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Original Research Article

Experience of laparoscopic cholecystectomy in patients presenting with acute cholecystitis at different duration

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ABSTRACT

Background: Acute inflammation of a gall bladder that contains stones is acute calculous cholecystitis, laparoscopic cholecystectomy is now the gold standard treatment for patients with gall stone disease. laparoscopic cholecystectomy for acute cholecystitis was initially considered technically challenging and potentially risky for the patient. Aim was to evaluate results of laparoscopic cholecystectomy in patients presenting with acute cholecystitis at different duration in a tertiary centre in eastern India.
Methods: Comparative study of 71 cases of acute cholecystitis who presented at different days and were treated by laparoscopic cholecystectomy. Outcome was compared.
Results: The incidence of conversion to open was 12.6%. Day of presentation 5 to 7 had the maximum 21% risk of conversion. Major intraoperative complications included 4 cases of common bile duct injury, 4 cases of vascular injury and 3 cases of bowel injury out of which vascular injury and one case of bowel injury was managed laparoscopically. 9 cases converted to open surgery. patient with DOP 1, 2 and 3 had an average hospital stays of 3 days. It was 5 for those with DOP 4 and 7 days for patients with DOP 5 to 7.
Conclusions: The study supports laparoscopic cholecystectomy in acute cholecystitis specially in patients presenting within 72 hours of onset of pain. Laparoscopic cholecystectomy can be attempted in patients who present at DOP 4 and DOP 5 to7 after explaining them the risk and benefit of the procedure to the patient. Conversion to open surgery should not be stigmatized.

Keywords: Acute cholecystitis, Eastern India, Laparoscopic cholecystectomy, Tertiary centre

INTRODUCTION

Cholecystitis is inflammation of gall bladder. It can be acute, chronic, or acute superimposed on chronic, and almost always occurs in association with gallstones. In the Asia, cholecystitis is one of the most common indications for abdominal surgery. Its epidemiologic distribution closely parallels that of gallstones.

Acute cholecystitis is the most common major complication of gallstones and the most frequent indication for emergency cholecystectomy. It is a surgical emergency marked by suddenness of its onset. The patients in acute stage of gall stone cholecystitis present with the right upper hypochondrial pain that is exacerbated during inspiration by the examiner's right subcostal palpation (Murphy's sign). Laparoscopic cholecystectomy is now the gold standard treatment for patients with gall stone disease. It is one of the most commonly performed surgeries in the middle-aged population.

Before the advent of laparoscopic cholecystectomy management protocols for the surgical treatment of acute cholecystitis used to be firmly established. The benefits of open cholecystectomy have been substantiated in a number of prospective, randomized clinical trials, showing that the early-operation strategy was associated

with a shorter hospital stay without added morbidity compared to delayed elective cholecystectomy.[1]

With the introduction of laparoscopy for the surgical approach to gallstone disease, acute cholecystitis was initially considered to pose certain technical challenges for the surgeon and potential risks to the patient, and was therefore considered contraindicated. Originally, high complication rates were reported, which were mainly the result of distorted anatomy caused by the acute inflammation.

But now things have changed. Last two decades have seen revolutionary change in the management of acute cholecystitis. With surgeons becoming more and more trained in laparoscopic surgery. Laparoscopic cholecystectomy is now being done in acute stage also.[1] In the India, and specially in eastern Indian Gangetic belt where this disease is so prevalent, we still require more solid data on the pros and cons of an early surgical intervention that to with a special emphasis on the laparoscopic cholecystectomy.

From open cholecystectomy with drain to four port laparoscopic cholecystectomy to single port surgery to now upcoming natural orifice transluminal endoscopic surgery (NOTES), the morbidity, mortality and cosmoses has significantly decreased. However, the conventional 4 or 3 port Laparoscopic cholecystectomy remains the gold standard. Population-based studies have shown laparoscopic cholecystectomy to be associated with lower cost and improved outcomes compared to of open cholecystectomy.[2]

Although studies continue to emerge that have analysed the use of laparoscopic cholecystectomy in specific patient populations, there has not been a prospective evaluation of the safety and efficacy of laparoscopic cholecystectomy as the first-line treatment for acute cholecystitis in eastern India which is a hotspot for the disease.[3] This fact apart from the fact that eastern India is resource crunched, inspired us to do this study.

Aim and objective

To perform a prospective cross-sectional study at a tertiary care centre in resource crunched eastern India of management of acute cholecystitis with emphasis on laparoscopic cholecystectomy done at different duration.

We evaluated the mortality and morbidity in terms of i) duration of operation, ii) duration of hospital stay, iii) complications encountered during procedure done at different interval.

