International Surgery Journal
Brahma RC et al. Int Surg J. 2016 Aug;3(3):1329-1335
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20162171

Research Article

Clinical study of empyema of gall bladder in Assam medical college and hospital, India

Rocket Chandra Brahma*, Biswajit Bora, Durlabh Thengal

Department of Surgery, Assam Medical College and Hospital, Dibrugarh, Assam, India

Received: 16 June 2016
Revised: 23 June 2016
Accepted: 28 June 2016

***Correspondence:**
Dr. Rocket Chandra Brahma,
E-mail: drrcbrahma@yahoo.com

ABSTRACT

Background: A Gallbladder disease represents a major health problem worldwide and has been known since the time of the Egyptian dynasty. The empyema of gall bladder may be associated with calculus cholecystitis, acalculus cholecystitis or carcinoma of the gallbladder. More commonly it is associated with acute cholecystitis and occurs in the setting of infected bile and an obstructed cystic duct. In the bacterially contaminated gall bladder, stagnation and marked inflammation ultimately leads to suppuration, tightly filling the gall bladder lumen with exudative material primarily comprising of frank pus. Patients with gallbladder empyema require urgent cholecystectomy or percutaneous cholecystostomy tube placement, depending on the severity of illness at the time of presentation.
Methods: This prospective clinical study covers 80 cases of empyema of the gall bladder, which were admitted in the General Surgery department of Assam Medical College and Hospital, India during the period from January 2013 to December 2015.
Results: In this series, age of the patients range from 25 years to 71 years. Maximum incidence was found in between the age group of 40-60 yrs. The average age for female was 44.78 years and for male was 49.5 years. In this study there is much higher incidence of disease in females with a male: female ratio of 1:2.33.
Conclusions: In the present study we found that Empyema of gall bladder is one of the common complications of acute cholecystitis and the patients were mostly younger females. The clinical history of a patient with empyema of gall bladder is most of the time similar to that of a patient with acute cholecystitis. An aggressive policy of early introduction of broad-spectrum antibiotics and cholecystectomy is the criterion standard of treatment.

Keywords: Gallbladder, Empyema, Cholecystitis, Cholecystectomy

INTRODUCTION

Gallbladder disease represents a major health problem worldwide and has been known since the time of the Egyptian dynasty. The word empyema comes from the Greek word 'Empyein' meaning producing (suppuration).[1] By definition, the gallbladder contains purulent material in cases of gallbladder empyema. Mentioning it as a 'neglected disease' Thorton et al, wrote "empyema of the gall bladder was described extensively in surgical texts of earlier century, but now receives scant mention, or none at all."[2]

Empyema of the gall bladder may be associated with features of sepsis and sometimes with a palpable distended gall bladder that is tender on palpation. Patients with diabetes or immunosuppression may exhibit few symptoms and signs.[3]

There seems to be two patterns of presentation of empyema of the gallbladder. The acute presentation being

associated with true suppuration characterized by leucocytosis and infective pathogens and the chronic presentation having gall bladder content that only macroscopically resembles pus but most often sterile on culture, usually those treated with antibiotics.[4-6]

Patients with gallbladder empyema require urgent cholecystectomy or percutaneous cholecystostomy tube placement, depending on the severity of illness at the time of presentation. The type of operation depends somewhat upon the findings and the general condition of the patient. Those patients with empyema of the gall bladder, who have presented early without significant gangrenous changes or perforation, can be treated with laparoscopic cholecystectomy. The gallstone diseases are fairly common in this part of the country and empyema gallbladder is often a cause of admission to Assam Medical College and Hospital, India. Hence, a comprehensive study on risk factors, clinical presentations and management of empyema gallbladder is of paramount importance in the appropriate management of these patients. The objective was to study the clinical profile of the patients of empyema gallbladder and to study the different modalities of management and their short term outcome during the study period.

