

Rate And Reasons Of Conversion Of Laparoscopic Cholecystectomy To Open Surgery: The Experience Of Baquba Teaching Hospital

Bashar Akram AlBayati¹, Fuad Jarrallah, Salah Saleh²

^{1,2}*General and Laparoscopic Surgeon, Department of General Surgery, Baquba Teaching Hospital, Diyala, Iraq.*

Abstract: Background: *Laparoscopic cholecystectomy is the gold standard procedure for symptomatic cholelithiasis and one of the most common surgical operations performed worldwide. However, laparoscopic approach to cholecystectomy may not be possible in every patient, thus conversion to open cholecystectomy is occasionally necessary to avoid or repair injury, delineate confusing anatomy or treat associated conditions.*

Patients and Method: *A prospective study conducted in the Laparoscopy Unit- Department of General Surgery - Baquba Teaching Hospital – Diyala – Iraq, from January 2017 to December 2019. A total of 2749 patients of all age groups and both sexes who were found to have symptomatic gallstones were included in the study. Operative findings, causes of conversion and postoperative complications were recorded.*

Result: *Out of the 2749 patients who were included in this study, successful laparoscopic cholecystectomy was completed in 2711 patients, while conversion to open procedure was required in 38 patients (1.38 %). Among those who were converted to open surgery, the most common cause of conversion was dense adhesions around the gallbladder representing 42.1 % of causes of conversion. The next common cause of conversion was obscure anatomy at Calot's triangle in 31.58 % patients. Instrument failure was responsible for 10.53 % of conversions. Massive bleeding that could not be controlled laparoscopically was the cause of conversion in 7.89 % of patients and visceral injury was the cause in 5.26 % while the least common cause of conversion was wide cystic duct in 2.63% which was difficult to clip laparoscopically.*

Conclusion: *The risk of conversion to open surgery is always present and the decision about when to convert to laparotomy is an individual one, often subjective, made by the surgeon in the course of the procedure. The conversion rate in the present study was 1.38 % which is in the lower limit as compared to other studies, with causes similar to or approximating many national and international literatures.*

Keywords: *symptomatic cholelithiasis, laparoscopic cholecystectomy, open cholecystectomy, conversion rate.*

1. INTRODUCTION

Gallstone disease is a global health problem, most patients are usually asymptomatic, and gallstones are generally detected in ultrasonography during the evaluation of some other unrelated medical conditions^(1, 2). The prevalence of gallstones varies widely and is related to factors like age, gender and ethnic background⁽³⁾.

Laparoscopic cholecystectomy revolutionized the minimally invasive procedures⁽²⁾ and replaced open cholecystectomy, which was the traditional procedure in the treatment of symptomatic cholelithiasis⁽⁴⁻⁷⁾, and thus, laparoscopic cholecystectomy became the gold standard procedure and one of the most common surgical operations performed worldwide⁽⁸⁾. The advantages of laparoscopic cholecystectomy made it attractive to patients, surgeons, and hospitals⁽⁹⁾ as it is a very safe and easy procedure^(2, 5, 4, 8). In spite of all advantages, sometimes, complications encountered during Laparoscopic cholecystectomy, some of these complications are common to laparoscopic surgery in general while other complications are specific to this unique technique^(10, 11).

Due to increase surgical experience and technical innovation, majority of patients with symptomatic gallstones can be managed by laparoscopy, except for patients with blood diathesis, carcinoma of gallbladder and patients not fit for anaesthesia^(3, 5).

Despite advancement in experience and technology, laparoscopic approach to cholecystectomy may not be possible in every patient⁽¹²⁾, thus conversion to open cholecystectomy is occasionally necessary to avoid or repair injury, delineate confusing anatomy or treat associated conditions⁽¹⁰⁾. This conversion should not be considered as a failure of surgery or inexperience of the surgeon, but rather a wise decision to avoid any risks or damage or to deal with adverse conditions^(2, 13), although conversion is associated with increased morbidity, prolonged hospitalization and longer recovery compared to a laparoscopic approach⁽¹³⁾.

