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Evaluation of Gallbladder Content Spillage in Laparoscopic Cholecystectomy

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Abstract:*With increasing number of laparoscopic cholecystectomy performed worldwide, there has been increasing cases of complications related to it. One of which is gallbladder content spillage and its complications. Here I present study of 25 such cases randomly selected during my period of surgical residency from july 2012 to november 2014, I have tried to evaluate factors affecting it, its age/sex incidence, incidence according to gall bladder status, post operative complications in form of Surgical site infection, Peritonitis, Increased hospital stay, etc*

Keywords:*Bile spillage in laparoscopic cholecystectomy, Gall bladder perforation during laparoscopic cholecystectomy, post operative complication in bile spillage, Factors causing bile spillage in laparoscopic cholecystectomy*

I. Introduction

Gallstones are present in about 10% to 15% of the adult population & 3-6 % of adult Indian population[19]. Between 1% and 4% become symptomatic in a year requiring cholecystectomy, making cholecystectomy one of the most common operations performed by general surgeons. Before 20 years open cholecystectomy was operation of choice for cholecystitis. It is since last 20 years that laparoscopic cholecystectomy is established as gold standard surgery for the cholelithiasis. laparoscopic cholecystectomy has clear cut advantages over open cholecystectomy so much so as to establish laparoscopic approach as the treatment of choice. However, with the increase in the number of laparoscopic operations performed, there has also been a noticeable increase in the number of complications specific to these procedures. Gallstones can be spilled during an open cholecystectomy, but these stones are eliminated usually through direct removal, copious irrigation and mopping with laparotomy sponges. In laparoscopic procedures, these techniques are more difficult or unavailable and so stones can disappear from view and can become "lost". Studies show that the incidence of spilled gallstones during laparoscopic cholecystectomy accounts for 6 to 40% of procedures performed, while incidence of stone loss is unknown[5]. Complications from stones that are left within the peritoneal cavity can cause unusual but significant morbidity. So I want to evaluate the cases in which gallbladder perforation and spillage occurred in laparoscopic cholecystectomy to evaluate the postoperative outcome and the risk factors for spillage as well.

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Acknowledgements

2) Aims of Study

1. To study and evaluate the predisposing risk factors for gallbladder spillage during laparoscopic cholecystectomy.
2. To study and evaluate all possible postoperative outcomes that occur during laparoscopic cholecystectomy with gallbladder perforation and spillage.
3. To study and evaluate the predisposing risk factors for developing complications in a patient with gallbladder spillage during laparoscopic cholecystectomy.

II. Material And Method

Hospital Setting

The study was conducted at the surgical unit of civil hospital, Ahmedabad, a publicly funded tertiary care institution, which serves as the major referral centre for other public and private hospitals within Gujarat state and surrounding states particularly Rajasthan and Madhya Pradesh. Hospital has also 24 hours emergency care service with ICU care.

Data collection

A total of 25 patients, with a diagnosis of chronic calculus cholecystitisthat underwent laparoscopic cholecystectomy with intra operative Gallbladder spillage from July 2012 to December 2014, were collected. Patients were interviewed according to the proforma. Data was obtained from surgical records to complete proforma and summarize events. Data collected included clinical features, past history, laboratory investigations, imaging, intraoperative or postoperative complications and duration of hospital stay.

Inclusion criteria

- Patients with cholelithiasis proven by ultrasonography with atleast one attack of upper abdominal pain and considered fit for cholecystectomy were included in the study.

Exclusion criteria

- The patients having history or investigation suggestive of common bile duct stone were excluded from the study.
- Patient with acute cholecytitis were excluded.

Review of Literature

- HISTORY:[3]
- 1420: The first account of gallstones was given by a Florentine pathologist Antonio Benevieni, in an autopsy of a woman who died with abdominal pain.
- 1687: Stal Pert Von Der Wiel, while operating a patient with purulent peritonitis accidentally found gallstones.
- 1733: Jean-Louis Petit, the founder of gall bladder surgery suggested removal of gallstone and drainage of the gall bladder, thus creating fistula in patients with empyema, which he successfully performed in 1743.
- 1859: J.L.W Thudichum proposed a two-stage elective cholecystostomy. In the first stage, the inflamed gall bladder was sewed to the anterior abdominal wall through a small incision, which served as a route for the removal of gall stone at a later date.
- 1867: Dr John StoughBobbs from Indianopolis, Indiana while operating on a patient with suspected ovarian cyst found an inflamed and adhered sac containing "several solid ordinary rifle bullet" like structures. He opened the sac, which incidentally happened to be the gall bladder packed with multiple gallstones. He removed the gallstones and left the gall bladder in the abdomen after closing the defect in the gall bladder (cholecystostomy).
- 1878: Marion Simms performed first cholecystostomy on a 45-year-old woman with obstructive jaundice. Though the patient died on the eighth postoperative day due to massive internal haemorrhage, it paved the way for Theodor Kocher to perform the first successful cholecystostomy in June 1878.
- 1882: Carl Johann August Langenbuch who observed that these measures were only temporary and rallied to find a definite solution for the disease. He developed the technique of cholecystectomy through cadeveric dissection and he successfully removed the gall bladder of a 43-year-old man who was suffering from the disease for 16 years. Langenbuch found two gallstones and a chronically inflamed and thickened gall bladder. The patient was discharged uneventfully from the hospital after six weeks.
- By the turn of the century it was established that cholecystectomy could guarantee permanent relief from pain whereas cholecystostomy gave a permanent fistula and not a pain-free state.
- 1987: Mouret from France performed the first human laparoscopic cholecystectomy. On that day as he was completing a gynaecologic laparoscopy on a woman also suffering from symptomatic gallstones, he shifted his laparoscope to the subhepatic area. Upon finding a comparatively free and supple gall bladder he decided to remove it laparoscopically instead of opening up. He performed the procedure successfully and the patient recovered without complications.
- 1992: Within two years, in the USA, the procedure was being adopted and because of the massive demand from the patients, standard traditional stages of scientific evaluation were bypassed. Finally, in September 1992 a NIH consensus conference held in Bethesda concluded that laparoscopic cholecystectomy was the treatment of choice for cholelithiasis.

- Actually Prof Dr Med Erich Mühe of Böblingen, Germany, performed the first laparoscopic cholecystectomy on September 12, 1985. The German Surgical Society rejected Mühe in 1986 after he reported that he had performed the first laparoscopic cholecystectomy, yet in 1992 he received their highest award, the German Surgical Society Anniversary Award.
- Perissat, Berci, Cuschieri, Dubois, and Mouret were recognized by SAGES for performing early laparoscopic cholecystectomies, but Mühe was not. However, in 1999 he was recognized by SAGES for having performed the first laparoscopic cholecystectomy–SAGES invited Mühe to present the Storz Lecture.
- In Mühe's presentation, titled "The First Laparoscopic Cholecystectomy," which he gave in March1999 in San Antonio, Texas, he described the first procedure.
- Finally, Mühe had received the worldwide acclaim that he deserved for his pioneering work.

Complications of laparoscopic cholecystectomy[(6)]

- Haemorrhage
- Bile duct injury
- Bile leak
- Gallstone spillage
- Pancreatitis
- Wound infection
- Incisional hernia
- Pneumoperitoneum related: CO2 embolism, vasovagal reflex, hypercarbic acidosis, cardiac arrhythmias
- Trocar related: abdominal wall bleeding, hematoma, visceral injury, vascular injury
- Wound infection and/or abscess
- Deep vein thrombosis
- Conversion to open procedure

Laparoscopic cholecystectomy has its own new complications other than of open cholecystectomy. These are mainly trocar related complications and spillage from gallbladder perforation. Spillage of bile and stone leads to some short term and long term complications but in a very low rate.

Studies on Gallbladder Spillage

A number of animal studies have been undertaken to determine the potential consequences of spilled gallstones in the abdominal cavity. Welch et al.[20] investigated the effects of unretrieved gallstones in a rabbit model. These researchers placed unwashed human gallstones (cholesterol, pigmented and mixed) retrieved from Laparoscopic cholecystectomy in the peritoneal cavity of rabbits within 6 hours of collection. Wound infection did not develop in any of the animals, and at autopsy no intra-abdominal sepsis or marked adhesions were discovered.

