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A Two-Year Prospective Study of Predictive Factors Determining the Difficult Laparoscopic Cholecystectomy

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I. Introduction

- Gallstones are present in 10 to 15% of the general population and asymptomatic in the majority (>80%).
- In India it is estimated to be around 4%.
- The advantages of laparoscopic cholecystectomy over open cholecystectomy are
  - earlier return to bowel functions,
  - less postoperative pain,
  - improved cosmosis,
  - shorter length of hospital stay,
  - earlier return to full activity,
  - and decreased overall cost,
  - decreased infection.[3,4,5]
- The rate of conversion from laparoscopic cholecystectomy to open cholecystectomy is 5 to 10%.
- Hence it is necessary to study the predictive factors for difficult laparoscopic cholecystectomy. Therefore, this study was undertaken.

AIMS AND OBJECTIVES OF THE STUDY

- To determine the predictive factors for difficult laparoscopic cholecystectomy.
- To study the clinical presentation of cholelithiasis.
- To study the surgical mode of management.
- To study the complications of laparoscopic cholecystectomy.

INCLUSION CRITERIA:

- The patients aged between 16 and 60 years presenting with symptoms and signs of Cholelithiasis/ Cholecystitis and diagnosed by USG examination in surgical ward of GGH, Kakinada.

EXCLUSION CRITERIA:

- Patients below 15 years of age.
- Patients with CBD calculus, raised ALP, dilated CBD, where CBD exploration was needed.•
- Patients with features of obstructive jaundice.
- Patients refusing surgery.
- Patients not willing for laparoscopic cholecystectomy.

II. Methodology

- The materials for the present study comprising of 60 cases admitted to GGH, Kakinada from JUNE 2017 to MAY 2018 a period of 24 months.
- The method of the study included screening of patients who presented with upper abdominal pain, or vomiting or dyspepsia or jaundice.
- Ultrasound abdomen was done in all patients.
- LFT and PT-INR were done in all patients.
- The patients confirmed by USG examination were evaluated with following factors:
  - age,
  - sex,
  - h/o previous hospitalization,
  - BMI wt. (kg)/ ht. (mt^2),

- abdominal scar-supraumbilical or infraumbilical,
- palpable gall bladder,
- sonographic findings- wall thickness, Pericholecystic collection, impacted stone.
- All the patients were received symptomatic treatment and vitamin K for 3 days preoperatively. Following evaluation, the patient will be subjected to laparoscopic cholecystectomy
- time taken,
- biliary / stone spillage,
- injury to duct/ artery
- conversion were noted.

III. Discussion

AGE DISTRIBUTION

• In the present series the youngest patient was 18 years of age and the oldest was 70 years of age. Majority of the patients in the present series were in the age group of 31-40 years of age.

TABLE 10: Showing the age wise distribution of cholelithiasis

AGE IN YEARS	HERMAN'S SERIES	%	HANIF SERIES	%	PRESENT SERIES	%
0-10	0	0%	0	0	0	0
11-20	25	1.60%	1	0.4%	2	3.3%
21-30	92	5.90%	8	3.2%	14	23.4%
31-40	226	14.60%	58	23.2%	18	30%
41-50	325	21%	150	60%	15	25%
51-60	473	30.60%	33	13.2%	10	16.7%
>61	352	23.57%	0	0	1	1.6%

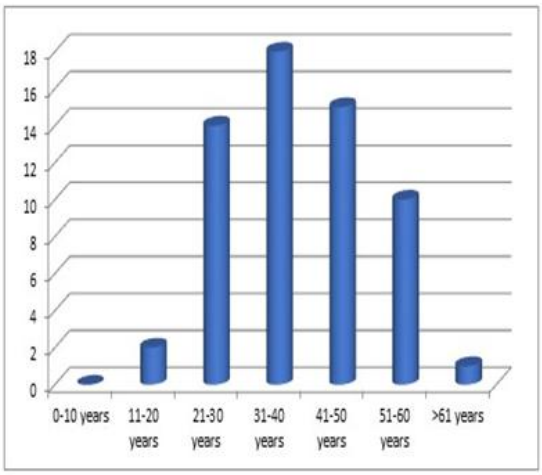

FIGURE 17: Graph showing age wise distribution of cholelithiasis

SEX DISTRIBUTION

• Out of 60 patients 40 were females and 20 were male patients. The male:
female ratio is 1:2.