Every surgeon should know the factors leading to conversion of laparoscopic cholecystectomy to open cholecystectomy for a better understanding of the limitations, and improved preoperative counseling⁽¹⁴⁾.

2. PATIENTS AND METHODS

A prospective study conducted in the Laparoscopy Unit- Department of General Surgery - Baquba Teaching Hospital – Diyala – Iraq, from 1st of January 2017 to 31st of December 2019 (three years). A total of 2749 patients of all age groups and both sexes who were found to have symptomatic gallstones were included in the study. Patients with jaundice, choledocholithiasis or dilated common bile duct, gallbladder malignancy, patients with viral hepatitis (B or C) or HIV and patients who were medically unfit for laparoscopic approach were excluded from the study.

Full preoperative assessment was done including full blood count, blood sugar, liver and renal function tests and screening for viral hepatitis (B and C) and HIV. Abdominal ultrasound was performed in all patients to confirm gallstones, to assess the common bile duct and used as a tool for exclusion criteria. ECG and chest X- ray were done when indicated.

Informed consents were taken from the patients including the possibility of conversion of laparoscopic cholecystectomy to open operation.

Standard four port technique was used to perform laparoscopic surgery and the operations were done by 16 distinct surgeons and the decision to convert to open cholecystectomy was made by the individual surgeon.

Data from all the patients were recorded, including operative findings, causes of conversion and postoperative complications.

3. RESULTS

Out of the 2749 patients who were included in this study, 2326 patients (84.61 %) were female and 423 patients (15.39 %) were male, giving rise to female to male ratio of 5.5:1. The patients' ages ranged from 9 to 82 years with a mean of 39.2 years.

Successful laparoscopic cholecystectomy was performed in 2711 patients (98.62%) Among those with successful procedure, 2301 were female and 410 were male, while conversion to open procedure was required in 38 patients (1.38%). Among those who were converted to open surgery, 25 patients were female (1.07 % of the total female patients) and 13 patients were male (3.07 % of the total male patients). As shown in table 1.

Table 1: Patients' gender and rate of conversion

Gender	Successful procedure (%)	Conversion to open procedure (%)	Total no. of the patients (%)
Female	2301 (98.93 %)	25 (1.07 %)	2326 (84.61%)
Male	410 (96.93 %)	13 (3.07 %)	423(15.39 %)
Total	2711 (98.62%)	38 (1.38 %)	2749

In this study, the most common reason of conversion was dense adhesions around the gallbladder, due to chronic cholecystitis or previous laparotomy, in 16 patients representing 42.1% of causes of conversion. The next common cause of conversion was obscure anatomy at Calot's triangle due to acute or chronic inflammation or aberrant anatomy in 12 patients (31.58%).

Instrument failure was the cause of conversion in 4 patients (10.53 %) due to inability to establish and / or maintain sufficient pneumoperitoneum during the course of laparoscopic cholecystectomy.

Three patients (7.89 %) were converted due to massive bleeding that made vision unclear and successful haemostasis could not be achieved laparoscopically. In two patients, the bleeding was from the gallbladder bed that occurred during diathermic dissection, while in one patient the bleeding was from the Calot's triangle, which occurred during dissection of cystic duct and artery.

Visceral injury was the reason of conversion in 2 patients (5.26 %), one with CBD injury and the other with duodenal injury, while wide cystic duct, which was difficult to clip laparoscopically, found in one patient (2.63 %), so the procedure was converted for successful ligation and division of the cystic duct.

Table 2: Reasons of conversion

Reason of conversion	No. of patients	Percentage
Adhesions	16	42.1 %
Obscure anatomy at Calot's triangle	12	31.58 %
Instrument failure	4	10.53 %
Bleeding	3	7.89 %
Visceral injury	2	5.26 %
Wide cystic duct	1	2.63 %
Total no.	38	

4. DISCUSSION

Laparoscopic cholecystectomy has become the gold standard procedure for management of symptomatic gallstone disease^(8,11).