METHODS

This prospective clinical study covers 80 cases of empyema of the gall bladder, which were admitted in the General Surgery department of Assam Medical College and Hospital, India during the period from January 2013 to December 2015.

Institutional ethical clearance was taken prior to the conduct of the study. All those patients who has been diagnosed as having empyema of the gallbladder on the basis of clinical findings, preoperative ultrasonographic findings and intraoperative aspiration of pus from gallbladder was included for this study. Children below 12 years of age were not included in this study.

After admission in the hospital, necessary particulars regarding the name, age, sex, religion and address of the patients were recorded. The patients were then studied clinically and necessary investigations were done and operation was performed after proper preoperative preparation. The data was calculated and analysed in percentage and statistical software was used whenever necessary. Microsoft word and excel has been used to generate graphs and tables.

RESULTS

Age and sex distribution

In this series, age of the patients ranges from 25 years to 71 years. Maximum incidence was found in between the age group of 40-60 years. The average age for female was 44.78 years and for male was 49.5 years. In this study there is much higher incidence of disease in females with a male: female ratio of 1:2.33.

Table 1: Age and sex incidence.

Age (in years)	Male	Percentage	Female	Percentage	Total	Percentage
<20	0	0	0	0	0	0
21-30	2	2.5%	8	10%	10	12.5%
31-40	4	5%	10	12.5%	14	17.5%
41-50	8	10%	20	25%	28	35%
51-60	4	5%	16	20%	20	25%
61-70	4	5%	2	2.5%	6	7.5%
> 70	2	2.5%	0	0	2	2.5%
Total	24	30%	56	70%	80	100%

Distribution of case in respect of socio-economic status

In this series 87.5% of patients were grade III-V family and most of them were from rural areas.

Table 2: Distribution in respect of socio-economic status.[19]

Socio-economic status	Percentage
Grade I	0
Grade II	12.5%
Grade III	40%
Grade IV	32.5%
Grade V	15%

Distribution of case in respect of presenting symptoms

In this series pain over upper abdomen was the commonest symptom and was present in all cases. Pain referred to right shoulder or the inferior angle of scapula was found in 55% of the cases.

Fever is present in 87.5% of the cases including 16 cases of fever with chills, which is about 20%. Nausea and vomiting was also fairly common feature. Jaundice was present only in 20% of patients. No history of itching over the body obtained.

Table 3: Distribution of presenting symptoms.

Presenting symptom	Percentage
Pain abdomen	100%
Nausea	77.5%
Vomiting	52.5%
Fever	87.5%
Fever with chills	20%
Yellowish discolouration of urine/ eyes	20%
Pain over right shoulder or inf angle of scapula	55%

Distribution of cases in respect of severity of pain abdomen

Pain abdomen was mild only in 10% of patients, others complained of moderate (37.5%) to severe (52.5%) degree of pain over right upper abdomen.

Distribution of cases in respect of examination findings

On examination, nearly half of the patients were found to be anaemic (45%). Icterus was present only in 8 patients (20%). All patients had tenderness in the right hypochondrium and abdominal guarding was found in 14 cases (35%). In nearly half of the cases (47.5%), a tender palpable gall bladder was found. Tenderness in the epigastric region was found in 15% cases.

Table 4: Distribution of cases in respect of laboratory findings.

Examination findings	Percentage
Pallor	45%
Icterus	20%
Rt. hypochondriac tenderness	100%
Epigastric tenderness	15%
Abdominal guarding	35%
Palpable gall bladder lump	47.5%

Laboratory findings

Almost all the patients had a raised total WBC count. The total WBC count >10,000 cells/cmm was found in 30 patients (75%) and one or more abnormal finding in LFT was found in all cases, but none were specific.

Table 5: Laboratory findings.

