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A STUDY OF VARIOUS FACTORS ASSOCIATED WITH LAPAROSCOPIC CHOLECYSTECTOMY FOR ACUTE CHOLECYSTITIS IN A TERTIARY CARE HOSPITAL

General Surgery

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ABSTRACT

Objective: To determine which preoperative data correlated with successful completion of laparoscopic cholecystectomy in patients with acute cholecystitis. **Result:** Twenty of 281 laparoscopic cholecystectomies were performed for acute cholecystitis; 7/20 patients with acute cholecystitis required conversion to open cholecystectomy compared with 6/281 patients undergoing elective surgery for chronic cholecystitis. In patients with acute cholecystitis, the interval from admission to cholecystectomy in successful cases was 0.6 days vs. 5 days in cases requiring conversion to open cholecystectomy ($p = 0.01$). Cases requiring conversion to open cholecystectomy also had higher WBC (14.0 vs. 9.0, $p < 0.05$), alkaline phosphatase (206 vs. 81, $p < 0.02$) and APACHE II scores (10.6 vs. 5.1, $p < 0.05$).Ultrasonographic findings such as gallbladder distension, wall thickness, and pericholecystic fluid did not correlate with laparoscopic cholecystectomy success Patients converted from laparoscopic to open cholecystectomy required more time in the operating room (120 min vs. 87 min, $p < 0.01$) and more days in hospital after termination (6 vs. 2, $p < 0.001$). **Conclusions:** Laparoscopic cholecystectomy for acute cholecystectomy should be performed immediately after the diagnosis is made, because delaying the operation allows the inflammation to become more intense, thereby increasing the technical difficulty of laparoscopic cholecystectomy.

KEYWORDS

Cholecystitis; laparoscopic cholecystectomy; Gallbladder.

INTRODUCTION

The rise of laparoscopic cholecystectomy has revolutionized the treatment of biliary diseases. Laparoscopic cholecystectomy is the preferred method for the treatment of chronic cholecystitis. Initially, conditions such as acute inflammation, cirrhosis, and previous upper abdominal surgery were considered contraindications to the procedure. However, with increasing experience, more and more difficult operations are attempted. Laparoscopic management of acute cholecystitis is a logical progression from elective laparoscopic cholecystectomy, but questions remain regarding its safety, cost-effectiveness, and success. So we reviewed our experience to answer these questions.

MATERIALS AND METHODS

Two hundred and eighty patients underwent laparoscopic cholecystectomy at ESICMCH Bihta, Patna during the period from September 1, 2021 to September 1, 2022. During this period, 20 acute cholecystectomy patients underwent laparoscopic cholecystectomy. These patients were identified prospectively based on preoperative findings. All patients were operated on using the standard laparoscopic four-port technique popularized by Reddick and Olsen. If necessary, a fifth trocar was placed in the upper abdomen. Electrocautery was used in all cases.

The diagnosis of acute cholecystitis was established based on:

1) Clinical and laboratory signs of inflammation (such as fever, leukocytosis, and acute tenderness over the gallbladder);
2) Intraoperative findings of severe acute inflammation.
3) Pathological report demonstrating acute cholecystitis.

Patients with operative findings compatible with acute cholecystitis but without clinical and laboratory signs of acute inflammation or pathologic findings of acute cholecystitis were excluded.

Charts have been revised retrospectively. Statistical analysis was performed using Statistical Package for Social Sciences [SPSS] for Windows, Version 26.0 was used to perform statistical analysis. Comparisons between groups were performed using Student's unpaired t-test with Bonferonni correction for interval variables and chi-square analysis of proportions; p values <0.05 were considered significant.

RESULT

Fourteen patients were women and six were men. The average age was 57 years. All patients had right upper quadrant or epigastric pain and all had cholelithiasis; 7 of 20 patients required conversion to open cholecystectomy.

Symptoms

Pain was constant in 8 patients and colicky in 12. Five of 8 patients with constant pain required conversion to open cholecystectomy, whereas only 2 of 12 whose pain was predominantly colic were converted. The median duration of preoperative biliary pain in the conversion group was 3 days (range, 2–30) versus 21 days (range, 2–90) in the success group.

