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Laparoscopic cholecystectomy in the treatment of acute cholecystitis: comparison of results between early and late cholecystectomy

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Abstract:

Background:

Laparoscopic cholecystectomy is defined as a minimally invasive surgical procedure which used for removal of gallbladder diseases. This technique has replaced the open surgical technique for routine cholecystectomies since the early 1990s. At this time, laparoscopic cholecystectomy is indicated to treat a wide range of gallbladder associated diseases. These indications are the same for an open cholecystectomy. Approximately 20 million people in the USA have gallstones, and from these people, there are around 300,000 cholecystectomies performed each year. Ten percent of the population has asymptomatic gallstones (20% are symptomatic biliary colic, and 20% of them who are symptomatic gallbladder with complications (acute cholecystitis, gallstone pancreatitis, choledocholithiasis, and gallstone ileus). The incidence of gallstones increases with an increase in age, with females more likely to form gallstones than males, People from 50 to 65 years old (ratio 4:1 females to males). Overall, 75% of gallstones are composed of cholesterol, and the other 25% are pigmented. Despite the composition of gallstones, the clinical features and patients presentations are the same.

Anatomy and physiology of gallbladder

The gallbladder lies on the inferior border of the liver bed, more specifically under the 4th and the 5th liver segments. The gallbladder can reach up to 10 cm in length and physiologically can hold up to 50 cc of bile. There are four anatomical sections to the gallbladder: fundus, body, infundibulum, and neck. There is great variation in the anatomy of the biliary ductal system which considers being of a great importance during surgical intervention. The cystic duct most commonly arises from the common bile duct and inter at the neck of the gallbladder. The branch point of the cystic duct from the common bile duct marks the beginning of the common hepatic duct superiorly. The blood supply to the gallbladder is from the cystic artery which approximately 90% of the time supplied from the right hepatic artery. The hepatocystic triangle (triangle of Calot) is a surgical anatomical

landmark created by the cystic duct laterally, the common hepatic duct medially, and the liver edge superiorly. This triangle is of surgical importance because this is the location for the most common path of the cystic artery to the gallbladder. The sentinel lymph node of the gallbladder resides within the hepatocystic triangle, also known as Lund's node. The etiology of gallbladder disease is associated with a poorly functioning gallbladder and super concentrated bile. Normally, the gallbladder empties its contents in response to physiologic changes associated with digestion (cholecystokinin, vagal input from antral distension, migrating myoelectric complex). A high concentration of cholesterol within the gallbladder is a known cause for precipitation of cholesterol gallstones. Pigmented stones precipitate typically from hemolytic diseases (black stones) or from infection (brown stones) where bacterial enzymes break down bilirubin into an insoluble content. Stasis within the gallbladder or bile ducts increases the likelihood of stone formation. Gallbladder disease is exemplified by obstruction of the cystic duct. Patients may experience acute obstruction of the cystic duct by stones, or occasionally, in most critically ill patients, there is acute acalculous cholecystitis, where there is no mechanical obstruction but a functional obstruction. This obstruction, mechanical or not, in conjunction with attempted bile excretion for digestion will cause acute inflammation of the gallbladder.

Indications for Laparoscopic cholecystectomy

- Cholecystitis (Acute/Chronic)
- Symptomatic cholelithiasis
- Biliary dyskinesia- hypofunction or hyperfunction
- Acalculous cholecystitis
- Gallstone pancreatitis
- Gallbladder masses/polyps

Contraindications for Laparoscopic cholecystectomy

- Inability to tolerate pneumoperitoneum or general anesthesia

- Uncorrectable coagulopathy
- Metastatic disease (Please note that although gallbladder cancer was once a contraindication to a laparoscopic cholecystectomy, the current studies supports laparoscopic intervention)

Methods

The aim of the study is to compare the outcomes of the patients to who have applied early or late laparoscopic cholecystectomy after hospitalization from the emergency department with the diagnosis of acute cholecystitis.

Results

The study was done retrospectively and reviewed the files of totally 66 patients in whom which have performed early laparoscopic cholecystectomy (within the first 24 hours) compare to those patients whom firstly received conservative therapy and performed late laparoscopic cholecystectomy (6 to 8 weeks) after hospitalization from the emergency department with the diagnosis of acute cholecystitis. The groups were made up of patients who had similar clinical and demographic characteristics. While there were no statistically significant differences between the durations of operation, the durations of hospitalization were longer in those who underwent early cholecystectomy. Moreover, more complications were seen in the patients who underwent early cholecystectomy although the difference was not statistically significant.

