

RELATIONSHIP OF GALL BLADDER PERFORATION AND BACTERIOBILIA WITH OCCURRENCE OF SURGICAL SITE INFECTION FOLLOWING LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

BACKGROUND

Surgical site infection (SSI), a significant postoperative complication, can lead to considerable patient morbidity and mortality¹. Preventing postoperative infection is an essential factor in improving the results of surgical procedures. At present, laparoscopic cholecystectomy (LC) is the standard treatment for symptomatic cholelithiasis. The incidence of infectious complications after LC is significantly lower compared to infections with open cholecystectomy.

MATERIALS AND METHODS

The study was conducted in the Post graduate Department of Surgery, Govt. Medical College, Srinagar over a period of two years from December 2015 to December 2017. This study is prospective in design comprising of 100 cases of cholelithiasis diagnosed by ultrasonography, undergoing Laparoscopic Cholecystectomy and fulfilling the inclusion and exclusion criteria.

RESULTS

Mean age of patients in our study was 37.3 years \pm 10.14 most of our patients were of the age group of 40-49 comprising of 42% and least were of the age group of 10-19 years comprising of 7%. Sex distribution in our study- most of them were females 61% followed by males who were 39%. Among 100 patients in our study of uncomplicated gall stones with bile spillage, bile culture was positive in 17 patients and 6 among these 17 developed port site infection and rest 11 didn't have any wound infections. Remaining 83 patients with spillage had negative bile cultures and only 3 had wound infection which is statistically significant with P value of 0.0006. So far as wound site infection was concerned among 100 patients in our study with bile spillage, superficial wound site infection was found in 9 patients (i.e. 100%) with no deep wound site infection in any patients.

CONCLUSION

Gall bladder 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. Whenever spillage of bile occurs during laparoscopic cholecystectomy, it's advisable to take sample of bile for culture and sensitivity and treat that patient accordingly.

KEYWORDS

Cholecystectomy; Laparoscopy; E. coli.

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BACKGROUND

Surgical site infections (SSI's), a significant postoperative complication, can lead to considerable patient morbidity and mortality.¹ Preventing postoperative infection is an essential factor in improving the results of surgical procedures. At present, laparoscopic cholecystectomy (LC) is the standard

treatment for symptomatic cholelithiasis. The incidence of infectious complications after LC is significantly lower compared to infections with open cholecystectomy.^{2,3} Perforation of the gallbladder and intraperitoneal spillage of bile or stones during laparoscopic cholecystectomy are not associated with undesirable events, and are not associated with further complications. When patients are given appropriate antibiotics peri-operatively and the spilt bile is properly aspirated and the peritoneum irrigated, the operative and postoperative courses are similar to those of patients with unperforated gallbladder.⁴ Accidental gallbladder perforation can cause more postoperative pain, ileus, and trocar site infection, which consequently increases the total duration of hospitalization, undermining the advantages of LC.⁵ the overall rate of major complications following a laparoscopic procedure is approximately 1.4 per

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1,000 procedures.⁶ However the incidence of port site complications following laparoscopic surgery is considered to be around 21 per 100,000 cases⁷

MATERIALS AND METHODS

The study was conducted in the Post graduate Department of Surgery, Govt. Medical College, Srinagar over a period of two years from December 2015 to December 2017.

The study population constituted cases of cholelithiasis diagnosed by ultrasonography, undergoing Laparoscopic Cholecystectomy and fulfilling the inclusion and exclusion criteria.

Sample Size

A total of 100 patients were studied and followed up post-operatively.

Study Design

Observational Study.

Inclusion Criteria

All patients more than 10 years of age with symptomatic cholelithiasis proven by ultrasound abdomen, were included in the study.

Exclusion Criteria

1. Patients younger than 10 and older than 70 years.
2. Acute cholecystitis.
3. Evidence of cholangitis and /or obstructive jaundice and pancreatitis.
4. Previous biliary tract surgery or previous endoscopic retrograde cholangiopancreatography.
5. Conversion to open cholecystectomy.
6. Patients with immunosuppressed conditions like HIV, SCID, taking immunosuppressive drugs etc.

