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A STUDY ON CLINICAL CHARACTERISTICS OF ACUTE CHOLECYSTITIS AND ITS RELATION WITH ELEVATED LIVER ENZYMES AND BILIRUBIN

General Surgery

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ABSTRACT

Introduction: Acute cholecystitis is the most common complication in a gallstone disease and remains one of the most common medical problems leading to surgical intervention. The clinical picture of the patients with acute cholecystitis is further complicated by deranged liver function tests due to inflammatory process induced by cholecystitis.74Liver damage in patients with gallstones is thought to be the result of chronic extra hepatic biliary tract obstruction with or without repeated episodes of cholangitis.69However, a few studies have reported the presence of hepatocellular injury in patients with acute cholecystitis without choledocholithiasis.70,38We conducted this study further to demonstrate any relation of gallstones with deranged liver function. **Methods:** This tertiary clinic based prospective observational study on 100 patients of gall stone disease diagnosed on imaging, was conducted at the Department of Surgery, Silchar Medical College and Hospital from 7th June 2018 to 6th June 2019.All routine tests with special reference to Total Leucocyte and Differential Leucocyte counts and Liver function tests- with special reference to serum bilirubin and fraction, Serum AST, ALT, ALP,GGT were obtained and statistical analysis performed to demonstrate their inter-relationship with gallstone disease. **Result:** On the day of admission (day-0), 32 patients (15.62% male & 84.37% female) had increased level of AST. Similarly, ALT was increased in 49 patients (20.4% male & 79.59% female), ALP was increased in 32 patients (15.62% male & 84.37% female), GGT was increased in 38 patients (26.31% male & 73.6% female).All four liver enzymes were increased in 32% patients (12.5% male & 87.5% female). Total Bilirubin was increased in 17 patients out of which 35.29% were Male and 64.7% were Female. Direct Bilirubin was increased in 26% patients (9 Males and 17 Females). Total Leucocytic count was increased in 60 patients out of which 14(23.3%) were Males and 46(76.6%) were Females. On the day of admission, AST was found to be in the range of 19U/L- 116U/L in the study population with a mean value of 48.10+27.59 and median value of 37.50.ALT was found to be in the range of 3U/L-141U/L in the study population with a mean value of 56.33+33.75 and median value of 40. ALP was found to be in the range of 60U/L-234U/L in the study population with a mean value of 117.58+39.64 and median value of 100.50. GGT was found to be in the range of 22U/L- 154U/L in the study population with a mean value of 74.66+30.05 and median value of 69.50. The mean values of Liver enzymes, Bilirubin (Total & Direct) and TLC were found to be significantly decreased on 6 weeks after admission. **Conclusion:** Liver enzymes and bilirubin tend to marginally increase in few cases of acute cholecystitis as a result of the inflammatory process. However, this increase is transient and the levels come down to normal once the inflammatory process of acute cholecystitis subsides.

KEYWORDS

acute cholecystitis, liver enzymes in gallstone disease, liver enzymes, bilirubin and gallstone disease, liver function in gallstones.

INTRODUCTION

Acute cholecystitis is the most common complication in a gallstone disease and remains one of the most common medical problems leading to surgical intervention. In its early stage the character of pain is somewhat similar to that of biliary colic, however the pain of acute cholecystitis is usually progressive in nature, in contrast to biliary colic, where the pain last for minutes to hours.

The pain of acute cholecystitis is most commonly located in the right upper quadrant or epigastria, but may also present with some atypical presentation. The pain may radiate to the right upper part of the back or the interscapular area. The pain is usually severe in intensity. There may be associated fever, anorexia, nausea and vomiting. The patient is usually reluctant to move as the inflammatory process affects the parietal peritoneum.

On examination, tenderness and guarding are present which are mostly localized to the right upper quadrant of the abdomen. Occasionally a mass (gallbladder with adherent omentum) may be palpable, but due to presence of guarding this clinical finding may not be appreciated on several occasions.

