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Original Research Article

Incidence of conversion from laparoscopic to open cholecystectomy and its associated factors

Rafea Jasim Hussein Al-Shammari*, Sabah Noori Abdulraheem Al-Khazaali

Department of Surgery, Baghdad Teaching Hospital, Baghdad Medical City, Baghdad, Iraq

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***Correspondence:**
Dr. Rafea Jasim Hussein Al-Shammari,
E-mail: Dr.rafea_jasim@yahoo.com

ABSTRACT

Background: Laparoscopic cholecystectomy has replaced open cholecystectomy as standard procedure for the treatment of Symptomatic cholelithiasis. Nonetheless, conversion from laparoscopic cholecystectomy to open one is still required in many circumstances. The aim of this study was to determine the main causes of conversion to open in laparoscopic cholecystectomy.
Methods: From 1st of January 2010 until the 1st of January 2011 one hundred and fifty patients who had laparoscopic cholecystectomy were prospectively followed at the time of surgery by obtaining a data for the patient's age, sex, time from the introduction of laparoscopic ports till decision of conversion and the cause of conversion if present.
Results: Put of the 150 laparoscopic cholecystectomy 9 conversions occurred (the percentage of conversion was 6%). The most common causes were: vascular injuries: 2 patients, empyema of the gall bladder: 2 patients, severe obesity: 1 patient, abnormal position of gall bladder: 1 patient, and dense adhesions and disturbed anatomy: 3 patients. Three patients of conversions are males from 25 male patients underwent laparoscopic cholecystectomy, 6 cases are females from 125 female patients underwent laparoscopic cholecystectomy so the percentage of conversion for male patients is 12% while for female patients is 4.8%.
Conclusions: The overall conversion rate in this study was 6% and the most common cause for conversion is dense adhesions, followed by empyema of GB. and severe bleeding that need conversion, and the rate for conversion was higher in male patients.

Keywords: Cholecystectomy, Conversion, Laparoscopic, Open

INTRODUCTION

Cholecystectomy was established as the surgical treatment for cholelithiasis in 1882, Carl Johan August Langenbuch was the first who performed the procedure. Open cholecystectomy became the gold standard for the treatment of cholelithiasis till the introduction of laparoscopic cholecystectomy in 1980, when Philip Mouret from France performed the first human laparoscopic cholecystectomy in 1987. There is no doubt that laparoscopic cholecystectomy replaced open cholecystectomy as a standard for the treatment of symptomatic cholelithiasis, the advantages of this procedure includes reduced postoperative pain, shorter hospitalization, earlier return to normal activity and definitely better cosmetics.[1] The spread of the procedure in almost all hospitals and the advancement in surgeon's experience and confidence has led to decrease the work with the open technique to be performed only in failures of the laparoscopically attempted ones. Conversion from laparoscopic cholecystectomy to open cholecystectomy is still required in certain circumstances.[2-4] Conversion is related to patient factors, surgeon factors and equipment failure factors but most are converted because of

difficulty in delineating the anatomy clearly or complications arising during the procedure.[5]

The well-documented advantages and safety of laparoscopic cholecystectomy have made it standard of care for the management of patients with symptomatic gallstones. Despite these advantages, conversion to open procedure is required in a varying proportion of patients which ranges from 2% to 15% in different studies.[6,7] It is important to realize that the need for conversion to laparotomy is neither a failure nor a complication, but an attempt to avoid complication and ensure patient safety. The surgical rule that you can only operate on what you can see remain a guiding principle of laparoscopic surgery. Rigorous attention to hemostasis is paramount to good exposure because relatively small amount of bleeding can obscure the laparoscopic view. Absolute identification of the anatomy of porta hepatis and triangle of Calot before ligation of any structure is the only safe way to reduce the risk of injury. Other technical problems that may ease the way to conversion are: inadequate or dysfunctional light source, broken fiber optics, camera malfunction, inadequate insufflations, and fogging, bleeding and poorly placed ports.[8]

Conversion: Conversion can be elective i.e. the surgeon decides for one reason or another that the operation is best conducted by the open approach. Or enforced, when the surgeon is forced to convert to open surgery because of the onset of a major or a life threatening intra operative complication.

