

Outcome Analysis of Conservative Management of Acute Calculus Cholecystitis in Addis Ababa University Teaching Hospitals Addis Ababa, Ethiopia: Retrospective Study

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Abstract: *Back ground:* cholecystectomy for an acutely inflamed gall bladder is accompanied with significant perioperative complications. Conservative (non operative management) is considered to be the standard of care mainly in the developed world. Non operative management is still widely practiced in many developing countries including Ethiopia. This study aimed to assess the outcome of such a conservative management in teaching hospitals Addis Ababa, Ethiopia. *Method:* Hospital based cross-sectional study design was conducted. Data was entered and analyzed by SPSS version 20. Chi-square, binary logistic regression, at 95% CI and P-value <0.05 were used to examine relationship between dependent and independent variables. *Results:* A total of 134 cases were admitted. In this study the mean age is 41.67, (95% CI 39.5 to 43.9) and M: F ratio is 1:2.2 and Age of the patients ranged between 15-80 years and majority of them were in the age group of 35-44 (32.1%) years. Conservative treatment during index admission was successful in 96.27% of the cases but mean duration of hospital stay 5.54 days, 95% CI (5.03, 6.05). Duration of illness before (OR = 3.47: 1.26-9.55) and Duration of hospital stay (OR = 1.92: 1.28-2.87) were determinant factors for index admission. 19% of patients encountered complication while waiting for cholecystectomy. Comorbidity (AOR = 4.06: 1.49 - 11.07; value = 0.006). GB stone impacted at the neck (AOR = 3.39: 1.259-9.13; value = 0.016) were associated factors identified. In this study out of 131 cases treated and discharged improved and appointed for interval- cholecystectomy only 71.7% of them had interval -cholecystectomy in two-year period. The rest 13 (9.7%) patients did not show up follow up after admission booked (registered under waiting list for bed). 3 patients died with complications directly or indirectly related to conservative management cholecystitis. *Conclusion and Recommendations:* this study revealed patients arrival to hospital is delayed and also stayed prolonged time in the hospital. significant number of patients also developed complications while waiting for interval cholecystectomy and also significant Number of patients did not get cholecystectomy service. Nationwide introduction of emergency laparoscopic cholecystectomy and Patient referral system, admission, discharge and follow up system needs revision.

Keywords: Conservative Management, Acute Cholecystitis, Elective Cholecystectomy Duration of Hospital Stay

1. Introduction

1.1. Background of the Study

Acute calculus cholecystitis results from obstruction of the

cystic duct by gall stone and irritation of the gall bladder wall mainly by components of the imprisoned bile like lecithin and bile salts. So, Conservative management measures include bed rest, intravenous fluids, a light diet and relief of pain with pethidine and diclofenac. During the first 24 hr

30% of the gall bladder cultures are positive, this rises to 80% after 72 h so antibiotics are given to treat septicemia and prevent peritonitis and empyema [1, 2].

In developed countries, the prevalence of gallstones ranges between 10 and 15% among adult population. 1–4% of all patients with known cholelithiasis are suffering from biliary colic each year and Most gallstones remain silent [3].

Once a patient has developed symptoms or complications related to gallstones, surgical therapy remains the gold standard because of a high rate of medical re-admission due to the same symptoms or due to pancreatitis or cholecystitis within a discrete time frame. Furthermore, biliary colic is one of the most common precursors of more and even life-threatening gallstone-related complications [4].

Even though there is no adequate research on the magnitude of gall stone disease in Ethiopia, research done in Gondar in 2006 showed the prevalence was 5.2%. Of the patients with gallstone disease, female for male ratio is 2:1. The ratio of symptomatic to asymptomatic cholelithiasis was 1:1 [4].

In Ethiopia, acute calculous cholecystitis is widely managed conservatively during the acute state followed by elective cholecystectomy after two months. In the developed world managed by laparoscopic cholecystectomy usually at the time of admission [5].