Furthermore, a 25% decrease in the size of pigmented stones was noticed after 2 months, raising the possibility of spontaneous absorption by the peritoneum. Welch et al.[20] concluded that free intraperitoneal gallstones are harmless and thus do not warrant exploratory laparotomy.

However, a larger animal study by Johnston et al.[21] using rats found that leakage of bile in combination with gallstones was associated with a significant risk of postoperative adhesion formation and possible intraabdominal abscesses in contradiction to the aforementioned study. These authors, however, did not endorse the policy of routine laparotomy, except when a large number of stones were unretrievable during Laparoscopic cholecystectomy.

Leland and Dawson[22] conducted an experimental study using Sprague Dawley rats as a model to determine the incidence of intra-abdominal adhesions 88 days after sterile artificial cholesterol stones were placed in the peritoneal cavity. They noted formations ranging from thin and flimsy membranes to thick and well-developed stalks in 27% of their animals. However, they did not observe any major complication or absorption of these stones. These authors suggested that intraperitoneal stones could lead to an even higher incidence of adhesion formation in association with contaminated bile. They observed, furthermore, that other minerals present in the naturally occurring human gallstones could result in a much stronger inflammatory response in humans. Leland and Dawson therefore concluded that unretrieved gallstones are not benign and should be aggressively removed to decrease long-term complications.

Cline et al.[23], using Sprague-Dawley rats, reported the effects of various numbers of gallstones lost in the peritoneal cavity. The authors placed no gallstones, one gallstone, and five gallstones in the peritoneal cavity of these rats. They killed these animals after 2, 4, and 8 weeks and looked for adhesions, fistulae, perforations, or obstructions. Except for a trend toward more stones becoming fixed within the abdomen over time, no other

complications were noted in any of these groups. These authors concluded that spilled gallstones do not increase morbidity after Laparoscopic cholecystectomy.

One of the definitive studies from the Mayo clinic[24] addressed the long-term consequences of intraoperative spillage of bile and gallstones during Laparoscopic cholecystectomy. This study analyzed prospectively data from 1,059 consecutive Laparoscopic cholecystectomies performed over a 3-year period. The iatrogenic gallbladder perforation was 29%. The factors associated with higher incidence of gallbladder perforation included male gender, increasing age, body weight, and the presence of omental adhesions.

The Mayo study demonstrated that spillage of gallbladder content is associated with statistically significant incidences of intra-abdominal abscesses compared with intact Laparoscopic cholecystectomy. However, the overall risk of serious complications is very low. The authors emphasized the need for removal of as many calculi as possible laparoscopically. However, they advised conversion to an open procedure in patients for whom it is not possible to retrieve the majority of the gallstones laparoscopically, especially when bacteriobilia is suspected or confirmed by Gram stain of the bile. They noticed that percutaneous drainage of intra-abdominal abscesses in most of their patients was ineffective if the inciting gallstones were not removed.

In retrospective study from Switzerland[25], which analyzed 10,174 Laparoscopic cholecystectomies performed at 82 surgical institutions over a 3-year period, the incidence of iatrogenic gallbladder perforation was only 6%, and serious postoperative complications occurred very rarely (0.08%). This study concluded that elderly patients who have acute cholecystitis with infected bile and spilled stones may experience an increased risk of intra-abdominal abscess formation. Therefore, perforation of the gallbladder should be prevented whenever possible. They also emphasized the need to retrieve spilled gallstones and irrigate the abdominal cavity to dilute the infected bile and spilled stones. They reiterated the message of previous studies that the laparoscopic procedure should not be converted to an open one just for the retrieval of stones because the incidence and the mortality rate of serious complications are extremely low.

Risk of Gallbladder Perforation

Certain situations lead to higher risk of gallbladder perforation during laparoscopic cholecystectomy. Patients with acutely inflamed gallbladders have friable tissue which is susceptible to tear. Dense adhesions around the gallbladder make dissection potentially more difficult, and a tense, distended gallbladder that has not been decompressed is at risk of perforation[8]. This usually occurs when the gallbladder is manipulated by laparoscopic instruments or when it is dissected from the liver bed or during gallbladder extraction. Spilled stones are also caused by the slipping of the cystic duct clip or the tearing of the gallbladder while it is retrieved from the port site[9].

There is also a well recognised learning curve for performing laparoscopic cholecystectomies, and the risk of perforation is high early in a surgeon's laparoscopic career[8].

Risk of Complications from Spillage

Although lost gallstones were initially considered innocuous, it is now recognised that they can be a small but significant source of postoperative morbidity (0.1 to 6%)[11]. The presentation of complications will vary from patient to patient. Recognised symptoms include abdominal pain, fever, abdominal masses, bowel obstruction and the presence of a sinus infection or fistula[9, 10]. In most instances, the diagnosis is made retrospectively, or after visualisation of the stones on imaging and revisiting the patient's surgical history.

Most complications occur within the first few months, but presentations up to ten years after the procedure have also been documented[13]. Zehetner et al.[10] looked into all documented complications from lost gallstones and these ranged from the most common like intra-abdominal and subcutaneous abscesses and fistulas, to the less common, such as liver abscess, staphylococcus bacteraemia, broncholithiasis and expectoration, empyema, granulomas, bowel obstruction and incarceration within a hernial sac.

Studies also show risk factors for complications after spilled stones, such as the presence of infected bile, spillage of pigmented gallstones, multiple stones (>15), stone size (>1.5 cm) and old age[10].

Complications from Gallbladder Spillage [(27)]

1. Intraabdominal abscesses
- Subphrenic abscess
- Subhepatic abscess
- Retroperitoneal abscess
- Pouch of douglas abscess

Cutaneous Complications

- Port site wound infection
- Port site sinus tract formation
- Cutaneous fistula

- Anterior abdominal wall abscess

Gastrointestinal
- Acute pancreatitis
- Small bowel obstruction
- Sigmoid colon erosion
- Partial necrosis and perforation of small bowel

Respiratory
- Pleural effusion
- Empyema
- Pleurolithiasis
- Hemoptysis
- Cholelithoptysis

Miscellaneous
- Incarceration within hernia sac
- Cholelithiasis of ovary
- Peritoneal granuloma

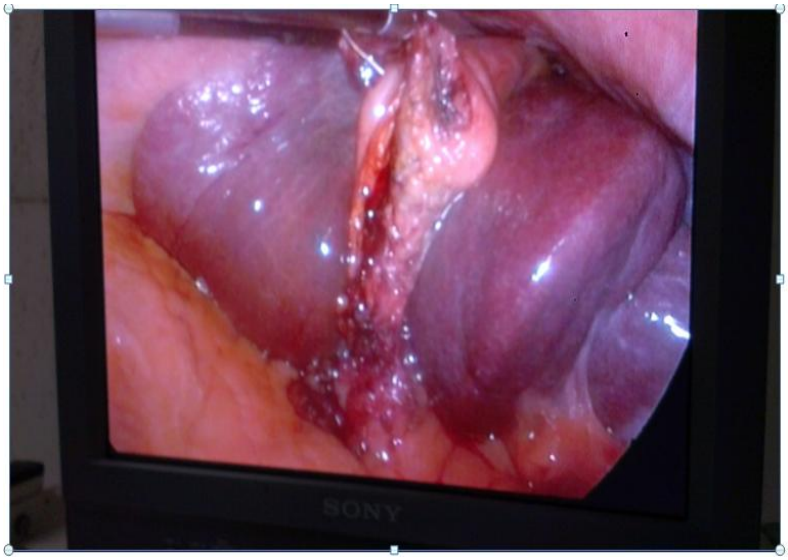


Fig.1 Single Gall bladder perforation during callots triangle dissection.

