

Original article

Study of factors for conversion of laparoscopic cholecystectomy to open cholecystectomy

DR. ARUN SINGH DALAL, DR.VIDHI SHARMA* ,DR RAVI KUMAR MATHUR

POST GRADUATE RESIDENT,DEPARTMENT OF SURGERY ;ASSISTANT PROFESSOR, DEPARTMENT OF PATHOLOGY;PROFESSOR , DEPARTMENT OF SURGERY
NIMS MEDICAL COLLEGE & HOSPITAL,SMS MEDICAL COLLEGE AND ATTACHED GROUP OF HOSPITALS , NIMS MEDICAL COLLEGE & HOSPITAL JAIPUR
CORRESPONDING AUTHOR*

Abstract

Objectives: To study the rate of conversion of Laproscopic Cholecystectomy to open cholecystectomy and to identify the factors responsible for conversion of Laproscopic Cholecystectomy to open cholecystectomy.

Methods: All patients undergoing laparoscopic cholecystectomy at NIMS hospital , Jaipur from January 2015 to June 2016,presenting with symptomatic cholelithiasis without choledocholithiasis ; and with no contraindication for general anesthesia were included in the study excluding the patients with factors responsible for conversion of laproscopic cholecystomy to open cholecystectomy.

Results: Total 12 Patients out of 945 cases in this study population had to be converted i.e. conversion rate is 1.27% with the mean age 44.11 years. Most of the patients (69%) presented with the chief complaint of pain abdomen in the right hypochondrium. Diabetic patients had a higher rates of conversion than non-diabetic patients i.e, 3 out of 84 patients (3.57%) as compared to 9 out of 861 non diabetic patients (1.05%) got converted. Thus diabetes being one of the important factors.Surgeon experience being significant factor with mean operation time 49 minutes. The main intra-operative cause of conversion from laparoscopic cholecystectomy to open was difficulty in identifying the anatomy as a result of dense adhesions (58.3%) followed by hemorrhage in the Calot's triangle (24.9%) and injury to the CBD (16.6%).

Conclusion: Laparoscopic cholecystectomy is a reliable,safe and minimally invasive surgical technique . While many reasons lead to conversion and influence conversion rate,commonest cause of conversion in this study was the presence of dense and extensive adhesions at Ca lot's triangle. Thus it is mandatory to explain about the possibility of conversion to open cholecystectomy while taking consent for LC.

Introduction

Cholecystectomy has changed profoundly by the advent of laproscopy. Laparoscopic cholecystectomy (LC) was the first surgery performed laproscopically. LC was the first procedure learned by Minimal Invasive Surgeon.Our purpose in this study was to identify the conversion rate and also identify the factors responsible for conversion of laparoscopic cholecystectomy to open cholecystectomy. Hence, these findings will allow us to preoperatively

discuss the higher, risk of conversion and allow for an earlier judgement and decision on conversion if intra-operative difficulty is encountered.

Material and Methods

All patients undergoing laparoscopic cholecystectomy at NIMS Hospital attached to NIMS Medical College, Jaipur from January 2015 to July 2016, and includes 945 patients. This is a hospital based descriptive analytical type of observational study.

Patients presenting with cholelithiasis without choledocholithiasis; and with no contraindication for general anaesthesia who were more than 18 years old were included in the study. Medical records of all patients who underwent LC were reviewed. Data recorded included demographic information, past medical history, indication for operation, duration of operation, reason for conversion and post-operative complications. The patients were operated by different senior 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. All patients had oral liquids followed by food from 2nd day after surgery, provided there was no nausea and vomiting.

Observations and Results

Amongst 12 Patients out of 945 cases in this study population had to be converted i.e. conversion rate is 1.27%. Our study showed maximum incidence of the gall bladder diseases in females as compared to males with a ratio of 1:3.8 (78.6 % were females).The commonest age of presentation of gall bladder diseases is 31-40 years (23.17% of the patients presented in this age group). Most of the patients (69%) presented with the chief complaint of pain abdomen in the right hypochondrium.

Diabetic patients had a higher rates of conversion to open cholecystectomy than non-diabetic patients i.e, 3 out of 84 patients (3.57%) as compared to 9 out of 861 non diabetic patients (1.05%) got converted. Thus diabetes being one of the important factors.