Conclusion

From the results which showed above, early cholecystectomy with laparoscopic intervention is known to reduce the costs significantly in patients with acute cholecystitis. However, conversion to open surgery with increase rate of complications in patients who admitted with severe inflammation attack and who have high comorbidity, careful assessment should be done when selecting patients for early operation.

Introduction

The incidence of gallstones is 10-15% and the recurrence rate of symptoms or its complications in such patients is about 35%. Laparoscopic cholecystectomy has lately become the gold standard in the treatment of symptomatic gallstones. The major advantages of laparoscopic cholecystectomy (LC) include (less postoperative pain, less time required for hospitalization and recovery, and better cosmetic results). The general view in the treatment of acute cholecystitis (AC) is to commence firstly conservative therapy in order to prevent possible complications associated with inflammation, followed by laparoscopic cholecystectomy after 6-8 weeks. Although over 70% of such patients respond to medical therapy within the first 24 to 48 hours, LC is the definitive treatment method for treatment of symptomatic gallstone disease. In the past, open surgery was the mainstay of the treatment even though the complications associated with operation and prolonged hospitalization ; moreover, performing emergency LC was difficult most of the times because of the patient comorbidity and the difficulty of availability of appropriate equipment and surgery room conditions in emergency cases. However, the recent increase in the number of experience doctors and the favorable results of the meta-analyses published on this prompts surgeons to perform early LC intervention. Furthermore, conversion to an open procedure has become a rare event as the experience of surgeons has increased over the years. Conversion to an open procedure creates a larger abdominal incision, causes significant pain control issues postoperatively, and leads to a cosmetically displeasing scar. Please note that the conversion to an open procedure should not be viewed as a complication but seen as a well-educated decision made by an experienced surgeon to safely care for the patient. Lastly,

Methods

The aim of the study was made to compare the outcomes of the patients who have gone under early or late laparoscopic cholecystectomy after admission from the emergency department with the diagnosis of acute cholecystitis between March 2012 and March 2015. Acute cholecystitis diagnosis was made after reviewing the physical examination, laboratory and imaging methods. The patients were divided into two groups and their files were reviewed retrospectively. The groups were made up of patients who had similar clinical and

demographic characteristics. The study included the patients who performed operation within the first 24 hours after hospitalization from the emergency department in the early cholecystectomy group and those people who firstly administered medical therapy (intravenous antibiotics, fluid and analgesics) and operated after 6 to 8 weeks in the late cholecystectomy group. Second generation cephalosporins and metronidazole were used as the medical therapy. Surgical interventions were made by totally six different surgeons as two groups of three who had identical experience in laparoscopic intervention.

Results

The data was collected retrospectively and reviewed the files of totally 66 patients in whom early laparoscopic cholecystectomy (within the first 24 hours) (n: 33) was performed and to those patients who firstly administered conservative therapy and performed late laparoscopic cholecystectomy (after 6 to 8 weeks) (n: 33) after hospitalization from the emergency department with the diagnosis of acute cholecystitis. The physical examination findings were similar in both groups. The parameters comprised the majority of the patients in whom early switching to open surgery occurred or complications developed. While there were no statistically significant differences between the durations of operation, the durations of hospitalization were longer in those who underwent early cholecystectomy. Moreover, more complications were seen in the patients who underwent early cholecystectomy although the difference was not statistically significant. The main reasons for switching to open surgery are shown in [table below](#). The majority of these are composed of the difficulties of anatomy. The rates of conversion to open surgery were higher in the group who underwent early LC.

Clinical and demographic characteristics of the patients who underwent early and late cholecystectomy

	Group 1 LC after 24 h (n = 33)	Group 2 LC after 24 h (n = 33)	p
Age	63.45±16.55	53.67±13.19	0.029

Male	17 (51.5)	11 (33.3)	0.135
Female	16 (48.5)	22 (66.7)	

Intraoperative and postoperative data of the patients who underwent early and late cholecystectomy

	Group 1LC within 24 h(n = 33)	Group 2LC after 24 h(n = 33)	p
Duration of operation (minutes)	95.36±32.9	95.73±22.94	0.529
Duration of hospitalization (days)	5.03±4.91	2.36±1.95	0.006
Intraoperative or postoperative complication, n (%) (Morbidity)	6 (18.2)	1 (3)	0.105
Rate of switching to open surgery, n (%)	16 (48.5)	7 (21.2)	0.020

The duration of patient stay in the hospital increased dramatically in the second group with the overall postoperative complications. Besides that, the rate of conversion to open procedure is twice more than the first group of the study.