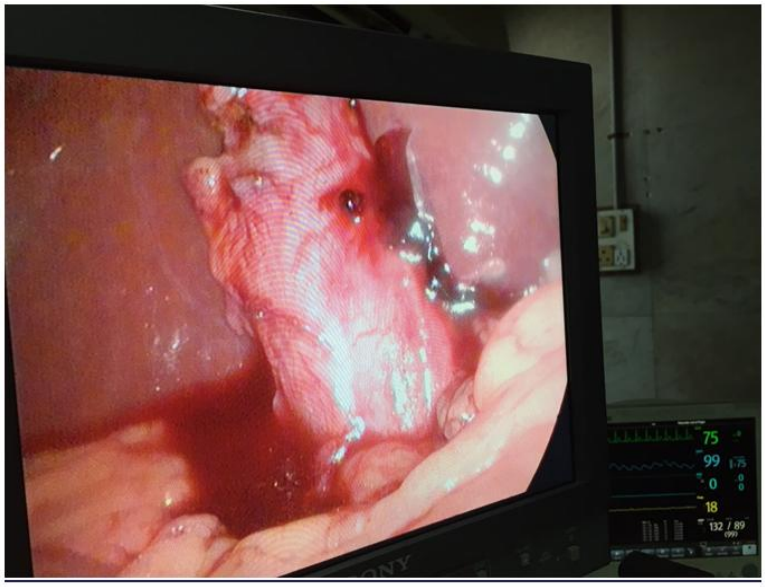


Fig.2 Single gall bladder perforation at body region

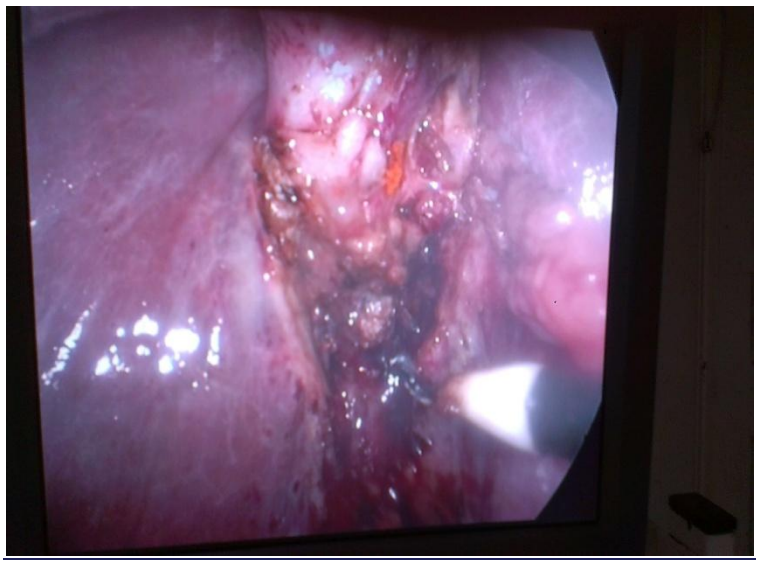


Fig.3Single gall bladder perforation during dissection of Gallbladder fossa

Fig.4 Dissected specimen showing perforation at infundibulum

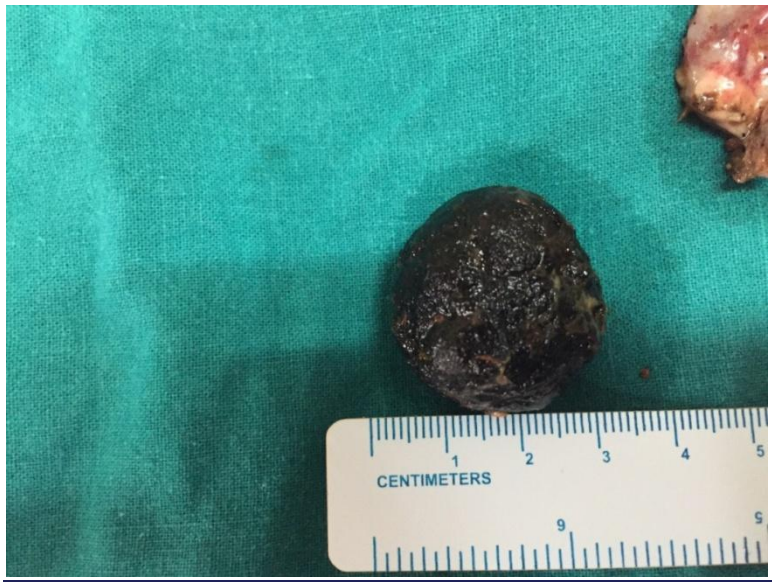


Fig.5 Spilled stone retrieved by laparotomy

Prevention and Management of Sppillage

The best way to avoid complications from spillage is to have awareness of the situations where perforation is likely, perform precise dissection, meticulously handle tissue and use devices such as endobags to retrieve dissected gallbladders through the port sites. Perforation usually occurs when dissecting the gallbladder from the hepatic fossa, and care taken at this stage of the operation can save many minutes attempting to retrieve stones from within the peritoneum[11].

Despite all precautionary measures, it is unavoidable that gallbladder perforation and stone spillage still occur in some patients. In these cases, it is crucial to minimize the number of stones spilled, attempt to retrieve all stones and to copiously irrigate the peritoneal cavity[9]. This serves the purpose of diluting any infected bile and may allow the stones to be washed up into the suction system. Some surgeons advocate the use of clips or an endoloop to close the hole in the gallbladder, while others will introduce a retrieval bag and 'park' it on the liver to receive all spilled stones[14]. In some situations it may be necessary to use an extra port adjusted to a 30-

or 45-degree scope or use a fan liver retractor to improve visualisation[11].
Use of antibiotics has been suggested for patients who undergo laparoscopic cholecystectomy to treat acute cholecystitis, have visibly infected bile, or have a high amount of spillage.
Possibly the most important aspect in the management of perforated gallbladders and potential stone spillage is documentation. Diagnosis of complications related to lost stones is often done only after the identification of gallstones on radiological imaging. If the documentation is clear and the patient is aware of the perforation, then clinicians may be alerted early to the possibility of a stone complication in order to expedite treatment.

Thus recommended steps during laparoscopic cholecystectomy in case of spillage are:

- Informed consent from patient and family preoperatively and mentioning that dropped stones are common depending on the size of stones and condition of the gallbladder wall and liver bed.
- Every effort should be made to retrieve the gallstones and the peritoneum should be irrigated with copious saline, in case of spillage.
- There is routinely no need for converting the laparoscopic procedure to a laparotomy for spilled stones, but it should be essential to document spilled stones in the operation notes and if laparoscopic stone removal is not possible, conversion to laparotomy should be done if stones are multiple and/or very large in size
- All possible but unlikely consequences of the spillage should be informed to the patient.
- The surgeon should have long term follow up of these patients unlike other routine cholecystectomy, as there is possibility of delayed complications.
- In view of confusing delayed clinical presentation during post-op period, surgeon should be alert to rule out possible complications due to spillage and manage them accordingly.

Management of Complications

Investigations

The imaging method of choice is usually ultrasound, as stones are usually visualised well using this method. Visualization, however, depends on the location of the lost stones. CT and magnetic resonance imaging (MRI) can also be used to obtain adjunct images depending on the biochemical composition of the stone. Radio-opaque calcified stones, such as pigmented stones, can be seen clearly on CT with unenhanced pictures. On MRI most stones are hypo-intense on T2-weighted images and iso-intense to hyperintense on T1-weighted images. These are best seen without fat suppression as this allows for the contrasting features of the stone to be seen against the fat. Sometimes the radiological findings mimic unusual diagnoses such as actinomycosis, hydatid disease or even malignancy, so diagnosis can be difficult.

Treatment

Treatment of complications basically depends on the type and site of the complication.