Methodology

Pre-operative work up

1. Clinical History and Examination.
2. Haemogram, coagulation profile, Blood sugar fasting, and other Pre-operative investigations required for general anaesthesia.
3. Liver Function Tests.
4. Ultrasound Abdomen.

Operative Technique

1. All patients were operated under general anaesthesia.
2. A single dose of prophylactic antibiotic was given to all the patients undergoing laparoscopic cholecystectomy at the time of first incision.
3. A supra/infra umbilical 10-mm trocar was placed after creating pneumoperitoneum via Veress needle.
4. The other 3 trocars were placed under direct vision with 10-mm trocar placed in the epigastrium, a 5-mm trocar in the right subcoastal area in the mid-clavicular line, and a 5-mm trocar in the right anterior axillary line between the 12th rib and iliac crest.

5. During the procedure, in case of spillage of bile from GB or calculi, into the peritoneum, the bile and/or the stone was sent for culture and sensitivity tests to microbiology laboratory.
6. Thorough peritoneal lavage was performed with copious amount of normal saline.
7. Gallbladder specimen was sent for histopathological examination.
8. After completion of surgery following parameters were recorded:
 - i) Gallbladder perforation present or absent. If present, type of content spillage. Gallbladder spillage in this study is defined as spillage of any amount of bile, stone or pus from the gallbladder intra-operatively.
 - ii) Duration of surgery.
 - iii) Bile culture and sensitivity.

Post-operative Follow-up

1. After discharge, the patients were called after 1 week for proper clinical assessment.
2. Thereafter patients were followed up weekly for 30 days.
3. If local signs of inflammation or purulent discharge from the wound noted, stitches were opened, and the pus was sent for culture and sensitivity.
4. Ultrasonography to rule out any collection was done in patients with clinical suspicion of deep infection, if patients had temperature >38°C (excluding the postoperative day 1), not responding to 48hrs of antibiotics, increased pain and tenderness in abdomen. If collection is found therapeutic aspiration of the collection was done. The quantity and type (pus/bile/blood) of content was noted. Fluid was sent for culture and sensitivity.

RESULTS

The study was conducted in the Postgraduate Department of Surgery, Govt. Medical College, Srinagar for a period of two years from December 2015 to December 2017 on 100 patients with diagnosis of symptomatic cholelithiasis. Patients Of either sex above 10 years of age were included in the study. The observation and results are as follows.

Age Distribution

Mean age of patients in our study was 37.3 years ±10.14 most of our patients were in the age group of 40-49 comprising of 42% and least no. of patients were of the age group of 10-19 years comprising of only 7%.