Laboratory findings	Total no. of cases	Percentage
Total W.B.C. >10,000 cells/cmm	60	75%
One or more abnormal finding in LFT	80	100%

Distribution of cases in respect of total W.B.C. count

Out of 80 patients, 40 had a total WBC count between 10,000-15,000 cell/cmm (50%). 20 patients (25%) had total WBC counts <10,000cell/cmm and 20 patients (25%) had total WBC count >15,000cell/cmm. More than 20, 000 cell/cmm total WBC count observed only in one patient.

Distribution cases in respect of treatment given (operative)

Majority of patients underwent open cholecystectomy (55%). In 15 patients with early presentation to this hospital, laparoscopic cholecystectomy was tried but complete procedure was possible in 12 cases. In remaining 3 cases cholecytectomy was completed by open procedure. Additional choledocholithotomy with T-Tube drainage was performed in 2 cases where a CBD calculus was detected preoperatively with ultrasound. No major complications encountered intraperatively except spillage of pus intra-peritoneally during operation (35% of the cases).

Table 6: Distribution of total W.B.C. count.

Total W.B.C. count	Total no. of cases	Percentage
5,000-10,000 cells/cmm	20	25%
10,000-15,000 cells/cmm	40	50%
15,000-20,000 cells/cmm	18	22.5%
>20,000 cells/cmm	2	2.5%

Table 7: Distribution in respect of treatment given (operative).

Operation done	Percentage
Open cholecystectomy	55%
Laparoscopic cholecystectomy	40%
Lap converted open cholecystectomy	7.5%
Additional choledocholithotomy	2.5%
cholecystostomy	0

Distribution of cases in respect of gall bladder content's bacteriological examination (pus culture) findings

Culture report of the pus obtained from the gall bladder lumen revealed no growth of any bacteria in 44 cases (55%) after 48 hours of aerobic incubation. Culture was positive in 36 cases (45%).

Distribution of cases in respect of type of microorganisms (obtained from bacteriological examination of gall bladder content)

Most common organism isolated from the pus obtained from gall bladder was *E.coli* (44.44%). Mixed pattern of growth was seen in 27.78% of cases, where *E.coli*

predominated. Other organisms isolated were *Klebsiella, Pseudomonas, Staphylococcus* etc.

Table 8: Distribution of type of microorganisms.

Type of microorganism	Total no. of cases (n = 36)	Percentage (of the total culture positive)
E. coli	16	44.44%
Klebsiella	6	16.67%
Mixed organisms	10	27.78%
Staphylococcus	4	11.11%

Distribution of cases in respect of post-operative complaints/complications during the period of post-operative hospital stay

Most common complaint (100%) in immediate postoperative period encountered was pain abdomen, more at the operative site in spite of usual doses of analgesics. Other common complaints were cough (40%) and mild fever (30%). Vomiting occurred in 10 patients (12.5%). Incision site infection was found in 14 cases (17.5%) and thrombophlebitis following IV usage found over superficial veins of arms in 18 cases (22.5%).

Table 9: Distribution of post operative complaints/complications.

Complaint/complication	Total no. of cases	Percentage
Pain abdomen	80	100%
Vomiting	10	12.5%
Fever	24	30%
Jaundice	2	2.5%
Wound dehiscence	0	0
Wound infection	14	17.5%
Cough	32	40%
Bile leakage>48 hours through drain	8	10%
Bile leakage at the time of discharge	0	0
Thrombophlebhitis following IV infusion	18	22.5%
Intra-abdominal abscess	0	0

Distribution of cases in respect of duration of hospital stay

Most of the patients (45%) discharged after 10-15 days of hospital stay and 40% of cases were discharged from the hospital in less than 10 days of hospital stay. One of the diabetic patient remained in the hospital for 26 days where there was difficulty to control the blood sugar level preoperatively. Most of the lately discharged patients had wound site infection and finally encountered difficulty in controlling that.