All the investigations done for acute cholecystitis were studied for different groups of patients e.g., ultrasonography of abdomen done for patients with day of presentation (DOP) 1, 2, 3 etc.

All the parameters were evaluated among different groups e.g., laparoscopic cholecystectomy done on day of presentation (DOP) 1, 2, 3 etc.

METHODS

This study was a prospective study started after taking all necessary permissions from the institutional ethics committee of Patna Medical College and Hospital. The due permissions from the head of department of surgery were also obtained.

The study was conducted at the department of surgery, Patna medical College and Hospital.

Study subjects

The patients admitted in surgery department through surgical outdoor and surgical emergency for acute cholecystitis.

Sample size

Sample size was 71 obtained through convenience sampling method.

Convenience sampling method is a type of non-probability sampling that involves the sample being drawn from that part of population that is close to hand.

The sample size was taken by convenient sampling method after discussing with the college statistician. The sample size was also affected by the fact that many patients still preferred conservative treatment for acute stages deferring surgery to a later date. The fact that portion of this study extends in to the COVID-19 pandemic should also be kept in mind.

Study duration

The study took place from October 2018 to October 2020.

Inclusion criteria

Patients admitted in surgical emergency or outdoor with presentation of acute cholecystitis of any age or sex. Radiologically proven gall stone disease.

Exclusion criteria

Patients whose diagnosis of acute cholecystitis is not proved; associated co morbid conditions like acute pancreatitis, obstructive jaundice, gall stone ileus etc; deranged coagulation profile; Tokyo grade III; chronic cholecystitis who are asymptomatic in presentation; acalculous cholecystitis; evidence of CBD stone on radiological investigations; all cases beyond 7 days of onset of symptoms; patient's preference for open

cholecystectomy; patient's refusal to participate in study; contra-indications of laparoscopic surgery.

The patients coming of acute cholecystitis after screening process were subjected to laparoscopic cholecystectomy were divided on the basis of days after which surgery was done with respect to the day of presentation. All the patients after screening process were subjected to intervention as soon as possible.

The surgery was performed by two experienced laparoscopic surgeons (associate professor rank and above) and assisted by post graduates of general surgery.

All the patients coming in outdoor or emergency of acute cholecystitis were initially managed by administering antibiotics, analgesics, proton pump inhibitor and anti-emetics. Fluid resuscitation was done in all. All the patients were kept NPO prior to surgery.

After taking all the necessary anaesthetic clearance, laparoscopic cholecystectomy was performed by two experienced laparoscopic surgeons.

Among intraoperative factors duration of surgery, amount of blood loss, need for drain and any other intra operative complications were recorded and accounted. Duration of surgery here refers to skin to skin timing.

In terms of post-operative data, we studied the duration of hospital stay and complications. The intra operative and post-operative complications and other relevant data were accounted for compared based on which day after the onset of pain the procedure was performed.

All the recorded data was analysed and presented in a tabular form. The findings were compared with those of previous study to come to conclusion.

RESULTS

This study consists of a total of 71 cases of acute cholecystitis. All of them underwent laparoscopic cholecystectomy.

Number of surgery vis a vis the day of onset of pain (DOP)

In the study 5 surgeries were done on DOP 1. In the DOP 2, DOP 3 and DOP 4 cohort 9, 18 and 16 surgeries were performed respectively. DOP 5 to 7 cohort had 23 surgeries.

While calculation of duration of surgery time was calculated from incision to make the port to the closure of port.

In this study the average duration of surgery (approximated to the nearest tens) on surgery done on DOP 1 was 100 minutes. On DOP 2, DOP 3, DOP 4 was 104 minutes, 120 minutes and 160 minutes respectively.

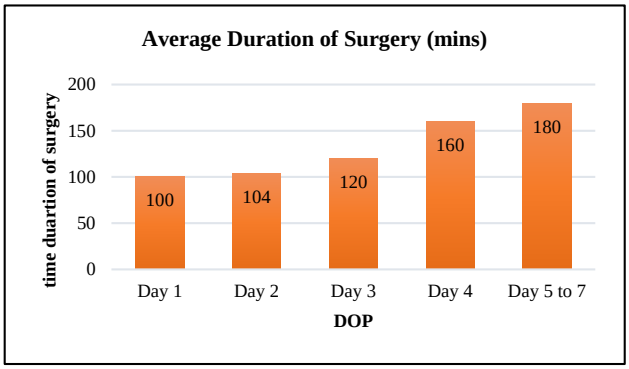

Figure 1: Duration of surgery with respect to time of surgery from date of onset of pain (DOP).