Age Groups (Years)	Number of Patients
10-19	7
20-29	9
30-39	16
40-49	42
>50	26

Table 1. Distribution of Patients in Various Age Groups

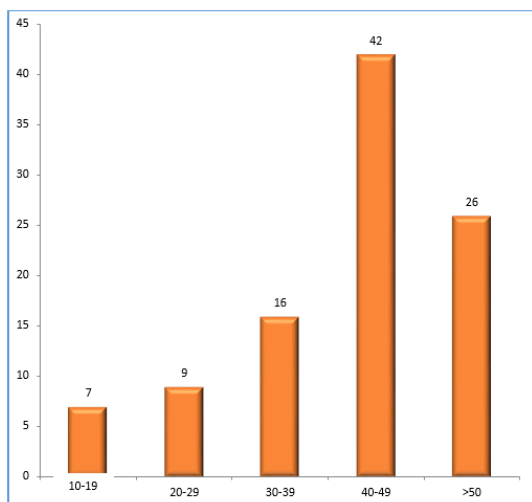


Figure 1(a). Showing Distribution of Patients in Various Age Groups

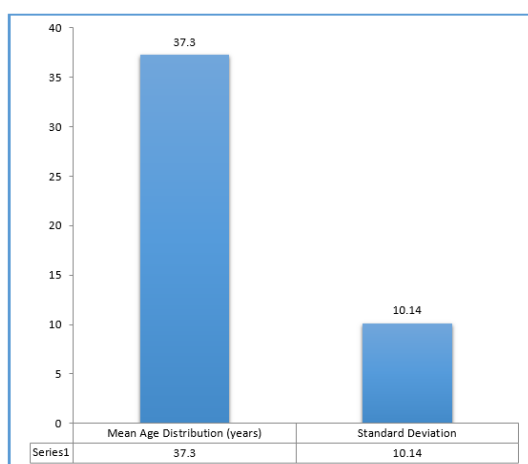


Figure 1(b). Showing Mean Age of Patients and Standard Deviation

Sex Distribution

In our study male patients comprised of 39% and females 61%.

Gender	No. of Patients	Percentage
Male	39	39.0%
Female	61	61.0%

Table 2. Sex Distribution in Our Study

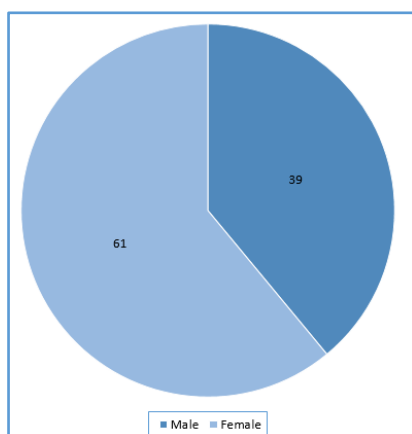


Figure 2. Showing Sex Distribution of Patients

USG Features of Gall Bladder

Among the 100 patients studied, on USG, most of the gall bladders were distended (65%) and only 5% of patients were found to have thickened gall bladder wall, normal wall thickness was present in 88% of patients and contracted gall bladder was present in 30%.

USG features of GB	No. of Patients	Percentage
Distended	65	65%
Contracted	30	30%
Wall normal	88	88%
Wall thickened	5	5%

Table 3. USG Features of Gall Bladder

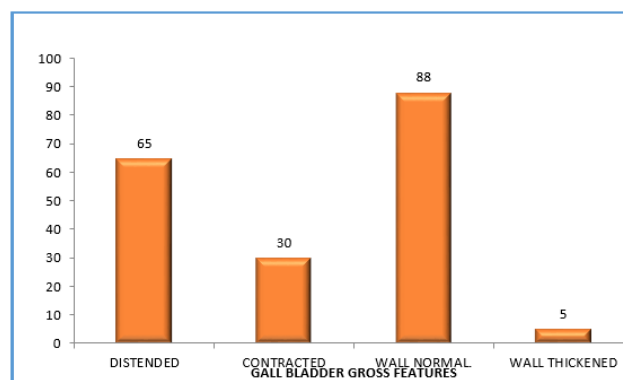


Figure 3. Showing USG Features of Gall Bladder

Intra Operative Findings

In our study of 100 patients most of the patients had intraoperative findings suggestive of chronic inflammation (90%), followed by Mucocele in 6% and Pyocoele in 4%. Peri GB adhesions were present in 60% of patients.

Intra Operative GB	No. of Patients	Percentage
Chronically inflamed	90	90%
Mucocele	6	6%
Pyocoele	4	4%
Peri GB adhesions	60	60%

Table 4. Intraoperative Findings

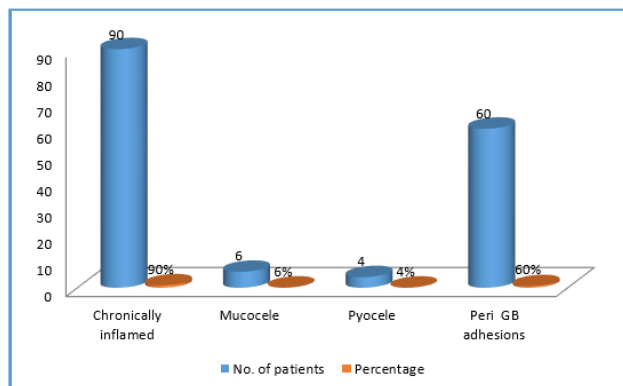


Figure 4. Showing Intra Operative Findings

Nature of Content Spillage

In present study out of 100 GB spillage, 85% patients had bile spillage, 4% had pus spillage and 6% had mucus spillage 55% patients had stone spillage, while 34% patients had bile/mucus/pus with stone spillage.