Abdominal wall abscess from stones caught at the port site can be dealt with by local drainage and evacuation of the stones. Stones which are the foci of infection in these abscesses and sinuses should be completely removed for a cure.[13, 14]

Intra-abdominal abscesses can be dealt with percutaneously by minimally invasive technique and laparotomy where this technique fails[15, 17.] The percutaneous procedure has the advantage of being less invasive, having a short hospital stay and minimal discomfort, and is ideally suited for old patients.[18] Computed tomography guided drainage of the pus is first done with a pigtail catheter. A few weeks later the tract is dilated with a dilator system and a nephroscope is passed through it and stones are removed.[16] Treatment is not complete until all the stones that are present in the abscess are removed. The size of the stone is an important determinant. Smaller stones usually less than 1 cm can often be removed through the nephroscope and using a basket. Larger ones need fragmentation by mechanical means or lithotripsy before attempting removal.[16] Ultrasonic lithotripsy requires a rigid endoscope and keeps stone fragments to a minimum, thereby minimising the risk of breaking an infected stone into tiny fragments, which may serve as a nidus for further infection. In dealing with a deep seated abscess with a tortuous tract electrohydraulic lithotripsy in association with choledochoscopy is a good alternative.[16]A completion contrast study (abscessogram) is recommended to check for the intactness of the cavity and for any retained stones.

Gall stones found at distant sites, have been an incidental finding and can be found in a hernial sac, in urine, or in sputum. Gall stones causing vesical granulomas resulting in haematuria have been dealt with by cystoscopic excision of the granulomas.[16]

III. Observation & Discussion

A total of 25 patients, with a diagnosis of chronic calculus cholecystitiswho underwent laparoscopic cholecystectomy with intra operative Gallbladder spillage from July 2012 to November 2014, were collected. Following parameters were observed and analyzed. Information data was represented as charts. Data was also

compared with similar studies in the past.

Table 1: Age distribution

Age group	No. of patients(n=25)	Percentage
20-29	5	20%
30-39	4	16%
40-49	10	40%
50-59	4	16%
60-69	2	8%

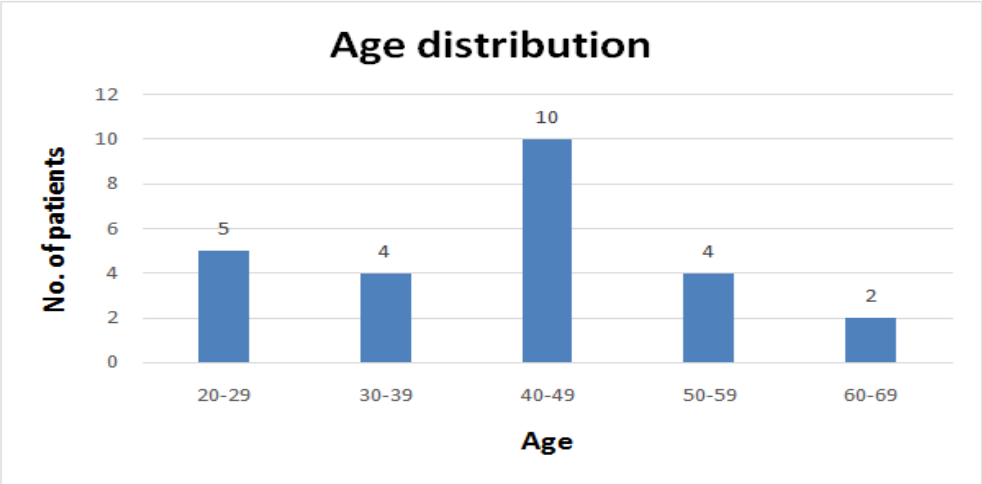
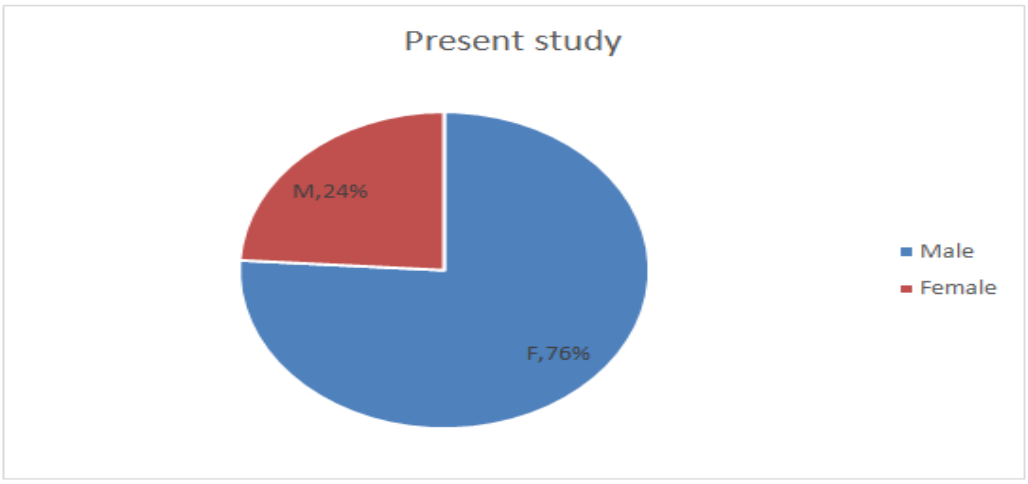
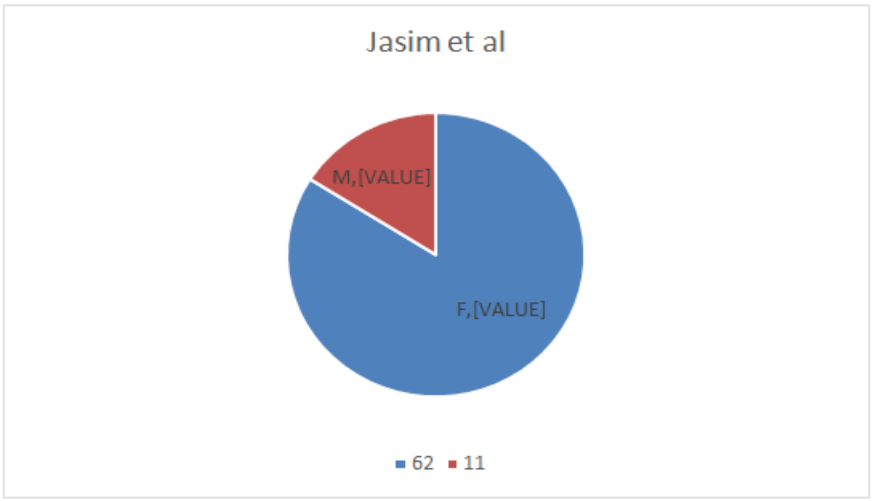


Table 2: Gender distribution

Sex	Present study(n=25)		Jasim et al(n=73)		Rice et al(n=306)	
	No. of patients	Percentage	No. of patients	Percentage	No. of patients	Percentage
Female	19	76%	62	84%	174	57%
Male	6	24%	11	16%	132	43%





