International Surgery Journal
Hari BMA et al. Int Surg J. 2019 Jul;6(7):2525-2532
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20192986

Original Research Article

A prospective study on emergency laparoscopic or open cholecystectomy in acute cholecystitis in a tertiary care hospital

Hari Babu M. A., Hareesh G. S. R.*, Praneeth Reddipogu, Venkata Ramanaiah Nannam

Department of General Surgery, Sri Venkateswara Medical College / SVRRGG Hospital, Tirupati, Andhra Pradesh, India

Received: 02 June 2019
Revised: 17 June 2019
Accepted: 18 June 2019

***Correspondence:**
Dr. Hareesh G. S. R.,
E-mail: gsrhareesh@gmail.com

ABSTRACT

Background: Gallstones are among one of the most common diseases affecting the digestive system requiring hospitalisation with a prevalence of 11% to 36%. Until 2 decades ago, patients presenting with acute cholecystitis were treated conservatively and a delayed interval cholecystectomy was performed after 6 weeks, now a days laparoscopic cholecystectomy was gaining popularity in acute cholecystitis. It cannot be said with certainty preoperatively whether the cholecystectomy is going to be easy or difficult. The aim of the study was to evaluate safety and outcomes of emergency laparoscopic or open cholecystectomy in acute cholecystitis.
Methods: This is a prospective, observational, single centre study conducted in the Department of General Surgery, S.V. Medical College/ SVRRGG hospital, Tirupati, for a period of one year from the time of approval of IEC. All patients undergoing emergency laparoscopic or open cholecystectomy for acute cholecystitis and its related complications are studied for various clinical, radiological and other variables.
Results: Total 100 patients who presented with acute cholecystitis and undergone cholecystectomy are studied. Age, sex, BMI, comorbities, clinical and usg criteria and intra-operative findings and post-operative complications are analysed.
Conclusions: Difficult dissection in cholecystectomy can be predicted using pre-operative parameters like increasing age, male gender, multiple attacks in the past, gallbladder wall thickness >3 mm, and presence of pericholecystic fluid. Surgery performed within 72 hrs had good prognosis and few intra op complications due to good place of dissection due to inflammation.

Keywords: Acute cholecystitis, Emergency cholecystectomy, Laparoscopic cholecystectomy

INTRODUCTION

Gallstones are among one of the most common diseases affecting the digestive system requiring hospitalisation with a prevalence of 11% to 36% in autopsy report.[1] However most patients remain asymptomatic (>80%) and they have <20% chance of ever developing symptoms and the risk of prophylactic cholecystectomy outweighs the potential benefit of surgery in most patients.[2] However, once the patient develops symptoms there is >80% chance that they will continue to have the symptoms and develop disease related complications.

Gallstone disease prevalence in general population is 3% to 20% of the total population worldwide.[3] In India, it is estimated to be around 6%.[4] An epidemiological study done on rail road workers revealed that north Indians have 7 times higher incidence of gallstones compared to South Indians.[5]

In 1992, the National Institute of Health (NIH) consensus development stated that laparoscopic cholecystectomy "provides a safe and effective treatment for most patients with symptomatic gallstones". Two decades since its introduction, laparoscopic cholecystectomy has now become widely accepted as the procedure of choice and with their growing experience surgeons have started taking up even more complex cases and high risk patients.[6] In about 5% to 12% of laparoscopic cholecystectomy, conversion to open method may be needed for various reasons.[7,8] Generally speaking, emergency cholecystectomy is performed within a time interval of 72 hrs, the so called golden 72 hrs.

Until 2 decades ago, patients presenting with acute cholecystitis were treated conservatively and a delayed interval cholecystectomy was performed after 6 weeks, once the inflammation was settled. A new concept of delayed urgent cholecystectomy is on the rise. In patients who are not able to undergo urgent cholecystectomy due to their general condition, can undergo cholecystectomy as early as possible. Studies have reported that there is no statistical significance when surgery has been delayed more than 72 hrs.[9, 10, 11.]

