



ORIGINAL RESEARCH PAPER

Surgery

ULTRASONOGRAPHIC PREDICTORS OF DIFFICULT LAPAROSCOPIC CHOLECYSTECTOMY:A PROSPECTIVE STUDY.

KEY WORDS: difficult laparoscopic cholecystectomy, ultrasonographic, predictors.

Mukul Singh

Assistant professor department of general surgery GMC Haldwani (UK).

Abhijeet Saini*

Assistant professor department of general surgery VAMC Shahjahanpur(UP).
*Corresponding Author

ABSTRACT

INTRODUCTION: Preoperative Difficulty estimation helps deciding whether to proceed with a minimally invasive approach, perform an open procedure or make a referral to a more experienced surgeon.

AIM: To determine the ultrasonographic predictive factors for difficult laparoscopic cholecystectomy.

Material and Methods: A total of 100 patients were enrolled to this study.clinical examination and ultrasound study was preformed for all patients.

CONCLUSION: Preoperative prediction of risk factors of difficult laparoscopic cholecystectomy on ultrasonogram is an important point for operative planning and the high risk patients may be informed accordingly.

INTRODUCTION :

Laparoscopic cholecystectomy (LC) has become the gold standard in the treatment of symptomatic gall stones.¹ LC has replaced open cholecystectomy as the therapeutic modality in the treatment of Cholelithiasis.¹ Decreased postoperative pain, earlier oral intake, shorter hospital stay, early resumption of normal activity and improved cosmesis have been well recognized after LC.² A significant reduction in the incidence of wound complications and postoperative ileus has been documented in patients undergoing LC.³ It is important to realize that the need for conversion to laparotomy is neither a failure nor a complication but an attempt to avoid complication and ensure patient safety.⁴ Prediction of a difficult Laparoscopic cholecystectomy would allow the surgeon to discuss the likelihood of conversion with the patient and prepare him/her psychologically.⁵ Another benefit would be to allow more efficient scheduling of the operating lists and ensuring the availability of a more experienced laparoscopic surgeon for the procedure.⁴ Our study is based on the assumption that difficult laparoscopic cholecystectomy can be predicted and our study has been desinged to identify the associated preoperative predictors.

METHODOLOGY:

This was a prospective study conducted in Department of Surgery, Dr. Susheela Tiwari Government Medical College and Associated Government Hospital, Rampur Road Haldwani, Distt. Nainital Uttarakhand, from Nov, 2013 to Sept, 2015. The patients who underwent laparoscopic cholecystectomy were included in this study. Total number of patients is 100 and includes both, admitted either as routine or emergency cases.

The following were the exclusion criteria:

EXCLUSION CRITERIA

- The patients who were taken for open cholecystectomy directly.
- Severe restrictive pulmonary disease (these patients cannot tolerate CO₂ pneumoperitoneum)
- Suspected gall bladder malignancy.
- Patients unfit for general anaesthesia.
- Patients not giving informed written consent

The selected patients were then told about the procedure and written informed consent was taken. Patients were also informed about the possibility of conversion to open cholecystectomy. In this study we have taken ultrasonographic predictors of difficult laparoscopic cholecystectomy.

ULTRASONOGRAPHIC FACTORS

1. Gall bladder wall thickening > 4mm / Edema of Gall bladder wall
2. Pericholecystic fluid.
3. Contracted Gall bladder.
4. Single/multiple gall stones/ location of stones (neck, fundus of

gall bladder).

5. Common bile duct diameter/ evaluation of cystic duct.
6. Common Bile duct stones.
7. Existing comorbid conditions detected on ultrasonography like pancreatitis, cholangitis.
8. Complications like mucocele/emphysematous/gangrenous/fistulous gall bladder
9. Liver cirrhosis.

OBSERVATIONS AND RESULT: The findings of ultrasonographic factors of all patients were co-related with total duration of surgery and intraoperative difficulties encountered during laparoscopic cholecystectomy to find out the predictors of difficult laparoscopic cholecystectomy.

TABLE 1 : AGE DISTRIBUTION

Age group (years)	Total number	Percentage%
<20	4	4%
21-30	14	14%
31-40	20	20%
41-50	30	30%
51-60	18	18%
>60	14	14%
Total	100	100%

Out of 100 patients, 21 (21%) were Males and 79 (79%) were Females.