Advantages of early cholecystectomy over conservative management is prevention of recurrent attacks of acute cholecystitis during the two months waiting area, shorter hospital stay and return of patients to productive life along with the overall safety of the cholecystectomy in the acute state [6].

The outcome of our conservative management approach to acute calculous cholecystitis has never been assessed and the magnitude of complications like recurrent acute cholecystitis and length of hospital stays is not described so far. This study will try to address these gaps.

1.2. General Objective

To Outcome analysis of conservative management of acute calculus cholecystitis in Addis Ababa university teaching hospitals Addis Ababa, Ethiopia:

1.3. Specific Objectives

1. To assess the socio-demographic characteristics of Patients admitted with acute calculus cholecystitis.
2. To assess the presenting signs and symptoms of Patients admitted with acute calculus cholecystitis.
3. To assess aftermath of conservative management of Patients admitted with acute calculus cholecystitis.

2. Methodology

2.1. Study Area (Setting)

The Study will be conducted in ZMH, Minilik II hospital and Yekatit 12 Medical college Hospital in Addis Ababa city, Ethiopia. These hospitals are under Addis Ababa city

administration Health Bureau and are comprehensive hospitals with different departments with their respective staff compositions. The department of surgery of AAU, College of Health sciences has affiliated the respective surgical departments in these hospitals as additional sites for teaching and service delivery besides Tikur Anbessa Specialized teaching and referral hospital. So throughout the year, deferent number of surgical residents at different levels of training will go to these hospitals on regular basis.

In the department of surgery at Minilik II hospital, the total bed for surgical patients is 101 of which 56 beds is allocated for male patients and the rest 45 beds are allocated for female patients in separate floor. There are 23 nurses and 7 consultant surgeons.

In the department of surgery at Yekatit 12 hospital medical college, the total bed for surgical patients is 56 of which 31 beds is allocated for male patients and the rest 25 beds are allocated for female patients in separate room. There are 24 nurses and 10 consultant general surgeons.

In the department of surgery at ZMH, the total number of beds for surgical patients is 33 of which 18 beds are allocated for male patients and the rest 15 beds for females. There are 19 nurses and 6 consultant general surgeons.

Study Period: The study was conducted from April to November, 2018GC.

Study design: Institution based retrospective cross-sectional study was employed.

Source population: All patients admitted to surgical wards of the three hospitals over the stated two years.

2.2. Study Population

All patients admitted to the surgical wards with the diagnosis of acute calculous cholecystitis that fulfill the criteria.

Inclusion: all patients whose ages were 15 years or older with acute calculus cholecystitis.

Exclusion: Patients whose medical files are incomplete and emergency laparotomy performed after they presented with peritonitis (complication of cholelithiasis) in the initial admission.

2.3. Sample Size Determination and Sampling Technique

Consecutive sampling technique was employed and patient records of patients who have been diagnosed to have acute calculus cholecystitis over the stated two years and admitted to surgical wards of ZMH, Minilik II hospital and Yekatit 12 Hospital medical college from March 1, 2016 to February 28, 2018 were used to collect data for achieving the objective of the study.

Data collection tool: The data collection was done by using a structured and pretested questionnaire.

Independent variables include, Age, Sex, Year of admission, Duration of illness before arrival, Duration of hospital stay, Co morbid disease, Clinical presentations, Laboratory results, U/S results and Management options.

Dependent variables: The Outcome of conservative

management of acute cholecystitis cases. Development of recurrent symptoms (complications) Interval cholecystectomy.

Data quality management: pre-tested on 5% of all patients' records who were admitted with the diagnosis of acute calculous cholecystitis to the respective hospitals. Necessary amendment was done to ensure the accuracy and consistency prior to concrete collection of data. Detailed training for data collectors and supervisor was given by the principal investigator, and a guiding document was given to them.

2.4. Data Analysis

Data was entered and analyzed using SPSS version 20. Frequencies and graphs were used to describe variables. Bivariate analysis was done to the associations between dependent and independent variables. A 95% CI and p-value of <0.05 considered to be statistically significant between variables. In addition, crude /adjusted odd ratio was calculated to assess the effects of each independent variable on the outcome variable.