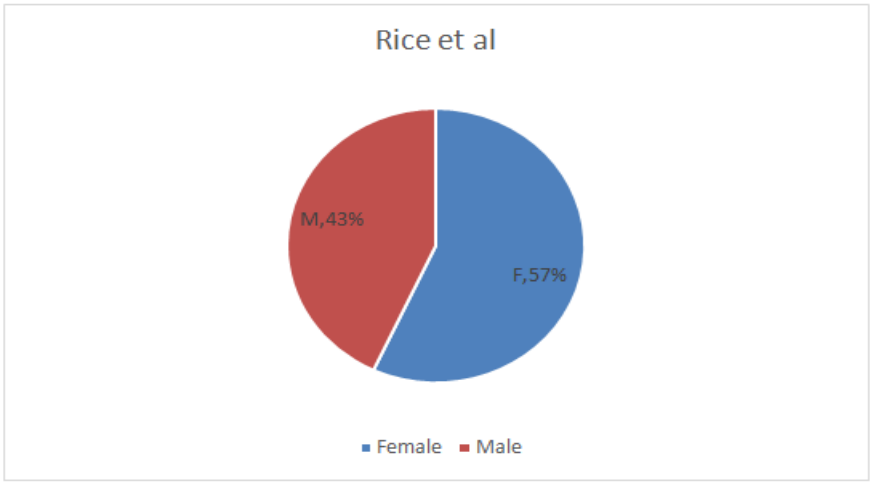


Table 3: Meanage

Study	Mean age(yr)
Rice et al	52
Jasim et al	36.6
Present study	41.48

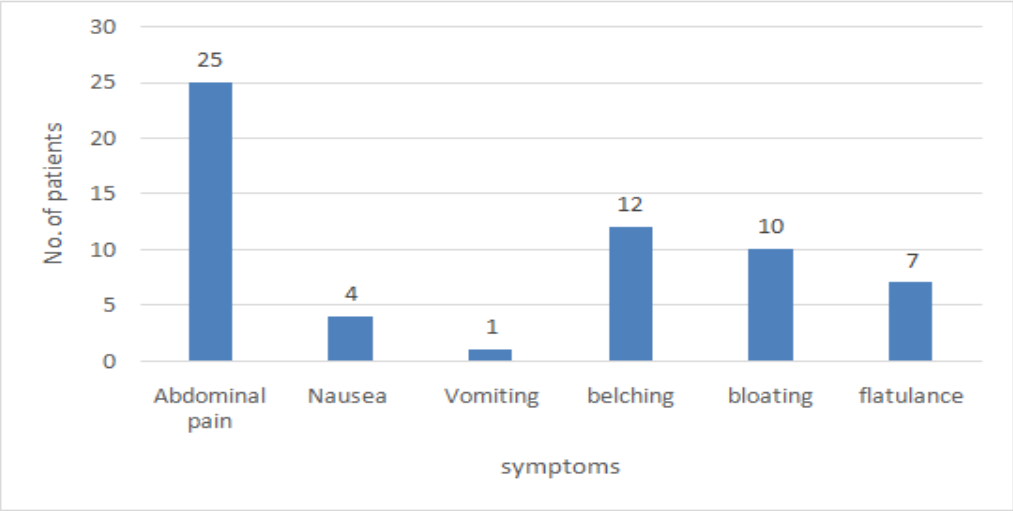
In present study there were 25 patients with mean age 41.48 ranging from 23 to 61 years. Female group accounts for 76% and male group for 24% of study.

In the study done by jasimet al.[26] mean age was 38.6 and female group accounts for 84% while male group was 16%.Another study done by rice et al.[24] mean age was 52 years, female group was 57% and male group was 43%.

Gallstone diseases are more common in females than males. Results found similar to present study.

Table 4: Symptoms

Symptoms	Present study(n=25)		Memon MA et al(n=165)	
	No. of patients	Percentage	No. of patients	Percentage
Abdominal pain	25	100%	165	100%
Nausea	4	16%	30	18%
Vomiting	1	4%	6	4%
Belching	12	48%	72	44%
Bloating	10	40%	60	36%
Flatulence	7	28%	42	25%



In the present study symptomatology distribution of patients shows abdominal pain as a most common symptom followed by belching and bloating. While nausea, vomiting and flatulence are other minor symptoms.

In other study by Memon MA et al.[27] all patients had abdominal pain, 44% had belching, 36% had bloating, 25% had flatulence, 18% had nausea and 4% had vomiting.

So the symptoms can be comparable to present study.

Table 5: USG (single/multiple stones)

USG: GB stone	Present study(n=25)		Memon MA et al(n=165)	
	No. of patients	Percentage	No. of patients	Percentage
Single stone	3	12%	32	19%
Multiple stones	22	88%	133	81%

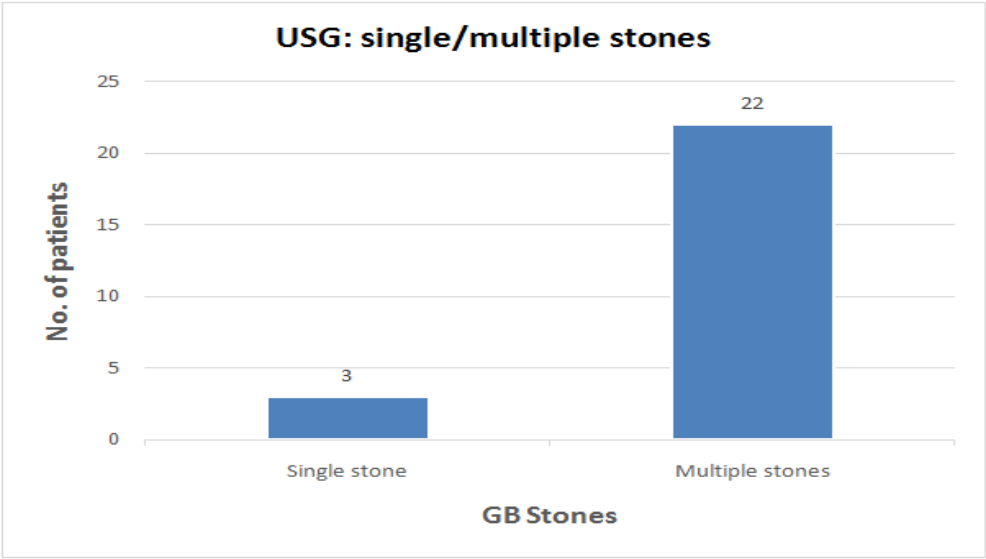
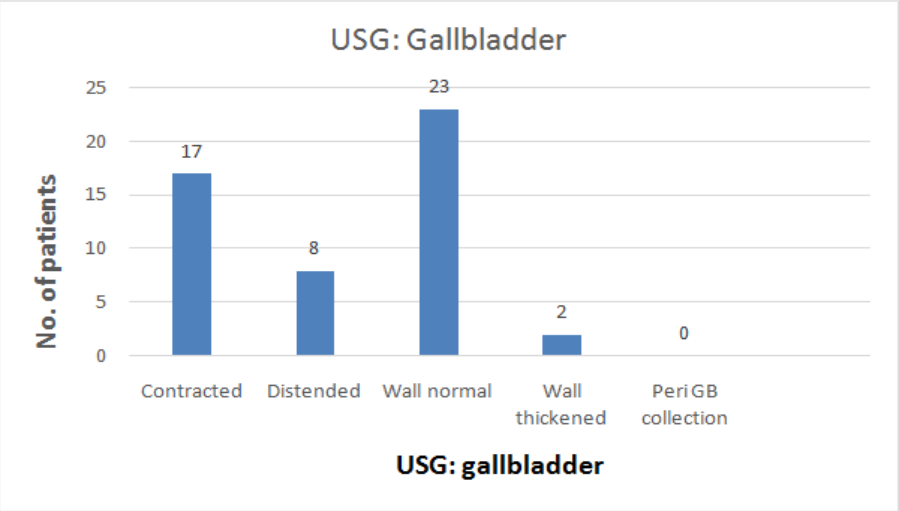


Table 6: USG (Gallbladder)

USG gallbladder	Present study(n=25)		Memon MA et al(n=165)	
	No. of patients	Percentage	No. of patients	Percentage
Contracted	17	68%	108	65%
Distended	8	32%	57	35%
Wall normal	23	92%	144	89%
Wall thickened	2	8%	21	11%
Peri GB collection	0	0	-	-



In present study 88% patients have multiple GB stones while 12% patients have single GB stone.32% patients have distended gallbladder and 68% patients have contracted gallbladder. Out of these, 92% patientshave normal GB wall with 8% have thickened GB wall.None of these have peri GB collection.

In a study by Memon MA et al.[27] 81% had multiple GB stones with 35% had distended gallbladder while 65% had contracted gallbladder. 89% had normal GB wall and 11% had thickened wall.

Ultrasonography findings are not more important in a relation with GB perforation and spillage. It is rather intraoperative GB status which is more important for occurance of gallbladder perforation and spillage.