Acute cholecystitis is provisionally diagnosed with the help of history and clinical examination, and confirmed with the help of investigations. Ultrasound imaging of the abdomen is the most commonly used radiological investigation for acute cholecystitis. The clinical picture of the patients with acute cholecystitis is further complicated by deranged liver function tests due to inflammatory process induced by cholecystitis.[74]

Liver damage in patients with gallstones is thought to be the result of chronic extra hepatic biliary tract obstruction with or without repeated episodes of cholangitis. [69]

However, few studies have reported the presence of hepatocellular injury in patients with acute cholecystitis without choledocholithiasis.[70,38] One of the studies reported that cholecystitis patients without choledocholithiasis show mild and transient acute hepatocellular injury and, hyperbilirubinemia and leukocytosis can be attributed to severe inflammatory change of the gallbladder.[70] A possible mechanism is that severe acute inflammation of gall bladder impairs the flow of bile, and the stasis of biliary tract induces diffuse intrahepatic inflammatory change and liver injury by bacterial contamination.71 Another study reported that Non- specific reactive hepatitis was a frequent finding in patients with acute cholecystitis.[35]

Hepatocellular injury is identified by increase in serum aspartate aminotransferase (AST) and alanine aminotransferase (ALT). Inflammation of the biliary tract is signaled by an increase in alkaline phosphatase (ALP) which is sometimes confirmed by measurement of gamma-glutamyl-transferase (GGT). Serum bilirubin levels may be elevated in both biliary tract and hepatocellular diseases .[70]

This study was thus conducted to further demonstrate any relation of gallstones with deranged liver function.

MATERIALS AND METHODS

This study was conducted at the Department of Surgery, Silchar Medical College and Hospital, Assam India from 7th June 2018 to 6th June 2019.

I. Case selection

Sample size –

A total of 100 patients randomly selected from outpatient admissions and emergency admissions, diagnosed as acute cholecystitis were taken for the study who fulfilled the following criteria

1. Patients diagnosed with Acute cholecystitis
2. Patients aged between 18 to 70 years.
3. Patients who give consent for the study

Clinical Criteria:
1. History of pain abdomen for not more than 5 days duration
2. Tenderness (Murphy's sign) or muscle guarding of right hypochondrium
3. With or without fever or leukocytosis

Ultrasound Criteria:
1. Presence of gallstones
2. Gallbladder distension
3. Gallbladder wall thickness (>4mm)
4. Pericholecystic fluid
5.Empyema gallbladder
6. Emphysematous gallbladder

Exclusion Criteria-
1. Patients less than 18 years and more than 70yrs of age.
2. Chronic calculous cholecystitis
3. Acute cholecystitis with choledocholithiasis
4. Viral hepatitis (hepatitis A, B, C)
5. Alcoholic liver disease
6. Hemolytic diseases
7. Metabolic diseases
8. Pregnancy
9. Fail to follow up
10. Patient not giving consent for study

Methods
The patients were admitted in the department of surgery who presented to the casualty or the outpatient department with history of pain abdomen for not more than 5 days. They were assessed clinically as well as radiologically to arrive at the diagnosis of acute cholecystitis. A detailed clinical history was elicited for each patient and thorough clinical examination was done in the following format.

A detailed clinical history and examination was obtained for all samples

Laboratory Investigations:
all routine tests with special reference to
• TLC, DLC
• Liver function tests- with special reference to serum bilirubin (unconjugated and conjugated), Serum AST, ALT, ALP, GGT

Radiological Investigations
• Ultrasonography- whole abdomen
• Chest X ray (PA view)

All the patients were assessed with USG whole abdomen on the day of admission. After complete clinical and radiological (USG) assessment, the diagnosis of acute cholecystitis was made. The USG results were suggestive of acute cholecystitis for the patients who were strongly suspected to have acute cholecystitis clinically. The patients non fulfilling the study criteria were taken off from the study. A total of 100 acute cholecystitis patients were enrolled for the study. Detailed proforma was filled up and written informed consent was obtained from each patient.

CBC, LFT and serology (HBsAg, anti HCV, HIV 1&2) were advised on the day of admission (within 1 hour) along with other routine blood and radiological investigations. Once reports were available, the relevant data were added to the proforma of each patient.

