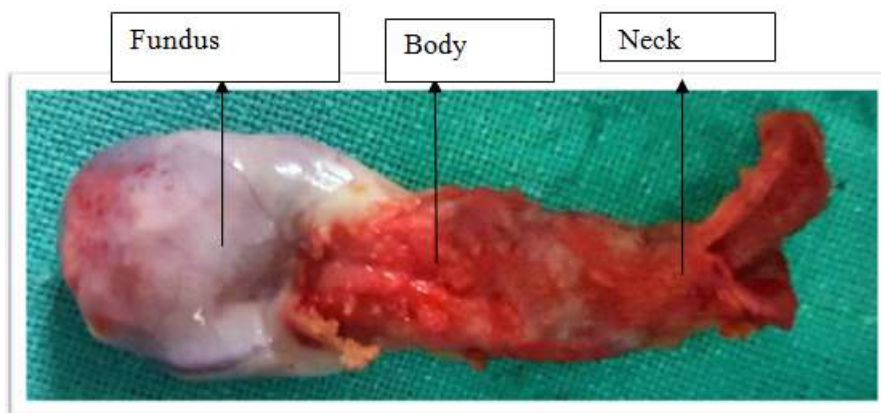


Fig. 24: Extracted Gall Bladder.

LAPAROSCOPIC SUBTOTAL CHOLECYSTECTOMY

In our study (n=174) 37(21%) patient out of 84 viral positive and 11(6%) out of 90 viral negative total cases 48(28%) have gone through laparoscopic subtotal cholecystectomy out of which 32 (67%) had LSC type 1 and 16(33%) had LSC type 2. Significant p value (0.003), itself explanatory. (TABLE NO.17). Its an option to avoid conversion of laparoscopic cholecystectomy to open cholecystectomy. **Palanivelu et al (2006)**^[30] Laparoscopic cholecystectomy is a safe and effective treatment for calculous cholecystitis in cirrhotic patients. Appropriate modification of subtotal cholecystectomy should be practiced, depending on the risk factors present, to avoid complication. **Jun Nakajima et al (2009)**^[31] the incidence of bile duct injury (1.6% vs 0.3%, $P = 0.040$) and conversion to open cholecystectomy (2.2% vs 0.3%, $P = 0.046$) was significantly lower in group B. The mean operative time was significantly longer (119.6 min vs 71.0 min., $P < 0.001$), and the mean blood loss was significantly higher (53.4 ml vs 12.9 ml, $P < 0.001$) in the LSC group. No significant differences were observed between LC and LSC in the incidence of postoperative morbidities or postoperative hospital stay. No patient had remnant gallstones or gallbladder cancers after a median follow-up of 42 months.