Timing of surgery

Ten patients underwent cholecystectomy during the initial hospitalization. Five of them required conversion. Six patients were initially treated with antibiotics and subsequently planned for elective laparoscopic cholecystectomy. Two of those six required conversion. Four patients had bouts of biliary colic but did not require emergency hospitalization and were scheduled for elective laparoscopic cholecystectomies.

All four of these patients were successfully treated with laparoscopic cholecystectomy and all had pathologically documented acute cholecystitis. The interval from admission to cholecystectomy was 0.6 days in successfully treated cases versus 5 days in transferred cases ($p=0.01$). This delay in performing cholecystectomy reflects delayed diagnosis.

Laboratory and radiological findings

No patients with jaundice were included in this study. Although SGOT was similar in both groups (25 vs. 23), alkaline phosphatase was significantly higher in the conversion group (206 + 183) than in the successfully treated group (8 L + 22) ($p = 0.023$). The only recognized common duct stone in the series occurred in the successfully treated group, and thus choledocholithiasis cannot explain this finding. The conversion group also had significantly higher WBC (14.0 + 4.0 vs. 9.8 + 3.0, $p= 0.05$) and APACHE II (10.6 + 7.9 vs. 5.1 + 3 .3, $p = .04$).

Eleven patients were examined by ultrasound during an attack of acute cholecystitis. In these patients, a dilated gallbladder was observed in two of the five successfully treated patients and in four of the six transferred patients. Gallbladder wall thickening was observed in three of five successfully treated patients and in four of six transferred patients. Pericholecystic fluid was noted in three of five successfully treated patients, but not seen in any of the converted patients, whereas stone impacted in the cystic duct was seen in two of five successfully

treated cases and one of six converted cases. Nine patients who were known to have cholelithiasis based on previous ultrasound examinations were not re-examined before surgery.

Operating Procedures

Successful laparoscopic cholecystectomies for acute cholecystitis took an average of 87 + 22 minutes. Procedures requiring conversion to open cholecystectomy took an average of 120 + 25 minutes (p = 0.007) (Table I). In the 7 unsuccessful cases, laparoscopic surgery took an average of 45 minutes before converting to an open approach. There were several reasons for laparoscopic cholecystectomy not being completed. In all cases, the gallbladder was decompressed by aspiration. Both toothed and multi-pronged grapples were used. Despite these manoeuvres, all failed cases resulted in failure to adequately grasp the gallbladder or the formation of multiple gallbladder tears. In 3 of 7 patients, failure to identify the ductal anatomy led to conversion. On several occasions, fundus dissection was initiated to overcome this problem. This tactic was once successful. Difficulties in dissection of the inflammatory mass from the gallbladder and difficulties in separating the gallbladder from the liver bed also contributed to the failure (Table 2). The postoperative stay lasted an average of 2 days in the successfully treated group and 6 days in the converted group. There was one complication in each group. One patient from the successfully treated group returned to the hospital 1 week postoperatively with abdominal pain, hyperamylasaemia, and elevated alkaline phosphatase. One patient in the conversion group had a wound infection in the subcostal incision as well as a low output bile duct that closed on the seventh postoperative day. No deaths occurred.

Table 1. Comparison Of Successful And Unsuccessful Laparoscopic Cholecystectomies

	Success	Failure	p
Patients	13	7	
Pre-op hospital days	0.6	5.0	0.01
Serum alkaline phosphatase (IU/I)	81	206	0.02
WBC (X10/mm)	9.0	14.0	0.05
APACHE II	5.1	10.6	0.05
Operative time (minutes)	87	120	0.01
Post-op hospital days	2	6	0.001

Table 2. Factors Contributing To Failure In Laparoscopic Cholecystectomy

	CASES
Difficulty in grasping gallbladder	4
Multiple tears in the gallbladder	4
Inability to separate gallbladder from liver bed	3
Inability to identify ducts	3
Inability to separate inflammatory mass	3

DISCUSSION

Laparoscopic cholecystectomy is the treatment of choice for most patients with symptomatic cholelithiasis. At first, acute cholecystitis was believed to be a contraindication for this procedure.2 However, as surgeons learned about the procedure, its use expanded to include acute cholecystitis. Initial series showed a high conversion rate in the presence of acute inflammation. In a report by The Southern Surgeons Club, unexpected acute inflammation occurred in 14 patients (out of a total of 1518 patients) and led to 8 conversions. 3 In two other early series, 41% and 60% of patients were converted to open cholecystectomy." 5 Several series reported higher success rates, with conversion rates ranging from 7–33%.6 In our study, the conversion rate was 35%. .