TABLE 11: Showing sex wise distribution of cholelithiasis

SEX	BATTACHARY'S SERIES	%	HANIF SERIES	%	PRESENT SERIES	%
MALE	26	28.6%	90	36%	20	33.3%
FEMALE	65	71.4%	160	64%	40	66.7%

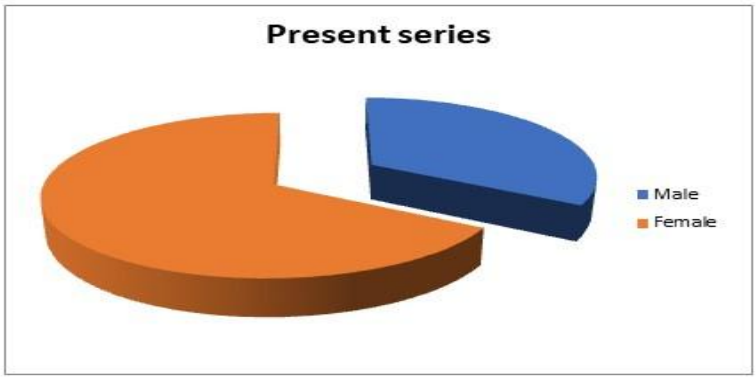

FIGURE 18: Pie diagram showing sex wise distribution of cholelithiasis

PRESENTING SYMPTOMS

• Pain was the predominant symptom seen in all 60 patients. Vomiting was present in 40% (19) of the patients with pain. 1 patient had jaundice and 22% had dyspepsia.

TABLE 12: Showing presenting symptoms

SYMPTOMS	GANEY'S	%	ALOK SHARMA	%	PRESENT	%
PAIN	987	95%	58	100%	60	100%
VOMITING	576	55.6%	48	82.8%	24	40%
JAUNDICE	101	10%	3	5.17%	2	3.5%
DYSPEPSIA	222	21%	5	8.62%	13	22%
FEVER	92	9%	NA	0%	7	12%

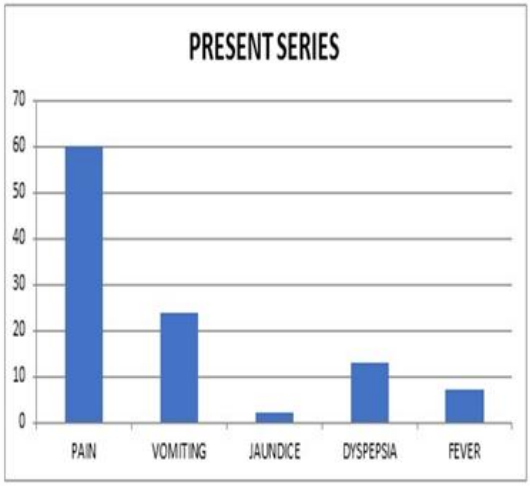

FIGURE 19: Graph showing presenting symptoms

PRESENTING SIGNS

• Tenderness in right hypochodrium was present in 40(80%) patients, guarding in 11 patients and a mass was palpable in 2 patients.

TABLE 13: Showing presenting signs

SIGNS	HADFIELD SERIES (%)	PRESENT SERIES	%
TENDERNES IN RIGHT HYPOCHONDRIUM	65.5%	40	67%
GUARDING	18.7%	11	18.5%
MASS	7%	2	3.5%

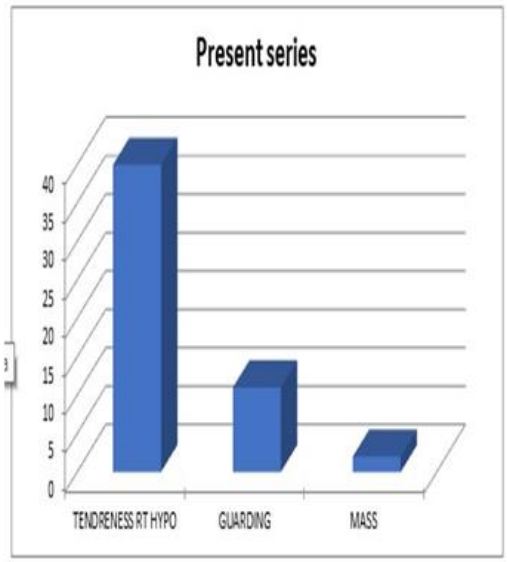

FIGURE 20: Graph showing presenting signs

CORRELATION WITH BLOOD GROUP

• Of the 60 patients 27 had of blood group 'O', 18 had of blood group 'B', 12 had of blood group 'A' and 3 had blood group 'AB'.