Group	No of patients	%	Converted		Successful	
			No of patients	%	No of patients	%
Patients with Diabetes	84	8.9	36	3.57	49	96.43
Patients without Diabetes	861	91.1	9	1.08	884	98.95

Table-1: Conversion in Diabetic patients

Ultrasonography appeared to be the most economical, simplest, easiest and an early tool for the evaluation of gall bladder diseases. Patients with thickened gall bladder wall had a high rate of conversion i.e, 4 out of 185 patients with a thickened gall bladder wall (2.16%) had to be converted. But this is not significant in our study according to

statistics. Patients who presented with acute cholecystitis had a higher conversion to open procedure compared to those who presented with cholelithiasis. But this is not significant in our study according to statistics.

Surgeon experience is significant factor, as conversion rate is very less in cases done by surgeon with higher case experience. The mean duration was 49 minutes for surgery with the range of 40 to 135 minutes. The mean postoperative hospital stay was 1.23 days.

Surgeon with experiences of	Case done in study	converted cases	conversion rates
<50 cases	48	3	6.25
50-200 cases	251	4	1.59
>200 cases	646	5	0.77

Table 2: Case experience of surgeons & conversion

The main intra-operative cause of conversion from LC to open was difficulty in defining anatomy because of dense adhesions (58.3%) followed by hemorrhage in Calot's triangle (24.9%) as well as injury to the CBD (16.6%).

Reason for conversion	No. of cases	Percentage (%)
Difficult anatomy due to :		
- Dense adhesions of Calot's triangle	6	50 } 58.3%
- Anatomical variation	1	8.3 }
Bleeding from :		
- Calot's triangle (Cystic artery)	2	16.6 } 24.9%
- Injury to portal cavernosna	1	8.3 }
Common bile duct injury	2	16.6

Table 3: Reasons for conversion

Discussion

Cholelithiasis is a common disease entity, Frequent occurrence and serious complications of Cholelithiasis have made this one of the most important surgically correctable diseases.

Open cholecystectomy has been a gold-standard for the treatment of cholilithiasis for more than 100 years since Carel Johann Langenbuch has performed first open cholecystectomy in 1882^[6]. In 1987, Philip Mouret performed first laparoscopic cholecystectomy in human which became the new gold standard and almostly replaced open cholecystectomy for the treatment of cholilithiasis^[6]. In India the first laparoscopic cholecystectomy was performed at II Hospital, Mumbai in 1990, followed by Dr. Jyotsna Kulkarni in Pune few months later.^[9]

Conversion to open surgery is sound surgical judgment and should not be regarded as a complication, as patient safety is of most importance.

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. In our study patients were younger and mean age was 44.1 years. Daradkeh^[52] Bingener et al^[51] reported mean age 47.2 and 40 years respectively. All the 945 patients were planned for elective laparoscopic cholecystectomy. 12 out of the 945 patients i.e. 1.27 % were converted from lap to open cholecystectomy. Maximum conversion rate was in older age group of 71 to 80 years i.e. - 6.45%. Workers like Thomas B Hugh et al^[68], R Schmitz et al^[69] have reported a similar peak incidence in the 4th and 5th decade.

The main sufferers of gallbladder disease in our study were females as compared to males. Out of total 945 cases, 743 (79%) were females and 202 (21%) were males, which are very much similar to those observed by Frazee et al^[70] and U. Berggren et al^[71].

In a study by Adbikardid Bedirli, Erdogan M. Sozuer et al^[74] between 1993 to 2000, conversion to open cholecystectomy was required in 19 patients out of 678 in non diabetic group (2.8%) and 13 patients out of 184 in diabetic group (7.1%). The author concluded laparoscopic cholecystectomy in diabetic patients is associated with higher morbidity and a higher conversion - rate than that in non diabetic patients which correlated with our study.

In a study by Tayeb M, Raza syed Ahsan et al^[67] 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 our study, out of 12 converted patients 1 were hypertensive (8.3%) and out of 933 successful laparoscopies 49 were hypertensive (5.25%). Though there is slightly higher conversion rate in hypertensive than in non-hypertensive but this is not significant value according to statistics. So our study correlates with their study stating that there is little bit higher risk of conversion in hypertensive patients but it is not significant.