It cannot be said with certainty preoperatively whether the cholecystectomy is going to be easy or difficult. This study has tried to look at safety and outcomes of emergency laparoscopic or open cholecystectomy in cholecystitis. As there is a spectrum of opinion regarding the association of the pre-operative variables with the intra-operative outcome, this study was performed to identify the pre-operative and intra operative predictive factors for a difficult cholecystectomy.

METHODS

Study design

This is a prospective, observational, single centre study

Study setting

Study was conducted in the Department of General Surgery, S.V. Medical College/ SVRRGG hospital, Tirupati.

Study period

The study was conducted for a period of one year from October 2017 to October 2018 from the time of approval of IEC.

Sample size

The sample size was calculated using sensitivity of 75% for pre-operative prediction score for difficult cholecystectomy with 10% allowable error. The sample size calculated is 100.

Inclusion criteria

All patients undergoing emergency laparoscopic or open cholecystectomy for acute cholecystitis and its related complications in S.V.R.R.G.G. Hospital.

Exclusion criteria

Exclusion criteria were gall stone with CBD stone; cirrhotic patients; abnormal coagulation profile; previous multiple upper abdominal surgeries; patient undergoing cholecystectomy for non-gallstone related diseases.

Ethical considerations

Institutional review board of research studies and Independent Ethics Committee (IEC) Lr.No41/2017, reviewed this study protocol and ethical clearance was obtained.

Procedure

Patients with acute cholecystitis is defined as those patients with right upper quadrant pain showing evidence of Murphy's sign on physical examination and pericholecystic fluid collection on imaging with or without constitutional symptoms, requiring emergency admission.

All patients undergoing emergency laparoscopic or open cholecystectomy presenting within 72 hrs were included in this study. Patients meeting the exclusion criteria were not included in the study. Duration of operative procedure, intra and post-operative complications and duration of hospital stay were analysed in this study. The following scores were used for analysis.

Scores were given based on history, clinical examination, laboratory investigations and imaging findings according to the tables 2 to 4. Maximum score given was 12+4+6=22. Scores up to 8 was defined as easy, between 9 and 15 was defined as moderate and scores more than 16 was defined as difficult. For statistical analysis, only two groups were considered- easy (scores <8) and difficult (scores >9).

Operative technique

The standard four port technique was used for all laparoscopic cholecystectomies. All surgeries were performed by the one experienced surgeon. Critical view of safety is observed in all cases. When conversion was required, a Kocher's incision was made and cholecystectomy was completed. Decision for conversion was made based on the surgeon's intra-operative judgement. For open cholecystectomy, a Kocher's incision was made in the right hypochondrium.

Table 1: Scoring factors-clinical parameters.

	Score	Max
Age (in years)	<50 (0) >50 (1)	1
Gender	Female (0) Male (1)	1
BMI (kg/m^2)	Normal (<25.5) (0) Overweight (25-30) (1) Obese (>30) (2)	2
Previous Intra-abdominal surgery	No (0) Yes (1)	1
Diabetes mellitus	No (0) Yes(1)	1
Pain	No h/o pain (0) Past history of pain but no pain at present (1) Present pain but no h/o pain in the past (2) h/o present pain and pain in the past (3)	3
Duration of pain (in days)	<3 (0) >3 (1)	1
Fever	No (0) Yes (1)	1
Murphy's sign	No (0) Yes (1)	1
Total		12

Table 2: Scoring factors – laboratory parameters.

	Score	Max
Total WBC count (mm^3)	<11,000 (0) >11,000 (1)	1
Serum bilirubin (mg/dL)	<1.3 (0) ≥1.3 (1)	1
Serum transaminases (IU/L)	Normal (0) Elevated (1)	1
Serum ALP/ GGT (IU/L)	Normal (0) Elevated (1)	1
Total		4

Statistical analysis

Descriptive analysis of all the independent and dependent variables were done. All the parameters were described as categorical variables and were presented in percentages. The association between the pre-operative parameters and the outcome parameters was assessed using chi-square test. Graphical representation of analysis is also presented in an appropriate way and used to assess the predictive values of difficult dissection during cholecystectomy by using a pre-operative score.