DISCUSSION

Age-sex distribution

Gall bladder diseases are more common in females and incidence is more in the 4th and 5th decade of life (Colcock et al, Gery D et al) though the disease have been reported in every decade of life (Adams et al).[10,11,5] Most Indian authors also report maximal incidence in the 4th and 5th decade of life (Tyagi SP et al) and they also mentioned that complications of cholelithiasis occurs earlier in India.[12] In this study age of the patient's ranged from 25 years to 65 years in cases of female and 30 years to 71 years in cases of male, with the average age 44.78 years for female and 49.5 years for male with maximum incidence is in 4th decade in both the sexes, with 60% were between the age of 40 years and 60 years. These findings of the study well corroborate with reports of previous study.

Symptoms

Pain abdomen is the commonest mode of presentation in most of the patients of empyema gall bladder. Tseng LJ et al, studied 145 cases of empyema gall bladder and noted right upper quardent pain in 70% of cases, epigastric pain in 27% of cases and fever in 62% of cases.[13] Malik A et al noted pain abdomen in all their cases, fever in 51 cases (76.11%) and vomiting in 19 cases (28.35%).[8] In this series pain abdomen was the commonest symptom and was present in all cases. Pain referred to right shoulder or the inferior angle of scapula in 55% of cases. Pain abdomen was mild only in 10% of patients, other complained moderate (37.5%) to severe (52.5%) degree of pain over right upper abdomen. Nausea and vomiting was also fairly common feature with 77.5% and 52.5% respectively. Jaundice was present in 20% of patients only. The findings found in this series well corroborate with the findings found by most of the authors in previous series.

Examination findings

On examination most of the patients found to be anaemic (45%). Icterus was present only in 16 patients (20%). All patients had tenderness in the right hypochondrium and abdominal guarding was found in 28 cases (35%). Malik A et al found tenderness over right hypochondrium in all their cases and palpable gallbladder was found in 39 cases (58.2%).[8] In the present series the findings of physical examinations well corroborate with the findings of previous studies except the abdominal guarding which was less than the data shown in previous studies. It may be due to the fact that the most of the cases of present series were chronic in nature with a long history of pain abdomen and received antibiotics before attending this hospital.

Laboratory findings

In the present series almost all the patients had a raised total WBC count. The total WBC count >10,000 cells/cmm was found in 60 cases (75%) and one or more abnormal finding in LFT was found in all cases, but none were specific. Raised in prothrombin time was in 4 cases. No abnormality in renal function was found.

Nathan et al, Fry et al, Thorton et al, all had also recorded a high total WBC count.[14,15,2] They had noted total WBC count >10,000 cells/cmm in >90%, 76% and 88% of cases respectively. Fry et al and Thorton et al had recorded one or more abnormality in LFT in 91% and 92% cases respectively. In Chow WC et al series, raised leucocyte count was found in 51.61% cases and altered liver function was found only in 19.35% of the cases.[16] The finding of present series, except Chow WC et al series, is similar to the findings of previous series, which is a reflection of ongoing suppurative process in the gall bladder.

Management

All patients underwent cholecystectomy either by open or laparoscopy. Majority of patients underwent open cholecystectomy (55%). In 15 patients with early presentation to this hospital, laparoscopic cholecystectomy was tried but complete procedure was possible in 12 cases. In remaining 3 cases cholecystectomy was completed by open procedure. The reason for conversion was intractable bleeding as well as frozen calot's triangle. Additional choledocholithotomy with T-Tube drainage was performed in 2 cases where a CBD calculus was detected preoperatively with ultrasound. No cholecystostomy was performed in any patients. No major complications encountered introperatively except spillage of pus intra-peritoneally during operation (35%). All the gall bladders were found to be distended with thickened wall and in some cases areas of patchy gangrene (25%) were seen. At operation all the cases were confirmed by aspirating pus from the gall bladder lumen, which was sent for bacteriological examination.