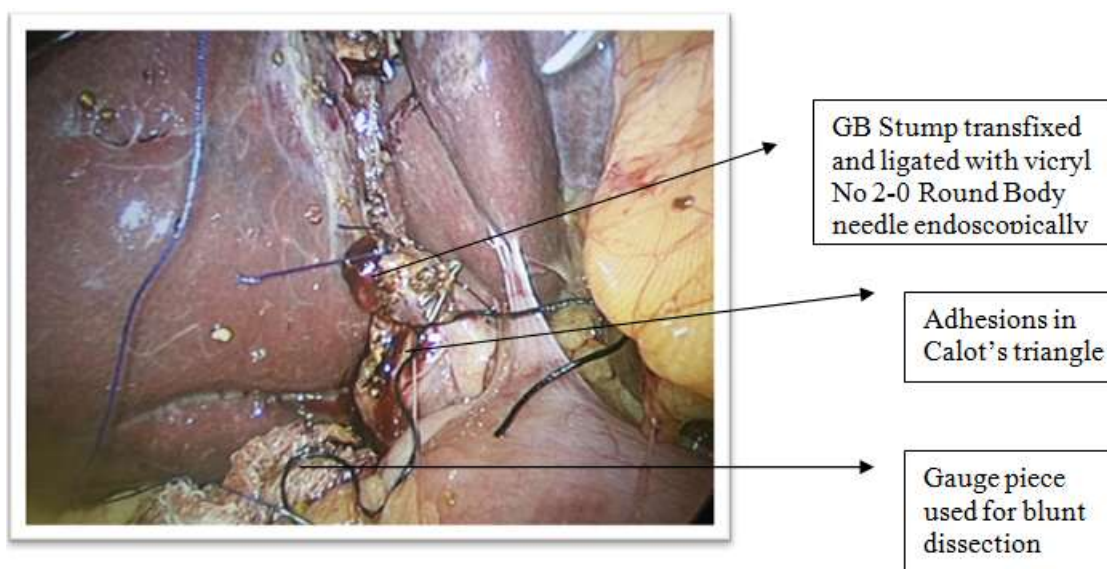


Fig. 25: Endoknoting in Cystic Duct Stump

Dhannur et al (2016)^[32] All the patients who underwent laparoscopic subtotal cholecystectomies by the same surgeon from January 2014 to November 2014 in our institution, was included in the study. Surgeon's experience of laparoscopic subtotal cholecystectomies, its safety and efficacy, associated surgical difficulties,

and post-operative complications was studied. Laparoscopic subtotal cholecystectomy is a safe, effective and an alternative procedure for complicated gallbladder surgeries

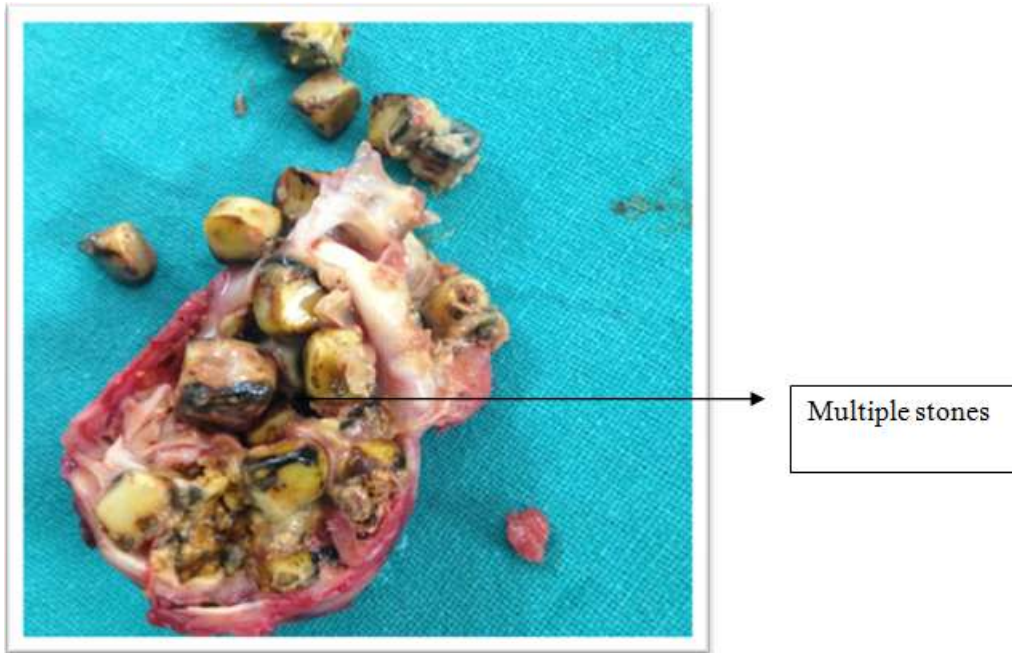


Fig.26 Multiple stones with thick walled gall bladder

Histopathological findings-

In our study (n=174) out of which 136(78%) had chronic cholecystitis among these 74 (54%) are positive patient. and 62(46%) were viral marker negative. Acute cholecystitis was present in 28(16%) viral marker negative patient and only 1 case of viral positive. 12(86%) positive patient had empyema out of total 14. (TABLE NO. 18).