TABLE 14: Showing correlation with blood group

Blood Group	North American Surgeon	%	Present	%
A	73	36.5%	12	20.0%
B	40	20.0%	18	30.0%
AB	27	13.5%	3	5.0%
O	60	30.0%	27	45.0%

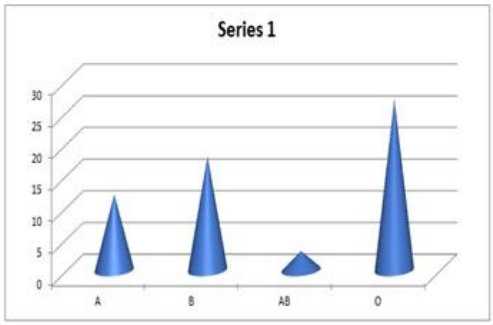

FIGURE 21: Graph showing correlation with blood group

ULTRASONOGRAPHY

• All the 60 patients had stones in gallbladder, 20 patients had wall thickening and 2 had pericholecystic collection.37 patients had multiple calculi, 15 had solitary calculi and 8 had solitary impacted calculi.

TABLE 15: Showing ultrasonography findings

ULTRASONOGRAPHY	NO OF CASES
Multiple calculi	37
Solitary calculi	15
Solitary impacted calculi	8
Wall thickening	20
Pericholecystic collection	2

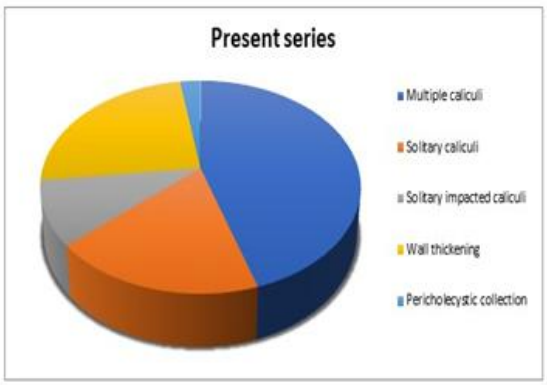

FIGURE 22: Pie chart showing ultrasonography findings

CORRELATION OF PRE-OP SCORE AND THE OUTCOME

• Out of the 5 patients in whom laparoscopy was converted to open, 3 had dilated CBD and 2 had aberrant anatomy. Therefore these 5 patients were excluded from the study. One out the 3 patients with dilated CBD required CBD exploration with T tube insertion.

TABLE 16: Showing correlation of pre-op score and the outcome

PRE-OP	EASY	DIFFICULT	VERY DIFFICULT	TOTAL
0-5	46	2	2	50
6-10	0	7	2	9
11-15	0	0	1	1
TOTAL	36	9	5	60

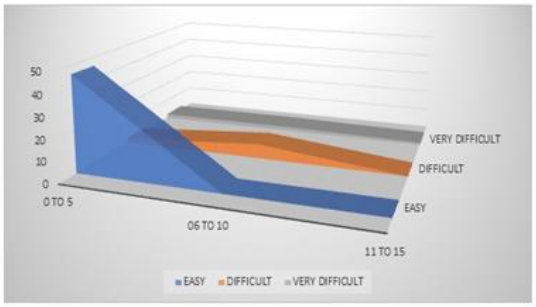

FIGURE 23: Graph showing correlation of preop score and the outcome

ANALYSIS OF PER-OP OUTCOME WITH THE RISK FACTORS

- **D-Difficult, E-Easy, PS-Present study, R-Journal with reference to no33 bibliography, NP-Non-palpable, N-Normal, P Value-Predictive value.**
- As per the R[32] study prior hospitalization, BMI >27.5, Palpable GB, Thick GB wall on USG were significant predictors of difficult laparoscopic cholecystectomy.
- **In the present study prior hospitalization (for ERCP and abdominal surgeries), BMI >27.5, Palpable GB, Thick GB wall, impacted stone and Pericholecysticcollection were significant predictors of difficult laparoscopic cholecystectomy.**
- Fischer exact test was used to find the significant association of findings of preoperative score with peroperative outcome.