2.5. Ethical Clearance

The department research committee and the college IRB checked and cleared any ethical issues of concern.

2.6. Operational Definition

Acute Calculus cholecystitis: acute inflammation of gallbladder that occurs most commonly because of an obstruction of the cystic duct by gall stone arising from gall bladder [7].

Positive findings of the disease: include gallbladder wall thickening >3 mm, pericholecystic fat stranding, and gallbladder distention.

Interval cholecystectomy: operative removal of gall bladder after 6-8 weeks of initial admission.

Index admission: patients admitted for the first time by cholecystitis in each hospital.

3. Result

During the period of study (From March 1, 2016 to Feb. 28, 2018) Cases of acute calculus cholecystitis registered on HMIS log book were 170 in three Affiliated Hospitals of which 134 were retrieved (~79% retrieval rate).

The age of the patients ranged between 15-80 years with a mean age of 41.67, (95% CI 39.5 to 43.9) in addition to this majority of the patients were between 35-44 (32.1%) years and 25-34 (23.1%) years and majority of patients admitted with Diagnosis of acute cholecystitis were Females 92 (68.7%) and the rest 42 (31.3%) were males. Male to female ratio is 1:2.2 (Table 1).

Clinical presenting sign in majority of the case positive murphy's sign 120 (89.9%) and Right upper quadrant tenderness 116 (86.6%). As well as majority of patients their vital signs are in the normal range on presentation, 52 (38.8%) of patients had tachycardia, 6 (4.5%) of the patients

were hypotensive and 16 (11.9%) of the patients were Febrile (Table 3).

Regarding laboratory values majority of them had raised WBC (54.5%), 26 (24.8%) raised direct bilirubin and 42 (40%) raised ALP (Table 4).

Ultrasound imaging of the majority of the patients is Gall bladder wall thickness >4mm 87 (65%), impacted Stone at the neck/pouch/cystic duct 31 (23.1%) pericholecystic fluid detected 20 (15%), the diameter of CBD is Normal range in the majority of the case 87 (64.9%), 36 (27%) of them ranging 7-10mm in diameter 9 (6&5) of them had >1 cm in diameter. (Table 5).

Conservative management parameters delivered to patients admitted with case of acute calculus cholecystitis in almost all patients were fluid management, antibiotics (ceftriaxone and metronidazole) and analgesia (Table 6).

* out of the 5 patients who are deteriorated in the Hospital in the First admission as case acute calculus cholecystitis, for 3 of the patients laparotomy was done because of non-responding for antibiotics Treatment despite change of antibiotics (ceftazidime, vancomycin) for more than 1week, and finding was GB empyema in 1 of them and 2 of them have distended and hyperemic Gall bladder. Among the three laparotomies 1 died of Sudden death (Table 7).

Two patients who were initially admitted for acute calculus cholecystitis, developed (HAP) and discharged improved.

The duration of hospital stays of patients who are admitted and discharged improved after admission with case of acute calculus cholecystitis ranged between 2 days to 27 days with a mean of 5.54 days, 95% CI (5.03, 6.05). and also majority of the patients Stayed in the hospital 72hr -1week 70 (54.6%), and 24hr-72hr in 39 (29.3%) of patients. The rest 24 (18.04%) of the patients stayed for >1week in the hospital (Table 8).

Out of 131 patients for whom appointment given for definitive treatment (interval cholecystectomy) given, 24 (19%) patients come back with complications listed on the above as an emergency basis. The majority of them present with recurrent acute calculus cholecystitis 15 (12.9) followed by biliary colic 4 (3%) and Pancreatitis.

Two of them had peritonitis for which laparotomy was done and the intra operative finding was bile mixed with pus in the peritoneum, gangrenous GB, both patients are diabetic and one of the patients has hypertension. After they stayed for more than 2 week died of uncontrolled sepsis (Table 9).