Table 7: Intraoperative GB finding

Intra operative GB	Present study(n=25)		Memon MA et al(n=165)	
	No. of patients	Percentage	No. of patients	Percentage
Chronically inflamed	25	100%	157	95%
Mucocele	1	4%	4%	-
Pyocele	1	4%	4%	-

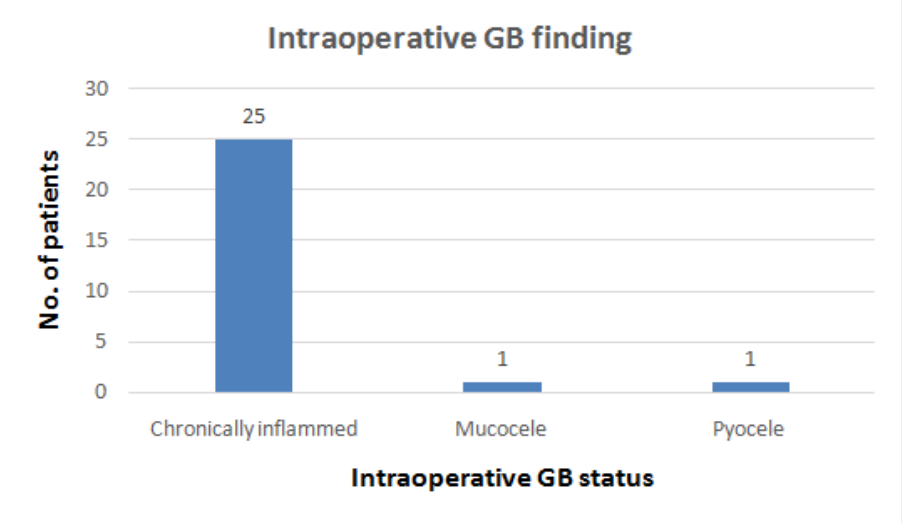
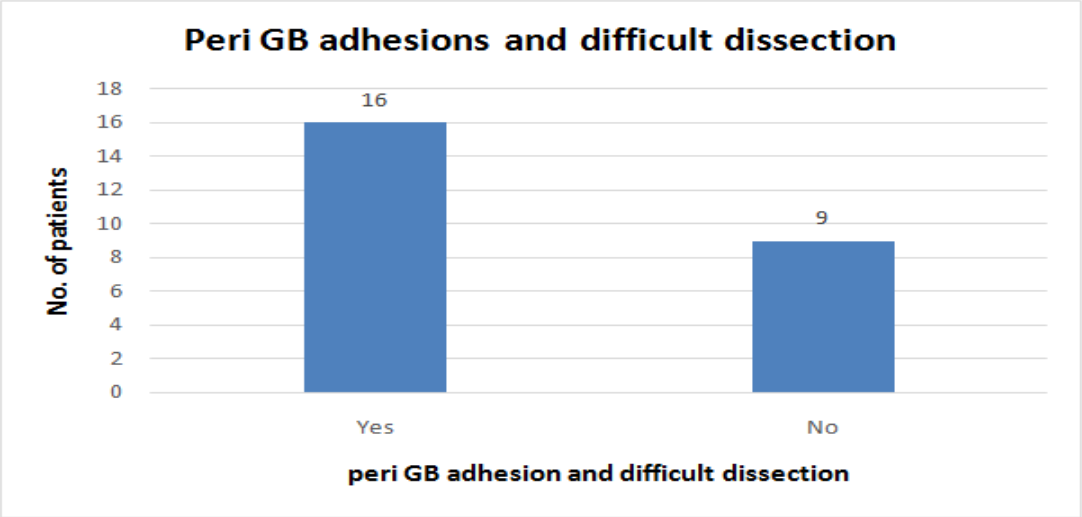


Table 8: Intraoperative peri GB adhesions and difficult dissection

Peri GB adhesions & difficult dissection	Present study(n=25)		Memon et al(n=165)		Rice et al(n=306)	
	No. of patients	Percentage	No. of patients	Percentage	No. of patients	Percentage
Yes	16	64%	94	57%	127	42%
No	9	36%	71	43%	179	58%



Intra operative GB status	Present study(n=25)	Memon MA et al(n=165)	Rice et al(n=306)
Chronically inflammed	100%	95%	89%
Mucocele	4%	-	-
Pyocele	4%	-	-
Peri GB adhesions	64%	57%	42%

In present study, Intraoperative 100% GB were chronically inflammed out of which 4% turned into mucocele and 4% into pyocele. There was peri GB adhesions and difficult dissection in 64% of patients while 36% had no peri GB adhesions.

In other study by Memon MA et al.[27] 95% had chronically inflammed GB while other 5% had acutely inflammed gallbladder and 57% had peri GB omental adhesions.

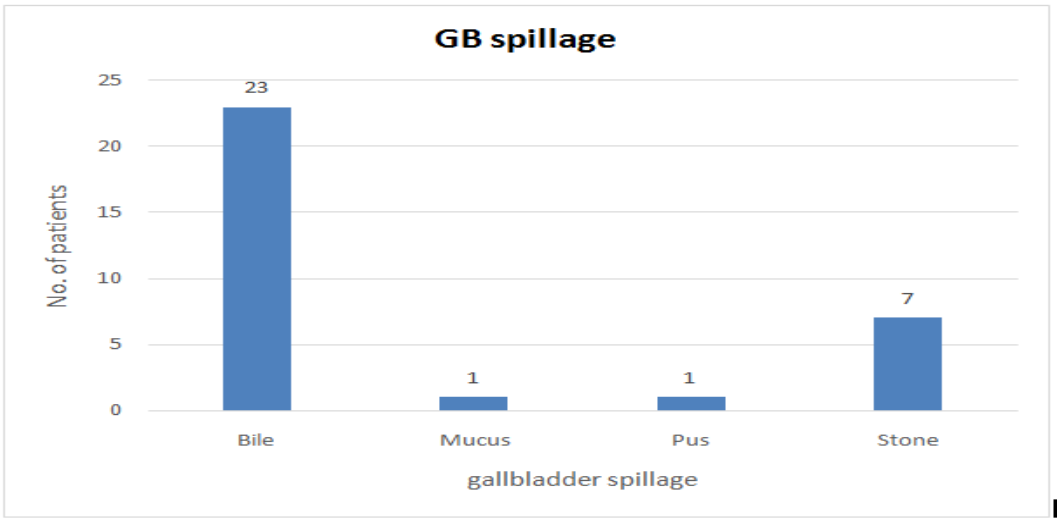
Another study done by rice et al.[25] at mayo clinic, 89% patients had chronically inflammed gallbladder and 42% had peri GB omental adhesions.

Chronically inflammed gallbladder has thickened, variegated and friable wall so increasing chances of GB perforation and spillage.

Omental adhesions makes dissection difficult and increses the chances of gallbladder perforation and spillage.

Table 9: Bile and Stone spillage

Spillage	No. of patients(n=25)	Percentage
Bile	23	92%
Mucus	1	4%
Pus	1	4%
Stone	7	28%



Spillage	Present study(n=25)	Jasim et al(n=73)	Rice et al(n=306)
Bile	92%	97%	62%
Mucus	4%	-	-
Pus	4%	3%	-
Stone	28%	47%	38%

In present study out of 25 GB spillage, 92% patients had bile spillage, 4% had pus spillage and 4% had mucus spillage. 7 (28%) patients had stone spillage. 16(64%) patients had only bile spillage while 7 (28%) patients had bile/mucus/pus with stone spillage.A study by Jasimet al.[26] bile spillage was present in 97% of patients and gallstone spillage was 47% and 3% had pus spillage.Another study by rice et al[24] bile spillage was present in 62% of patients and gallstone spillage was 38%.

So in present study occurrence of stone spillage is lower than above mentioned studies. Though there is significant difference in stone spillage between two studies, there is no significant difference in terms of complications between two studies. It is retained stones in peritoneal cavity which might be left after saline wash and irrigation, are more important for developing complications rather than occurance of stone spillage.

