

ORIGINAL RESEARCH

# **A Clinical Prospective Study to Determine the Role of Conversion and Identify the Factors Responsible for Conversion of Laparoscopic Cholecystectomy to Open Cholecystectomy at Newly Established Tertiary Care Center**

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Received: 08 October, 2022

Accepted: 23 November, 2022

## **ABSTRACT**

**Background:** Laparoscopic cholecystectomy is the procedure of choice for the majority of patients with gall bladder disease. Conversion to open technique is considered a major morbidity of laparoscopic cholecystectomy as it loses its supremacy over open technique once the conversion takes place. This study was conducted in an effort to determine the conversion rate and also identify the factors responsible for conversion of laparoscopic cholecystectomy to open cholecystectomy.

**Materials & Methods:** A clinical prospective study done on 50 patients presenting with cholelithiasis without choledocholithiasis; and with no contraindication for general anaesthesia were included in the study. Data recorded included demographic information, past medical history, indication for operation, duration of operation, reason for conversion and post-operative complications.

**Results:** The mean age in this study was 42.8 years. The sex distribution shows that the gall bladder diseases have a higher frequency in female than in males. Out of 50 patients, 35 patients (70%) had a chief complaint of pain in the right hypochondrium, 16 patients presented with epigastric pain. 8% of patients suffered from Diabetes mellitus whereas 6% of patients were Hypertensive. The average duration of surgery was 80.5 min. Average duration of post-op stay in successful cases was 4.2 days and in converted cases it was 6.3 days. A total laparoscopic surgery performed in 50 cases, out of which 10% cases converted to open cholecystectomy due to anatomic difficulty such as dense adhesion of calot's triangle and anatomic variations (60%), bleeding from calot's triangle (20%) and common bile duct injury (20%).

**Conclusion:** We conclude that laparoscopic cholecystectomy is a safe and minimally invasive technique, with only low conversion rate and the commonest cause of conversion in this study was the presence of dense adhesions at Calot's triangle.

**Keywords:** Laparoscopic cholecystectomy, Conversion, Open cholecystectomy, Calot's triangle.

## INTRODUCTION

Gallstones are among the most common gastrointestinal illness requiring hospitalization with a prevalence of 11% to 36% in autopsy reports. By the age of 75, about 35% of women and 20% of men would have developed gallstones. The incidence of gallstone disease in Asia is considerable and constitutes a problem of enormous magnitude. The incidence of cholesterol gallstones is increasing in Asia for the reasons that may be related to environmental and dietary considerations. Gall stone disease is a relatively common problem in our country particularly in North India. It is estimated that more than sixty percent of these patients have cholesterol stones.

The optimal treatment for patients with symptomatic cholelithiasis is cholecystectomy.<sup>1</sup> Gordon Taylor (1937) suggested that the first clinical description of gallstone disease was recorded in the 4th century BC. Cholecystotomy was reported and recommended by Jean-Louis Petit in 1743 after he had mistakenly opened the gall bladder when attempting to drain what he thought was an abdominal wall abscess. As surgical techniques began to evolve, John Bobbs, an Indian surgeon and others attempted to perform cholecystolithotomy, removing the stone from the gallbladder and leaving the organ in situ.<sup>2</sup>

Laparoscopic cholecystectomy is the procedure of choice for the majority of patients with gall bladder disease. These postulated advantages of laparoscopic cholecystectomy are the avoidance of large incision, shortened hospital stay and earlier return to work. In 1987, Philippe Mouret performed the first laparoscopic cholecystectomy in a human.<sup>3</sup> The first laparoscopic cholecystectomy in India was performed in 1990 at the JJ Hospital, Mumbai, followed by few months later in Pune by Dr. Jyotsna Kulkarni.<sup>4</sup> Within a short span of five years laparoscopic cholecystectomy has surpassed conventional cholecystectomy as procedure of choice for diseases of gallbladder.<sup>5</sup>

The condition of the patient, the level of experience of the surgeon, and technical factors all can play a role in the decision for conversion. Inability to define the anatomy and difficult dissection are the leading reasons for conversion followed by other complications like bleeding. The conversion rate for elective laparoscopic cholecystectomy is around 5%, whereas the conversion rate in the setting of acute cholecystitis may be as high as 30%.