Management
All the patients were managed conservatively. They were kept nil per orally, nasogastric tube was kept in situ in case of abdominal distension. IV fluids, antibiotics were administered according to the body weight. Pain management was done with analgesics & antipyretics and antiemetics were administered for fever and nausea& vomiting respectively. Patients were monitored regularly. Once the clinical conditions improved and the patients tolerated oral feeds, they were discharged and reviewed on follow-up at 6 weeks.

Follow Up
Patients were again followed up at 6 weeks from the date of admission. They were assessed clinically and radiologically. The relevant blood tests were also advised and recorded.

Data Entry And Statistical Analysis:
• The study respondent completed questionnaires was checked for errors and omissions and same, if any, was rectified in front of the study participant itself.
• SPSS (Version 24) was used for analysis.
• Homogeneity test was applied to test whether subgroups were homogenous or not.
• Students unpaired T-test was applied wherever two groups were analyzed

RESULTS AND OBSERVATIONS
Age Wise Distribution:
The age of the subjects in the study population ranged from 20 to 65 years with mean age of 36.78 years and standard deviation of 10.501.The predominant age group was 31-45 years(46%). The same age group had the predominance of male (16) and female (30) patients.

Distribution Of Study Participants As Per Gender:
The study participants included 70 Female (70%) and 30 Male (30%) with male: female ratio to be 1: 2.3

Presenting Symptoms:
Table - 8.03: - Showing Symptomatology Of The Study Population:

Symptomatology	Number of cases	Percentage (%)
Pain abdomen	100	100
Dyspepsia	71	71
Nausea & vomiting	56	56
Fever	23	23

The presenting symptoms of the study population were pain abdomen, dyspepsia, nausea & vomiting and fever. (Table - 8.03)

Abdominal pain was the most common symptoms which was present in all the cases. 19% patients complained of radiation of pain to back, while 13% had radiation to right shoulder. Dyspepsia was present in 71% cases, while nausea & vomiting and fever were present in 56% and 23% cases respectively.

Physical Examination:

Physical examination	No. of cases	Percentage
RHQ tenderness	100	100
Tachycardia	36	36
Boa's sign	14	14
Guarding & rigidity	64	64

Table - 8.04: - showing physical examination finding in the study population.

In the present study, abdominal tenderness which was mostly confined to right hypochondrium, was present in all the patients. Guarding and rigidity in the right upper quadrant was present in 64% cases. 14 patients were found to have tachycardia, while, Boa's sign was elicited in 14% patients. (Table - 8.04)

Investigations: Liver Enzymes

Liver enzyme	Total No. of patients (%)	Male (%)	Female (%)
AST	32 (32%)	05 (15.62%)	27 (84.37%)
ALT	49 (49%)	10 (20.4%)	39 (79.59%)
ALP	32 (32%)	05 (15.62%)	27 (84.37%)
GGT	38 (38%)	10 (26.31%)	28 (73.6%)
All four liver enzymes	32 (32%)	4 (12.5%)	28 (87.5%)

Table 8.05: - patients with increase in liver enzyme on the day of admission asper gender

On the day of admission (day-0), 32 patients (15.62% male & 84.37%

female) had increased level of AST. Similarly, ALT was increased in 49 patients (20.4% male & 79.59% female), ALP was increased in 32 patients (15.62% male & 84.37% female), GGT was increased in 38 patients (26.31% male & 73.6% female).

All four liver enzymes were increased in 32% patients (12.5% male & 87.5% female). (Table 8.05)

Bilirubin And Total Leucocyte Count:

Parameter	Total No. of increase (%)	Male	Female
Total bilirubin	17(17%)	6(35.29%)	11(64.7%)
Direct bilirubin	26(26%)	9(34.61%)	17(65.38%)
TLC	60(60%)	14(23.3%)	46(76.6%)

Table 8.06: - Increase in bilirubin and TLC on the day of admission as per genderIn the present study, Total Bilirubin was increased in 17 patients out of which 35.29% were Male and 64.7% were Female. Direct Bilirubin was increased in 26% patients (9 Males and 17 Females). (Table 8.06)

Total Leucocytic count was increased in 60 patients out of which 14(23.3%) were Males and 46(76.6%) were Females. (Table 8.06)

Individual Parameters On The Day Of Admission (day 0):

Table 8.07: - Showing Liver enzymes, bilirubin and TLC on day-0

Parameters	Mean±SD	Median	Minimum value	Maximum value
AST	48.10±27.59	37.50	19	116
ALT	56.33± 33.75	40	03	141
GGT	74.66±30.05	69.5	22	154
ALP	117.58± 39.64	100.50	60	234
Total bilirubin	0.88 ±0.609	0.60	0.20	2.80
TLC	11.62± 2.06	11.50	6	18.50
Direct bilirubin	0.35 ± 0.30	0.23	0.02	1.30

On the day of admission, AST was found to be in the range of 19U/L-116U/L in the study population with a mean value of 48.10+27.59 and median value of 37.50.