Out of 131 patients for whom appointment given for interval cholecystectomy (usual practice) only for 94 (71.7%) of patients elective cholecystectomy was done at different time gaps after treatment for both (recurrent plus first attack of cholecystitis). The rest 13 (9.7%) patients did not show up follow up and 22 were absent for unknown reason after admission booked (registered under waiting list for bed).

Associated Factors for the outcome of conservative management of acute calculus cholecystitis

Bi-variate analysis involving all variables was performed to identify candidate variables for multivariate analysis and to test for association between dependent and independent

variables for the patient's outcome of conservative management of acute calculous cholecystitis, weather improved or deteriorated in the initial admission. Consequently, yellowish discoloration of patients eye, and duration of Hospital stay in days showed significant association ($p < 0.05$) with outcome of conservative management, weather improved or deteriorated in the initial admission. Even though extent of illness before arrival, raised WBC count and gall bladder wall thickness $> 4\text{mm}$ is clinically significant, it did not show statistically significant association with the outcome of conservative management of acute calculous chelecystitis during initial admission. Patients who had no presenting symptom of yellowish discoloration of patients eyes were 99.96% less likely to deteriorate from acute calculous cholecystitis as compared with those who had yellowish discoloration of eyes on presentation ($OR = 0.004$: $0.00 - 0.053$; $value = 0.000$). (Table 11).

In patients who were admitted with the diagnosis of acute calculous cholecystitis cases on conservative management, as duration of illness before arrival to Hospital delays by one day, they have 3.47 times more likely to deteriorate with acute calculous cholecystitis than in their counterparts ($OR = 3.47$: $1.26-9.55$) (Table 11).

In patients who were admitted with the diagnosis of acute calculous cholecystitis cases on conservative management, as length of hospital stay increase by one day, they have 1.92

times more likely to deteriorate with acute calculous cholecystitis than in their counterparts ($OR = 1.92$: $1.28-2.87$) (Table 11).

Bi-variate analysis involving all variables was also performed to identify candidate variables for multivariate analysis and to test for association between dependent and independent variables for outcome (development of complications) of patients conservatively treated and discharged improved (waiting for interval Cholecystectomy) after initial admission. Comorbidity and Gall bladder stone impacted at the neck showed significant association ($p < 0.05$) with the outcome of patients conservatively treated and discharged improved (waiting for interval Cholecystectomy) after initial admission. Duration of Hospital stay in the initial admission did not show significance with progress of complication while waiting for interval cholecystectomy.

The patients who had comorbidity were 4 times more likely to develop complication as compared with those who did not have comorbidity ($AOR = 4.06$: $1.49 - 11.07$; $value = 0.006$). The patients who had gallbladder stone impacted at the neck showed on U/S were 3.4 times more likely to develop complication as compared with those who did not have had gallbladder stone impacted at the neck while waiting for elective cholecystectomy ($AOR = 3.39$: $(1.259-9.13)$; $value = 0.016$). (Table 12).

Table 1. Socio-demographic Characteristics patients admitted with case of acute calculus cholecystitis in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

Variable	Category	Frequency	Percent (%)
Sex	Male	42	31.3
	Female	92	68.7
	Total	134	100
Age	<25 year	9	6.7
	25-34 years	31	23.1
	35-44 years	43	32.1
	45-54 years	22	16.4
	55-64 years	20	14.9
	>64 years	9	6.7
	Total	134	100%

Clinical presenting symptoms of the majority of cases were RUQ pain 134 (100%), Nausea 114 (85.1%) and Vomitting 109 (81.3%) (Table 2).