Nathan et al had performed cholecystectomy in 45.2% and cholecystostomy in 54.8% of cases.[14] In Fry et al, series cholecystectomy was done in 94.11% of cases, cholecystostomy in 5.89% of cases and additional bile duct exploration was done in 17.47% of cases.[15] Cox MR et al operated 18 cases of empyema gall bladder and their laparoscopy to open conversion rate was 83.3%.[17] They stated that conversion to open operation was most frequent for empyema and gangrenous cholecystitis, suggesting that once this diagnosis is made, excessive time should not be spent in laparoscopic trial dissection before converting to an open operation. Elder S et al found conversion rate of 40% for acute gangrenous cholecystitis (40%), 8% for uncomplicated acute cholecystitis (P <0.00001, odds ratio=7.7) and 12.5% for empyema of the gallbladder.[18]

Arshad Malik et al attempted laparoscopic cyolecystectomy to 67 patients of empyema gallbladder.[10] LC was successfully completed in 54 (80.59%) patients. In 13 (19.40%) patients the procedure was converted to open cholecystectomy (OC) due to various operative difficulties, such as intractable bleeding from cystic artery, common bile duct injury and duodenal injury. The reports of previous series of studies and findings of present series indicates that cholecystectomy is an effective procedure for treatment of empyema of the gall bladder and it can be done in all cases of empyema of the gall bladder.

Distribution in respect of bacteriological finding of pus

In this study, culture report of the pus obtained from the gall bladder lumen revealed no growth of any bacteria in 22 cases (55%) after 48 hours of aerobic incubation. Culture was positive in 18 cases (45%). Most common organism isolated from the pus obtained from gall bladder was *E.coli* (44.44%). Mixed pattern of growth was found in 27.78% of cases, where *E.coli* predominated. Other organisms isolated were *Klebsiella* (16.67%) and *staphylococcus* (11.11%). Fry et al, found bacterial growths from the pus in 75.86% of cases of empyema of the gall bladder. In their series organisms found were *E.coli* (41.37%), *Klebsiella* (17.24%), *Proteus* (10.24%), *Pseudomonas* (10.24%), *Streptococcus* (10.24%), *Citobacter* (3.44%) and mixed growth in 17.24%. In Chow WC et al series, bile was taken for culture study in 26 cases and positive result was found in 19 cases.[16] The most common organisms were *Escherichia coli* and *Klebsiella* species, which were sensitive to gentamycin and cephalosporins. In the series of Tseng LJ et al, bile culture was positive in 83% of the cases.[13] The common pathogens were *Escherichia coli* (57%), *Enterococcus* (27%), *Klebsiella pneumonia* (18%), *Morganella morganii* (7.6%), *Pseudomonas aeruginosa* (4.1%) and *Salmonella* (0.7%). Though the pus found in gall bladder in empyema of the gall bladder is the ultimate product of the suppurative process inside the gall bladder, culture of it does not shows bacterial growth always. The probable cause mentioned by various authors is receiving of antibiotics before operation. The large number of cases (55%) without any bacterial growth can be explained by this phenomenon as most of the patient of present series had taken antibiotics more than 48 hours prior to operative intervention.

Post-operative complains and complications

Most common complaint in immediate postoperative period encountered was pain abdomen (100%), more at the operative site in spite of usual doses of analgesics. Other common complaints were cough (40%) and mild fever (30%). Vomiting occurred in 10 patients (12.5%). Incision site infection was found in 14 cases (17.5%) and