ALT was found to be in the range of 3U/L-141U/L in the study population with a mean value of 56.33+33.75 and median value of 40.

ALP was found to be in the range of 60U/L-234U/L in the study population with a mean value of 117.58+39.64 and median value of 100.50.

GGT was found to be in the range of 22U/L-154U/L in the study population with a mean value of 74.66+30.05 and median value of 69.50.

The mean value of Total Bilirubin was 0.88 +0.609 and Direct Bilirubin was 0.35 + 0.30. The maximum value of Total and Direct Bilirubin were 2.80mg/dL and 1.30mg/dL respectively.The minimum and maximum value of TLC were 6x103/µL and 18.50x103/µL respectively, with a mean value of 11.62+ 2.06. (Table 8.07)

Individual parameters on 6 weeks from the day of admission (Week 6):

Table 8.08: - Showing liver enzymes, bilirubin and TLC on 6th weeks after admission in the study population

Parameters	Mean±SD	Median	Minimum value	Maximum value
AST	29.34±8.99	28	12	65
ALT	33.08± 10.93	33	13	78.5
GGT	52.5±19.96	55.5	11	102
ALP	94.89±22.38	93	50	173
Total bilirubin	0.54± 0.26	0.45	0.12	1.54
TLC	6.72± 1.97	6.65	3.70	12.50
Direct bilirubin	0.25 ± 0.13	0.22	0.02	1.03

The mean values of AST, ALT, ALP, GGT, Total Bilirubin, Direct Bilirubin and TLC were 29.34±8.99, 33.08±10.93, 94.89±22.38, 52.5±19.96, 0.54±0.26, 0.25±0.13, 6.72±1.97 respectively on 6th week after admission in the study population. (Table 8.08)

Patients With Normal Liver Enzymes And Bilirubin On 6 Weeks:

Out of those patients, who were found to have increase in the level of Liver enzymes and Bilirubin on the day of admission (Day 0); AST, ALT, ALP, GGT, Total Bilirubin, Direct Bilirubin and TLC were found to be within the normal range in 84.3%, 81.6%, 81.25%, 86.8%, 94.1%, 65.38% and 93.3% patients respectively at 6 weeks after admission. (Table 8.09)Table 8.09: - Showing number of patients with normal liver enzymes, bilirubin & TLC on 6th weeks.

Parameters	Day of admission (Day-0)	Week 6th (returned to normal)	Percentage.
AST	32	27	84.3%
ALT	49	40	81.6%
ALP	32	26	81.25%
GGT	38	33	86.8%
T.Bilirubin	17	16	94.1%
D. Bilirubin	26	17	65.38%
TLC	60	56	93.3%

Association Between Liver Enzymes, Bilirubin And TLC: (day-0 and 6th weeks)

Table 8.10: - Showing association between liver enzymes, bilirubin and TLC on day-0 and 6th weeks after admission

Parameters.	Mean±SD (day-0)	Mean±SD (6weeks)	P value
AST	48.10±27.59	29.34±8.99	0.000
ALT	56.33± 33.75	33.08± 10.93	0.001
GGT	74.66± 30.05	52.5±19.96	0.00
ALP	117.58± 39.64	94.89± 22.38	0.004
Total Bilirubin	0.88 ± 0.609	0.56±0.37	0.00
TLC	11.62±2.06	6.72± 1.97	0.00
Direct Bilirubin	0.35 ±0.30	0.25± 0.13	0.00

The mean values of Liver enzymes, Bilirubin (Total & Direct) and TLC were found to be significantly decreased on 6 weeks after admission. (Table 8.10)

The p-value was significant for all liver enzymes (AST, ALT, ALP, GGT) and Bilirubin (Total & Direct) in our study.