Table 3: Scoring factors – imaging parameters.

	Score	Maximum score
Number of stones	Single (0) Multiple (1)	1
Size of stones (cm)	<1 (0) >1 (1)	1
GB wall thickness (mm)	<3 (0) >3 (1)	1
CBD diameter (mm)	<8 (0) >8 (1)	1
Stone impaction	No (0) Yes (1)	1
Pericholecystic fluid	No (0) Yes (1)	1
Total		6

RESULTS

In a total 100 patients, 34% of patients are in the age group of 30-40 years, 50% are in 40-50 years and 16% are in 50-60 years. The mean±SD age of 100 patients is 42.15±6.89. In a total 100 patients, 65% of patients are in females, 35% of patients are in males. In a total 100 patients, 76% undergone laparoscopic and 24% open cholecystectomy. In a total 100 patients, 29% of patients are having operating difficulty. In a total 100 patients, 29% of patients are having intra OP complications**.** In a total 100 patients, 13% of patients are having post OP complications.

Table 4: Age incidence in acute cholecystitis.

Age group (years)	Number	Percentage (%)
30-40	34	34.0
40-50	50	50.0
50-60	16	16.0
Total	100	100.0

In a total 100 patients, 21% of patients stayed for three days in the hospital for treatment, 28% stayed for four days in the hospital for treatment, 14% of patients are staying five days in hospital for treatment, and 27% of patients are staying more than five days in hospital for a treatment.

In a total 100 patients, 29 (29.0%) patients are having operating difficulty and 71 (71.0%) patients are not having operating difficulty. In lap cholecysetectomy of 76 patients, 11 (14.5%) patients are having operating difficulty and 65 (85.5%) patients are not having operating difficulty. Whereas in open cholecysetectomy of 24 patients, 18 (75.0%) patients are having operating difficulty and 6 (25.0%) patients are not having operating difficulty.

Table 5: Operating difficulty vs. type of surgery.

			Type of surgery		Total
			Lap Cholecysetectomy	Open Cholecystectomy	
Operating difficulty	No	Count	65	6	71
		% within operating difficulty	91.5	8.5	100.0
		% within type of surgery	85.5	25.0	71.0
	Yes	Count	11	18	29
		% within operating difficulty	37.9	62.1	100.0
		% within type of surgery	14.5	75.0	29.0
Total		Count	76	24	100
		% within operating difficulty	76.0	24.0	100.0
		% within type of surgery	100.0	100.0	100.0

Chi-Square value = 32.453, P Value < 0.0001 (Very High Significant)

Table 6: Intra op complications vs. type of surgery.

			Type of surgery		Total
			Lap cholecysetectomy	Open cholecystectomy	
Intra op complications	No	Count	65	6	71
		% within Intra op complications	91.5	8.5	100.0
		% within type of surgery	85.5	25.0	71.0
	Yes	Count	11	18	29
		% within Intra op complications	37.9	62.1	100.0
		% within type of surgery	14.5	75.0	29.0
Total		Count	76	24	100
		% within Intra op complications	76.0	24.0	100.0
		% within type of surgery	100.0	100.0	100.0

Chi-Square value = 32.453, P Value < 0.0001 (Very High Significant)

Table 7: Post-operative complications vs. type of surgery.

			Type of surgery		Total
			Lap Cholecysetectomy	Open Cholecystectomy	
Post-operative complications	No	Count	68	19	87
		% Within post-operative complications	78.2	21.8	100.0
		% Within type of surgery	89.5	79.2	87.0
	Yes	Count	8	5	13
		% Within post-operative complications	61.5	38.5	100.0
		% Within type of surgery	10.5	20.8	13.0
Total		Count	76	24	100
		% Within post-operative complications	76.0	24.0	100.0
		% Within type of surgery	100.0	100.0	100.0

Chi-Square value=1.713, p=0.191 (Not Significant).