There are a number of clinical situations that, when present, make the laparoscopic approach more difficult and should prompt consideration of the open approach. Morbid obesity, cirrhosis, portal hypertension, severe obstructive lung disease, previous surgery, and pregnancy are all factors for which laparoscopic cholecystectomy may be difficult and associated, with increased risk.<sup>6</sup> Despite the advent of minimally invasive technology, open cholecystectomy continues to be a perfectly acceptable method for removal of the gallbladder under any circumstances and should certainly be considered if proper facilities for performance of laparoscopic surgery are not available or if the surgeon is not, adequately trained. Conversion to open technique is considered a major morbidity of laparoscopic cholecystectomy as it loses its supremacy over open technique once the conversion takes place. In most cases, dense adhesion around the gall bladder and bile leakage, as well as uncontrolled bleeding and bowel injury during insertion of Veress needle or dissection of dense adhesions were the main reasons for conversion to the open procedure. This study was conducted in an effort to determine the conversion rate and also identify the factors responsible for conversion of laparoscopic cholecystectomy to open cholecystectomy.

## MATERIALS & METHODS

A clinical prospective study done on 50 patients presenting with cholelithiasis without choledocholithiasis; and with no contraindication for general anaesthesia were included in the study. Data recorded included demographic information, past medical history, indication for operation, duration of operation, reason for conversion and post-operative complications.

**INCLUSION CRITERIA**

- All patients with symptomatic cholelithiasis (including acute cholecystitis).
- Patients presenting with acalculous cholecystitis.
- Age > 18 years

**EXCLUSION CRITERIA**

- Carcinoma of gall bladder,
- Perforated gall bladder,
- Patients unfit for general anesthesia,
- Previous upper abdominal surgery,

**METHODS**

The general bio-data of patient regarding his name, age, sex, religion, occupation, socio economic status and address was collected. A detailed history was taken with special reference to duration of right upper quadrant pain or epigastric pain, its periodicity, its aggravation by fatty meals and relief by oral or parenteral analgesics.

Any significant past history was also enquired. A relevant general physical examination, abdominal and systemic examination was done. Pre-operative work up included a complete blood count, blood sugar, blood urea, serum creatinine, liver function tests, hepatitis profile, X-ray chest and ultrasound of abdomen. Ultrasonogram was routinely performed on all patients to confirm the clinical diagnosis of cholelithiasis with number of calculus and size of calculus, gallbladder wall thickness (>4mm was considered abnormal), pericholecystic collection and CBD calculi or dilatation of CBD.

A routine pre-anaesthetic checkup was done. A fully explained well informed consent was taken with explanation of risk of conversion to open cholecystectomy. A nasogastric tube was placed in all cases for gastric decompression to prevent trocar injury. All patients received prophylactic pre-op antibiotics (Inj. Ceftriaxone 1gm IV). The patients were operated by different general surgeons. The operation was performed with standard four port technique, using carbon dioxide for peritoneal cavity insufflation. The Veress technique was used to obtain pneumoperitoneum. Cystic artery and cystic duct were skeletonized and clamped with metallic clips separately. Following gall bladder removal, No.16 romovac suction drain was placed in all cases. All patients had oral liquids followed by food from 3rd day after surgery, provided there was no nausea and vomiting.

**RESULTS**

The mean age in this study was 42.8 years. The age group of the patients ranged from 20 years to 70 years. The ratio of males to females was 1:2. The sex distribution shows that the gall bladder diseases have a higher frequency in female than in males. Out of 50 patients, 35 patients (70%) had a chief complaint of pain in the right hypochondrium, 16 patients presented with epigastric pain. 8% of patients suffered from Diabetes mellitus whereas 6% of patients were Hypertensive. The average duration of surgery was 80.5 min. Average duration of post-op stay in successful cases was 4.2 days and in converted cases it was 6.3 days (table 1).

**Table 1: Demographic & clinical profile of patients**

Demographic & clinical profile		No. of patients	Percentage
Age (mean±SD)		42.8±5.36 yrs	
Sex	Male	16	32%
	Female	34	62%

	Clinical presentation	
<b>Epigastric pain</b>	15	30%
<b>Right hypochondrium pain</b>	35	70%
	Co morbidity	
<b>Diabetes mellitus</b>	4	8%
<b>Hypertension</b>	3	6%
<b>Duration of surgery (Minutes)</b>	80.5±11.3	
<b>Hospital stay (Days)</b>	4.2±1.16	

Among a total of 16 male patients, 2 were converted (12.5%) whereas among 34 female patients, 3 were converted (8.82%). Out of total 4 patients who were diabetic, 1 patient underwent conversion (25%) (table 2).