TABLE 17: Showing the analysis of pre-operative outcome with the risk factors

RISK FACTORS	LEVEL	PER-OP OUTCOME		P VALUE	
		D-NO (%)	E-NO (%)	PS	R[33]
AGE	<= 50 Y	8	29		
	>50 Y	1	7	1.000	0.937
SEX	FEMALE	7	24		
	MALE	2	12	0.6976	0.736
BMI wt(kg)/ht(m²)	<=25	1	27		
	25.1-27.5	1	8	0.4324	0.227
	>27.5	7	1	**<0.0001**	**0.010**
PREVIOUS SURG.	Nil	7	24		
	yes	2	13	0.6959	0.882
HOSPITALIZATION	Nil	5	36		
	Yes	4	0	**0.0008**	**<0.001**
GB PALPABLE	NP	7	36		
	Yes	2	0	**0.0364**	**0.022**
USG- WALL THICK	N	1	30		
	Yes	8	6	**0.0001**	**0.038**
IMPACTED STONE	Nil	5	34		
	Yes	4	2	**0.0103**	0.190
P/C COLLECTION	Nil	6	34		
	Yes	3	2	**0.0471**	0.999

POST-OPERATIVE COMPLICATION

- Only 2 patients had infection of the umbilical port site which required about 2 to 3 dressing.

TABLE 18: Showing postoperative complications

POST OPERATIVE COMPLICATION	NO. OF CASES
Wound infection	2
Haemorrhage	0
Retained stone	0
Bile leak	0
Prolonged ileus	0

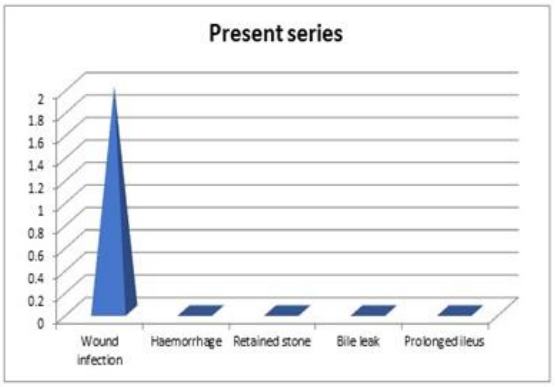

FIGURE 24: Graph showing post-operative complications

HISTOPATHOLOGICAL EXAMINATION

- 57 cases were reported as chronic cholecystitis, while one was reported as acute cholecystitis. No case of malignancy of the GB was detected.

TABLE 19: Showing histopathological examination

HISTOPATHOLOGIC EXAMINATION	NO. OF CASES
Chronic cholecystitis	57
Acute cholecystitis	3
Ruptured gall bladder	0
Gangrenous gall bladder	0

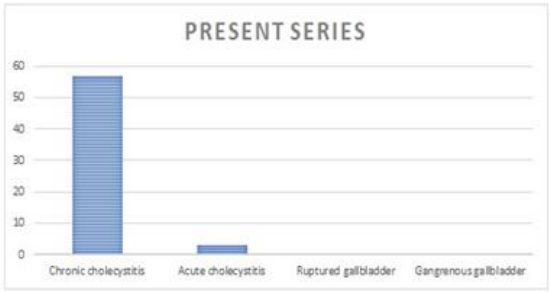

FIGURE 25: Graph showing histopathological examination

EVALUATION OF PREDICTIVE FACTORS FOR DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY:

- The factors included were
  - age,
  - sex,
  - prior H/O hospitalization for acute cholecystitis/ biliary pancreatitis/ ERCP for obstructive jaundice due to CBD calculus,
  - BMI,
  - abdominal scar due to previous surgery,
  - clinically palpable GB, wall thickness,
  - pericholecystic collection,
  - impacted stone.[33]

