Analysis of Causes of Difficult Laparoscopic Cholecystectomy - A Retrospective Study

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Abstract: <u>Background</u>: Commonly performed and gold standard surgical procedure for the treatment of gall stones is laparoscopic cholecystectomy. Laparoscopic cholecystectomy is associated with low incidence of morbidity and mortality. But surgeons have encountered difficulties while doing laparoscopic cholecystectomy. Prediction of risk factors is needed to assess the intraoperative difficulties. <u>Methodology</u>: Patients who underwent laparoscopic cholecystectomy for cholelithiasis in Coimbatore medical college and hospital was retrospectively analysed and grouped into easy and difficult cases based on time taken for surgery, bile or stone spillage, injury to cystic duct or cystic artery, conversion to laparoscopic cholecystectomy. parameters like gallbladder wall thickness, presence of pericholecystic fluid collection, fibrosed gall bladder and adhesions in calots triangle were compared and statistical analysis done. <u>Results</u>: Thickened gall bladder wall, presence of pericholecystic fluid, fibrosed gall bladder and adhesions in calots triangle were found to be statistically significant predicting difficult laparoscopic cholecystectomy. <u>Conclusion</u>: Eventhough Laparoscopic cholecystectomy is one of the commonly performed surgical procedure. It should not be underestimated since vascular and biliary duct injuries associated with it increases the morbidity and care costs, and often lead to litigations. Therefore, identifying risk factors for difficult laparoscopic cholecystectomy.

Keywords: laparoscopic cholecystectomy, difficult, risk factor

1. Introduction

Laparoscopic cholecystectomy is the gold standard treatment for cholelithiasis. It is one of the most commonly performed surgery by general surgeons. Advantages of laparoscopic cholecystectomy are shorter hospital stay, early return to work, early return of bowel function and less postoperative pain. The outcome of laparoscopic cholecystectomy could range from partial cholecystectomy to conversion to an open cholecystectomy, depending on the challenges encountered during the treatment. Surgeons can plan the operation time and team appropriately if they receive an indication prior to surgery. Patients who are expected to be at high risk should be admitted for longer periods of time and receive more thorough postoperative care. Our goal was to evaluate the various variables in cholelithiasis patients that predicted a challenging laparoscopic cholecystectomy.

Aims and Objectives

- To determine the risk factors for difficult laparoscopic cholecystectomy
- Reduce complications associated with laparoscopic cholecystectomy
- Prior counselling to patients having significant risk factors for difficult laparoscopic cholecystectomy

2. Materials and Methods

Study Design: retrospective study of symptomatic gall bladder stone patients who underwent laparoscopic cholecystectomy

Study Population: Patients who underwent laparoscopic cholecystectomy for cholelithiasis in Department of General Surgery in Coimbatore Medical College Hospital.

Sample Size: 100 Patients

Inclusion Criteria:

- Patients with cholelithiasis managed by laparoscopic cholecystectomy
- Patients aged 18 years to 50 years

Exclusion Criteria:

- Age less than 18 years and above 50 years
- Patient who underwent laparoscopic cholecystectomy for causes other than gall stone disease
- Equipment failure

Methodology

Patients who underwent laparoscopic cholecystectomy for cholelithiasis in Coimbatore medical college and hospital

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Was retrospectively analysed and grouped into easy and difficult cases

Level of difficulty of surgery assessed based on 1.time taken for surgery

- 2. spillage of bile or stone during surgery
- 2. spinage of one of stone during surgery
- 3.injury to cystic duct or cystic artery
- 4. conversion to open cholecystectomy

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Study Parameters Assessed in Each Group

- 1) Gall bladder wall thickness on ultrasound
- 2) Presence of pericholecystic fluid collection on ultrasound
- 3) Presence of fibrosed gall bladder
- 4) Presence of adhesions in calots triangle

3. Observation and Results

1) Comparison of Gall Bladder Wall Thickness:

Table 1:	Comparisor	n of GB	thickness
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GB thickness	Difficult cases	Easy cases
>4mm	16	18
<4mm	14	52
= 10 B	1 0.005	0.05

Chi - squ: 7.13, P - value: 0.007 (<0.05) statistically significant.



In this study out of 30 patients with difficult cholecystectomy 16 had gall bladder wall thickness >4mm in USG. When compare this with easy cases it shows statistically significant value. Indicating >4mm gall bladder thickness is one of the risk factor for difficult lap cholecystectomy.

2) Comparison of Presence of Pericholecystic Fluid Collection

Table 2: Comparison of present of pericystic fluid collection

	Difficult cases	Easy cases
Present	9	3
Absent	21	67

Chi - squ: 13.15, P - value: 0.0002 (<0.05) statistically significant.