Spillage	Percentage
BILE	85%
MUCUS	6%
PUS	4%
STONES	55%

Table 5. Nature of Content Spillage and Their Respective Percentage

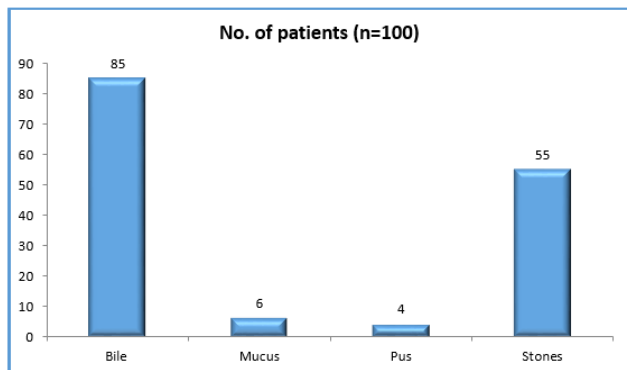


Figure 5. Showing Nature of Content Spillage and Their Corresponding Percentage

Bactibilia and Port Site Infection

Among 100 patients in our study of uncomplicated gall stones with bile spillage, bile culture was positive in 17 patients and 6 out of these, 17 developed port site infection. Rest of the 11 didn't have any wound infection. Remaining 83 patients with spillage had negative bile cultures and only 3 had wound infection which is statistically significant with P value of 0.0006.

Number of Patients	Port Site Infection Present	Port Site Infection Absent
Bile Culture (positive) 17	6	11
Bile culture (negative) 83	3	80

Table 6. Positive Bile Culture and Corresponding Port Site Infections

P VALUE= 0.0006.

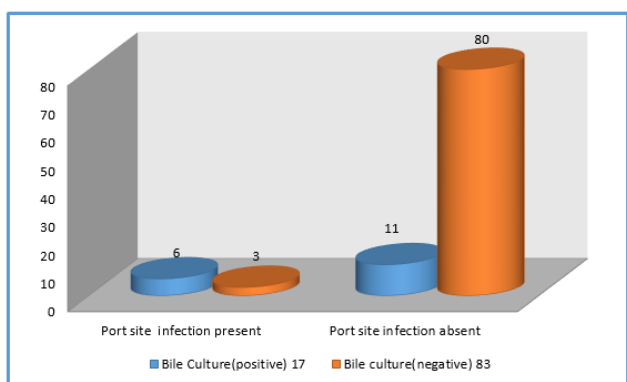


Figure 6. Showing Nature of Bile Culture and Corresponding Port Site Infections

Micro-Organism Isolates from Bile Culture and Port Site Infection

In our study of 100 patients the commonest organism isolated from the patients of positive bile culture and surgical site infection was E. coli followed by Staph, Enterococcus and Proteus.

Bacterial Species	Bile	Port Site
E. coli	2	2
Enterococcus	1	1
Proteus	1	1
Staph aureus	1	2

Table 7. Microorganism Isolates from Port Sites

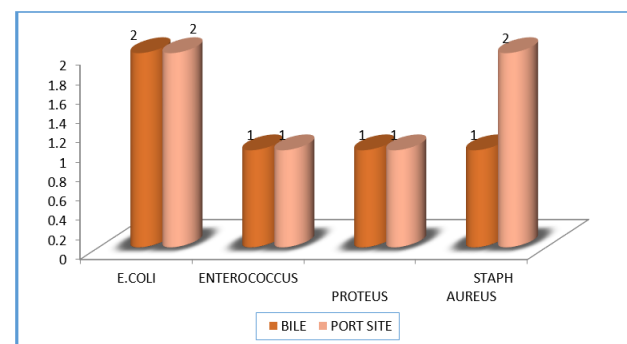


Figure 7. Showing Micro-organism Isolates from Port Sites

Distribution of Port Site Infection

In our study of 100 patients with gall bladder perforation, majority of patients (66.6%) had infection in epigastric port than umbilical port (33%). This may be due to the fact that in our study epigastric port being the common site of gall bladder extraction than umbilical port.