In a total 100 patients, 29 (29.0%) patients are having Intra OP complications and 71 (71.0%) patients are not having Intra OP complications. In lap cholecystectomy of 76 patients, 11 (14.5%) patients are having Intra OP complications and 65 (85.5%) patients are not having Intra OP complications. Whereas in open Cholecystectomy of 24 patients, 18 (75.0%) patients are having Intra OP complications and 6 (25.0%) patients are not having Intra OP complications.

In a total 100 patients, 13 (13.0%) patients are having post-operative complications and 87 (87.0%) patients are

not having post-operative complications. In lap cholecystectomy of 76 patients, 8 (10.5%) patients are having post-operative complications and 68 (89.5%) patients are not having post-operative complications. Whereas in open cholecystectomy of 24 patients, 5 (20.8%) patients are having Post OP complications and 19 (79.2%) patients are not having post OP complications.

Majority of the patients had multiple stones on imaging, 80/100 (80%). However, there was no statistical significance between the number of stones and the intra-operative outcome. Of all the 30 difficult surgeries, 52% had stone size <1 cm and 48% had size >1 cm. 44 patients (44%) in this study had gallbladder wall thickness (>3 mm), 17 of them (36.1%) had easy surgery and 27 patients (63.9%) had difficult surgery. 19 patients had dilated CBD on imaging, of which 8 had easy surgery (53.8%) while 11 had difficult surgery (46.1%). 22 patients had stone impaction, 14 (75%) among them had easy surgery and 8 (25%) had difficult surgery. 26 patients had pericholecystic fluid, 8 among them had easy surgery and 18 had difficult surgery.

Table 8: Association between imaging findings and per-operative outcome.

		Intra-op findings		Total	P value
		Easy	Difficult		
Number of stones	Single	18	12	30	0.67
	Multiple	47	23	70	
Stone size (cm)	<1	42	18	60	0.19
	>1	23	17	40	
GB wall thickness (mm)	<3	48	8	56	0.01
	>3	17	27	44	
CBD diameter (mm)	<8	57	24	81	0.08
	>8	8	11	19	
Impacted stones	No	51	27	78	0.01
	Yes	14	8	22	
Pericholecystic fluid	Yes	8	18	26	0.00
	No	57	17	74	

Chi-square test: P significant at 0.05.

Table 9: Correlation of pre-operative score with the intra-operative score.

Pre-operative score	Intra-operative score		Sensitivity	Specificity	PPV%	NPV%
	Easy	Difficult				
≤8	44	10				
>8	21	25	71%	80%	88	55
Total	65	35				

Pre-operative scores were given based on history, clinical examination, laboratory investigations and imaging findings as per tables 1-3. Scores of 8 or below was considered easy and scores of 9 or above was considered difficult. Taking 8 as the cut off value for pre-operative score, the sensitivity and specificity for predicting the intra-operative outcome was at 71% and 80% respectively. The positive predictive value for easy prediction was 88% and for difficult prediction was 55%.

DISCUSSION

Difficult cholecystectomy

There are no set criteria to define a difficult gallbladder. Singh et al, defined difficult cholecystectomy as (1) dense adhesions at the Calot's triangle (2) contracted and fibrotic gallbladder (3) previous upper abdominal surgery (4) gangrenous gallbladder (5) acutely inflamed gallbladder (6) empyema gallbladder (including Mirrizi's syndrome Type II) and (7) biliary fistula. The cases were analyzed in relation to conversion rate to open surgery and factors affecting conversion.[12] Randhawa et al, defined cholecystectomy as easy or difficult taking into account the duration of surgery, injury to bile duct/artery and bile leak.[13] Nachnani et al included the following operative parameters as the outcome: duration of surgery, bleeding during surgery, access to peritoneal cavity, GB bed dissection, difficult extraction, and conversion to open surgery.[14]

The question is when to convert to open. Lengyel et al, reported that in 49% of the cases conversion was performed without a genuine attempt at laparoscopic dissection. There was minimal or no effort at laparoscopic dissection and less than standard 4 port placement. Their recommendation is that surgeons, whenever possible, should place the standard number of ports and try to identify and elevate the gallbladder before making a decision to convert to open surgery.