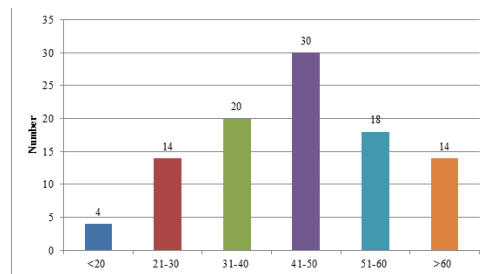


FIG-1 : AGE DISTRIBUTION

TABLE -2 : DISTRIBUTION OF ULTRASONOGRAPHIC FACTORS

Ultrasonographic factors	Total number of patients	Percentage %
Multiple calculus	80	80%
CBD dilated (≥ 6mm)	17	17%
CBD stone	4	4%
GB wall thickness >4mm	22	22%
Pericholecystic fluid	4	4%
Contracted GB	7	7%
Distended GB	47	47%

Liver cirrhosis	4	4%
Mucocele GB	12	12%
Empyema GB	2	2%
Gangrenous GB	1	1%

- Analysis of ultrasonographic factors showed that most frequent finding was multiple calculi 80 (80%) cases
- Next most common finding on ultrasonography was distended GB 47 (47%) cases.
- Patients with Gallbladder wall thickness >4mm were 22 cases (22%).
- Patients with Pericholecystic fluid 4 (4%) cases, Contracted gallbladder 7 (7%) cases and Liver cirrhosis 4 (4%) cases.

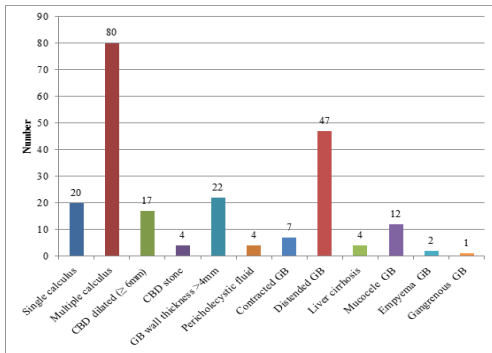


FIGURE-2: DISTRIBUTION OF ULTRASONOGRAPHIC FACTORS

TABLE-3 : DISTRIBUTION OF TOTAL DURATION OF SURGERY

Time (min)	Total number	Male	Female
<30	0	0	0
31-60	73	9	64
61-90	4	0	4
91-120	20	10	10
>120	3	2	1
Conversion	5	4	1

- The above table shows that, 77 cases were completed within 90 minutes, out of which 68 were females and 9 were males. 3 cases took more than 2 hours, out of which 2 cases were males and 1 case was female.

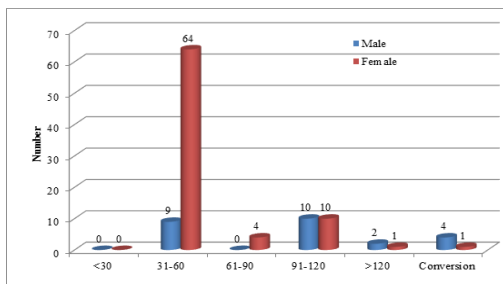


TABLE-3 : DISTRIBUTION OF TOTAL DURATION OF SURGERY

Table-4: Difficulty assessment in relation to ultrasonographic factors

Ultrasonographic factors	Total number of patients	Laparoscopic cholecystectomy		Laparoscopic cholecystectomy	
		Difficult	Easy	Difficult%	Easy%
Single calculus	20	3	17	14.29	80.95
Multiple calculus	80	22	58	27.85	73.42
CBD dilated (≥ 6mm)	17	11	6	64.71	35.29
CBD stone	4	4	0	100.00	0.00
GB wall thickness	22	18	4	81.82	18.18
Pericholecystic fluid	4	4	0	100.00	0.00
Contracted GB	7	7	0	100.00	0.00
Distended GB	47	15	32	31.91	68.09

Liver cirrhosis	4	4	0	100.00	0.00
Mucocele	12	6	6	50.00	50.00
Empyema	2	2	0	100.00	0.00
Gangrenous	1	1	0	100.00	0.00

- Out of 80 cases with multiple calculi on ultrasonography 22 cases (27.5% of laparoscopic cholecystectomy was difficult, 15 (31.9%) cases with distended GB out of 47 cases of laparoscopic cholecystectomy were difficult.
- In patients with gallbladder wall thickness >4mm (22 cases), 77.3% (17 cases) of laparoscopic cholecystectomy were difficult.
- In patients with Pericholecystic fluid (4 cases), contracted gallbladder (7 cases) and Liver cirrhosis (4 cases), all laparoscopic cholecystectomies were difficult.