**Table 2: Sex and co morbidity with surgery outcome**

Sex and co morbidity		Surgery outcome	
		Successful	Converted
<b>Sex</b>	<b>Male</b>	14	2
	<b>Female</b>	31	3
<b>Co Morbidity</b>	<b>Diabetes mellitus (N=4)</b>	3	1
	<b>Hypertension (N=3)</b>	2	1

Our study showed that total laparoscopic surgery performed in 50 cases, out of which 10% cases converted to open cholecystectomy due to anatomic difficulty such as dense adhesion of calot's triangle and anatomic variations (60%), bleeding from calot's triangle (20%) and common bile duct injury (20%) (table 3).

**Table 3: Reason for conversion**

Reason for conversion	No. of cases	Percentage
<b>Difficulty anatomy</b>	3	60%
<b>Bleeding</b>	1	20%
<b>Common bile duct injury</b>	1	20%

Out of 50 patients, 42 patients presented with a diagnosis of Cholelithiasis of which 4 cases were converted (9.52%), and 8 patients presented with acute cholecystitis of which 1 underwent conversion (12.5%) (table 4).

**Table 4: Pre-operative diagnosis**

Pre-operative diagnosis	Surgery outcome	
	Successful	Converted
<b>Cholelithiasis (N=42)</b>	38 (90.48%)	4 (9.52%)
<b>Acute cholecystitis (N=8)</b>	7 (87.5%)	1 (12.5%)

## DISCUSSION

Open cholecystectomy has being a gold standard for the treatment of gallbladder diseases for more than 100 years since Carel Johann Langenbuch has performed first open cholecystectomy in 1882.<sup>3</sup> First laparoscopic cholecystectomy in human has been performed in 1987 by Dr. Philip Mouret to become the new gold standard and almost replaced open cholecystectomy for the treatment of gallbladder disease.<sup>3</sup> No age is said to be immune to gallbladder disease, however they were more common in the third, fourth and fifth decades of life as 75% of the cases belonged to these decades. Our study population was younger, mean

age 42.8 years. Daradkeh<sup>7</sup> reported mean age of 47.2 years, whereas Bingener et al<sup>8</sup> 40 years. Workers like Thomas B Hugh et al<sup>9</sup>, R Schmitz et al<sup>10</sup> have reported a similar peak incidence in the 4<sup>th</sup> and 5<sup>th</sup> decade.

The main sufferers of gallbladder disease in our study were females as compared to males. Out of total 50 cases, 34 (68%) were females and 16 (32%) were males, which are very much similar to those observed by Frazee et al<sup>11</sup> and U. Berggren et al<sup>12</sup>. The reason for the high incidence among females could be that pregnancy and childbirth have a definitive influence on biliary tract disease, acting by casual stasis as well as weight gain and consequent hypercholesteremia.

In our study, 12.5% males required conversion as compared to 8.82% females; this was similar to Ibrahim et al<sup>13</sup>, Brodsky et al<sup>14</sup> and Al Salamah<sup>15</sup> also found male gender as a most significant determinant for conversion to OC. Gharaibeh et al<sup>16</sup> reported 24% conversion rate in males vs. 4% in females, whereas Lim et al<sup>17</sup> reported 16.6% conversions in males vs 8.2% in females. The reason for higher conversion rates in male patients remains unexplained, though male gender has been a significant risk factor in most series. It has been observed that male patients have more intense inflammation or fibrosis, resulting in more difficult dissection both in the triangle of Calot and through the plane between the GB and the liver.

In a study by Adbikardid Bedirli et al<sup>18</sup> between 1993 to 2000, conversion to open cholecystectomy was required in 19 of 678 patients in nondiabetic group (2.8%) and 13 of 184 patients in diabetic group (7.1%). The author's concluded laparoscopically cholecystectomy in diabetic patients is associated with more morbidity and a higher conversion rate than that in nondiabetic patients.

In a study by Tayeb M, Raza syed Ahsan et al<sup>19</sup> from 1997 to 2001, out of 73 converted patients 20 were hypertensive (27.4%) and out of 146 successful patients 29 were hypertensive (19.9%).

