

Determination the main causes of conversion to open cholecystectomy in laparoscopic cholecystectomy

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Abstract

Background: For the treatment of symptomatic gall stone, laparoscopic cholecystectomy has taken the place of open cholecystectomy as the norm. However, switching from a laparoscopic to an open cholecystectomy is still necessary in many cases. This study set out to identify the primary factors that led to laparoscopic cholecystectomy conversion to open surgery.

Methods: 150 patients who underwent laparoscopic cholecystectomy between January 1, 2013, and January 1, 2015 were prospectively followed at the time of surgery by collecting information on the patient's age, sex, length of time from the introduction of laparoscopic ports until the decision to convert, and the cause of conversion, if any, at the time at Al-Diwnaniya teaching hospital.

Results: 9 conversions, or 6% of the 150 laparoscopic cholecystectomy procedures, actually took place. Vascular injuries were the most frequent causes. Two individuals each with gall bladder empyema and extreme 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 study's overall conversion rate was 6%, with dense adhesions, empyema of the GB, and severe bleeding being the most prevalent reasons for conversion. The conversion rate was greater in male patients.

Keywords: Cholecystectomy, Conversion, Laparoscopic, Open

Introduction

In 1882, the surgical operation known as a cholecystectomy was first carried out by Carl Johan August Langenbuch to treat cholelithiasis. Before laparoscopic cholecystectomy was developed in 1980 and Philip Mouret from France performed the first human laparoscopic cholecystectomy in 1987, open cholecystectomy was the gold standard for the treatment of cholelithiasis. The benefits

of this procedure include less postoperative pain, a shorter hospital stay, an earlier return to normal activity, and unquestionably better cosmetics. There is no doubt that laparoscopic cholecystectomy has replaced open cholecystectomy as the gold standard for the treatment of symptomatic cholelithiasis.^{1,2} 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 standard of care for treating patients with symptomatic gallstones is laparoscopic cholecystectomy due to its well-established benefits and safety. Despite these benefits, a variable percentage of patients—ranging from 2% to 15% in various studies—require conversion to an open operation.^{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 2013 to January 2015 (150) patients were enrolled in the study that was carried out in diwanyah 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 Verses 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

25 patients (16.66%) and 125 patients (83.33%) out of 150 patients who underwent laparoscopic cholecystectomy were male and female, respectively. Three male and six female patients made up the nine conversions (the conversion rate was 6%), giving a male

conversion rate of 33.33% and a female conversion rate of 66.66%. The conversion rate for male patients from all male cases was 12%, and for female patients from all female cases was 4.8%. 50 years was the average age for conversions. (Table 1).

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 decision of the surgeon was based on the difficulty encountered during surgery or technological defects, among other associated causes. These factors were used to determine the causes of conversions. The following were the conversions' causes: Due to thick adhesions and altered anatomy that prevented safe dissection and clipping in three patients

(33.33%), conversion was necessary. Gallbladder empyema was the cause in two patients (22.2%), severe obesity in one patient (11.1%) made it difficult to dissect the gallbladder using standard ports, vascular injuries in two patients (22.22%), and intrahepatic gallbladder malposition in one patient (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).

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)

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

The conversion rate in the current study was 6%, which is within the range of conversion rates shown in other studies. This approximate rate of conversion in the current study compared to those from other studies may imply that doctors' skills are improving and that laparoscopic surgery is successful. Male patients had a greater rate of conversion in the current study's findings, and some earlier research had identified male sex as a risk factor for conversion because of severe adhesion. Because of the difficulty in removal, which can result in bleeding and injury to the liver, the surgeon preferred switching to open surgery when addressing the causes of conversions in the study, starting with improper gallbladder position (intrahepatic). Although laparoscopic surgery greatly reduces the danger for obese patients, 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.

In the current investigation, frozen Calot triangles and thick adhesions are the main conversion-causing factors. In three cases where dense adhesions were noted, attempts to break the adhesions through dissection and

cauterization failed to provide apparent anatomical structures.¹³ Adhesions must be safely removed using a mix of expert technique and close attention to visual clues.

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

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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 were related to disrupted anatomy either from thick adhesions or anatomical abnormalities, From the rate of conversion and the lack of biliary ducts injury during the surgeries included in the study authors may observe the quick improvement of the technique in the present area and expanding the abilities of present surgeons.

Due to the intense adhesion, the conversion rate in men is higher than in women.