IV. Conclusions

- The highest incidence of gallstone in present series is in the age group of 30 to 40 years, which is closely followed by 21-30 years and 41-50 years. Where as in Herman's series and Hanif series highest incidence were in the age group of 51-60y and 41-50 y respectively.
- The sex ratio (Female: Male) is 1:2. This clearly shows female preponderance which is same all over the world. Endogenous estrogen and progestin are attributed to this phenomenon.
- The incidence of gall stones was found to be more in patients with blood group O, which differs greatly with The North American Series where the incidence was found to be more in patients with blood group A.
- Pain was the predominant symptom seen in all (100%) the patients. Vomiting was present in 40% of the patients with pain. Dyspepsia was present in 22% of the patients and fever in 12% of them.
- The symptomatology matched well with that of Ganey's series.
- Tenderness in the right hypochondrium was present in 80% of the patients, while guarding and mass were present in 4 and 10% respectively.
- Ultrasound is the most accurate and sensitive investigation for diagnosis of cholelithiasis.
- Of the 60 patients, all had stones in the gall bladder, 20 patients had wall thickening and 2 had peri-cholecystic collection.
- The incidence of CBD stones is 4%. 1 patient had obstructive jaundice for which he had undergone ERCP previously while another patient was detected to have CBD stone pre-operatively.
- In the present study, Prior Hospitalization (for ERCP and abdominal surgeries), BMI > 27.5, Palpable Gall Bladder, Thick GB Wall, Impacted Stone and Peri-Cholecystic Collection were significant predictors of difficult laparoscopic cholecystectomy.
- As per the R[32] study, Prior Hospitalization, BMI > 27.5, Palpable GB, Thick GB Wall were significant predictors of difficult laparoscopic cholecystectomy.
- The positive predictive value for easy prediction was 94.7% and for difficult prediction was 100%.
- The conversion rate from laparoscopic cholecystectomy to open cholecystectomy was 10% which was in accordance with that of the study by Kama et al. [27]
- The incidence of port site infections was 4% and, in both cases, there was biliary spillage.
- The incidence of complications due to bile stone spillage is 2.3% as per the study by T Santhosh Kumar et al. [40]
- Histopathologicalexamination revealed chronic cholecystitis in 98% of cases and acute cholecystitis in 2%.

V. Summary

- Cholelithiasis is the most common biliary pathology. Gall stones are present in10 to 15% of the general population and asymptomatic in the majority of them, of about >80%. Approximately 1-2% of asymptomatic patients will develop symptoms requiring cholecystectomy every year, making it one of the most common operations performed.
- In 1992, The National Institute of Health (NIH) consensus development Conference stated that laparoscopic cholecystectomy "Provides a safe and effective treatment for most patients with symptomatic gallstones".
- In about 5 to 10% of the cases of laparoscopic cholecystectomy, conversion to open cholecystectomy may be needed for safe removal of gallbladder.
- Therefore, it is necessary to analyse the risk factors that predict difficult laparoscopic cholecystectomy.
- The following risk factors were considered- age>50 years, male sex, H/O prior hospitalization for acute cholecystitis/ biliary pancreatitis, ERCP, BMI 25-27.5 and >27.5, abdominal scar, palpable GB, wall thickening, impacted stone, and pericholecystic collection.
- Out of this BMI >27.5, H/O prior hospitalization for acute cholecystitis/acute pancreatitis, ERCP, palpable GB, wall thickening, impacted stone, and pericholecystic collection were significant predictors of difficult laparoscopic cholecystectomy, as per present study.

ANNEXURE-II

SCORING FACTORS[32]

HISTORY			MAX. SCORE
AGE	<50y (0)	>50y (1)	1
SEX	Female (0)	Male (1)	1
H/O HOSPITALIZATION	N (0)	Y (4)	4
CLINICAL			
BMI wt(kg)/ht(m^2)	<25 (0)	25-27.5(1) >27.5 (2)	2
ABDOMINAL SCAR	N (0)	Infra-umbilical (1)\ Supra-umbilical (2)	1
PALPABLE GB	N (0)	Y (1)	1
SONOGRAPHY			
WALL THICKNESS	Thin (0)	Thick >4mm (2)	2
PERICHOLECYSTIC COLLECTION	N (0)	Y (1)	1
IMPACTED STONE	N (0)	Y (1)	1

TOTAL MAXIMUM SCORE - 15

N – NO, Y – YES

H/O - HISTORY OF

ANNEXURE-III

EASY/DIFFICULT CRITERIA[32]

EASY	Time taken <60 min No bile spillage No injury to duct, artery
DIFFICULLT	Time taken 60-120 min Bile/stone spillage Injury to duct No conversion
VERY DIFFICULT	Time taken >120 min Conversion

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