Port Site	Frequency (n=9)	Percentage (%)
Epigastric port	6	66.6%
Umbilical port	3	33.3%

Table 8. Showing Port Site Infection

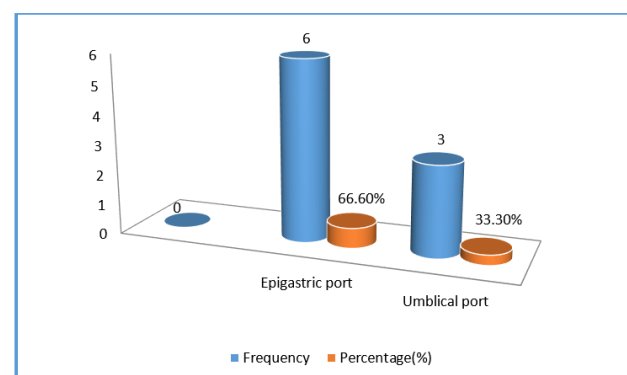


Figure 8. Showing Port Site Infection

Wound Complication

In our study of 100 patients with bile spillage, superficial wound site infection was found in 9 patients with no deep wound site infection in any patients. The wound was laid open and swab taken for culture and antibiotic sensitivity.

Port Site Complication	No. of Patients
Superficial infection	9
Deep infection.	0
Seroma formation.	0

Table 9. Showing Port Site Complication in LC

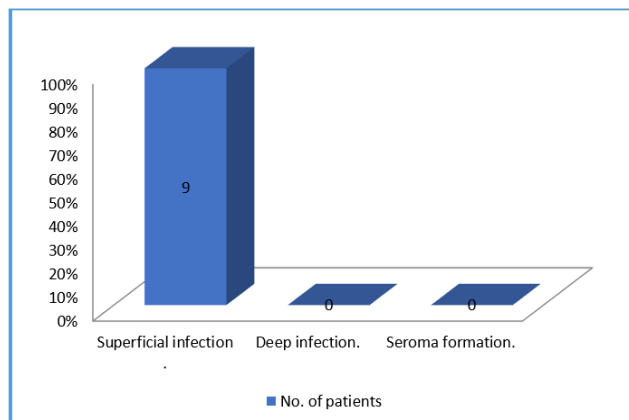


Figure 9. Showing Port Site Complication After LC

DISCUSSION

Any surgical procedure conducted has some risks and complications associated with it. Abdominal surgical site infections are among the most common complications of inpatient admissions and have serious consequences regarding the outcome as well as cost involved. Technologic advances in surgery include a trend toward less invasive procedures, driven by potential benefits to patients. Since its introduction in 1987, Laparoscopic cholecystectomy rapidly gained popularity in modern times to the extent that it is now being regarded as the gold standard for treating symptomatic gallstones disease.^{8,9,10,11}

Age and Sex Distribution

In our study of 100 patients we had the mean age of 37.3 with age above 10 years, females account for 61% and males for 39%. Similar results were found by Keval Sansiya et al¹² who found that out of a total of 25 patients with mean age of 41.48 ranging from 23 to 61 years, female group accounts for 76% and male group for 24% of study.

Another study done by Jasim et al¹³ found that mean age was 38.6 and female group accounts for 84% while male group was 16%. Similar study done by Rice et al.¹⁴ found mean age was 52 years, female group was 57% and male group was 43% which corresponds similar as that of our study.