Table 10: Postoperative complications

Complications	No. of patients(25)	Percentage
Port site wound infection	3	12%
Port site sinus tract	1	4%
Intraabdominal abscess	1	4%
Conversion to laparotomy	1	4%
No complications	19	76%

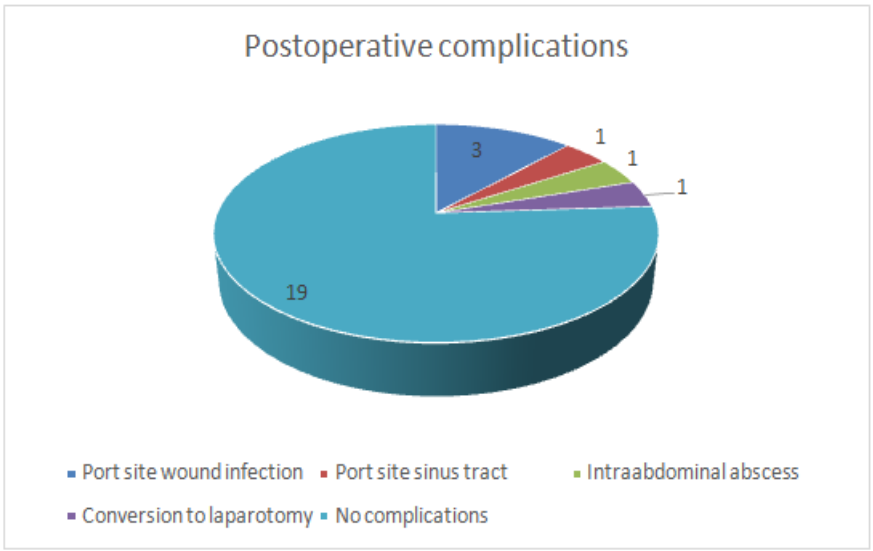


Table 11: Comparison of complications

Complications	Present study(n=25)		Jasim et al(n=34)	
	No. of patients	Percentage	No. of patients	Percentage
Port site wound infection	3	12%	3	8.8%
Port site sinus tract	1	4%	1	2.94%
Intraabdominal abscess	1	4%	3	8.8%
Persistant abdominal pain	-	-	1	2.94%
Conversion to laparotomy	1	4%	-	-

Table 12: Relation between gallbladder spillage and complications

	Complications developed	No complications	Total
Bile only	1	17	18
Bile/mucus/pus+stone	5	2	7
Total	6	9	25

In present study no complications occurred in 76% cases. 6 patients (24%) developed complications of which 3 patients had port site wound infection, 1 had intraabdominal abscess, 1 had sinus tract formation and 1 was converted to open cholecystectomy

20% complicated cases had both stone and bile/pus spillage while 4% had only bile spillage.

In other study by Jasimet al[26] complication rate was 23.53%. In that study, out of 34 patients 3 patients(8.8%) developed intaabdominal abscess,3 patients(8.8%) developed port site wound infection, 1 patient(2.94%) developed port site sinus tract formation and other 1 patient(2.94%) developed persistant abdominal pain due to retained gallstone in peritoneal cavity.

So wound infection and intraabdominal abscess are common complications occurred after gallbladder spillage.

The p value of table 11 is 0.000535 ($p<0.05$) which is significant. So chances of postoperative complications are more in case of bile and stone spillage rather than only bile spillage.

Table 12: postoperative drain removal day

Postoperative day of drain removal	No. of patients(25)	Percentage
1	4	16%
2	17	68%
3	2	8%
4	1	4%
5	0	0
6	1	4%

Study	Mean postoperative drain removal day
Memon MA at el	2.5 days
Present study	2.16 Days

In present study postoperative drain removed on 1st day in 16% of cases, 2nd day in 68% of cases, on 3rd day in 8% of cases, on 4th day in 4% of cases and on 6th day in 4% of cases.

Mean postoperative drain removal day was 2.16.

In a study by Memon MA et al[27] mean postoperative drain removal day was 2.5.

Table 13: Relation between complications and postoperative drain removal day

	Complications developed	No complications	Total
Drain removal day<=2	4	17	21
Drain removal day >2	2	2	4
Total	6	19	25

The p value of above table is 0.184 ($p=0.184$) which is not significant. Therefore postoperative complications are not related to early or late drain removal.

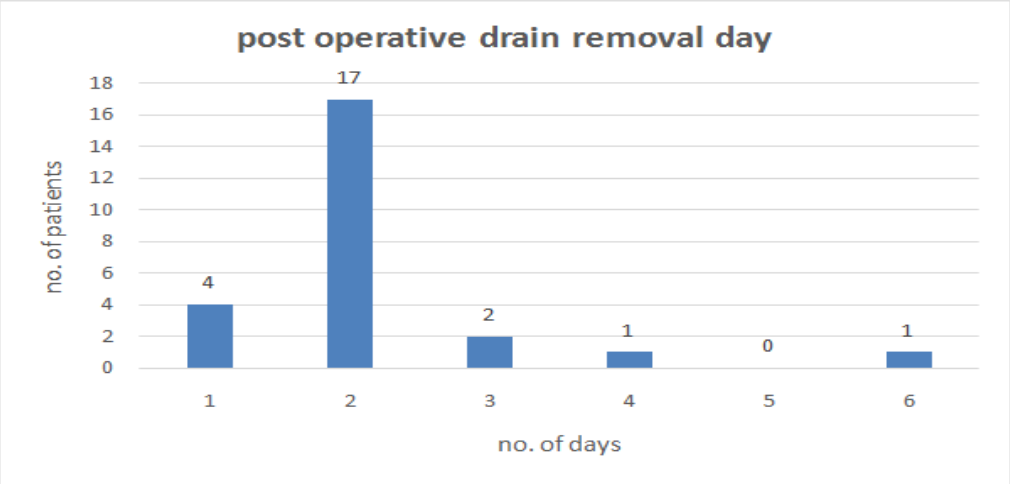
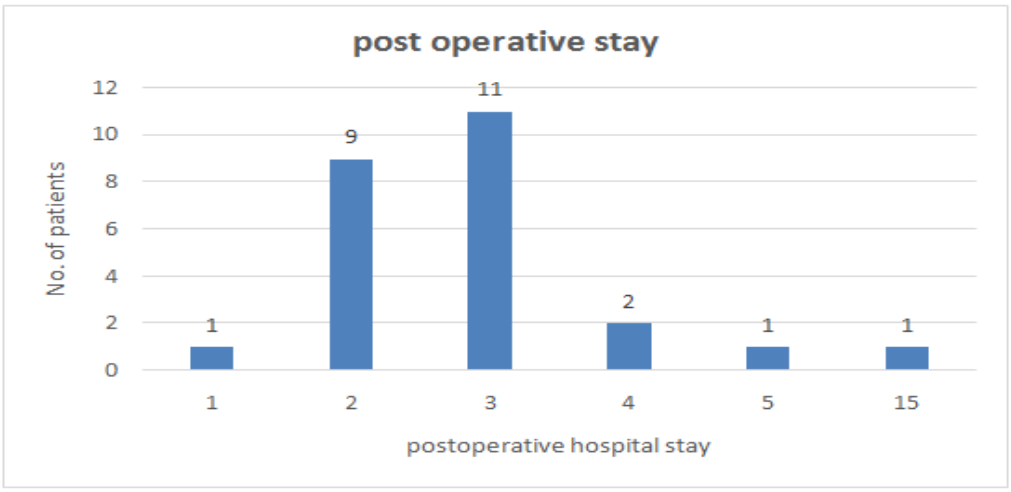


Table 11: Postoperative hospital stay

Day of postoperative hospital stay	No. of patients(25)	Percentage
1	1	4%
2	9	36%
3	11	44%
4	2	8%
5	1	4%
15	1	4%



Study	Mean postoperative hospital stay
Rice et al	2.1 days
Jasim et al	2 days
Present study	3.2 days

In present study 44% patients discharged on 3rd postoperative day while 36% were discharged on 2nd postoperative day. Mean postoperative stay was 3.2 ranging from 1 to 15.In a study by Jasimet al[26] mean postoperative hospital stay was 2 days.Another study by rice et al.[25] mean postoperative hospital stay was 2.1 days.So In this study mean postoperative hospital stay is 1 day longer than above studies. This difference may be due to different protocols for discharging the patient.

Summary

- In this study we have considered randomly selected 25 cases of gallbladder spillage during laparoscopic cholecystectomy according to inclusion and exclusion criteria.
- Study was conducted during period of 30 months (July 2012 to november 2014).
- After filling details in proforma, master chart was prepared. A detailed analysis was done and various observations were derived, discussed and concluded.
- The gallbladder spillage is more common in age group 41-50 years (n=10, 40%) with female predominance

(F:M:19:6)as gallstone disease itself is more common in females with 41-50 age group.