The outcome of laparoscopic cholecystectomy is influenced greatly by surgeon specific factors (such as the training, experience, skill and judgement of the surgeon performing the procedure)⁽⁷⁾, numerous patient and disease related factors (such as obesity, male gender, old age, prior abdominal surgery, acute cholecystitis, common bile duct stone, and anomalous anatomy)⁽¹⁵⁾ and equipment related factors (such as electricity or equipment failure)⁽¹⁶⁾. Thus, the risk of conversion to open surgery is always present⁽¹¹⁾ and the decision about when to convert to laparotomy is an individual one, often subjective, made by the surgeon in the course of the procedure⁽¹⁰⁾ and preferably, the time to conversion should be as short as possible⁽¹⁷⁾ although this conversion is associated with increased morbidity, prolonged hospitalization and longer recovery compared to a laparoscopic approach^(1,13,14,18).

Every institution must have a thorough understanding of the rate and causes of conversion to open surgery based on culture and geography, in addition to an understanding of conversion within the institution^(1,16).

Conversion rates of 1 to 19% have been reported in different studies^(1,3-6,10-16,19,21-23), with increasing experience in laparoscopic cholecystectomy, an inverse trend in conversion rate is seen^(9,19,20). The conversion rate in the present study was 1.38 % and this could be partly explained by the high learning curve for most of our surgeons and seeking for second opinion when difficulties were encountered and by the tendency of our surgeons to operate the cases of acute cholecystitis after an initial conservative treatment.

Dense adhesions around the gallbladder was the most common cause of conversion in 31%, 38%, 40.4%, 46%, 62% of cases in studies conducted by Ajay Anand et al.⁽⁷⁾, Tariq Rashid et al.⁽¹⁶⁾, Sujit Vijay et al.⁽¹⁵⁾, Naseer Ahmed Awan et al.⁽²²⁾, and Sujoy Mukherjee et al.⁽¹⁴⁾ respectively, similarly, adhesions were the most common cause of conversion in 42.1 % of patients in this study.

Obscure anatomy at Calot's triangle was the next most common cause of conversion in this study (31.58 % of cases), while this was the cause in 9.5%, 23%, 50% and 54.32% of cases in studies conducted by Ajay Anand et al.⁽⁷⁾, Naseer Ahmed Awan et al.⁽²²⁾, Rizwan Ahmed Khan et al.⁽¹⁹⁾ and Muhammad Shamim et al.⁽⁹⁾. Instrument failure was the cause of conversion in 10.53 % due to inability to establish and / or maintain sufficient pneumoperitoneum, these technical difficulties also encountered in other studies as in Ajay Anand et al.⁽⁷⁾ which was 4.77%, Sujoy Mukherjee et al.⁽¹⁴⁾ was 8.1%, Sujit Vijay et al.⁽¹⁵⁾ in 22.9%. While uncontrollable bleeding was the cause of conversion in 7.89 % of patients in this study; it was responsible for 6.4%, 7.4%, 16% and 19.23% of causes of conversions in the studies of Sujit Vijay et al.⁽¹⁵⁾, Muhammad Shamim et al.⁽⁹⁾, Mohammed Reda AlGhadhban et al.⁽⁶⁾, and Naseer Ahmed Awan et al.⁽²²⁾. Visceral injury was the cause of conversion in 5.26 % of cases in this study, while it was the cause of conversion in 2.74%, 6.66%, 11%, 13.5% in studies conducted by Muhammad Shamim et al.⁽⁹⁾,⁽²⁴⁾, Sujit Vijay et al.⁽¹⁵⁾ and Sujoy Mukherjee et al.⁽¹⁴⁾ respectively. Wide cystic duct, which was difficult to clip laparoscopically, was responsible for 2.63 % of conversion in our study, while it was seen in 8.3% and 8.6% of cases in studies of Mohammed Reda AlGhadhban et al.⁽⁶⁾ and Muhammad Shamim et al.⁽⁹⁾.