Although the operating time for these cases was longer, this was not associated with an increase in overall hospital cost or complication rate. Therefore conversion is only a sign of good surgical judgement after an attempt at laparoscopic dissection is made.[15]

Among the various imaging parameters taken in various studies, gallbladder wall thickness has been consistently associated with technical difficulty of laparoscopic cholecystectomy. In study by Ohio et al, morbidly obese patients with chronic cholecystitis and a thickened gallbladder wall were more likely to undergo conversion. But a few studies did not find any association with pre-operative ultrasound wall thickness and difficult surgery. Baki et al, reported that in patients with solitary large stones inside the gallbladder are associated with significantly longer operative time. A single large stone is more likely to get impacted at the neck or Hartmann's pouch which hinder holding the gallbladder during dissection.[16] Dhanke et al, found presence of pericholecystic fluid as a significant predictor of difficult cholecystectomy.[17] Cwik et al, in their large study identified ultrasound presentations of acute cholecystitis, such as gallbladder wall thickenening >5 mm, pericholecystic exudates, abscess adjacent to gallbladder, intense gallbladder wall deformation, and difficulty in identifying anatomical structures, as significant predictive factors of conversion to open cholecystectomy. Ultrasound presentation of at least two of the above signs resulted in a conversion rate of >70%.[18]

Present study consists of 100 patients who are known case of acute cholecystitis admitted for surgery. The incidence of cholelithiasis in the present study was most common in the age group of 30 to 50. Randhawa et al in their study also reported highest incidence in the age group between 30 and 50 and making their total number comparable to the present study. 65% (65/100) were females and 35% (35/100) were males in the current study. Oymaci et al had incidence of 68% of females which was comparable to this study. Women are affected most commonly and at earlier age than men. This is probably because of the hormone estrogen influence causing gallbladder stasis, pregnancy and multiparity of female patients.[19]

Majority of the patients in the study were in the normal weight category which is in contrast to study by Gabriel et al who reported that most of the patients (58%) had normal BMI and 42% had abnormal BMI which included 38% in the overweight group and 4% in the obese group.[20] In the study population with associated medical illness of which hypertension was the commonest-35/100 (35%). Similarly Randhawa et al found that 22.6% had associated medical illness of which hypertension was the most common.

There were a total of 25 patients (25%) with diabetes in the present study. There is no proof that diabetic patients have more gallstones or that gallstones is a risk factor for diabetes. However, the prevalence of gallstones among diabetic patients is 17.5%.[21]

The most common complaint was upper abdominal pain in 80 patients (80%) followed by 15 patients had fever (15%). In the study by Gabriel et al, there were 209 patients with complaints of biliary colic (89%) and 102 patients had right upper quadrant pain at the time of presentation.

In the present study, altered LFT showed poor PPV and reasonably good sensitivity. Hyperbilirubinemia had a PPV of 28.1%, elevated liver enzymes had PPV of 24% and sensitivity of 76%. The low positive predictive value is probably due to the false positives as in viral hepatitis or drug induced hepatitis and the high sensitivity indicates the inflammation of the common bile duct associated with stones.

Majority of the patients had multiple stones (75%) and small (<1 cm) sized stones (60%). In the current study, there was significant correlation between common bile duct diameter (>8 mm) and intra-operative difficulty with p=0.01. Gallbladder wall thickness was an important factor. In the present study, 43/100 patients (42.5%) had wall thickness >3 mm. Nachnani et al found similar proportion of patients, (32/105, 30.5%) respectively, with thickened gallbladder wall. This study has 20 patients (20%) with presence of pericholecystic fluid.