Table 2. Clinical presentation (Symptoms) of patients admitted with case of acute calculus cholecystitis in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

Clinical presentation	Yes/%	No/%	Total/%
RUQ pain	134 (100%)	0	134 (100)
Fever	81 (60.4%)	53 (39.6)	134 (100)
Nausea	114 (85.1%)	20 (14.9)	134 (100)
Vomiting	109 (81.3%)	25 (18.7)	134 (100)
Chills and rigor	21 (15.7%)	113 (84.3)	134 (100)
Yellowish discoloration of eye	5 (3.7%)	129 (96.3)	134 (100)

Table 3. Clinical presentation (Signs on P/E) of patients admitted with case of acute calculus cholecystitis in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

Variables	No. of patients	Percentage
PR		
60-90 bpm	81	60.4
>90bpm	52	38.8

Variables	No. of patients	Percentage
<60bpm	1	0.7
BP		
90-140/60-90mmhg	119	88.8
<90/60mmhg	6	4.5
>140/90mmhg	9	6.7
Temperature		
36.5-37.5	109	81.3
>37.5	16	11.9
<36.5	9	6.7
RUQ tenderness	116	86.6
Murphy's sign	120	89.6
RUQ mass	2	1.5
Generalized tenderness	5	3.7
Total	134	100

Table 4. Laboratory values patients admitted with case of acute calculus cholecystitis in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

Laboratory	Raised (no/%)	Normal (no/%)	Not done
WBC	73 (54.5)	61 (45.5)	0
Direct B	26 (24.8)	79 (75.2)	29
Total B	42 (40)	63 (60)	29
ALP	44 (37.6)	73 (62.4)	17

Table 5. Ultrasound finding of patients admitted with case of acute calculus cholecystitis in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

U/S parameters	Finding	No/%
Gall bladder wall thickness	Normal (<4mm)	47 (35.1)
	Thickened (>4mm)	87 (64.9)
Pericholecystic fluid collection	Detected	20 (14.9)
	Not Detected	114 (85.1)
Hydronic gall bladder	Yes	10 (7.5)
	No	124 (92.5)
Stone impaction at the neck/pouch/cystic duct	Yes	31 (23.1)
	No	103 (76.9)
CBD diameter	<6mm	87 (64.9)
	7-10mm	36 (26.9)
	>10mm	9 (6.7)
	Not measured	2 (1.5)

Table 6. Conservative management parameters delivered to patients admitted with case of acute calculus cholecystitis in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

Management given		Frequency	Percent
Kept NPO	Yes	132	98.5
Fluid Management (MF)	Yes	132	98.5
	Yes	130	97
Antibiotics (both Ceftriaxone Metronidazole)	No	4*	3
	Total	134	100
NG tube inserted	Yes	7	5.2
Analgesia (Diclofenac or Tramadol)	Yes	132	98.5
Antiemetic (plasil)	Yes	32	23.9
	Yes	37	27.9
Others (cimetidine, hyosin,...)	No	97	76.1
Grand total		134	100

*There is no order written type of antibiotics given

Table 7. Outcome of the conservative management of patients with case of acute calculus cholecystitis in the initial admission, in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

		Frequency	Percent
Outcome	Improved	129	96.27%
	deterioration in the Hospital*	5	3.73%
Grand total	134 100%		

Table 8. Duration of hospital stay of patients who are admitted and discharged improved after admitted with case of acute calculus cholecystitis in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

Duration of Hospital Stay	Frequency	Percent
24hr-72hr	39	29.3
72hr-1week	70	54.6
>1week	24	18.04
Total	133	100

**1 patient was died in the hospital in the initial admission

Table 9. Complication encountered while waiting for Elective cholecystectomy among patients admitted with case of acute calculus cholecystitis and discharged improved in the initial admission in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

Type of complication	Frequency	Percent
Recurrent Acute cholecystitis	15	12.9%
Biliary colic	4	3%
Acute pancreatitis	3	1.5%
Others **	2	1.5%
Total	24	19%

** Severe sepsis 2nd perforated GB with peritonitis

Table 10. Definitive management performed among patients admitted with calculus cholecystitis following conservative management during initial admission in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