5. CONCLUSION

The risk of conversion to open surgery is always present and the decision about when to convert to laparotomy is an individual one, often subjective, made by the surgeon in the course of the procedure. The conversion rate in the present study was 1.38 % which is in the lower limit as compared to other studies, with causes similar to or approximating many national and international literatures.

6. REFERENCES

- [1] Volkan Genc, Marlen Sulaimanov, Gokhan Cipe, Salim Ilksen Basceken, Nezh Erverdi, Mehmet Gurel et al. What necessitates the conversion to open cholecystectomy? A retrospective analysis of 5164 consecutive laparoscopic operations. *CLINICS* 2011; 66 (3):417-420.
- [2] SV Ramamohan Reddy, G Balamaddaiah. Predictive factors for conversion of laparoscopic cholecystectomy to open cholecystectomy: a retrospective study. *Int Surg J.* 2016; 3(2):817-820.
- [3] Ravindra Nidoni, Tejaswini Vudachan, Prasad Sasnur, Ramakanth Baloorkar, Vikram Sindgikar, Basavaraj Narasangi. Predicting Difficult Laparoscopic Cholecystectomy Based on Clinicoradiological Assessment. *Journal of Clinical and Diagnostic Research.* 2015; 9(12):09-12.
- [4] Nandkishor Narwade, Tanveer Shaikh, Rishabh Jain, Naseem Khan, Mithilesh Ghosalkar, Sharique Ansari, Yashashvi Sharma. The study of laparoscopic cholecystectomy and its conversion to open cholecystectomy: analysis of 100 cases in Navi Mumbai, India. *Int J Res Med Sci.* 2015; 3 (12):3586-3590.
- [5] Muhammad Afzal, Shafqat Rehman, Muhammad Amer Mian, Raees Ahmed. Rate and reasons of conversion of laparoscopic cholecystectomy to open cholecystectomy? A prospective analysis of 450 consecutive laparoscopic cholecystectomy. *Pak Armed Forces Med J* 2016; 66(1):117-21.
- [6] Mohammed Reda Al Ghadhban, Hussein Ali Alkumasi, Mohammed Saleem Meziad. *Int Surg J.* 2018; 5 (5):1640-1643.
- [7] Ajay Anand, B.S. Pathania, Gurjeet Singh. Conversion in Laparoscopic Cholecystectomy: An Evaluation Study. *JK SCIENCE* 2007; 9(4): 171 - 4.
- [8] Verdeja Robles CA, Turcio Aceves O, Zubia Arellano CP, Norberto Gonzalez JJ, Valles Hernandez AC, Juliàn Novoa MF and Idelfonso Esquivel M. Laparoscopic Cholecystectomy; Complications and Conversion to Open Cholecystectomy. *Open Access J Surg.* 2018; 9(3): 555763.
- [9] Muhammad Shamim, Amjad Siraj Memon, Ashfaq Ahmed Bhutto, Mir Muhammad Dahri. Reasons of conversion of laparoscopic to open cholecystectomy in a tertiary care institution. *J Pak Med Assoc* 2009; 59(7): 456-460.
- [10] Faruquzzaman. Contributing Factors and Conversion Prevalence of Laparoscopic Cholecystectomy to Open Surgery. *Arch Clin Gastroenterol* 2017; 3(2): 037-040.
- [11] Mohanapriya Thyagarajan, Balaji Singh, Arulappan Thangasamy, Shobana Rajasekar. Risk factors influencing conversion of laparoscopic cholecystectomy to open cholecystectomy. *Int Surg J.* 2017; 4(10):3354-7.