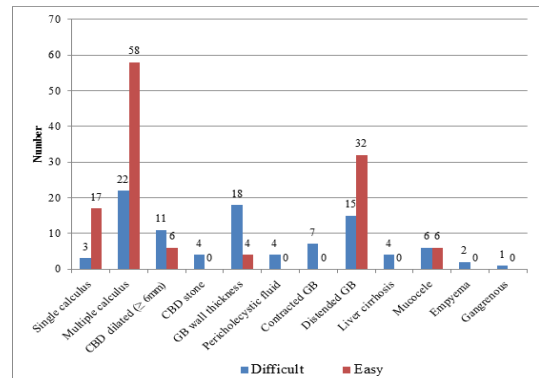


FIGURE-4: DIFFICULTY ASSESSMENT IN RELATION TO ULTRASONOGRAPHIC FACTORS

TABLE-5: STATISTICAL ANALYSIS OF ULTRASONOGRAPHIC FACTORS

Ultrasonographic factors	P value	Factors significant
Single calculus	0.097	NS
Multiple calculus	0.002	*
CBD dilated (≥ 6mm)	0.011	*
CBD stone	0.76	NS
GB wall thickness	0.001	*
Pericholecystic fluid	0.34	NS
Contracted GB	0.42	NS
Distended GB	0.018	*
Liver cirrhosis	0.62	NS

NS = Non significant, * = Significant

DISCUSSION :

This study was done to find out the predictors of difficult laparoscopic cholecystectomy by analysis of ultrasonographic factors. The statistically significant factors in our study, which can predict difficult laparoscopic cholecystectomy, were:

- Gallbladder wall thickness >4mm (n=22; p value=0.001)
- Dilated CBD (n=17; p value=0.011)
- Distended GB (n=47; p value=0.018)
- Multiple stones in GB (n=80 p value=0.002)

GALLBLADDER WALL THICKNESS

In our study gallbladder wall thickness >4mm was seen in 22 patients out of which 18 laparoscopic cholecystectomies were difficult. So, it is statistically highly significant predictor for difficult laparoscopic cholecystectomy (p value=0.001).

Fried et al reported that, thickened gallbladder wall was significant predictor of conversion of Laparoscopic to open cholecystectomy.⁽⁶⁾

ACUTE CHOLECYSTITIS

According to Rattner DW et al the changes that occur with acute cholecystitis are edema, hypervascularity, venous engorgement and gallbladder distention. Within 72 hours of symptoms the

tissue planes are edematous and inflamed but are easier to dissect, having no adhesions at all. But after 72 hours, the tissue becomes more friable and becomes dangerous and risky to dissect.⁽⁷⁾

In our study also 4 patients presented with acute cholecystitis and in all of them laparoscopic cholecystectomy was difficult. This may be because all of them presented after 72 hours of onset of symptoms. 2 patients had empyema of gallbladder but both of them were completed successfully with laparoscopic cholecystectomy.

MULTIPLE GALLBLADDER CALCULI

In our study also multiple GB calculi (p value=0.002) is statistically significant predictor for difficult laparoscopic cholecystectomy. Among 80 patients who were having multiple calculi, 22 cases turned out to be difficult.

According to Y K S Vishwanath retrieval of gall bladder through the port site opening is technically difficult and challenging when it is packed with multiple calculi.⁽⁸⁾

DISTENDED GALLBLADDER

In our study among 47 patients who were having distended gall bladder 15 cases turned out to be difficult which is statistically significant. (p value=0.018).

Daradekh S also concluded that gallbladder size was a significant predictor of the variation in overall difficulty score.⁽⁹⁾

PERICHOLECYSTIC FLUID

In our study pericholecystic fluid on sonography was seen in 4 patients and in all of them laparoscopic cholecystectomy was difficult yet it is statistically insignificant factor in predicting difficult laparoscopic cholecystectomy (p value=0.34).