		Frequency	Percent
Interval cholecystectomy Performed	<6week	16	11.9
	6-8week	44	32.8
	>8week	34	25.4
	Total	94	70.1
Interval cholecystectomy Not performed	Did not show up appointment	13	9.7
	Unknown reason	22	16.4
	Emergency laparotomy done 2nd admission	2	1.5
	Emergency laparotomy done initial admission	3	2.2
	Total	40	29.1
	Grand total	134	100%

Table 11. Associated Factors for the outcome of conservative management of acute calculous chelecystitis during initial admission in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

Variables		outcome		OR 95%CI	P-value
		Improved	Deteriorated		
Yellowish discoloration of eye	Yes	2 (33.3%)	4 (66.7)	1.00	0.000
	No	127 (99.2%)	1 (0.8%)	0.004 (0.00-0.053)	
Gall bladder wall thickness	<4mm	44 (93.6%)	3 (6.4%)	1.00	0.253
	≥4mm	85 (97.7%)	2 (2.3%)	0.345 (0.56-2.142)	
Duration of illness before arrival days				3.47 (1.26-9.55)	0.016
Duration of Hospital stay				1.92 (1.28-2.87)	0.001

Table 12. Associated Factors for the outcome of development of complications for patients conservatively treated and discharged improved and waiting for interval Cholecystectomy, in AAU affiliated hospitals, Addis Ababa Ethiopia, June 2019.

Variables		Outcome (complication encountered while waiting admission)		COR 95%CI	P-value	AOR 95%CI	P-value
		Yes	No				
Comorbidity	yes	9 (32.1%)	19 (67.9%)	3.49 (1.34-9.05)	0.01	4.06 (1.49-11.07)	0.006
	no	15 (14.6%)	88 (85.4%)	1.00		1.00	
Stone impacted at Gall bladder neck	yes	10 (33.3%)	20 (66.7%)	2.867 (1.124-7.313)	0.028	3.39 (1.259-9.13)	0.016
	No	14 (13.9%)	87 (86.1%)	1.00		1.00	
Duration of Hospital stay				0.81 (0.67-0.988)	0.037		

4. Discussion

This institutional based retrospective cross-sectional study was used to analyze the outcome of conservative

management of acute calculous cholecystitis at Zewditu Memorial, Minilik II and Yekatit 12 Medical College Hospitals, Addis Ababa Ethiopia.

In this research the result revealed that outcome of Conservative treatment during index admission was

successful in 96.27% of the cases which is far better than Systematic review and pooled analysis done by Losen and his colleagues showed, Conservative treatment during index admission was successful in 87% of the case [8-10]. In this study the rest 3.73% patient were deteriorated and whereas emergency cholecystectomy was done for 4 patients and discharged with improvement unfortunately one patient died in the hospital due to failed Conservative treatment.

The duration of hospital stay during index admission was ranged between 2 days to 27 days with a mean of 5.54 days, 95% CI (5.03, 6.05). Nearly half of the patients Stayed in the hospital 72hr -1week 70 (54.6%), and 24hr-72hr in 39 (29.3%) of patients. The rest of 24 (18.04%) patients stayed for >1week in the hospital.

In the other set ups for patens who were subjected for conservative management and failed to improve within 72 to 96hr of admission, the subsequent management with cholecystectomy (the definitive treatment) [11, 12].

In our study patients who were admitted with the diagnosis of acute calculus cholecystitis cases on conservative management, as length of illness before arrival to Hospital, delays by one day, they have 3.47times more likely to deteriorate in the hospital than in their counterparts (OR = 3.47: 1.26-9.55) (table 11). Similarly, as span of hospital stay increase by one day, they have 1.92 times more likely to deteriorate with acute calculous cholecystitis than in their counterparts (OR = 1.92: 1.28-2.87) (Table 11) this is mainly because of patients' development of hospital acquired infections on top of the primary diagnosis which makes the medical management of patients Challenging. Drug resistance issue also possible reason of not responding for antibiotics treatment and subsequently the patient complicates to peritonitis, sepsis and to death [13].

