



## A COMPARATIVE STUDY ON CLINICAL EFFICACY BETWEEN OPEN VERSUS LAPAROSCOPIC CHOLECYSTECTOMY - A RESEARCH

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### ABSTRACT

**Background:** Gallstones are common in population and the main objective is Laparoscopic cholecystectomy has rapidly become established as the popular alternative to open cholecystectomy, but it should have a safety profile better than of open procedure. The aim of this study was to compare conventional cholecystectomy and laparoscopic cholecystectomy with respect to duration of procedure, complications, postoperative pain, analgesic requirement and period of hospital stay and now preferences of patients are changing rapidly due to better level of awareness and availability of healthcare facility.

**Aims:** The aim of this study was to compare Open cholecystectomy and laparoscopic cholecystectomy by comparing use of Post-operative analgesia, Operative time, Post-operative hospital stay, morbidity and mortality.

**Material and Method:** This is a retrospective study of 50 Patients with cholelithiasis with no evidence of CBD stones aged between 18 years to 70 years operated during 2014-2016 at a central hospital. They were divided into open and laparoscopic cholecystectomy group by draw a lot method and due to the pros and cons of both the procedure were explained in detail to the patient.

**Results:** The duration of pain, rate of complications and hospital stay were significantly lower in laparoscopic group.

**Conclusion:** The main advantages of Laparoscopic cholecystectomy were reduced postoperative pain with less duration of analgesic intake, more rapid recovery, reduced hospital stay and early return to normal work.

However, open cholecystectomy is preferred method for Surgeons in the beginning of their career and in case of difficult cholecystectomy.

**Keywords:** Cholelithiasis, Laparoscopic cholecystectomy, Open cholecystectomy, Cholecystitis, Bile duct injury.

## INTRODUCTION

Gallstones (GS) are a common occurrence in population due to blending of cultures and lifestyle. For every patient with symptomatic gallstone disease (GSD) there are many more with asymptomatic gallstones. Various studies performed on mortals suggest that most of the gallstones are asymptomatic. Gall stones are one of the major causes of morbidity and mortality all over the world. Until the end of 1980's, open Cholecystectomy was the gold standard for treatment of stones in gall bladder. First Cholecystectomy performed in 1882 by Karl Langenbuch<sup>[1]</sup>. Karl Langenbuch in 1882 quoted. "The gallbladder should be removed, not because it contains stones, but because it forms them" <sup>[2,3]</sup>. In the early 1990s, the laparoscopic approach rapidly replaced open surgery as the standard procedure. The laparoscopic procedure was found to reduced hospitalization and cost, decreased pain, avoidance of large incision with improved cosmesis and reduced post-operative recovery time with an early return to work. Although it showed early promising results, recent trials show an increase in the incidence of operative complications, especially common bile duct injury <sup>[4]</sup>. We live in an era of surgical innovation that has seen the development and expansion of various types of laparoscopic surgery in which the incisions made are increasingly small. It is well established that laparoscopic surgery, in comparison with more traditional methods, results in fewer post-operative complications and leads to earlier patient mobility and recovery of the normal activities of daily life. The safety of laparoscopic cholecystectomy for the elderly has also been confirmed in many studies as an acceptable procedure and is now the preferred method for cholecystectomy <sup>[5]</sup>. Recent upsurge in practice of laparoscopic surgery and other form of minimal access surgery has ushered a new era of surgical treatment which is having profound effect on surgical management. Minimal access surgery has touched every field of surgical specialty <sup>[6]</sup>. The non-operative methods for the treatment of cholelithiasis in the form oral bile acid (Chenodexychoic acid and Ursodexychoic acid) and Extracorporeal Shock Wave Lithotripsy (ESWL) have not shown promising results<sup>[7-9]</sup>.

The major complications are significantly less in laparoscopic cholecystectomy and it has become the mainstay of management of uncomplicated gallstone disease. However few years after its inception, uncertainty persists about the application of laparoscopic techniques to the management of patients with complicated gallstone disease <sup>[10]</sup>. Post operative pain, cosmesis and late complication like incisional hernia, intestinal obstruction should help to decide which technique are better for patients<sup>[11]</sup>.

## **Aims and objectives:**

The aim of this study was to compare Open cholecystectomy and laparoscopic cholecystectomy by comparing use of Post-operative analgesia, Operative time, Post-operative hospital stay, morbidity and mortality.