In a retrospective analysis by Chahin F^[60] over a 3 year period of 557 patients who underwent laproscopic Cholecystectomy 88 patients had acute cholecystitis. He concluded that conversion rate was 22% in acute cholecystitis patients as compared to 5.5% in case of patients with chronic cholecystitis. In our study of 945 patients, 160 patients (16.93%) had acute cholecystitis, out of which patients (1.88%) were converted. According to Singh Kuldip, Ohri Ashish^[6]; within onset of symptoms in 72 hours, the tissue planes are edematous and inflamed but dissection is easier. But after 72 hours, tissues become more friable and become risky to dissect in next 3 - 4 weeks when inflammation decreases and fibrosis sets in. In another study by Koo KP et al^[81] experienced a high conversion rate for laparoscopic cholecystectomy in acute cholecystitis if delayed for more than 72 hours.

Previous attacks of acute cholecystitis results in scarred and fibrosed gall bladder. These dense fibrotic adhesions lead to difficult laparoscopic dissection. Gall bladder wall thickness is related to the fibrosis or inflammation that follows prior attacks of acute cholecystitis, and this may reflect difficulty in identifying anatomy during LC.

Average duration of surgery in our series was 49 min. The average duration of surgery in other studies were as follows:-

Series	Duration of surgery
AJ Karayiannakis et al ^[82]	105 minutes
Ravimohan SM et al ^[83]	46.8 minutes
Bart M Redemaker ^[84]	78 minutes
Sooper et al ^[85]	95 minutes
Axe ROS et al ^[86]	93 minutes

Table 4: Average duration of surgery in other studies

In our study, mean duration of operation in converted cases was 128 min and successful laparoscopic operated was 48.3 min. In a study by Tayeb M, Raza Syed Ahsan et al ^[67] from 1997 to 2001, the mean duration of surgery in converted cases was 2.4 hours and successful laparoscopic operated was 1.3 hours. Conversion to open cholecystectomy is considered a major morbidity of laparoscopic cholecystectomy. The conversion rate was 1.27% in this study which is comparable to the 2.6% to 14% conversion - rate reported in surgery literature. In 3 (24.9%) cases conversion was due to intraperitoneal bleeding. In 2 (16.6%) cases, there was excessive haemorrhage in Calot's triangle, which occurred while dissecting cystic artery and duct. In another 1 (8.3%) case, there was uncontrolled bleeding from the porta cavernoma. Conversion to open was necessary for controlling haemorrhage as they could not be controlled laparoscopically.

Table 5 is comparison of our conversion rate with some other major published similar studies: -

Study	Place	Year	No. of	Conversion rate
This study	India	2014	945	1.27%
Masoom Raza et al ^[88]	Karachi	2006	118	11.1%
Tarcoveanu et al ^[59]	Romania	2005	6985	3.2%
Ishiazaki et al ^[53]	Japan	2006	1179	7.5%
Dholia et al ^[56]	Larkana	2005	100	8.0%
Lim et al ^[60]	Singapore	2005	443	11.5%
Vecchio et al ^[57]	USA	1998	114005	2.2%
Tan et al ^[89]	Australia	2006	202	4.2%
Tayeb et al ^[67]	Karachi	2005	1249	7.5%

Conclusion

Lap cholecystectomy is a reliable , safe surgery and minimally invasive procedure. With increasing experience complications and conversion rate can be decreased to minimum. The present study has shown that we have comparable conversion rate to that in literature of last five years. Whilst, the most important reason for conversion was the presence of dense and extensive adhesions at Ca lot's triangle henceforth it being mandatory to explain about the possibility of conversion to open cholecystectomy while taking consent for LC.

Bibliography

1. Halpert B, Carl Langenbuch. Master surgeon of the biliary system. Arch Surg 1932; 178.
2. Tehemton E. Udwardia. Journal of minimal access. Surgery 2005 June; 1:51-52.