Figure 2: Comparison of presence of pericholecystic fluid collection

In this study out of 30 patients with difficult cholecystectomy 9 had pericholecystic fluid collection in ultrasound. When compare this with easy cases it shows statistically significant value. Indicating pericholecystic fluid collection in ultrasound is one of the risk factor for difficult laparoscopic cholecystectomy.

3) Comparison of Fibrosed Gallbladder

Table 3: Comparison of fibrosed gallbladder			
	Difficult cases	Easy cases	
Present	5	3	
Absent	25	67	

Chi - squ: 4.37, P - value: 0.036 (<0.05) statistically significant.



Figure 3: Comparison of fibrosed gallbladder

In this study out of 30 patients with difficult laparoscopic cholecystectomy 5 had fibrosed Gall bladder intra operatively. When compare this with easy cases it shows statistically significant value. Indicating fibrosed Gall bladder is one of the risk factor for difficult laparoscopic cholecystectomy.

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4) Comparison of Adhesion in Calot Triangle:

Table 4: Com	parison of	adhesion i	in calot triangle
	D'.CC	1.	Б

		Difficult cases	Easy cases	
	Present	4	1	
	Absent	26	69	
hi	6.76	\mathbf{P} value 0.012	(<0.05) statisti	0.111

Chi- square 6.26, P - value: 0.012 (<0.05) statistically significant.



Figure 4: Comparison of adhesion in calot triangle

In this study out of 30 patients with difficult cholecystectomy 4 had adhesion in calot triangle intra operatively. When compare this with easy cases it shows statistically significant value. Indicating adhesion in calot triangle is one of the risk factor for difficult lap cholecystectomy.

4. Discussion

Laparoscopic cholecystectomy has been standard treatment for gall stone disease. Laparoscopic cholecystectomy may require conversion to open procedure due to various challenges encountered during the operation. Patient counseling may benefit from preoperative evaluation that uses clinical and radiographic measures to estimate the likelihood of difficulties with Laparoscopic cholecystectomy.

According to our study, gall bladder wall thickness >4 mm is a strong predictor of problematic Laparoscopic cholecystectomy. Gall bladder wall thickness may indicate the difficulty in distinguishing the anatomy during surgery since it is associated with the inflammation or fibrosis that follows prior episodes of Acute cholecystitis. Having a thick gall bladder wall can make it challenging to grasp and manipulate gall bladder. This restricts the amount of anatomical clarity and makes dissection at Calot's triangle and the Gall bladder bed particularly challenging. In addition, Singh and Ohri's study [6] revealed a statistically significant correlation between inflammed Gall bladder and pericholecystic inflammation when it comes to gall bladder gripping difficulties. Analogous findings were observed in many investigations. [5, 8, 9, 12]

In our investigation, we discovered that a strong predictor of difficult laparoscopic cholecystectomy prior to surgery was the pericholecystic fluid collection than gall bladder wall thickness on ultrasonography. An inflammatory field with adhesions is present when pericholecystic fluid is present. It is difficult to dissect the Calot's triangle in such cases. Numerous investigations yielded comparable findings. [8, 10, 5]

We discovered that gallbladder fibrosis is linked to challenging Laparoscopic cholecystectomy, in line with what Stanisic et al. [10] described. Gallstones constantly irritating the gallbladder wall led to recurrent episodes of cholecystitis, which in turn caused the fibrosed gallbladder. Chronic gallbladder inflammation causes adhesions at the triangle of calot and pericholecystic adhesions, which make it difficult to dissect the gallbladder during laparoscopic procedures. This prolonged surgical procedure also increases the risk of bleeding and damage to nearby structures. Thus, another significant predictor that has been mentioned in a few research that are comparable to ours [15, 16] is adhesion at Calot's triangle.

5. Conclusion

Risk factors for Difficult Laparoscopic cholecystectomy include pericholecystic fluid collection, adhesion at Calot's triangle, gallbladder wall thickness (\geq 4 - 5 mm), fibrotic gallbladder. Furthermore, knowing the accurate predictors of challenging Laparoscopic cholecystectomy would be beneficial for developing a suitable treatment strategy and allocating resources in advance of challenging Laparoscopic cholecystectomy. It also allows us to counsel the patient preoperatively regarding risk associated with difficult laparoscopic cholecystectomy and need for conversion to open cholecystectomy. we may also consider performing open cholecystectomy in presence of these risk factors for the benefit of the patient and avoid unnecessary complications.

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