## **MATERIAL AND METHODS**

This study is a retrospective study included 50 patients with cholelithiasis who have undergone gallbladder removal in Jingzhou central hospital, P.R. China. 25 patients who have undergone laparoscopic cholecystectomy and 25 patients who have undergone open cholecystectomy for a study period of two years have been taken into the study. The selection of procedure of open cholecystectomy or laparoscopic was decided depending upon the inclusion and exclusion criteria, exception when patient consent was not given for a particular procedure. Information was collected after a written valid informed consent from patients. Patients between 18 years to 70 years with acute cholecystitis, or chronic cholecystitis and gallstones without pain abdomen including those with diabetes, hemolytic anemia etc., were included in the study. Patient's written valid informed consent for the particular procedure was taken. Patients less than 18 years and more than 70 years or those with Gall bladder cancer and Choledocholithiasis were excluded. In this study preoperative assessment, intraoperative practice and post-operative management and follow up involved till 3 to 8 months. All the patients were studied with reference to duration of surgery, post-operative analgesic, postoperative stay, intra operative and post-operative complications.

Patients were admitted one day prior to surgery in case of elective cholecystectomy from OPD after complete investigations performed required for general anesthesia and Some patients were admitted from emergency department of hospital as they had presented with acute abdominal pain. These patients were also investigated same Investigations include Haemogram, Blood sugar level, Urine examination, Liver function test, Blood urea and serum creatinine level, Chest x-ray, ECG and Ultrasonography of abdomen. The patient were studied according to their clinical presentation and were grouped as patients with asymptomatic Gall stones, acute calculus cholecystitis and chronic calculus cholecystitis.

After completed the investigations, inclusion and exclusion criteria for selection study then patients were subjected to either open or laparoscopic cholecystectomy . First dose of antibiotics administered to the patient just prior to incision, immediately after intubation. Foleys Catheterization and Ryle's tube insertion was done in all patients. General anesthesia was administered to all the patients.

## **Inclusion criteria:**

- 1) Age 18-70 years.

- 2) Patients either open or laparoscopic cholecystectomy.
- 3) Patients diagnosed with diagnostic tools.

**Exclusion criteria:**

- 1) Age less than 18 and more than 70 years.
- 2) Patients with tumor, gall bladder cancer.
- 3) History of previous abdominal surgery.

Post-operative management included nil per mouth till bowel sounds are heard. Intravenous fluids in the form of crystalloids, Broad spectrum antibiotics (Inj.ceftriaxone).Injection amikacin and Injection Metronidazole were added in cases of bile leak. Analgesics in the form of Injection Tramadol was given. Topup analgesia like intramuscular Injection Diclofenac Sodium was given, whenever it was required. Discharge after start of oral diet and without any signs of postoperative wound infection after first day of dressing change. If sign of wound infection were present then pus from wound was taken and sent for microbiological culture and sensitivity testing. Appropriate antibiotics started after reports and wound care taken properly. Follow up in OPD for suture removal after 7 days, if operative wound is healthy. All laparoscopic cholecystectomy converted to open cholecystectomy if considered as difficult laparoscopic cholecystectomy.

**RESULTS**

In this study, most of the patients did not presented with pain abdomen and had been diagnosed by ultrasonography for vague abdominal symptoms, like epigastric fullness and early satiety.some of them had already been diagnosed earlier and had few episodes of acute cholecystitis in the past and some had presented with features suggestive of acute cholecystitis.

25 patients of laparoscopic cholecystectomy (LC) and 25 patients of open cholecystectomy (OC) were done.The time taken was generally lesser in laparoscopy surgery than in open cholecystectomy. 36% of patients who underwent open surgery had complications developed like wound infection,wound dehiscence, postoperative ileus and 20% of patients who underwent laparoscopic surgery had also complications.So above this cases the overall percentage of complications is lesser in laparoscopic surgery than open surgery(Table-2).

It has been observed that duration of post-operative pain and analgesia required were significantly less in laparoscopic cholecystectomy group than open cholecystectomy group. 23 patients who underwent laparoscopic surgery had analgesics only for a maximum of 5 days whereas all patients who underwent open surgery had analgesics for more than 5 days (Table 3).

23 patients who underwent laparoscopic cholecystectomy were discharged before 5 days. All

patients who underwent open cholecystectomy stayed more than 5 days in hospital(Table-4). Therefore, laparoscopic cholecystectomy group had significantly less hospital stay than Open cholecystectomy group.

Conversion of laparoscopic to open cholecystectomy occurred in two (2) of the fifty (50) patients i.e. 4% and this cases of laparoscopic cholecystectomy were converted to open surgery due to intra operative hemorrhage.