Causes of morbidity

Complications	Group 1LC within 24 h(n = 33)	Group 2LC after 24 h(n = 33)	p
Wound infection, n (%)	2 (6.1%)		
Biliary leakage, n (%)	2 (6.1%)	1 (3%)	
Bleeding, n (%)	1 (3%)		
Bile duct injury, n (%)	1 (3%)		
Total, n (%)	6 (18.2)	1 (3)	0.105

The morbidity in the 2nd group was lower than in the 1st group, with statistically significant differences. Within the EC group, there were significant differences between the morbidity of patients <24 h and the morbidity of patients >24 h.

Reasons for switching to open surgery

Conversion, n (%)	Group 1LC within 24 h(n = 33)	Group 2LC after 24 h(n = 33)	p
Difficulty identifying anatomy	8 (24.3%)	4 (12.1%)	
Adhesions	4 (12.1%)	2 (6.1%)	

Conversion, n (%)	Group 1LC within 24 h(n = 33)	Group 2LC after 24 h(n = 33)	p
Haemorrhage	3 (9.1%)	1 (3%)	
Biliary tract injury	1 (3%)	-	
Total	16 (48.5)	7 (21.2)	0.020

Discussion

The mean age of patients presenting with acute cholecystitis varies between 40 and 80 years. This condition is seen three times more in women than men. This report also classifies AC based on the severity. According to this, in mild cholecystitis (grade 1) the inflammation is limited to the gallbladder and no organ dysfunction is seen. In moderate cholecystitis (grade 2) no organ dysfunction but advanced inflammation is seen. In severe cholecystitis (grade 3) organ dysfunction is present. According to this classification, it is stated that percutaneous transhepatic bile drainage (PTHBD) may be preferred in the patient group who have high comorbidity and moderate or severe AC. It is emphasized that a marked clinical improvement and a marked reduction in morbidity can be observed in this way. It is a standard practice to administer fluid, analgesia and broad-spectrum antibiotics in the initial treatment of acute cholecystitis. During the first years of laparoscopic surgery, LC was recognized as a relative contraindication in AC. But especially during the recent years, LC has been demonstrated to be safe in the treatment of AC. However, the appropriate timing for this procedure is still a question of debate. In some studies, it is considered that the optimal timing for LC is 6 to 9 weeks after the conservative therapy taking into consideration the general condition and comorbidities of the patients and projecting that the acute inflammation will resolve in 6 weeks.

However, those who advocate early LC state that in patients who are prepared for late LC after the conservative therapy, the fibrotic adhesions developed between the gallbladder and the surrounding structures following inflammation and edema may cause excessively difficult dissection. They advocate that, early LC performed

with appropriate timing in correctly selected patients will facilitate the dissection of edematous plane, and reduce morbidity as well as the possibility of late complications such as emphysematous or gangrenous cholecystitis .

Biliary tract injury is one of the most frightening complications that may develop during LC. It can even be fatal due to sepsis. Even the corrective surgical procedures can lead to high morbidity and mortality rates and impair quality of life. The increasing experience, improved skills and new tools have reduced especially biliary tract injuries and associated morbidities in early LC .A meta-analysis conducted by Japanese researchers demonstrated that early laparoscopic cholecystectomy performed within 24 to 96 hours in acute cholecystitis ensure shorter hospitalization while having similar complication rates compared to late laparoscopic cholecystectomy . When the studies performed are reviewed, it is seen that the rates of switching to open surgery are considerably different [0-39%] .The reason of this considerable difference can be attributed to the different demographics of the patients, the severity of inflammation, the experience of the surgeons and the timing. The study found a rate of 6.7% and the authors stated that their center has a great experience in gallbladder surgery .The foundation of these rates as 16% is early surgery and 7% in late surgery. A statistically significant difference was found between the two groups [P: 0.020]. In the study, the most common reason for switching to open surgery was the fact that Callot's dissection could not be properly performed due to anatomical difficulty associated with inflammation.

Conclusion

When patients present to the emergency department physician, primary care provider and nurse practitioner with gallstones, they should be educated about the options of treatment. While laparoscopic cholecystectomy is now the standard of care, patients should be informed about the possibility of conversion to an open procedure. The risk of injury to the bile duct is always a possibility depending on the experience of the surgeon. For those patients who are asymptomatic, it is important to recommend a healthy low-fat diet, maintenance of low body weight and regular exercise. On the other hand, early cholecystectomy is known to significantly reduce the costs in patients with acute cholecystitis. However, given the facts that prolongation of hospitalization and switching to open surgery as well as increase of complications in patients who admitted with severe inflammation attack and who have high comorbidity, caution should be exercised when selecting patients for early operation. Each

clinic should consider the patient and physician factors, the population and the type of medical facility when making a decision with respect to the timing of the operation. Maybe a new treatment scale containing these data should be created for the treatment of acute cholecystitis.

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