DISCUSSION

Age Incidence

In this study cases fall between 18 to 70 years of age. There is an increased incidence of acute cholecystitis in the 3rd and 4th decades with the maximum incidence in the 4th decade. The predominant age group was 31-45 years (46% patients) with the mean age of the current study population being 36 years.

However, Vijay et al (1980)60 reported the maximum cases to be in 4th-5th decades, while Bhansali (1980)61 reported the same between 5th-6th decades. Chunhamaneewat S et al (1999)34 reported that most common age group was 51 – 60 years.

Presenting Symptoms:

Table 9.02: Showing the Presenting symptoms of the study population

in percentage.

Symptoms	Present study	Vijay et al (1980)[60]	Solan et al (1971)[59]
Pain Abdomen	100%	84%	82%
Radiation of pain	13-19%	13.3%	45%
Nausea / Vomiting	56%	54.7%	21%
Dyspepsia	71%	34.66%	30%
Fever	23%	16%	10%

The duration of symptoms at presentation was between 1–5 days. All the Patients complained of abdominal pain.

There are some variations in the present study as compared to the other studies. In my study 100% of the patients complained of abdominal pain at presentation, while pain was complaint in 84% and 82% in studies of Vijay et al (1980)60 and Solan et al (1971)59respectively. The chief complaints in our patients for attending the hospital was pain in my study. The pain was mainly confined to be to the right upper quadrant. 19% patients complained of radiation of pain to back, while 13% had radiation to right shoulder in our study.

Nausea and vomiting were present in 56% patients in our study which correlated with the study by Vijayetal(1980)60, who reported it to be 54.7%. However, Solan et al (1971)59, reported nausea and vomiting to be 21%.

Icterus (yellow discoloration of upper sclera) was not found in my study population since there was marginally raised bilirubin level in few patients (17%). Also, most of the elderly patients had dirty sclera. However, Vijay et al (1980)60 and Solan et al (1971)59 reported jaundice to be present in 6.6% and 15% cases respectively. King et al (1971)62 and Morrow et al (1978)63 reported 24% and 24.1% jaundice cases respectively.

Dyspepsia was present in 71% cases in my study. Whereas, the same was reported to be 34.66% and 30% in studies done by Vijay et al and Solan et al respectively.

Fever was present in 23% Cases in my study. In studies done by Vijay et al (1980)60 and Solan et al (1971)59 fever was reported to be 16% and 10% respectively.

Physical Examination:

Tenderness was present in 100% of my study cases. In the study by Vijay et al and Solan et al, the Right Hypochondrial Tenderness was reported to be 76% and 16% respectively; but the same was reported to be 16% in the study done by Solan et al in 1971. No lump could be elicited in my study population as there was guarding which was mostly confined to the right upper quadrant.

In the present study, guarding and rigidity, which was mostly confined to the right upper quadrant of the abdomen, were found to be in 64% patients. 36% patients were found to have tachycardia and Boa's sign of acute cholecystitis was found to be in 14% patients.

Investigations:

In the present study, 60 out of 100 patients had increased total leucocytic count due to Neutrophilia which probably is the result of Acute Inflammatory state.

USG was the diagnostic modality of choice and its accuracy was 100% in the present study. All the patients in my study had acute calculous cholecystitis. Gall bladder was more than 4mm thick and gall bladder distension was also present. Pericholecystic fluid collection was also present in most of the cases. Hence, USG is the Diagnostic modality of choice in case of acute cholecystitis which is cheap, readily available and gives a real time imaging.McCluskey et al (1979) found the diagnostic accuracy of USG to be 100% while Hassler et al (1989)26 found accuracy rate to be 98.6% for a positive diagnosis.

Liver Enzymes:

In the present study population of Acute cholecystitis, AST and ALT are found to be raised in 32% and 49% patients respectively. In the study done by M. S. Padda et al (2009) the same was reported to be 54.8% and 50% respectively. Chang CW et al (2009) reported that, 51.0% had an ALT level elevated to 2-3 times the upper limit of normal and 41.2% had an elevated AST level. Kassem AA et al (2011) reported that , 46.8 % had an elevated AST levels and 87.4% had an elevated ALT level.