Elective conversion is indicated:

1. When the exposure obtained is inadequate or the anatomy so disturbed by the pathology or adhesions that visual anatomical planes for safe dissection are not available to the surgeon.
2. On failure to progress more than one hour of the operation for any reason.[9]

METHODS

A prospective study to find out the incidence and causes of conversion in laparoscopic cholecystectomy. From January 2010 to January 2011 (150) patients were enrolled in the study that was carried out in Baghdad Teaching Hospital, all patients that were included in the study were diagnosed as a symptomatic gall stones disease clinically and by ultrasonic examination. All patients had no previous upper abdominal surgery; those with previous upper abdominal surgery had open procedure from the start.

Patients that were admitted for laparoscopic cholecystectomy had preoperative full history and clinical examination followed by the general investigations: RBS, Hb, renal function tests, liver function tests, ECG, chest X-ray, and abdominal ultrasound. At the time of surgery, the following data were obtained: age, sex, time from introduction of ports till the decision of conversion and the cause of conversion.

A standard technique for laparoscopic cholecystectomy was practiced; using four ports. After general anesthesia and positioning of the patient and draping, insufflations achieved through a Veress needle or open method. Carbon dioxide used as the insufflation gas. 30 degrees camera used through 10 mm port. Standard procedures done through four ports technique. The instruments which were available could be described as the minimum of the standard that is usually available in most centers in different countries. Graspers, dissectors, spatula, L-shaped cauterization tool, suction irrigation machine, Babcock, and open technique are frequently and mainly used for the procedures.

RESULTS

From 150 patients who underwent laparoscopic cholecystectomy 25 patients were males (16.66%) and 125 patients were females (83.33%). Nine conversions were obtained (conversion rate was 6%), 3 conversions were males and 6 patients were females so the percentage for conversion in males from the total conversions is 33.33% and for females is 66.66% and the conversion rate for male patients from the total male cases was 12% and for female patients from the total female cases was 4.8%.the average age for conversions was 50 years (Table 1).

Table 1: Age and gender distribution of the patients who underwent laparoscopic cholecystectomy.

Total cases	Male	Female	Total conversions	Male conversions	Female conversions	Mean age of conversion
150	25, 16.66%	125, 83.33%	9, 6%	3, 33.33% from total cases	6, 66.66% from total cases	50

The mean time needed from the introduction of ports till the decision of conversion was 22.5 minutes the longest time was 35 minutes and the shortest time needed was 10 minutes.

The causes of conversions were obtained depending on the decision of the surgeon according to the difficulty faced during surgery or technical faults and other associated causes.

The causes of conversions were as follow: Three patients' conversion were due to dense adhesions and disturbed anatomy that could not guaranteed safe dissection and clipping (33.33%). In two patients the cause was empyema of the gallbladder (22.2%), one patient due to severe obesity that it was very difficult to negotiate the dissection by the standard ports (11%), vascular injuries in 2 patients (22.22%), one patient due to anatomical malposition of the gall bladder (intrahepatic) (11%).

The most common cause for conversion in the study was disturbed anatomy due to dense adhesions with the difficulty to carry out a clear and safe dissection (Table 2).

Table 2: Causes of conversions.

Cause of conversion	n	Percentage
Dense adhesions	3	33.33
Abnormal position of the gall bladder	1	11
Severe obesity (BMI ≥40)	1	11
Empyema of the gall bladder	2	22.22
Vascular injuries	2	22.2

In order to give insight to readers, the conversion rate from other studies was presented here. It is observable that the highest conversion rate cited from Pakistan, followed that from Texas and the lowest from Georgia medical Centre (Table 3).

Table 3: Conversion rates in different studies.