thrombophlebhitis following IV usage found over superficial veins of arms in 18 cases (22.5%). Bile leakage more than 48 hours through the drain site was found in 8 cases which stopped spontaneously on conservative managements. Jaundice was found in one case, had very high bilirubin level preoperatively due to choledocholithiasis. No intrabdominal abscess or wound dehiscence was found postoperatively. Fry et al had documented a total of 51 complications occurred in 17 patients in the series.[15] Five patients had only one complication, either pneumonitis (three) or a minor wound infection (two). However, 12 patients had two or more complications. All patients in this series who had common duct exploration had major postoperative morbidity. Chow WC et al documented seven complications, of which 2 cases had retained stones, 2 cases had wound infections and 3 cases had one of these-chest infection, dislodgement of T-tube and posterior urethral rupture.[16] Malik A et al noted port site infection, bile leak, intra-abdominal collection and chest infection in 5.55%, 3.7%, 5.55% and 3.7% of the successfully operated cases (via laparoscopy) respectively.[10] In present study, the immediate postoperative complications were less than what the previous authors documented. The patient who had undergone bile duct exploration does not show any increase in complication rate except longer duration of hospital stay for the T-Tube. Cough, as complained by most of the patients were probably due to irritation following endotracheal intubation as the most of the patient recovered from this within 2-5 days post-operatively. The cause of fewer complications may be the rational use of good antibiotics, taking of timely surgical intervention after optimization of patient's health, good quality of intraoperative and post-operative patient care. In this study, cefotaxime IV, 1 gm was given to all the patients one hour before incision.

Hospital stay

Most of the patients (45%) were discharged after 10-15 days of hospital stay and 40% of cases were discharged from the hospital in less than 10 days of hospital stay. One of the diabetic patient remained in the hospital for 26 days where there was difficulty to control the blood sugar level preoperatively. Most of the lately discharged patients had wound site infection and finally encountered difficulty in controlling that. Nathan et al mentioned that mortality rate is higher in diabetic patients with empyema of the gall bladder.[14] Chow WC et al documented a mean length of hospital stay for 10 days and their longest duration of hospital stay was of 17 days.[17] In the present series early discharge of the patients from the hospital reflects effectiveness of rational use of broad-spectrum antibiotics, timely surgical intervention and good patient care.

Mortality

Fry et al, documented operative mortality of 15%.[15] One patient died from postoperative myocardial infarction, one from respiratory failure secondary to necrotizing pneumonia and three from abdominal sepsis. In the study of Thortan et al, eight patients died (25%).[2] The patients who died were older than those survived (83±1 vs. 67±3 years). The fatalities included all 4 patients who did not undergo cholecystectomy. The causes of death were probable or confirmed septiceamia (five cases), septiceamia and pneumonia (one), pulmonary embolus (one) and postoperative stroke.[1] In the present series zero mortality of the patients with empyema of the gall bladder reflects effectiveness of rational use of broad-spectrum antibiotics, timely surgical intervention and good patient care.

Follow-up

Patients were call for first check up after 2 weeks from the day of discharge and second check-up was arranged after 1 month. More than 80% of patient attended for follow up. Most of the patients recovered well. Mild pain over right upper abdomen was experienced by 14 patients (17.5%), which decreased at subsequent revisits. Three patients came back with infection over the operative site wound, which required secondary suturing. Secondary suture was removed at the 2nd check-up. 18 patients (22.5%) had dyspeptic symptoms postoperatively, which decreased at subsequent revisits. No patient had jaundice postoperatively and also no patient had biliary fistula.

CONCLUSION

In this series, age of the patients ranges from 25 years to 71 years. Maximum incidence was found in between the age group of 40-50 years. The average age for female was 44.78 years and for male it was 49.5 years. In this study there is much higher incidence of disease in females with a male: female ratio of 1:2.33. In this series 87.5% of patients were from lower and lower middle class family i.e grade III-V, Kuppuswamy scale, 2012 and most of them were from rural areas. Almost all the patients had a raised total WBC count. The reports of previous series of studies and findings of present series indicates that cholecystectomy, weather open or laparoscopic, is an effective procedure for treatment of empyema of the gallbladder. The large number of cases (55%) without any bacterial growth is probably due to the wide spread use of antibiotics preoperatively in the hospital or before admission in this hospital.