- [12] Farzana Memon, Roger Christopher Gill, Sumera Baloch, Mehmood A. Khan, Amber Bawa, M. Saeed Quraishy, Noman Shehzad. Conversion of laparoscopic to open cholecystectomy, is gender a predictor? *Pak J Surg* 2014; 30(4):290-5.
- [13] Robert P. Sutcliffe, Marianne Hollyman, James Hodson, Glenn Bonney, Ravi S. Vohra, Ewen A. Griffiths. Preoperative risk factors for conversion from laparoscopic to open cholecystectomy: a validated risk score derived from a prospective U.K. database of 8820 patients. *HPB* 2016; 18: 922–8.
- [14] Sujoy Mukherjee, Jagadamba Sharan, Rishi Jindal. Evaluation of factors for conversion of laparoscopic to open cholecystectomy in a tertiary care center .*International Journal of Anatomy, Radiology and Surgery*. 2018; 7(1): 9-12.
- [15] Sujit Vijay Sakpal, Supreet Singh Bindra, Ronald S. Chamberlain. Laparoscopic Cholecystectomy Conversion Rates Two Decades Later. *Journal of the Society of Laparoendoscopic Surgeons*. 2010; 14:476–483.
- [16] Tariq Rashid, Asma Naheed, Umar Farooq, Muhammad Iqbal, Najeeb Barkat. Conversion of laparoscopic cholecystectomy into open cholecystectomy: An experience in 300. *J Ayub Med Coll Abbottabad* 2016; 28 (1): 116-19.
- [17] Satoshi Hayama, Kazuto Ohtaka, Yasushito Shoji, Tatsunosuke Ichimura, Miri Fujita, Naoto Senmaru, Satoshi Hirano. Risk Factors for Difficult Laparoscopic Cholecystectomy in Acute Cholecystitis. *JLS* 2016;20(4):1-8.
- [18] Alan Shiun Yew Hu, R. Menon, R. Gunnarsson, A. de Costa. Risk factors for conversion of laparoscopic cholecystectomy to open surgery - A systematic literature review of 30 studies. *The American Journal of Surgery*. 2017; 214: 920-930.
- [19] Rizwan Ahmad Khan, Shaukat Rabbani, Salma Batool, Mohammad Touseef Asghar. Laparoscopic Cholecystectomy Indications to Convert to Open Cholecystectomy? A Retrospective Study, Analysis of 856 Laparoscopic Cholecystectomy Operations. *PJMHS* 2018; 12 (2):760-761.
- [20] John Griniatsos. Factors predisposing to conversion from laparoscopic to open cholecystectomy. *Ann Laparosc Endosc Surg* 2018; 3:12.
- [21] Basim Jasim Abdulhussein, Yarub Fadhil Hussein, Abdulsalam Hatem Nawar, Redhwan Ahmed Al-Naggar. Conversion Rate of Laparoscopic Cholecystectomy to Open Surgery at Al Karamah Teaching Hospital, Iraq. *Surgical Science*, 2015; 6: 221-226.
- [22] Naseer Ahmad Awan, Firdous Hamid, Irfan Nazir Mir, Mir Mujtaba Ahmad, Ajaz Ahmad Shah, Athar Asimi, Alfar Ah Nafee, Hilal Ahmad Wani. Factors resulting in conversion of laparoscopic cholecystectomy to open cholecystectomy-institution based study. *Int Surg J*. 2018; 5 (1):132-137.
- [23] Muhammad Rafique Memon, Ghulam Muhammad, Saima Arshad, Muhammad Ayub, Ali G Bozdar, Syed Qarib Abbas Shah. Study of open conversion in laparoscopic cholecystectomy. *Gomal Journal of medical Sciences* 2011; 9(1):51-54.
- [24] Chaudhary Sanchit, Sharma Maneesh, Wig JD, Gupta NM, Mahajan Amit. Assesment of Risk Factors for Conversion to Open Surgery in Patients Undergoing Laparoscopic Cholecystectomy. *Journal of Dental and Medical Sciences* 2016; 15(10): 14-18.