In this study, of the 76 laparoscopic cholecystectomies, 69 were completed successfully by laparoscopic method and 7 cases required conversion to open method. The conversion rate of the current study was 7%. The accepted conversion rate worldwide is around 2% to 15%.[26] The reasons for conversion are frozen calot's (2), adhesions (2), gall bladder perforation (1), inflamed gangrenous gallbladder (1) and equipment failure (1).

Adhesions to the gallbladder were noted in 62% of the patients, which was graded as flimsy in 34 patients and dense in 28 patients. 38 patients (38%) had no adhesions. Intra-operative bile leak from the gallbladder or spillage of stone into the peritoneal cavity were noted in 23 patients (23%). Difficult identification of Calot's triangle intra-operatively was encountered in 20 patients (20%). Difficulty in gallbladder dissection from liver bed was seen in 15 patients (15%). 4 patients had continuous oozing from liver surface during gallbladder bed dissection prolonging the dissection time. However, both the cases were completed laparoscopically and bleeding was arrested by compression. 10 patients (10%) required subtotal cholecystectomy and 17 patients (17%) required fundus first technique. This was employed when there was frozen Calot's so as to prevent injury to common bile duct and ensure patient safety.

The study is comparable with other studies in terms of sensitivity, specificity, positive predictive value for easy and difficult prediction. As the score increases, the

difficulty level increases. Kama et al, reported that patients who required conversion had significantly higher scores (mean=6.9) and increasing scores resulted with significant increases in conversion rates and probabilities ($p<0.001$).[22-24.]

Limitations

Sample size was a limiting factor as the duration of the study was limited to 12 months. This study is from a single-centre and hence, a better application of the results can be made if the study was a multi-centre one encompassing a wider spectrum of the population. By choosing one modality of imaging, uniformity among the radiological parameters can be achieved. Though ultrasonography is the basic standard it is operator dependent.