Study	AST	ALT
M. S. Padda et al (2009)[74]	54.8%	50%
Chang CW et al (2009)[70]	41.2%	51.0%
Kassem AA et al (2011)[28]	46.8 %	87.4%
Present study (2018-19)	32%	49%

Table 9.03: Showing the patients with increased levels of AST & ALT

The patients with increased AST levels in my study were different than the other studies mentioned, but the patients with increased ALT levels correlated with studies by M. S. Padda et al (2009) and Chang CW et al (2009). However , Kassem AA et al (2011) reported a higher a higher percentage of patients (87.4%) with increased ALT levels.

In my study population, ALP was raised in 32% patients. In the study done by M. S. Padda et al (2009)74 the same was reported to be 30.6%. Same was reported by Chang CW et al (2009)70 to be 23%. In the study done by Kassem AA et al (2011)28, ALP was raised in 38.6% cases.

GGT was raised in 38% patients. In the study done by M. S. Padda et al (2009)74 the same was reported to be 47.2%. In the study done by Kassem AA et al (2011)28, it was raised in 51.1% cases.

My results of patients with increased levels of ALP correlated with study by M. S. Padda et al (2009) with slight difference from that of Kassem AA et al (2011). The result of patients withincreased levels of GGT in my study was slightly different from other studies mentioned above. (Table 9.04)

Study	ALP	GGT
M. S. Padda et al (2009)[74]	30.6%.	47.2%.
Chang CW et al (2009)[70]	23%	-
Kassem AA et al (2011)[28]	38.6%	51.1%
Present study (2018-19)	32%	38%

Table 9.04: Showing the patients with increased levels of ALP & GGT

All the liver enzymes were raised in 32% patients in my study. The same was reported to be 18% in the study done by M. S. Padda et al (2009). Chang et al also reported the elevation of liver enzymes in patients with Acute cholecystitis.

Bilirubin:

In my study population, total bilirubin was raised in 17% patients, while direct bilirubin was raised in 26% patients on the day of admission (Day-0). Chang CW et al (2009) reported the increased level of bilirubin in 27% patients. In the study done by Kassem AA et al (2011)28, total bilirubin was raised in 40.61% cases with direct bilirubin in 41.9% cases.

Parameters	Present study (2018-19)	Chang CW et al (2009)[70]	Kassem AA et al (2011)[28]
T. Bilirubin	17%	27%	40.61%
D. Bilirubin	26%	-	41.9%

Table 9.05: Showing bilirubin level on Day-0

Parameters At 6 Weeks:

In my study population, liver enzymes (AST, ALT, ALP, GGT), bilirubin and TLC were repeated at the end of 6weeks, when the patients had remission of clinical sign and symptoms.

Parameters	Day-0 (mean)	6 weeks (mean)	P value
AST	48.10±27.59	29.34±8.99	0.000
ALT	56.33± 33.75	33.08± 10.93	0.001
ALP	117.58± 39.64	94.89± 22.38	0.004
GGT	74.66± 30.05	52.5±19.96	0.00
T. Bilirubin	0.88 ± 0.609	0.56±0.37	0.00
D.Bilirubin	0.35 ±0.30	0.25± 0.13	0.00
TLC	11.62±2.06	6.72± 1.97	0.00

Table 9.06: - Showing association of mean values on Day-0 and 6 weeks:

It was noted that, there was a significant decrease in the mean values of liver enzymes (AST,ALT, ALP, GGT), Bilirubin (Total & Direct) and TLC on 6 weeks. It is thought to be the result of resolution of inflammation.

The maximum values of individual liver enzymes and bilirubin came down to the normal limits in most of the patients along with clinical improvement of the acute inflammatory process. Patients were managed conservatively with antibiotics, IV fluids, analgesics and antipyretics during the acute phase and discharged once the patients improved clinically.