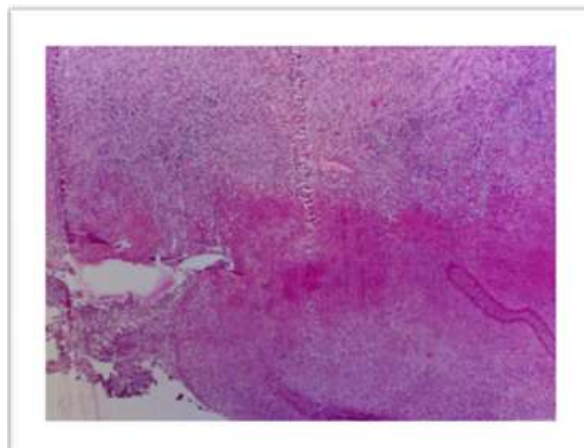


FIG NO.27 CASE OF EMPYEMA GALL BLADDER (Photo micrograph HE X 100) Mucosa is eroded and replaced by neutrophilic exudates with Trans mural inflammation and fibrosis

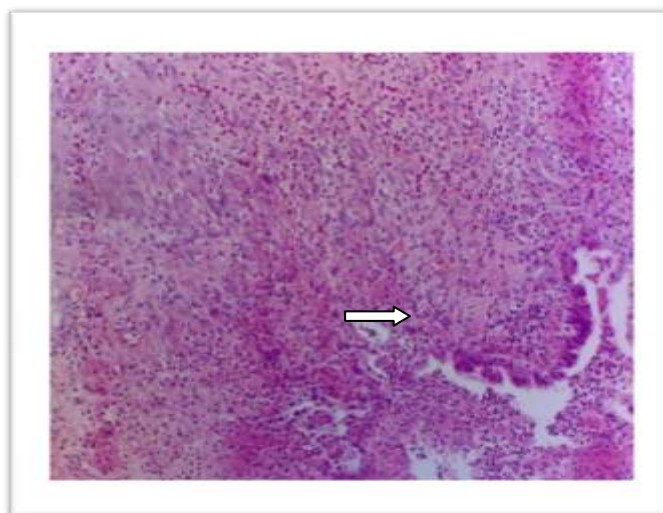


FIG NO 28 CASE OF EMPYEMA GALL BLADDER (HE X 100) preserved small focus of surface epithelium with mixed inflammatory infiltrate rich in eosinophil (arrow) destroying all the layers.

M R Cox (1993) ^[26] Patients presenting with symptomatic cholelithiasis from October 1990 until June 1992 were evaluated at laparoscopy with intention of proceeding to a laparoscopic cholecystectomy. The gross appearance of the gallbladder was categorized as acute inflammation, chronic inflammation, or no inflammation. Ninety-eight (23.4%) of 418 patients had acute inflammation of the gallbladder: 55 were oedematous, 10 were gangrenous, 15 had a mucocele, and 18 had an empyema. The authors assessed outcome in these patients. The frequency of conversion to an open operation was 33.7% for acute inflammation, 21.7% for chronic inflammation ($p < 0.05$), and 4% for no inflammation ($p < 0.001$). The conversion rate was highest for empyema (83.3%) and gangrenous cholecystitis (50%), while the conversion rate for oedematous cholecystitis was 21.8% and for acute inflammation with a mucocele it was 7%

R.Thamil selvi et al (2017) ^[33] Histopathological study showed 85.8 % of these patients suffering from chronic cholecystitis, 2.5% with acute cholecystitis, 2.5% polyp, 1.2% granulomatous cholecystitis, 1.2% empyema, 5.1% eosinophilic cholecystitis and 1.2% carcinoma.