3. Daradkeh S. Laparoscopic cholecystectomy: Aanalytical study of 1208 cases. *J Hepatogastroenterology* 2005; 52:1011-4
4. Bingener-Casey 1, Richards ML, Strodel WE, Schwesinger WH, Sirinek KR. Reasons for conversion from laparoscopic to open cholecystectomy: a 10-year review. *16astrointest Surg* 2002; 6: 800-5.
5. Hugh TB. New strategies to prevent laparoscopic bile duct injury - surgeons can learn from pilots. *Surgery* 2002;132:826-35.
6. Schmitz R, Rohde V, Treckmann J, Shah S. Randomized clinical trial of conventional cholecystectomy versus mini cholecystectomy *BrJ Surg* 1997;84:1683-6.
7. Frazee RC, Roberts JW, Symmonds R et al. What are the contraindications for laparoscopic cholecystectomy? *Am Jr Surg* 1992; 164: 491-95.
8. Berggren U, Gordh T, Grama D, et al. Laparoscopic versus open cholecystectomy: hospitalization, sick leave, analgesia and trauma responses. *Br J Surg* 1994;81:1362-5.
9. Abdulkadir Bedirli, Erdogan M. Soziler, Osman YUksel, and Zeki Yilmaz Laparoscopic Cholecystectomy for Symptomatic Gallstones in Diabetic Patients *Journal of Laparoendoscopic & Advanced Surgical Techniques*. October 2001, Vol. 11, No. 5: 281-284.
10. Tayab M, Ahsan RS, Khan MR. Conversion from laproscopic to open Cholecystectomy. Multivariant analysis of preoperative risk factors. *J Post-grad Med* 2005;51:17-20.
11. 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.
12. Kuldip Singh, Ashish Ohri. *Journal of minimal access. Surgery* 2005 June; 1:59-61.
13. Koo KP, Thirlby RC. Laparoscopic cholecystectomy in acute cholecystitis. What is the optimal timing for operation? *Arch Surg* 1996; 131:540-5.
14. Ka rayianna kis AJ, Makri GG, Mantzioka A, Karousos D, Karatzas G. Systemic stress response after laparoscopic or open cholecystectomy: A randomized trial. *Br J Surg* 1997; 84; 467-471.
15. Ravimohan SM, Lileswar Kaman, Ravi Jindal, Rajinder Singh, Jindal S.K. Postoperative pulmonary function in laparoscopic versus open cholecystectomy: A prospective, comparative study, *IJ Gastroenterol* 2005; 24:6-8.
16. Bart M. Rademaker, Jan Ringers,, JoSeph A, Odoom Laurens T. Dewit, Cor J. Kalkman, Johannes Oosting. Pulmonary function and stress response after laparoscopic cholecystectomy: Comparison with subcostal incision and influence of thoracic epidural analgesia. *Anaesth Analg* 1992; 75:381-385.
17. Nathaniel J. Soper, Jeffrey A. Barteau, Ralph V. Clayman, Stanley W. Ashley, Deanna L. Dunnegan. Comparison of early postoperative results for laparoscopic versus standard open cholecystectomy *Gynec Obstet* 1992 Feb; 174:114-116.
18. Axel Ros, Lennart Gustafsson, Hans Krook, Carl-Eric, Nordgren, Anders Thorell, Goran Wallin et al. Laparoscopic cholecystectomy versus mini laparotomy cholecystectomy. *Ann surg* 2001; 234:741-743.
19. Masoom Raza Mirza, Wajahat H. Wasty, Lubna Habib. An audit of cholecystectomy. *Pakistan Journal of Surgery*. Volume 23, Issue 2, 2007; pg 104-8.

20. Tarcoveanu E, Niculescu D, Georgescu S. Conversion in laparoscopic cholecystectomy. *Chir-urgie*.2005; 100:437-44.
21. . Ishizaki Y, Miwa K, Yoshimoto J, Sugo H, Kawasaki S. Conversion of elective laparoscopic to open cholecystectomy between 1993 and 2004. *Bri Surg* 2006; 93: 987-91.
22. . Dholia KM, Memon AA, Sheikh MS. Laparoscopic cholecystectomy: Experience of 100 cases at a teaching hospital of Sindh. *J Liaquat Univ Med Health Sci* 2005; 4:105-8.
23. . 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.
24. Vecchio R, Macfadyen BV, Latterl S. Laparoscopic cholecystectomy: Analysis of 114,005 cases of United States series. *Int Surg* 1998; 83:215-9.
25. Tan JT, Suyapto DR, Neo EL, et al. Prospective audit of Laparoscopic Cholecystectomy at a secondary referral centre in South Australia. *Aust NZ J Surg* 2006; 76(5): 335-8.
26. . Tayab M, Ahsan RS, Khan MR. Conversion from laproscopic to open Cholecystectomy. Multivariant analysis of preoperative risk factors. *J Post-grad Med* 2005;51:17-20.