In a retrospective analysis by Chahin F et al<sup>20</sup> over a 3-year period of 557 patients who underwent laparoscopic cholecystectomy; 88 patients had acute cholecystitis. He concluded that conversion rates were 22% in patients with acute cholecystitis as compared to 5.5% in cases of patients with chronic cholecystitis, which was correlated with our results. Prior acute cholecystitis results in scarred and fibrosed GB, and in dense fibrotic adhesions that render laparoscopic dissection difficult. GB wall thickness is related to the inflammation or fibrosis that follows previous attacks of cholecystitis, and thus may reflect difficulty in delineation of the anatomy during surgery.

The reason for longer hospital stays in our hospital could be that even though many of our patients could have been suggested discharge earlier, because most of our patients were from rural background they insisted on staying till sutures were removed and hence majority of cases discharged after a week.

Conversion to open technique is considered a major morbidity of LC as it loses its supremacy over open technique once the conversion takes place. The conversion rate in this study was 10% and this is comparable to the conversion rate of 2.6% to 14% reported in literature. With the passage of time the experience has grown, the laparoscopic technique has been understood and thus the conversion rate has reached a remarkably low level of 1-6%<sup>21</sup>). In our series, the conversion to open cholecystectomy was required in 5 patients with conversion rate of 10%. This rate is comparable to the results of most international studies published in early years of LC (2-15%)<sup>3, 22-27</sup>, but remains higher than those results reported recently in last five years (1-6%)<sup>3</sup>. This may be due to differences in institutional and individual practice including experience of operating team. Saeed Hadi et al<sup>28</sup> and Waseen Memon et al<sup>29</sup> claimed that commonest cause of conversion was frozen Calot's triangle which was true in our study also. Frozen Calot's triangle means dense adhesion around the Calot's triangle.

Meshikhes et al<sup>30</sup> and Al-Saigh et al<sup>31</sup> from Saudi Arabia reported a conversion rate of 11% in their cases, the most common cause of conversion being difficult anatomy.

## CONCLUSION

We conclude that laparoscopic cholecystectomy is a safe and minimally invasive technique, with only low conversion rate and the commonest cause of conversion in this study was the presence of dense adhesions at Calot's triangle.

## REFERENCES

1. Ravi S. Chari and Shimul A. Shah. Biliary system. In, Townsend (ed). Sabiston Textbook of Surger; Volume 2, 18<sup>th</sup> edition, South Asia edition. Philadelphia, Saunders Publishers, 2009;1558-62.
2. Sparkman RS, Bobes Centennial. The first cholecystectomy surgery 1967; 61:965.
3. Kuldip Singh, Ashish Ohri. Journal of minimal access. Surgery 2005 June; 1:59-61.
4. Tehemton E. Udwadia. Journal of minimal access. Surgery 2005 June; 1:51-52.
5. James Toouli. Surgery of the biliary tract. Churchill Livingstone 1993: Pg 135.
6. Michael J. Zinner, Seymour L. Schwartz, Harold Ellis. Maingot's abdominal operations, 10th ed, Appleton and Lange 1997:1732-35.
7. Daradkeh S. Laparoscopic cholecystectomy: Analytical study of 1208 cases. J Hepatogastroenterology 2005; 52:1011-4.
8. Bingener-Casey J, Richards ML, Strodel WE, Schwesinger WH, Sirinek KR. Reasons for conversion from laparoscopic to open cholecystectomy: a 10-year review. J Gastrointest Surg 2002; 6: 800-5.
9. Hugh TB. New strategies to prevent laparoscopic bile duct injury - surgeons can learn from pilots. Surgery 2002;132:826-35.
10. Schmitz R, Rohde V, Treckmann J, Shah S. Randomized clinical trial of conventional cholecystectomy versus mini cholecystectomy Br J Surg1997;84:1683-6.
11. Frazee RC, Roberts JW, Symmonds R et al. What are the contraindications for laparoscopic cholecystectomy? Am Jr Surg 1992; 164: 491-95.
12. Berggren U, Gordh T, Grama D, et al. Laparoscopic versus open cholecystectomy: hospitalization, sick leave, analgesia and trauma responses. Br J Surg1994;81:1362-5.
13. Ibrahim S, Hean TK, Ho LS, Ravintharan T, Chye TN, Chee CH. Risk factors for conversion to open surgery in patients undergoing laparoscopic cholecystectomy. World J Surg 2006; 30:1698-704.
14. Brodsky A, Matter I, Sabo E, Cohen A, Abrahamson J, Eldar S. Laparoscopic cholecystectomy for acute cholecystitis: can the need for conversion and the probability of complications be predicted? A prospective study. Surg Endosc2000; 14: 755-60.
15. Al Salamah SM. Outcome of laparoscopic cholecystectomy in acute cholecystitis. J Coll Physicians Surg Pak 2005; 15: 400-3.
16. Gharaibeh KI, Qasaimeh GR, Al-Heiss H, Ammari F, Bani-Hani K, Al-JaberiTM, et al. Effect of timing of surgery, type of inflammation, and sex on outcome of laparoscopic cholecystectomy for acute cholecystitis. J Laparoendosc Adv Surg Tech 2002; 12: 193-8.
17. Lim SH, Salleh I, Poh BK, Tay KH. Laparoscopic cholecystectomy: an audit of our training programme. Aust N Z J Surg 2005;75:231-3.
18. Abdulkadir Bedirli, Erdogan M. Sözüer, Osman Yüksel, and Zeki Yilmaz Laparoscopic Cholecystectomy for Symptomatic Gallstones in Diabetic Patients Journal of Laparoendoscopic & Advanced Surgical Techniques. October 2001;11(5): 281-84.
19. Tayab M, Ahsan RS, Khan MR. Conversion from laparoscopic to open Cholecystectomy. Multivariant analysis of preoperative risk factors. J Post-grad Med 2005;51:17-20.