CONCLUSION

Difficult dissection in cholecystectomy can be predicted using pre-operative parameters. Among demographic variables, increasing age (>50 years) and male gender was significantly associated with difficult surgery. Clinically, patients presenting with pain at the time of admission or patients with multiple attacks in the past had a higher proportion of difficult cholecystectomy. Patients with fever, positive Murphy's tenderness and leucocytosis indicating inflammation of the gallbladder had higher risk for difficult surgery**.** Among the radiological parameters, irrespective of the number and size of the stones, gallbladder wall thickness >3mm, and presence of pericholecystic fluid had strong association with difficult cholecystectomy. Surgery performed within 72 hrs had good prognosis and few intra op complications due to good place of dissection due to inflammation.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Brett M, Barker DJ. The world distribution of gallstones. Int J Epidemiol. 1976;5:335.
2. Ransohoff D, Gracie W, Wolfenson L, Neuhauser D. Prophylactic cholecystectomy or expectant management for silent gallstones: A decision analysis to assess survival. Ann Intern Med. 1983;99:199–204.
3. Syed Amjad Ali Rizvi, Syed Asmat Ali, Sadik Akhtar, Shehbaz Faridi, Mehtab Ahmad. Forecast of difficult Laparoscopic cholecystectomy by Sonography: An added advantage. Biomed Res. 2012;23(3): 425-9.
4. Khuroo MS, Mahajan R, Zargar SA, Javid G, Sapru S. Prevalence of biliary tract disease in India: A sonographic study in adult population in Kashmir. Gut. 1989;30:201-5.
5. Tendon R. Disease of gallbladder and biliary tract. In: Shah SN, ed. API textbook of medicine. 7th edition. Association of Physicians of India: Mumbai; 2003: 642-644.
6. Legorreta AP, Silber JH, Costantino GN, Kobylinski RW, Zatz SL. Increased cholecystectomy rate after the introduction of laparoscopic cholecystectomy. JAMA. 1993;270(12):1429-32.
7. Alponat A, Kum CK, Koh BC, Rajnakova A, Goh PMY. Predictive Factors for Conversion of Laparoscopic Cholecystectomy. World Journal of Surgery. 1997;21(6):629-33.
8. Rosen M, Brody F, Ponsky J. Predictive factors for conversion of laparoscopic cholecystectomy. Am J Surg. 2002;184(3):254-8.
9. Low JK, Barrow P, Owera A, Ammori BJ. Timing of laparoscopic cholecystectomy for acute cholecystitis: evidence to support a proposal for an early interval surgery. Am Surg. 2007;73(11):1188-92.
10. Ohta M, Iwashita Y, Yada K, Ogawa T, Kai S. Operative Timing of Laparoscopic Cholecystectomy for Acute Cholecystitis in a Japanese Institute. JSLS. 2012;16:65–70.
11. Ambe P, Weber SA, Christ H, Wassenberg D. Cholecystectomy for acute cholecystitis. How time-critical are the so called "golden 72 hours"? Or better "golden 24 hours" and "silver 25-72 hour"? A case control study. World J Emerg Surg. 2014;9:6-11.
12. Singh K, Ohri A. Laparoscopic cholecystectomy – is there a need to convert? J Minim Access Surg. 2005;1(2):59–62.
13. Randhawa JS, Pujahari AK. Pre-operative prediction of difficult lap chole: A scoring method. Indian J Surg. 2009;71:198–201.
14. Nachnani J, Supe A. Pre-operative prediction of difficult laparoscopic cholecystectomy using clinical and ultrasonographic parameters. Indian J. Gastroenterol. 2005;24:16-8.
15. Lengyel BI, Azagury D, Varban O, Panizales MT, Steinberg J, Brooks DC, et al. Laparoscopic cholecystectomy after a quarter century: why do we still convert? Surg Endosc. 2012;26(2):508–13.
16. Baki NAA, Motawei MA, Soliman KE, Farouk AM. Pre-Operative Prediction of Difficult Laparoscopic Cholecystectomy Using Clinical and Ultrasonographic Parameters. JMRI. 2006;27(2):102-7.
17. Dhanke PS, Ugane SP. Factors predicting difficult laparoscopic cholecystectomy: A single institution experience. Int J Stud Res. 2014;4(1):3-7.
18. C´wik G, Skoczylas T, ´lak-Najs JW, Wallner G. The value of percutaneous ultrasound in predicting conversion from laparoscopic to open cholecystectomy due to acute cholecystitis. Surg Endosc. 2013;27:2561–8.
19. Oymaci E, Ucar AD, Aydogan S, Sari E, Erkan N, Yildirim M. Evaluation of affecting factors for

conversion to open cholecystectomy in acute cholecystitis. Prz Gastroenterol. 2014;9(6):336–41.
20. Gabriel R, Kumar S, Shrestha A. Evaluation of predictive factors for conversion of laparoscopic cholecystectomy. Kathmandu Univ Med J. 2009;7(25): 26-30.
21. Feldman M, Feldman M Jr. Incidence of cholelithiasis, cholesterosis and liver disease in diabetes mellitus: Autopsy study. Diabetes. 1954;23:305-12.
22. Kama NA, Kologlu M, Doganay M, Reis E, Atli M, Dolapci M. A risk score for conversion from laparoscopic to open cholecystectomy. Am J Surg. 2001;181(6):520-5.
23. Gupta A, Agarwal PN, Kant R, Malik V: Evaluation of Fundus-First Laparoscopic Cholecystectomy. JSLS. 2004;8(3):255-8.
24. Vivek MAKM, Augustine AJ, Rao R. A comprehensive predictive scoring method for difficult laparoscopic cholecystectomy. J Minim Access Surg. 2014;10(2):62–7.

Cite this article as: Hari BMA, Hareesh GSR, Reddipogu P, Nannam VR. A prospective study on emergency laparoscopic or open cholecystectomy in acute cholecystitis in a tertiary care hospital. Int Surg J 2019;6:2525-32.