Hans –peter Dinkel et al reported that on sonography pericholecystic fluid is most specific indicator of technical difficulties during laparoscopic cholecystectomy⁽¹⁰⁾

CONTRACTED GALLBLADDER

In our study we observed that laparoscopic cholecystectomy was difficult in all 7 patients with contracted gallbladder. Though statistically insignificant, may be because of small number of cases, contracted gallbladder with thick walled gallbladder is strong predictor of difficult laparoscopic cholecystectomy (p value 0.001).

Lal P et al reported that contracted gallbladder on ultrasonography was a predictor of difficult laparoscopic cholecystectomy⁽¹¹⁾

DILATED COMMON BILE DUCT AND COMMON BILE DUCT STONES

In our study, dilated common bile duct >6 mm is statistically significant predictor for difficult laparoscopic cholecystectomy (p value=0.011) Common bile duct was dilated in 17 patients out of which 11 cases turned out to be difficult. Presence of common bile duct stones is statistically insignificant predictor of laparoscopic cholecystectomy. (n=4, p value=0.76).

Jansen S concluded that common bile duct diameter wider than 6mm was found to increase significantly the risk of conversion of laparoscopic to open cholecystectomy.⁽¹²⁾

CONCLUSION

From the study we conclude that ultrasonographic parameters can help to predict difficult laparoscopic cholecystectomy in majority of the cases. These predictors can help the surgeon to get an idea of potential difficulty that he can face in that particular patient. On the basis of predictors, one can plan whether surgical laparoscopic trainee should do a particular case in learning phase or not.

On the basis of these predictors we can also know the approximate total time taken for surgery, so that operation theatre timings can be better planned in major institutions where time factor is very important. The best way to avoid complication is to anticipate it beforehand and take precautions accordingly. This will help surgeon to select patients for laparoscopic cholecystectomy.

REFERENCES:

1. Palanivelu C, Laparoscopic Cholecystectomy. In: Parthasarathi R editor. Art of Laparoscopic Surgery- Textbook and Atlas. 1st ed. India: Jaya Publications;2005. P.555-83.
2. Udwardia TE. Laparoscopic cholecystectomy. In: Udwardia TE, editor. Laparoscopic surgery in Developing Countries. 1st ed. New Delhi: Jaypee Brothers;1997 p. 84-6.
3. A ntonio B Francis G, Stalpart Ven Der Weil. Carl Langenbech and the first cholecystectomy. Am J Surg 1976;132:81-82.
4. Hunter JG, TrusT, Laparoscopic cholecystectomy.In: Nyhus LM, Baker RJ, Fischer JE editors. Mastery of surgery. 3rd ed. Boston: Little Brown and company 1997:p.1098.
5. Ohri A, Singh K. Difficult laparoscopic cholecystectomy: A large series from North India. 2006;68(4):205-08.
6. Fried GM, Barkun JS, Sigman HH, Lawrence J, Clas D, Garzon J et al. Factors determining conversion to laparotomy in patients undergoing laparoscopic cholecystectomy. Am J Surg 1994; 167:35-41.
7. Rattner DW, Ferguson C, Warshaw AL. Factors associated with successful laparoscopic cholecystectomy for acute cholecystitis. Ann Surg. 1993; 217(3):233-6.
8. Y.K.S Vishwanath, K.S. Wynne. Use of fistula director to enlarge the port site opening to retrieve a stone packed bulky gallbladder during laparoscopic cholecystectomy: A simple and safe technique. J.R Coll. Surg Edinb. 1999;44:179-80.
9. Daradekh S. Laparoscopic cholecystectomy: what are the factors determining difficulty? Hepatogastroenterology 2001; 48(37):76-8.
10. Dinkel HP et al. Sonography for selecting candidates for laparoscopic cholecystectomy: A Prospective study. AJR 2000; 174: 1433-39.
11. Lal P, Agarwal PN, Malik VK, Chakarvarti AL. A difficult laparoscopic cholecystectomy that requires conversion to open procedure can be predicted by preoperative ultrasonography. JSL 2002;6(1):59-63.
12. Jansen S, Jorgensen J, Caplehorn J et al. Preoperative ultrasonography to predict conversion in laparoscopic cholecystectomy. Surg-laparosc-endosc. 1997;7(2):121-23.