The conversion of laparoscopic cholecystectomy to an open procedure is intended to ensure the safety of the procedure. As surgeons gain more confidence in laparoscopic cholecystectomy, there is a tendency to persist with difficult dissection to prevent opening. Conversion thus became a marker for a truly difficult cholecystectomy.

The economic impact of converted open cholecystectomy is also substantial. Because laparoscopic cholecystectomy for acute cholecystectomy requires more operating room time than typical elective cholecystectomy (either open or laparoscopic), requires additional equipment and nursing staff costs (compared to open cholecystectomy), and has a longer hospital stay than elective laparectomy cholecystectomy, conversion to cholecys open surgery combines the worst of both procedures in terms of cost. We retrospectively reviewed our experience with laparoscopic cholecystectomy to identify factors associated with failure of the laparoscopic procedure. Clinical parameters related to severe inflammation, such as leukocytosis grade, alkaline phosphatase elevation grade, and APACHE II score, were significantly associated with performance failure. In this series, there were no ultrasonographic findings that correlated with the difficulty of the procedure, although the data are limited. These findings are consistent with the report by Jacobs that the ability to perform laparoscopic cholecystectomy is directly related to the severity of the inflammatory response.

Perhaps the most important predictor of the success of attempted laparoscopic cholecystectomy in these patients was the timing of the operation. There was a highly significant difference in the length of hospital stay before surgery between successful and unsuccessful laparoscopic cholecystectomy (Table 1). Patients undergoing surgery within 48 hours of hospital admission had successful procedures, while those operated on later in the course of the disease had inflammation too severe to allow safe laparoscopic cholecystectomy. This finding is consistent with the well-known progression of pathomorphological changes in acute cholecystitis. In the early stages of the disease, swelling and hyperemia are prominent. However, as inflammation progresses, induration, hypervascularization, abscess formation, and necrosis occur. These latter factors are responsible for the inability to adequately retract the gallbladder (induration and necrosis) and delineate the ductal structures (hypervascularity and induration) that require conversion to open surgery (Table 2). Patients with a prolonged interval from symptom onset to diagnosis (especially if hospitalized) and patients with evidence of severe inflammation are at high risk for conversion.

The six patients who developed acute cholecystitis were initially treated nonoperatively with antibiotics and elective laparoscopic cholecystectomy was planned after the initial attack. Two of these patients required conversion to open cholecystectomy (33%), which is similar to the conversion rate for this series as a whole. If laparoscopic cholecystectomy can be performed early in the course of the initial attack, initial medical therapy followed by interval cholecystectomy appears to be of little benefit. There is little evidence to show that a cooling-off period reduces the rate of conversion to open cholecystectomy in these patients. In addition, some patients will not "cool down" on medical therapy and therefore will need emergency surgery. Therefore, the optimal timing of surgery is as soon as possible after the diagnosis of acute cholecystitis.

We have shown that laparoscopic cholecystectomy can be safely performed in patients with acute cholecystitis, provided that the threshold for conversion to open cholecystectomy is maintained. When a gangrenous gallbladder is encountered that cannot be grasped and morcellates during attempts to separate it from the liver, conversion to open cholecystectomy should occur. The benefits of completing a suboptimal procedure using a laparoscope are balanced by the risks of bile duct injury and postoperative sepsis. In cases of severe advanced cholecystitis, open cholecystectomy should be considered for both patient safety and cost-effectiveness reasons. Only prospective randomized trials will be able to compare the safety and cost-effectiveness of laparoscopic cholecystectomy and open cholecystectomy in this group of patients.

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