Empyema of the gall bladder is one of the common complications of acute cholecystitis and the patients of this study were mostly younger females. The clinical history of a patient with empyema of the gall bladder is most of the time similar to that of a patient with acute cholecystitis. The most useful sign is a gallbladder mass which when absent requires a high index of suspicion for diagnosis. An aggressive policy of early introduction of broad-spectrum antibiotics and cholecystectomy is the criterion standard of treatment.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Empyema. Available at http://medical dictionary. the freedictionary.com. Accessed on 16 May 2016.
2. Thorton JR, Heaton KW, Espiner HJ, Eltringham WK. Empyema of the gall bladder- reappraisal of a neglected disease. Gut. 1983;24(12):1183-5.
3. eMedicine- Empyema Gallbladder: Article by Benjamin Pace, MD, FACS. December, 2011.
4. Russel RCG. The gallbladder and bile ducts. In Russel RCG, Williams NS, Bulstrode CJK (eds), Bailey & Love's Short Practice of Surgery, 24th edn; London Hodder Arnold; 2004:1094-1113.
5. Adams R, Stranahan A. Cholecystitis and cholelithiasis: an analytical report of 1104 operative cases. Surg Gynae Obst. 1947;85:776.
6. Mentzer SH. The acute gallbladder manifesting few signs or symptoms. Surg Gynaec Obstet. 1932;55:709-16.
7. Al JTM, Gharaibeh K, Khammash M. Empyema of the gall bladder: reappraisal in the laparoscopy era. Ann Saudi Med. 2003;23(3):140-2.
8. Malik A, Laghari AA, Talpur KAH, Memon A, Mallah Q, Memon JM. Laparoscopic cholecystectomy in empyema of gall bladder: an experience at Liaquat University Hospital, Jamshoro, Pakistan. J Minimal Access Surg. 2007;3(2):52-6.
9. Simopoulos C, Botaitis S, Polychrondis A, Trypsianis G, Perente S, Pitiakondis M. Laparoscopic cholecystectomy in patient with empyematous cholecystitis; an outcome analysis. Indian J Surgery. 2009;71(5):258-64.
10. Colcook, BP, Mcmanus JE. Experience with 1356 cases of cholecystitis and chotelithiasis. Surg Gynaec Obst.1955;101:161-72.
11. Feldman M, Feldman M Jr. The incidence of cholelithiasis, cholesterosis and liver disease in diabetes mellitus. Diabetes. 1954;3:305-7.
12. Tyagi SP, Tyagi N, Maheshwari V, Ashraf SM, Sahoo P. Morphological changes in diseased gallbladder: a study of 415 cholecystectomies at Aligarh. J Indian Med Assoc.1992 Jul; 90(7):178-81.
13. Tseng LJ, Tsai. Palliative percutaneous transhepatic gallbladder drainage of gallbladder empyema before laparoscopic cholecystectomy. Hepato Gastroenterology. 2000;47(34):932-6.
14. Blumberg N, Zisserman L. Acute Suppurative and Gangrenous Cholecystitis. Am J Surg. 1945;70(1):38-44.
15. Fry DE, Cox RA, Harbrecht PJ. Empyema of the gall bladder: A common complication in the natural history of acute Cholecystitis. Am J Surg. 1981;141(3):366-9.
16. Chow WC, Ong CL, Png JC, Rauff A. Gall bladder empyema-another good reason for early cholecystectomy. J R Coll Surg Edinb. 1993;38(4):213-5.
17. Cox MR, Gunn IF, Eastman MC, Hunt RF, Heinz AW. Laparoscopic cholecystectomy for acute inflammation of the gallbladder. Ann Surg. 1993;218 (5):630-4.
18. Elder S, Sebo E, Nash E, Abrahamson J, Matter I. Laparoscopic cholecystectomy for the various types of gallbladder inflammation a prospective trial. Surg Laparosc Endosc.1998;8(3):200-7.
19. Kumar BPR. Kuppuswamy's socio-economic status scale-a revision of economic parameter for 2012. Int J Res Develop Health. 2013;1(1):2-4.

Cite this article as: Brahma RC, Bora B, Thengal D. Clinical study of empyema of gall bladder in Assam medical college and hospital, India. Int Surg J 2016;3:1329-35.