20. Chahin F, Elias N, Paramesh A, Saba A, Godziachvili V, Silva YJ. The efficacy of laparoscopic cholecystectomy in acute cholecystitis. *JLS* 1999;3:121-5.
21. Michael Rosen M.D., Fred Brody M.D. and Jeffery Ponsky M.D.: Predictive factors for conversion of laparoscopic cholecystectomy. *Am J Surg* September 2002;184(3):254-58.
22. Nuri Aydin Kama, M. Kologlu, E. Reis, M. Atli and M. Dolapci: Risks score for conversion from laparoscopic to open cholecystectomy. *The American Journal of Surgery* June 2001; 181(6) : 520-25.
23. Alponat A, Kum CK, Koh BC, Rajnakova A, Goh PMY. Predictive factors for conversion of laparoscopic cholecystectomy. *World J Surg.* 1997;21:629–33.
24. G. M. Fried, J.S. Barkun, H.H. Sigman et al: Factors determining conversion to laparotomy in patients undergoing laparoscopic cholecystectomy. *Am J Surg* 1994; 167:35-39.
25. C.L. Liu, S.T. Fan, E. C. S. Lai, Lo CM and Chu KM: Factors effecting conversion of laparoscopic cholecystectomy to open surgery. *Arch Surg* 1996;131:98-101.
26. Jeremy M. Lipman MD, Jeffer A. Claridge MD et al: Preoperative findings predict conversion from laparoscopic to open cholecystectomy. *Surgery.* Oct 2007;142(4):556-65.
27. Markus S. M.D., Lukas K.M.D. and Buchler W. M.D.: predictive factors for the type of surgery in acute cholecystitis. *The Am. J of Surgery* 2001;182(3):291-7.
28. Al-Bahlouli SH, Al-Malahi A, Ghalla NH, Al-Dain AS, Ali Sabahi AA. Conversion rate of laparoscopic to open cholecystectomy. *Yemeni Journal for Medical Science* 2009;1:1-8.
29. Memon W, Khanzada TW, Samad A, Laghari MH. Laparoscopic cholecystectomy: conversion rate and its causes at Isra University Hospital, Hyderabad. *RMJ.* 2008; 33(2): 159-161.
30. Meshikhes AW, Al-Dhuraish S, Bhatia D, al-Khatir N. Laparoscopic cholecystectomy: The Dammam Central Hospital experience. *Int Surg.* 1995;80:102–4.
31. Al-Saigh AA, Fadl-Elahi FA, Maqbool fazili F. Analysis of laparoscopic cholecystectomies in 606 patients: Experience at King Fahad Hospital, Medina. *Ann Saudi Med.* 1996;16:392–4.