Table 1: Intra operative findings.

Surgery done from DOP Intra op findings	Day 1	Day 2	Day 3	Day 4	Day 5 and onwards
Thick-walled GB	1	3	7	11	23
Mucocele	nil	nil	1	1	5
Frozen calots	nil	nil	2	5	11
Perforation of GB	2	3	3	5	7
Impacted stone	2	2	4	6	7
Adhesions with gut	nil	nil	3	4	9
Adhesions with liver bed	nil	2	5	11	21
Porcelain GB	nil	nil	nil	nil	2

In this study thick-walled gall bladder was found in a total of 45 patients. Mucocele was found in total of 7 cases, maximum in the cohort of day 5 and onwards. Perforated gall bladder was found in total of 3 cases. Inflamed and dilated CBD was found in 9 cases, maximum 7 were found in the cohort of day 5 and onwards. The finding of stone impacted in the neck of gall bladder was present in all the cohorts. A total of 21 patients had impacted stone.

Adhesions with gut were found in a total of 16 cases with the group day 5 and onwards having the maximum. A total of 39 patients had adhesions with liver bed with maximum 21 in the cohort of day 5 and onwards. Porcelain gall bladder was seen in just 2 cases in the cohort of day 5 and onwards.

Table 2: Major intra operative complications.

Surgery done from DOP / Intra op complications	Day 1	Day 2	Day 3	Day 4	Day 5 and onwards
CBD injury	Nil	Nil	1	1	2
Vascular injury	Nil	1	Nil	Nil	3
Bowel injury	Nil	Nil	Nil	1	2

In present study there were 11 episodes of major intra operative complications distributed all cohorts except that of DOP 1. Out of which one case of vascular injury and one case of bowel injury was managed laparoscopically. Rest all were managed by conversion to open cholecystectomy.

Table 4: Major post-operative complications.

Surgery done from DOP / Post-operative complications	Day 1	Day 2	Day 3	Day 4	Day 5 to 7
Wound infection	1	Nil	1		2
Hemorrhage	Nil	1	Nil	Nil	1
Partial cholecystectomy with retained stone	Nil	Nil	1	Nil	1
Biliary leak	Nil	Nil	1	Nil	2
Prolong ileus	2	Nil	Nil	1	Nil
Diarrhoea	Nil	Nil	Nil	Nil	1
Jaundice	Nil	Nil	Nil	Nil	1

In this study 4 patients had port site infection. Minor hemorrhage was found in 2 patients. 3 patients had post-operative bile leak. 3 patients had post-operative ileus. Explosive post cholecystectomy diarrhea was seen in 1 patient.

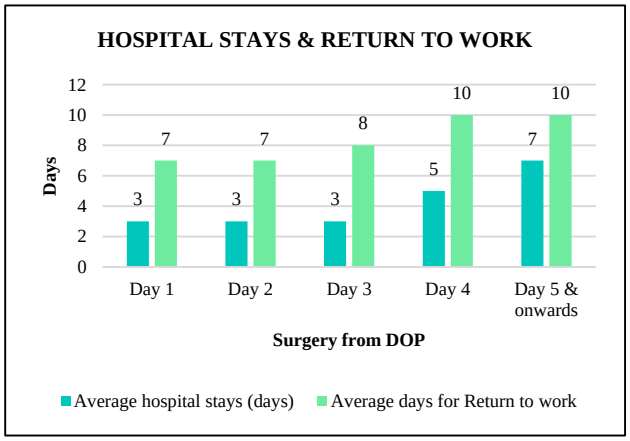

Figure 2: Duration of hospital stays and time for return to work.

One patient in the cohort of day 5 to 7 had jaundice (total bilirubin 9.7 mg/dl and direct bilirubin 6.5 mg/dl) who was investigated for the cause and had to undergo a corrective hepato-jejunostomy in another sitting (day 15) after the laparoscopic cholecystectomy. In two patient complete cholecystectomy couldn't be done and resulted in partial cholecystectomy with retained stone.

Patients in the cohort of DOP 1, 2 and 3 stayed in the hospital for an average of three days. Those in the cohort of DOP 4 and 5 to 7 were stayed for five and seven days respectively. It took an average of seven days for patients in cohort of DOP 1 and 2 to return to work and eight, ten and ten days for the cohorts of DOP 3, 4 and 5 to 7 to return to work.

