



CORRELATION BETWEEN CRP AND INTRA-OPERATIVE DIFFICULTY IN LAPAROSCOPIC CHOLECYSTECTOMY : A CASE SERIES

General Surgery

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ABSTRACT

A gallstone is a stone formed within the gallbladder from precipitated bile components. The term cholelithiasis may refer to the presence of gallstones or to any disease caused by gallstones. Among American adults the prevalence of cholelithiasis is about 10% while in Western Europe the prevalence ranges from 5.9% to 21.9%. Prevalence rates of 3.2% to 15.6% have been reported from Asia. The standard treatment for symptomatic gallstones is to remove the gallbladder entirely. Laparoscopic cholecystectomy can be the easiest or the most difficult laparoscopic operation. Conversion to open surgery has been a traditional marker of difficult Laparoscopic cholecystectomy and anticipation of conversion can help in consenting patients and preparing them for longer stay and complications. C-reactive protein (CRP) is an acute phase reactant protein secreted by the liver in response to interleukin-6 and other pro-inflammatory cytokines in the context in inflammation, infection, trauma, malignancy and tissue infarction. Its circulating concentration is determined by its rate of synthesis reflecting the intensity of the pathological process, and hence it is a good indicator of severity of inflammation.

KEYWORDS

Cholelithiasis, Laparoscopic Cholecystectomy, CRP

INTRODUCTION :

In the early days of laparoscopic surgery (LC) conversion of LC was influenced by multiple factors like patient characteristics (high body mass index, previous abdominal surgery), anatomical variations of extra-hepatic biliary system and gallbladder (GB) pathology (severe inflammation of GB or common bile duct [CBD]). The studies from early 1990s found significant association of conversion with advancing age, male gender, obesity, previous abdominal surgery, previous endoscopic retrograde cholangiopancreatography (ERCP), and ultrasonographic findings (USS) like GB wall thickness etc.[1,2,3,4,5,6,7] With increasing experience in laparoscopic surgery and advancement of technology many of the difficulties due to anatomical and patient factors could be dealt with laparoscopically.[8] As a result LC was increasingly offered to patients with acute cholecystitis (AC). The subsequent studies showed that GB wall thickness on ultrasound scan was a strong predictor of conversion of LC for AC.[9,10,11,12] These conversions were related to the inflammation of the GB and were more relevant in terms of bile duct injury.

Meta-analysis comparing results of emergency and delayed LC[13] showed no difference in conversion rates[14] implying that once GB is significantly inflamed delaying the surgery doesn't necessarily make the operation easier, or avoids conversion.

C-reactive protein (CRP) is an acute phase reactant protein secreted by the liver in response to interleukin-6 and other pro-inflammatory cytokines in the context in inflammation, infection, trauma, malignancy and tissue infarction.[15,16,17] Its circulating concentration is determined by its rate of synthesis reflecting the intensity of the pathological process, and hence it is a good indicator of severity of inflammation.[18]

In our practice it was observed that many of the patients who had their LC converted to open surgery (either emergency or delayed) had very high CRP at the time of their index admission for GB pathology. Even for those who were not converted, LC were difficult if their preoperative CRP levels were moderately raised.

We hypothesised that high preoperative CRP level due to GB pathology-either biliary colic or AC, is associated with intraoperative difficulties and conversion. Very few studies have looked at CRP as predictor of conversion of LC.[11,12]

METHODS AND MATERIAL:

- 25 patients admitted to Mahatma Gandhi Hospital from July 2022

to August 2022 for Cholelithiasis were studied.