USG Features of Gall Bladder

In our study among 100 patients with USG documented cholelithiasis, Majority of patients (88%) had normal wall thickness with distended gall bladder in 65% of patients followed by contracted gall bladder in 30% and thickened gall bladder wall in 5% of patients.

Similar findings were observed by studies conducted by Keval Sansiya et al¹² who found that on USG majority of patients (92%) had normal wall thickness with contracted

gall bladder in 68% followed by distended gall bladder in 32% and thick-walled gall bladder in 8% of patients.

Intraoperative Findings

In our study, Intraoperative 90% GB were chronically inflamed out of which 6% turned into mucocele and 4% into pyocele and there was peri GB adhesions and difficult dissection in 60% of patients. Similar results were found by Keval Sansiya et al¹² who found that Intraoperative 100% GB were chronically inflamed out of which 4% turned into mucocele and 4% into pyocele. There was peri GB adhesions and difficult dissection in 64% of patients.

Nature of Content Spillage

In present study out of 100 GB spillage, 85% patients had bile spillage, 4% had pus spillage and 6% had mucus spillage 55% patients had stone spillage. 72% patients had only bile spillage while 34% patients had bile/mucus/pus with stone spillage. These findings are similar as study conducted by, Keval Sansiya et al¹² out of 25 GB spillage, 92% patients had bile spillage, 4% had pus spillage and 4% had mucus There was peri GB adhesions and difficult dissection in 64% of patients. In our study the most common organism isolated from the port site infection following laparoscopic cholecystectomy is E coli followed by enterococcus and staph aureus. These results were similar as found by M Jawein et al¹⁵ who found Enterococcus, E. coli and Klebsiella among the common isolates from wound site following laparoscopic cholecystectomy.

Port Site Infection.

Although in literature there has been great consideration of the increased frequency of umbilical port infection and the role of umbilical flora in the development of port site infection, we in contrast found the epigastric port which was the common site of gall bladder extraction to be the most commonly infected.

In our study of 100 patients with spillage, the majority (66.6%) of the patients had infection involving epigastric port while others had infection involving umbilical port (33.4%). This may be due to the fact that in our study the majority of the gall bladder were extracted via epigastric port. Similar results were found by the Waqar Alam Jan et al¹⁶ who found the epigastric port sites from which the gall bladder was extracted was the most frequent (88.2%) site to be infected followed by umbilical port (11.7%).

Port Site Infection and Bacteriobilia

In our study the bile cultures were positive in 17 patients out of 100, among these port site infection present in only 6 and no wound site infection in.¹¹ Negative bile cultures were reported in 83 with wound site infection in 3 and no wound site infection in 80 of patients. The rate of bile culture positivity was similar to other studies; Malatani TS,¹⁷ Mahafzah and Daradkeh¹⁸ who also noted positive bile culture in 27%, and 20% of patients respectively.

In our study we found that the occurrence of port site infection in patients with bacteriobilia was nearly 9.7 times

more than in patients without bacteriobilia; also, we found statistically significant association between bacteriobilia and SSI (p value = 0.0006).

These results were comparable with the study conducted by K. S. Shahi¹⁹ who concluded that post-operative wound infection was found in 10% of patients who had bacteriobilia. Patients with sterile bile cultures did not develop any post-operative infections.

Wound Complication

In our study of 100 patients with bile spillage, superficial wound site infection was found in 9 patients (100%) with no deep wound site infection in any patients. The wound was laid open and swab taken for culture and antibiotic sensitivity. Similar results were found by the study conducted by the Ashwani Kumar et al²⁰ who found the superficial wound site infection in only one patient with no deep wound site infection in any patient.

CONCLUSION

From this study, we found that the organisms responsible for bacteriobilia were found to cause post-operative infections in the same patients. Gall bladder perforation occurs as a result of intraoperative retraction, dissection and extraction of gall bladder especially when gall bladder is acutely inflamed and fragile. Gall bladder 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. Whenever spillage of bile occurs during laparoscopic cholecystectomy it's advisable to take sample of bile for culture and sensitivity and treat that patient accordingly.

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