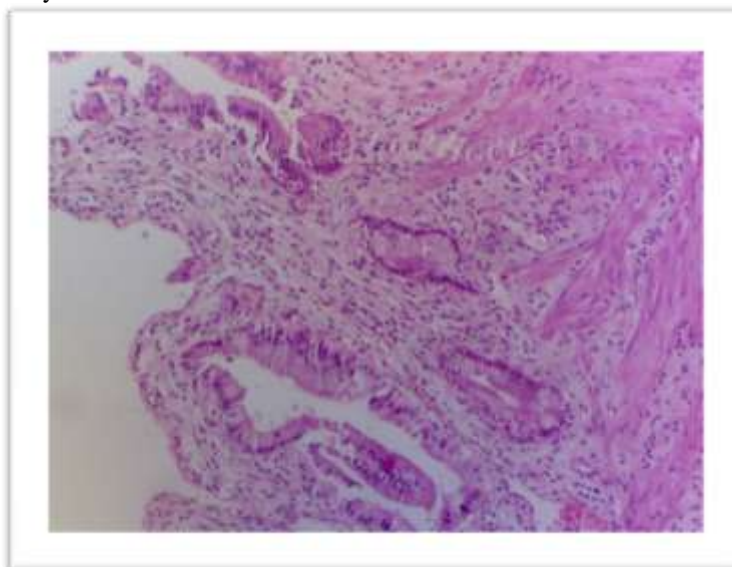


FIG NO. 29 CASE OF ACUTE ON CHRONIC CHOLECYSTITIS (HE X 100) exhibiting oedema and fibrosis and mixed inflammatory infiltrate.

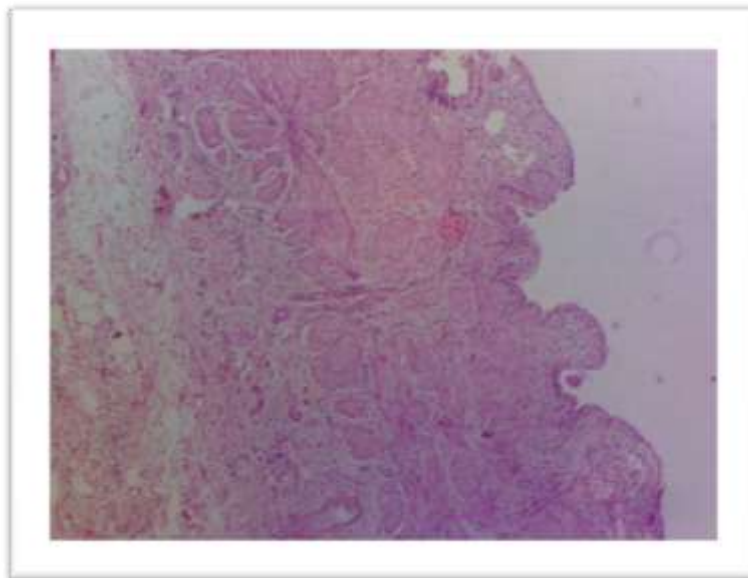


FIG NO. 30 CASE OF CHOLESTROLOSIS (HE X 100) lamina contain foamy macrophages, transmurular mono nuclei inflammatory infiltrate also noted.