DISCUSSION

Duration of surgery in various cohorts

Zucker et al reposted the operative time as 128 minutes for patients undergoing laparoscopic cholecystectomy in their study.[7]

Habib et al in their study on cases of acute gangrenous cholecystitis observed 107 minutes as the mean operating time for laparoscopic cholecystectomy.[9]

Pessaux et al reported the average duration of surgery as 141 minutes in their study for patients undergoing laparoscopic cholecystectomy for acute cholecystitis.[8]

Present study revealed the average duration of surgery for various cohorts as 100, 104, 120, 160, 180 minutes DOP 1, 2, 3, 4, 5 to 7 respectively. The maximum duration of surgery was in surgery done on DOP 5 to 7. While calculation of average duration of surgery the time taken during those surgeries which required conversion to open were not included.

The increased time associated with the different cohorts can be attributable to the fact that with increasing time duration after the onset of acute attack of cholecystitis there in increasing inflammation which results in adhesion around the calots triangle. This cause difficulty in dissection of calots and thereby increase in the operative duration. However, we did not find any significant correlation between patient's recovery and increased operative timing.

Intra-operative findings

The most common significant intra-operative finding in our study was thick-walled gall bladder. This was mostly due to the setting of inflammation in acute cholecystitis. There were a total forty-five cases in which intra-operatively we found a thickened gall bladder. These were distributed over all the cohorts. There was a maximum of twenty-three episodes of thick-walled gall bladder in the cohort of DOP 5 to 7. We had one, three,

seven and eleven cases of thick-walled gall bladder in the group of DOP 1, 2, 3 and 4 respectively.

The next most common intra-operative finding was the presence of adhesions with the liver bed which was seen in thirty-nine cases. They were distributed along all the cohorts leave aside cohort of DOP 1. We had two, five, eleven and twenty-one episodes of the same in the cohorts of DOP 2, 3, 4 and 5 to 7 respectively. Adhesion with gut were found in a total of sixteen cases with the group day 5 to 7 having the maximum.

We found that there was increase in incidence of gall bladder wall thickening, adhesions with liver bed and adhesions with gut as we move from DOP 1 to DOP 5 to 7. This was attributable to the factor of increasing inflammation with time.

The setting of inflammatory process was the main reason in the past for delaying laparoscopic cholecystectomy in acute stages and proceeding for interval cholecystectomy six weeks safter the initial episode. The same is confirmed in our study with increasing time duration for surgery as we move from DOP 1 to DOP 5 to 7.

Given the inflammatory process occurring in the porta hepatis, early conversion to open cholecystectomy should be considered when delineation of anatomy is not clear or when progress cannot be made laparoscopically.[11]

Perforation of gall bladder was another common occurrence in our study with a total of twenty-two episodes distributed over all the groups. The maximum seven in cohort of DOP 5 to 7. Stone impacted at the neck of gall bladder was there in twenty-on cases the maxima again observed in the DOP 5 to 7.

Mucocele of gall bladder as a sequalae to acute cholecystitis was there in a total of seven cases, absent in the cohorts of DOP 1 and 2, and maximum the cohort of DOP 5 to 7, a total of seven episodes. DOP 3 and 5 had one episode if mucocele of gall bladder each. The study also contained two cases of porcelain gall bladder. Both of these patients had the acute attack of cholecystitis over chronic cholecystitis. Both these cases were in the cohort of 5 to 7.

Laparoscopic surgery converted to open*: *its incidence with respect to day of presentation

Kum et al in their study had the conversion rate of 30.3% i.e., twenty of sixty-six patient who underwent laparoscopic cholecystectomy for acute cholecystitis needed the conversion to open surgery.[4]

Hawasli et al had a conversion rate of 11.1%.[5] Two out of the eighteen patients in their study who underwent laparoscopic cholecystectomy for acute cholecystitis needed conversion to open surgery.

Willsher et al had a conversion rate of 9% i.e., fourteen out of hundred and fifty-two cases in their series needed the conversion to open surgery form laparoscopic cholecystectomy.[6]

This study saw the need for conversion of laparoscopic cholecystectomy to open cholecystectomy in a total of nine patients. The incidence was nil in the cohort of DOP 1. It was one (11%) in the cohort of DOP 2, one (5.5%) in the cohort of DOP 3, two (12.5%) in the cohort of DOP 4 and five (21%) in the DOP 5 to 7. The overall incidence of conversion was 12.6%similar to above forementioned studies.