- Of these 25 patients, 18 were female and 7 were male. The mean age of patients was ___ in females and ___ in males.
- Pre-operative CRP was sent and the following factors considered intra-op for assessing the difficulty :
 - Adhesions of Gall bladder with surrounding structures
 - Oedematous gallbladder
 - Peri-cholecystic fluid collection

Cases	Pre-op CRP	Intra-op findings			Need for conversion to open	Simple/Difficult Lap. Chole
		Adhesions	Oedematous GB	Peri-cholecystic fluid		
1	18.1	+	-	-	x	Simple
2	10.9	-	-	-	x	Simple
3	<5	-	-	-	x	Simple
4	9.8	-	-	-	x	Simple
5	5.6	-	-	-	x	Simple
6	246.8	+	+	+	Yes	Difficult
7	<5	-	-	-	x	Simple
8	8.4	-	-	-	x	Simple
9	<5	-	-	-	x	Simple
10	<5	-	-	-	x	Simple
11	26.1	+	+	-	x	Difficult
12	<5	-	-	-	x	Simple
13	<5	-	-	-	x	Simple
14	15.4	-	-	-	x	Simple
15	<5	-	-	-	x	Simple
16	42.1	+	+	-	x	Difficult
17	<5	-	-	-	x	Simple
18	40.3	+	+	-	x	Difficult
19	9.2	-	-	-	x	Simple
20	<5	+	-	-	x	Difficult
21	<5	-	-	-	x	Simple
22	35.9	+	-	+	x	Difficult
23	<5	-	-	-	x	Simple
24	62.5	+	+	+	x	Difficult
25	<5	-	-	-	x	Simple

DISCUSSION:

In this study, the median CRP was significantly higher in the patients converted to open operation (246.8) compared to those with difficult LC (35.31) and laparoscopic group (7.35).

This is one of the first studies to assess value of CRP as a sole predictor of difficult laparoscopic cholecystectomy. Two other studies have

evaluated predictive value of CRP along with other parameters.[11,12] In a study for AC by Schäfer et al., CRP level on admission along with American Society of Anaesthesiology grade, duration of symptoms, age and WBC count on admission were found to be determinants of surgical approach-laparoscopic or open. Another recent study for AC found that CRP level at admission (≥ 3.6 mg/dL) and male gender were strongly related to conversion of emergency LC. Our study looked at peak CRP level during acute admission and showed that, 66.6% patients who had CRP >10 mg/L during their index admission were found to be difficult intra-operatively.

This finding highlights the fact that once severe inflammation sets in, delaying surgery in these patients does not make the operation easier. A recent meta-analysis of using CRP to predict anastomotic leak after colorectal surgery has shown the value of CRP as a negative predictor. The same may be true for predicting difficult laparoscopic cholecystectomy, as suggested in this study (6.25% conversion if CRP ≤ 10).

Factors other than GB pathology leading to difficult laparoscopic cholecystectomy, though important, are not specific for cholecystectomy (e.g., previous surgery, high BMI), can sometimes be unpredictable (e.g., adhesions due to previous surgery), and do not have direct impact on complication specific to cholecystectomy like bile duct injury.

Two studies have been done previously to predict difficult LC rather than predicting conversion.[13,14] Randhawa and Pujahari looked at 15 factors that make the operation difficult, but not necessarily requiring conversion. The other study by Sakuramoto et al. is the only study that looked at “difficult LC due to GB pathology” — a concept similar to ours, but required 41 factors to predict intraoperative difficulties. Authors have graded inflammation of GB in four categories based on histopathological findings and correlated these grades with intraoperative difficulties. These difficulties in turn correlated well with “time taken for GB dissection” than with total operating time and could be predicted preoperatively.

It was previously thought that LC has less morbidity than open cholecystectomy even if it takes longer time. However, Giger et al. in their analysis of 22,953 patients from Swiss database have shown that risk of complications of LC is increased with conversion as well as with longer operating time (for, e.g., difficult LC). The authors claim that addition of each 30 min duration increases chances of both local and systemic postoperative complications. This finding demonstrates why predicting difficult LC is as important as predicting conversion. This study and another one by Alponat et al. have shown experience of surgeon as predictor of conversion. It is possible that total number of difficult LC and conversions may be constant for given population and proportion of conversions may reduce with increasing experience of a surgeon.

Due to retrospective nature of this study the investigated variables have been limited to objective measures such as laboratory results, radiological findings and preoperative complication of gallstone disease (pancreatitis and CBD stones). We have not incorporated other important variables like physical examination due to subjective nature. In previous studies, USS diagnosed wall thickness is shown to be an important predictor of conversion particularly for emergency cholecystectomy.

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