Parameters	Day of admission (Day-0)	Week 6th (returned to normal)	Percentage.
AST	32	27	84.3%
ALT	49	40	81.6%
ALP	32	26	81.25%
GGT	38	33	86.8%
T.Bilirubin	17	16	94.1%
D. Bilirubin	26	17	65.38%
TLC	60	56	93.3%

Table 9.07: - Showing patients with resolution of the acute condition

27 out of 32 patients with increased AST and 40 out of 49 patients with increased ALT were found to have their AST and ALT come down to normal limits by 6 weeks which accounted for 84.3% and 81.6% patients respectively.

Similarly, ALP and GGT were also found to be lowered into the normal limits in 81.25% and 86.8% patients respectively.

Total bilirubin was found to be within normal limits in 94.1% of patients out of the patients with increased level of total bilirubin. However, direct bilirubin came down to normal level only in 65.38% cases in this study. TLC lowered into the normal limits in 93.3% cases by 6 weeks. There was associated clinical improvement along with the improvements of biochemical levels of liver enzymes and bilirubin.

SUMMARY AND CONCLUSION

The present study comprises of 100 patients who were admitted and diagnosed with acute cholecystitis in the Department of surgery, Silchar medical College and hospital during the study period starting from 7th June 2018 to 6th June 2019. This study was conducted to study the clinical characteristics of acute cholecystitis and its relation with liver enzymes (AST, ALT, ALP, GGT)and bilirubin.

The age of our study population was in the range of 18-70 yrs. The highest incidence of acute cholecystitis was in between 31-45 years, with a mean age of 36.78 years.

Female sex is more prone to suffer from acute cholecystitis and male: female ratio was found to be 1:2.3 in our study.

All the patients (100%) had presented with pain abdomen which was mostly located at the right upper quadrant of the abdomen, with radiation of pain to back in 19% and to shoulder in 13% patients. Out of these patients, 56% had associated nausea & vomiting, 71% had dyspepsia, 23% had fever. However, no patients complained of yellowish discoloration of urine and upper sclera, but few of them were found to have a marginally increased bilirubin level.

On examination, tenderness was elicited in the right hypochondrium in 100% of the patients. There was associated guarding and rigidity in 64% patients which was mostly confined to the right upper quadrant of the abdomen. Boa's sign was elicited in 14% patient.36% patients were found to have tachycardia. None of the patients in the study population had any other co-morbidities.

Out of the 100 patients with acute cholecystitis, liver enzymes i.e. AST, ALT, ALP, and GGT were found to be elevated in 32%,49%,32%, and 38% patients respectively. The maximum value of AST was 116U/L, ALT was 141 U/L, ALP U/L was 234 and GGT was 154U/L on the day of admission. 60% of the patients had leukocytosis on presentation. The mean values of the liver enzymes were also found to be elevated in the study population. Patients were managed conservatively and discharged after clinical improvement of their condition.

Out of these patients with elevated liver enzymes at the time of admission; values of AST, ALT, ALP, GGT were found to be returned to normal level in 84.3%, 81.6%, 81.25%, 86.8% patients respectively at 6 weeks after admission. The mean values of the liver enzymes declined at 6weeks after admission. The maximum values of AST, ALT, ALP and GGT were also declined to 65 U/L, 78.5 U/L, 173 U/L and 102 U/L respectively.

The total bilirubin was found to be elevated in 17% cases and direct bilirubin in 26% cases on the day of admission (day-0), with maximum value of 2.80 mg/dl and 1.30 mg/dl respectively. The mean values of total and direct bilirubin also declined in the study population at 6 weeks after the admission.

The mean value of TLC also declined from 11.62+ 2.06 to 6.72 ±1.97 at 6weeks.

From the relevant observation and discussion of the present study, the following conclusions can be drawn:

1. Acute cholecystitis, which has a female predominance, is typically presented with pain and tenderness in the in right upper quadrant of the abdomen, which is usually associated with one or more of the signs & symptoms like dyspepsia, nausea and vomiting, fever, tachycardia, guarding & rigidity mostly confined to the right upper quadrant of the abdomen.

2. Ultrasonography is an effective , cheap, readily available and real time investigation that is enough to diagnose acute cholecystitis.

3. Liver enzymes and bilirubin tend to marginally increase in few cases of acute cholecystitis as a result of the inflammatory process. However, this increase is transient and the levels come down to normal once the inflammatory process of acute cholecystitis subside.

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