Rationale for conversion to open surgery and major intra-operative complications

We can look at the reason for conversion to open surgery in my study with respect to major intra-operative complications that we encountered. In our study there were a total of eleven episodes of major intra operative complications. This included four cases of common bile duct injury, four cases of vascular injury and three cases of bowel injury. All the major intra-operative complications were distributed over the cohort of DOP 2, 3, 4 and 5 to 7. One case of vascular injury possibly due to difficulty in dissection of calots was managed laparoscopically and one case of bowel injury also was managed laparoscopically. Rest nine cases needed conversion to open surgery. In all the cases of conversion we found that there was dense adhesion around the calot's triangle which made its dissection difficult and made the anatomy distorted

Post-operative complications

The findings in my study are similar to those of Haoa et al in the terms of post-operative bleeding and bile leak.[10]

In my study there four cases of port site infection. Three out of these four were at the epigastric port site from where the gall bladder was extracted after cholecystectomy. This was probably due port site getting infected from the bacteria from the inflamed gall bladder. They were distributed over the cohorts of DOP 1-one case, DOP 3-one case and DOP 5 to 7-two cases. All these cases were managed conservatively. Minor hemorrhage (blood in drain) was present in two cases which resolved spontaneously. Three patients had post-operative bile leak (bile in drain) which was managed conservatively. One patient reported explosive diarrhoea. Three patients developed post-operative ileus which was managed conservatively.

Due to dense adhesions complete cholecystectomy could not be done in two cases which resulted in partial cholecystectomy with retained stone as a post-operative complication.

One patient in the cohort of DOP 5 to 7 developed jaundice on post-operative day two. She was investigated for the same and had total bilirubin of 9.7 mg/dl and direct bilirubin of 6.7 mg/dl. The patient underwent MRCP and it was found to be a case of common bile duct injury. The patient had to undergo a corrective hepatico-jejunostomy in another sitting (day 15) after the laparoscopic cholecystectomy. The patient recovered well after the corrective procedure.

Duration of hospital stay and return to work

Our findings are similar to those of various other studies done on laparoscopic cholecystectomy for acute cholecystitis.

Zucker et al reported the post-operative stay as 3.3 days for patients undergoing laparoscopic cholecystectomy for acute cholecystitis in their study.[7]

Hawasli have reposted the average post-operative stay of mere nineteen hours for patients undergoing laparoscopic cholecystectomy for acute cholecystitis.[5]

In the study by Pessaux et al, they observed a hospital stay of 7.6 days for patients who were operated within three days of onset of acute attack of cholecystitis and 11.4 days patients who were operated after three days of onset of acute cholecystitis.[8]

Habib et al observed the average postoperative stay as 3.3 days in their study.[9]

The average duration of hospital stays for patients who were operated on DOP 1, 2 and 3 was three days. For the patients in the cohort of DOP 4 it was five days and for DOP 5 to 7 it was seven days. The patients were discharged after they were mobilized and had passed flatus and stared taking meals. All the patients had stable vitals at the time of discharge without any fresh complains. The drain if applied during the time of laparoscopic surgery was removed before discharge. All the patients were taught to take care of their port-site stiches and were asked to come to the next outdoor for stitch removal.

All were given a seven-day dosage of antibiotics, proton pump inhibitor, an anti-emetic for SOS usage and a pain killer for SOS usage at the time of discharge.

The limitations of this study include convenience sampling method to calculate the sample size.[12] The small sample size of the subjects which was due to factors such as choice of patients to defer acute immediate surgery to a more planned one and refusal of consent. The study duration includes the period when first wave of COVID-19 was at its peak and there was a total lockdown. This affected the accessibility of patients to come to tertiary care centre. During the pandemic the surgeries were being done only in those case where it was utmost necessary. Acute cholecystitis cases if any were mostly managed conservatively. Our centre has only one general surgery laparoscopic OR with a single set of laparoscopic armamentaria. This might have also led to reduced subject number. Another limitation is the fact that Patna medical college and hospital is a post graduate training institute and there for in many cases the laparoscopic cholecystectomy was being assisted by post graduate residents which may have led to slightly elevated surgery time.

CONCLUSION

The study supports the procedure of laparoscopic cholecystectomy in cases of acute cholecystitis specially in patients presenting within 72 hours DOP 3 of onset of pain. Depending on the surgeon's expertise, laparoscopic cholecystectomy can be attempted in patients who present at DOP 4 and DOP 5 to 7 after explaining them the risk and benefit of the procedure to the patient. The very fact that the study was done in a resource crunched state has implications towards the fact that the direct laparoscopic management of acute cholecystitis should be more and more popularized throughout the country. Where ever there is availability of laparoscopic surgeon and basic laparoscopic OT, acute cholecystitis should be managed by laparoscopic cholecystectomy rather than managing it conservatively and postponing the definite management. However, one should also bear in mind the fact that conversion to open surgery should not be stigmatized at any point of time either by the surgeons or by the patients and their attendants.

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