- All patients (n=25, 100%) presented with abdominal pain with 12(48%) patients had belching, 10(40%) patients had bloating, 7(28%) patients had flatulence, 4(16%) patients had nausea and 1(4%) patient had vomiting. Abdominal pain, belching and bloating are common clinical features associated with gallstone disease.
- In ultrasonography, 17(68%) patients had contracted gallbladder and 8(32%) patients had distended gallbladder. 23(92%) patients had normal gallbladder wall and 2(8%) patients had thickened gallbladder wall. None of them had peri GB collection. 22(88%) patients had multiple GB stones while 3(12%) patients had single GB stone.
- Intraoperative, all patients (100%) had chronically inflammed gallbladder with 1(4%) patient had mucocele and 1(4%) had pyocele. Out of them, 16(64%) patients had peri GB omental adhesions with difficult dissection.
- Bile spillage was present in 23(92%) patients. 1(4%) patient had pus spillage and 1(4%) patient had mucus spillage. 7(28%) patients had stone spillage as well. So 16(64%) patients had only bile spillage and 7(28%) patients had both bile/pus/mucus and stone spillage.
- Postoperative complication rate was 24% (n=6). 3(12%) patients developed port site wound infection, 1(4%) patient had intraabdominal abscess formation, 1(4%) patient had port site sinus tract formation and 1(4%) case was converted to laparotomy. Out of these 6 patients, 5(20%) patients had bile/pus with stone spillage while 1(4%) patient had only bile spillage.
- Postoperative, in 17(68%) patients drain was removed on 2nd postoperative day, in 4(16%) patients drain was removed on 1st day while in 4(16%) patients drain was removed after 2 days.
- In 11(44%) patients postoperative hospital stay was 3 days, in 9(36%) patients it was 2 days and 1(4%) patient discharged on 1st postoperative day. In 4(16%) patients postoperative hospital stay was more than 3 days.

IV. Conclusion

- Laparoscopic cholecystectomy is the gold standard for gallstone disease.
- Gallbladder perforation occurs as a result of intraoperative retraction, dissection and extraction of gallbladder especially when gallbladder is acutely inflammed and fragile and there is peri GB omental adhesions.
- Gallbladder content spillage is an uncommon occurrence in most of the cases but when it occurs, main goal of all surgeons should be to manage these complications with minimal harm to the patients and to minimize unwanted consequences of these complications.
- Surgeon should take utmost care and attempt to remove all visible stones and should irrigate abdominal cavity to dilute infected bile.
- If spillage occurs it should be recorded and such patients should be kept under close follow up to aid in early diagnosis of late complications.
- There is no indication for routine conversion to open surgery just for sake of removal of spilled gallstones.
- Though complications arises from spillage of gallbladder during laparoscopic cholecystectomy are rare, they can present months to years later after surgery with septic complications.
- Complications are more common after spillage of both bile and stones rather than bile only.
- Most of the complications of spillage can be managed by minimal invasive techniques like percutaneous drainage of abscess. However laparotomy may be needed to address large abscess formation with mass within it.
- Gallbladder spillage during laparoscopic cholecystectomy can be a source of morbidity. So every attempt should be made to prevent it rather than managing it afterwards.

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References

[1]. Bailey and Love short practice of surgery 25th Edition chapter 63
[2]. Laparoscopic cholecystectomy an evidence based guide by ferdinandoagresta, 1st edition, page no. 23,24.
[3]. Evolution of cholecystectomy: A tribute to Carl August Langenbuch. Indian Journal of Surgery 2004;66:97-100.
[4]. Gray's anatomy, 39th edition, page no. 243-245.
[5]. Laparoscopic surgery of the abdomen By Bruce V. MacFadyen, 1st edition, chapter 15, page no.127
[6]. Maingot's abdominal operations 11th edition
[7]. Mastery of surgery, 5th edition, chapter 97
[8]. Frola C, Cannici F, Cantoni S, et al.: Peritoneal abscess formation as a late complication of gallstones spilled during laparoscopic cholecystectomy. British Journal of surgery 1999, 72:201-203.
[9]. Hand AH, Self ML, Dunn E: Abdominal wall abscess formation two years after laparoscopic cholecystectomy. Journal of surgical endoscopy 2006, 10:105-107.
[10]. Zehetner J, Shamiyeh A, Wayand W: Lost gallstones in laparoscopic cholecystectomy: all possible complications. American Journal of Surgery 2007, 193:73-78.
[11]. Chowbey PK, Bagchi N, sharma A, et al.: Abdominal Wall Sinus: An unusual presentation of spilled gallstone. Journal of Laparoscopic and endoscopic Surgery Tech A 2006, 16:613-615.
[12]. Patterson EJ, Nagy AG: Don't cry over spilled stones? Complications of gallstones spilled during laparoscopic cholecystectomy: case report and literature review. Canadian Journal of Surgery 1997, 40:300-304.
[13]. Cacdac RG, Lakra YP. Abdominal wall sinus tract secondary to gall stones. A complication of laparoscopic cholecystectomy. Journal of Laparoscopic and endoscopic Surgery 1993; 3: 509–11.
[14]. Yao CC, Wong HH, Yang CC, et al. Abdominal wall abscess secondary to spilled gallstones: late complication of laparoscopic cholecystectomy and preventive measures. Journal of laparoscopic and endoscopic surgery 2001;11:47–51.
[15]. Albrecht RM, Eghtestad B, Gibel L, et al. Percutaneous removal of spilled gallstones in a subhepatic abscess. American journal of Surgery2002;68:193–5
[16]. Brueggemeyer MT, Saba AK, Thibodeaux LC. Abscess formation following spilled gallstones during laparascopic cholecystectomy. Journal of the Society of the Laparoscopic and endoscopic surgery1997;1:145–52.
[17]. Zamir G, Lyass S, Pertsemlidis D, et al. The fate of dropped gallstones during cholecystectomy. Journal of Surgical endoscopy1999;13:68–70.
[18]. Campbell WB, McGarity WC. An unusual complication of laparoscopic cholecystectomy. American journal of surgery 1992;58:641–42.
[19]. Singh V, Trikha B, Nain CK, Singh K, Bose SM. Epidemiology of gallstone disease in india: A community-based study. Journal of Gastroenterology 2001; 16: 560-563.
[20]. Welch N, Hinder RA, Fitzgibbons RJ Jr, Rouse JW (1991) Gallstones in the peritoneal cavity: a clinical and experimental study. Journal of Laparoscopic and Endoscopic surgery 1: 246–247
[21]. Johnston S, O'Malley K, McEntee G, Grace P, Smyth E, Bouchier Hayes D (1994) The need to retrieve the dropped stone during laparoscopic cholecystectomy. American Journal of Surgery 167: 608–610
[22]. Leland DG, Dawson DL (1993) Adhesions and experimental intraperitoneal gallstones. International journal of Contemporary Surgery 42: 273–27
[23]. Cline RW, Poulos E, Clifford EJ (1994) An assessment of potential complications caused by intraperitoneal gallstones. American journal of Surgery 60: 303-305
[24]. Rice DC, Jamison RL, et al (1997) Long-term consequences of intraoperative spillage of bile and gallstones during laparoscopic cholecystectomy. Journal of Gastrointestinal Surgery 1: 85–91
[25]. Schafer M, Suter C, Klaiber CH, Wehrli H, Frei E, Krahenbuhl L(1998) Spilled gallstones after laparoscopic cholecystectomy: a relevant problem? A retrospective analysis of 10,174 laparoscopic cholecystectomies. Journal of Surgical Endoscopy 12: 305–309
[26]. Jasim D Saud, MazinA Abdulla &Mushtaq Ch. Abu-Alhail spilled gallstones during laparoscopic cholecystectomy: a prospective study. (2011) basrah journal of surgery 2: 123-127
[27]. M. A. Memon, R. K. Deeik, T. R. Maffi, R. J. Fitzgibbons The outcome of unretrieved gallstones in the peritoneal cavity during laparoscopic cholecystectomy: A prospective analysis Journal of Surgical Endoscopy (1999) 13: 848–857