Study	Rate of conversion
Georgia Baptist Medical Center (1989-1991)[6]	2.3%
University of Texas, The National Hospital (1998-2001)[10]	5%
RIPAS Hospital/ Bandar Seri Begawan/ Brunei (1992-1996)[11]	4%
Aga Khan University/ Karachi/ Pakistan (1997-2001)[12]	7.5%

DISCUSSION

In present study the conversion rate was 6% which is within the usual rates of conversions in different studies. This approximate rate of conversion in present study with those from different studies may indicate increasing in the skills of present doctors and a success in laparoscopic surgery in present study the results showed higher rate of conversion in male patients and some previous studies considered male sex as a risk factor for conversion due to severe adhesion. Regarding the causes of conversions in the study and beginning with abnormal position of gallbladder (intrahepatic), the surgeon preferred shifting to open surgery because of difficulty in removal which can lead to liver injuries and bleeding.Although laparoscopic surgery is very suitable for obese patients by decreasing the risk and the need for large incisions that usually needed in obese patient, a severe obesity caused a conversion in the study because of the difficulty in handling and negotiation of the field by the ports because of the very thick abdominal wall.

In other two cases empyema of the gall bladder was the cause for conversion with difficulty in grasping the gall bladder and risk of perforation during manipulation.

Vascular injuries occur in two cases due to injury to the sinuses in the liver bed with significant blood loss and difficult to control which lead to poor visualization of the operative field, so conversion needed for safety of the patient.

The major cause of conversion in present study is dense adhesions and frozen triangle of Calot. Three cases recorded to have dense adhesions, attempts to release the adhesions by cauterization and dissection failed to ensure clear anatomy.[13] Safe lysis of adhesions requires a combination of skillful technique and attention to visual cues.

A study carried out in Georgia between 1989-1991 by the Georgia Baptist Medical Center, from the conversion rate which is about 2.3%, also dense adhesion was the main cause for conversions and they face no trocar injury or biliary ducts injury and they consider dense adhesions as a technical cause.[6]

Another study in Pakistan by Aga Khan Hospital in Karachi between 1997-2001, conversion rate was 7.5% and also dense adhesions were the main cause for conversion (56.3%) and the second cause was empyema of the gallbladder.[11]

In USA, Texas a study carried out by Texas University and North Texas Health Center between 2003-2004, conversion rate was 5% and they consider male sex, severe obesity and acute cholecystitis as the major risk factors for conversion.[10]

Between 1992-1996 a study carried out in Brunei by the RIPAS Hospital to evaluate the efficacy of laparoscopic cholecystectomy as a new procedure in their country, conversion rate was 4% and adhesions from acute cholecystitis were the main cause for conversion and they consider this result as a successful introduction of this procedure.[12]

From present results and comparing with the other results authors can consider the followings as the main causes of conversion respectively: dense adhesions (33.33%), empyema of the gallbladder (22.22%), vascular injuries (22.22%), abnormal position of gall bladder (11%) and severe obesity (11%).

Conversion rate is higher in male sex due to severe adhesion and other studies consider male sex as risk factor for conversion.

Authors attribute the acceptable rate of conversion to the fact that authors follow the basic rules of surgical technique strictly-like use of Veress needle or open technique, adequate vision, minimal use of electrocautery at the triangle of Calot, displaying the structures at the triangle of Calot before clipping, and adequate traction in proper direction.[14]

CONCLUSION

Major causes for conversions in the study was due to disturbed anatomy either from dense adhesions or anatomical variations, From the rate of conversion and the absence of biliary ducts injury during the procedures included in the study authors can notice the rapid improvement of the technique in present locality and increasing the skills of present surgeons.

The conversion rate in male is higher than the female because of the severe adhesion.

Recommendations

The importance of the training and contact courses for present surgeons in a recognized center in the world. The importance of the modern techniques and tools used for the laparoscopic surgery and other facilities and their relation to safer procedures. The use of intraoperative cholangiogram in patients with unclear anatomy.

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