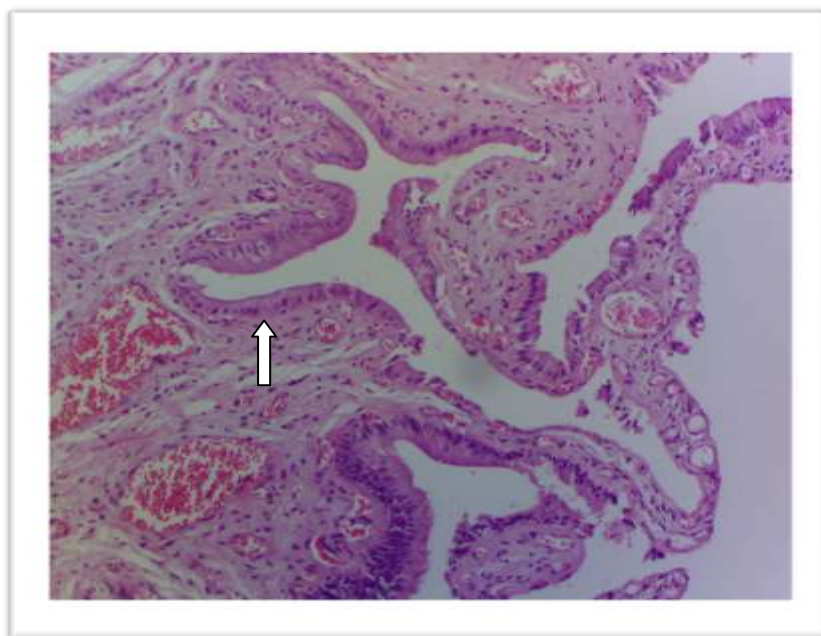


FIG NO.31 CASE OF CHRONIC CHOLECYSTITIS (HE X 100)Rokitansky Aschoff sinus (arrow)seen.

IV. Conclusion

1. In our study majority of patients were female (56%) and male were (44%) (n=174).
2. 36.0% patients had contracted gall bladder out of total n= 174 in which 24% were viral marker positive where as 22% had distended gall bladder of which 19% were viral marker positive. 53% patients of 174 had gall bladder thickness >3mm in which 40% are viral marker positive.
3. 55% patients out of 174 had multiple stones on USG in which 28% are viral marker positive. 33% were viral marker positive had stone size >1cm out of total n=174 patients and had 71(41%) total patient stone impacted at Hartmann's pouch out of which 31% were viral marker positive.
4. In 52% (90) of the patients, laparoscopic cholecystectomy was difficult. Out of these 40% were viral marker positive patient.
5. Moderate amount of bleeding occurred in 44% patients & 56% patients had minimal bleeding out of which viral marker positive patient had 34% moderate and 14% mild cases of bleeding. Severe bleeding occurred in none of the case. GB wall thickness >3mm and pericholecystic fluid on USG was strongly associated with more chance of bleeding. Difficulty in GB dissection occurred in 52% patients who had contracted gall

bladder also along with GB wall thickness >3mm, impacted stone at Hartmann’s pouch, pericholecystic fluid and in male gender.

6. Extraction of gall bladder was difficult in 43% patients who had stone>10mm. GB wall thickness (>3mm) and extension of incision was required in 24% patients. It depends upon stone size is >10mm.
7. Conversion to open was required in 10 (6.0%) patients in total n=174 out of which 8(80%) are viral marker positive patient. It occurred mostly in patients having contracted GB, GB wall thickness>3mm, pericholecystic fluid and in male gender. Dense adhesion with obscured anatomy was the most common cause of conversion.
8. LSC was done in 48(28%) patient out of which 37(21%) patient were viral marker patient.
9. The mean operative time was 34.9±7 minutes. 45% patients had operating time more than 45 minutes which signifies prolonged duration of surgery.34% were viral marker positive n=174 Operative time was more in male gender, contracted gall bladder, thickened gall bladder, contracted gallbladder.
10. Significant factors which can pre-operatively & per operatively predict the difficult laparoscopic cholecystectomy in elective cases are - Male gender, BMI >30kg/m², Pain in upper abdomen with fever, Contracted gall bladder, Adhesions in sub hepatic region on laparoscopy, Gall bladder wall thickness >3 mm, Size of the largest stone>1cm, Impacted stone at Hartmann’s pouch.

V. Summary

1. There should be no hesitation to convert to open if laparoscopically dissection duration exceeds from 20 to 25 min and no progression in surgical process noted due to dense adhesions and unclear anatomy.
2. Our study shows that viral marker positive have more complication and difficulty in dissection than viral negative patient in same sitting.
3. Pre-operative prediction of a difficult cholecystectomy and explaining advantage and disadvantage of conversion are of great help both to the patient who can plan his work and the surgeon who can also schedule his time and team accordingly.

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