The patients who had comorbidity were 4 times more likely to develop complication as compared with those who did not have comorbidity (*AOR* = 4.06: 1.49 - 11.07; *value* = 0.006). This is explained by immune compromised individuals are at increased risk to develop infections like hospital acquired pneumonia, and the disease progress to the severest form is more in immune comprised individual than those who don't have co morbidity. The patients who had gallbladder stone impacted at the neck showed on U/S were 3.4 times more likely to develop complication as compared with those who did not had gallbladder stone impacted at the neck comorbidity while waiting for elective cholecystectomy (*AOR* = 3.39: (1.259-9.13); *value* = 0.016. anatomically the neck of GB is narrow and the stone impacted at the neck obstructs the flow of Bile from GB to CBD through cystic duct. As result stasis will occur, the GB wall will get distended and the content will get infected. Subsequently empyema, gangrenous Gall bladder, perforation, peritonitis and sepsis will occur. In the other way smaller stones pass down to biliary tree and causes of biliary colic, gall stone pancreatitis and obstructive jaundice [14-15].

In our set up the usual practice of managing cases of acute cholecystitis is initially by medical treatment (conservatively) and later by interval cholecystectomy. In this study out of

131 cases treated and discharged improved and appointed for interval cholecystectomy only 71.7% of them had interval cholecystectomy in two-year period. The rest 13 (9.7%) patients did not show up follow up and the rest were absent for unknown reason after admission (registered under list for bed).

Patients that had comorbidity were 3.42 times more likely to had interval cholecystectomy (*AOR* =3.422: 1.066-10.988; 0.039). Possible explanation why Patients that had comorbidity better got cholecystectomy service when compared to their counter parts could be, patients in alder age groups who are having comorbidities of chronic illness had regular follow up and they are also more adherent to follow up they had.

5. Conclusion

In this study even though, there is improved figure of improvement of acute calculus case with conservative management during the index admission, the duration of hospital stay and patient recovery was very protracted. Duration of illness before arrival to hospital, presenting symptom of yellowish discoloration of eyes and duration of hospital stay were identified as factors influencing out come during initial Index admission.

The rate of complication (recurrent cholecystitis, biliary colic, pancreatitis gangrenous GB and perforation) was high This study revealed that Patient's age and the present of co comorbid illness *positively* affect the service delivery of interval cholecystectomy.

6. Recommendation

Based on the above finding of the study the following recommendations were made: -

Improving management out comes of patients with acute calculus cholecystitis

- 1) Ministry of health, Addis Ababa University College of health science department of Surgery, Addis Ababa city administration health bureau and their partners should work together and do nationwide researches and introduce other management strategies like emergency laparoscopic cholecystectomy.
- 2) Addis Abeba city administration health bureau and their partners should equip health facility for the provision of services regarding early diagnosis and referring patients and preventing dalliances to Hospitals and avoid delay.
- 3) Addis Ababa University, College of health science department of surgery, city admiration health bureau, referral hospitals and their partners should revise patients admission, discharge and follow up protocol so that patients problem of lost follow up and unknown reasons will be addressed.
- 4) referral hospitals unnecessary Hospital stays should be avoided by providing facilitated appropriate treatment and early discharging the patients from Hospitals.

Abbreviations

ALP	Alkaline Phosphatase
CBD	common bile duct
DM	diabetes mellitus
GB	gall bladder
LC	laparoscopic cholecystectomy

Consent for Publication

Not relevant.

Availability of Data and Materials

The dataset will be available whenever required.

Competing Interests

The authors declared the absence conflict of interest.

Author's Contribution

BS: apprehended and planned the study, performed analysis and interpretation of result.

PW: supervised the design conception, analysis, interpretation of data and made critical comments at each step of research.

HS: supervised the design conception, interpretation of data and made serious comments at each step of research.

NS: supervised design conception, analysis, interpretation of data and gives important comments at each step of research.

SW: supervised the design conception, analysis, interpretation of data and made critical comments at each step.

All authors delivered and accepted the final Manuscript.

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