Laparoscopic cholecystectomy				Open cholecystectomy			
< 90 min	%	> 90 min	%	< 90 min	%	> 90 min	%
22	88	3	12	17	68	8	32

**Table 1:** Time taken for surgery

P value = < 0.05

Complication	Open	%	Lap	%
Bleeding	3	12	3	12
Wound infection	4	16	1	4
CBD injury	0	0	0	0
Postoperative ileus	2	8	1	4
Pancreatitis	0	0	0	0
Cardiac problems	0	0	0	0
Pulmonary problems	0	0	0	0
Death	0	0	0	0
Total		36		20

**Table 2:** Complications of open and laparoscopic surgery

P value = <0.05

Surgery	<5 days	%	>5 days	%
LC	23	92	2	8
OC	0	0	25	100

**Table 3:** Number of days of analgesics

LC (Laparoscopic cholecystectomy) OC (Open cholecystectomy)

P value = <0.001

Surgery	<5 days	%	>5 days	%
LC	23	92	2	8
OC	0	0	25	100

**Table 4:** Number of days of in hospital stay

LC (Laparoscopic cholecystectomy) OC (Open cholecystectomy) P value= <0.001

## DISCUSSION

According to history of surgery, some of the operations have changed the thinking and operating habits of surgeons as quickly which can be seen as laparoscopic cholecystectomy. This technique of small incision for cholecystectomy has shown good result due to the reducing pain and morbidity and cover the way for use of minimal access surgery [12,13]. Laparoscopic cholecystectomy was first performed in Lyon, France in March 1987 by Philippe Mouret, a general surgeon, who already had vast experience in gynecological surgery and consequently was knowledgeable in the use of laparoscope. Due to explosive growth of minimally invasive surgery of which laparoscopic cholecystectomy is prototype mandates the need for comparisons with respect to morbidity and mortality. Most surgeons have passed through the learning curve phase of their experience and have now settled into established patterns of activity [14,15]. A century ago, in 1904, Mayo wrote, there is no innocent gallstone, but today we know there are plenty of evidences to support that not only there are asymptomatic gallstones but most of these incidentally found stones remain asymptomatic throughout life, and do not require treatment so gallstone disease is a benign condition because 70-90% of patients remain asymptomatic. Several studies have shown that the natural history of incidentally discovered gallstone is not only benign but even when they do develop complications; it is usually preceded by at least one episode of biliary pain. In other words, the longer the stones remain asymptomatic, the less likely it's complications will occur. In about 30%, patients who have had pain do not

have further episodes of pain. Thus, for persons with asymptomatic gallstones, the natural history is so benign that not only treatment but also a regular follow-up is not recommended [16-19], laparoscopic cholecystectomy changed the view of the surgeons due to widespread use of Laparoscopic cholecystectomy in young patients with uncomplicated, asymptomatic gallstones is safe with greater patient acceptance, and this approach in early age eliminates the need for problematic surgery at a later date when the patient is older, with associated diseases or with complications [20,21]. Sometimes consideration is given to perform an incidental cholecystectomy in addition to the planned operation in patients with asymptomatic gallstones. The purpose would be to prevent postoperative cholecystitis or the later development of symptoms. Patients having multiple gallstones. The chance of slipping into CBD is high, as complications like obstructive jaundice, cholangitis and pancreatitis are likely [22-26].

Conversion rates in laparoscopic cholecystectomy ranges from 3% to 15% in well trained hands and according to a report on laparoscopic cholecystectomy comparing operations for simple and complicated cholecystolithiasis reported a conversion rate 25% for complicated cases compared with 1% rate for simple cases[27]. In our series conversion rate is 4%; only 2 cases were converted to open because of intra operative hemorrhage. The frequency of bile duct injury is 0.1% to 0.2% for open cholecystectomy and 0.3% to 0.6% for laparoscopic cholecystectomy. Two most common reasons for conversion are dense upper abdominal adhesions or necrotic gall bladder wall that precludes grasping and elevation with grasper. Common risk factors for conversion are obesity. Conversion should be opted for in the beginning and at the time of recognition of a difficult dissection rather than after the occurrence of complication. It is vital for the surgeons and patients to appreciate that the decision to go for conversion is not failure but rather implies safe approach and sound surgical judgment. It is therefore mandatory to explain the patients about possibility of conversion to open technique at the time of taking consent for laparoscopic cholecystectomy [28,29].

The time taken for laparoscopic surgery was found to be more than open cholecystectomy according to Supe AN *et al.*:[30] According to Waldner H *et al.*, there was no significant time difference between both the procedures [31]. According to the our study the overall time taken for laparoscopic surgery was found to be less than for open surgery. Antibiotic requirement was found to be less in laparoscopic surgery according to Foster D.S et al and Phillips E *et al* [32, 33].

Indications for analgesia in both procedures were different. Whereas in open cholecystectomy group this was due to wound pain, the patients in the laparoscopic group required post-operative analgesia for relief of shoulder tip pain secondary to diaphragmatic irritation due to CO<sub>2</sub> pneumoperitoneum [34,35].

Wound infection in open procedure is 3 times the laparoscopic procedures. Jatzko et al. in their study observed that grade I complications rate is lower in laparoscopic cholecystectomy group (0.3%) as compared to open cholecystectomy group (5.1%). Barkun JS et al. in Toronto group study also observed that number of complications in laparoscopic cholecystectomy were significantly less than number of complication in open

cholecystectomy. Siddiqui et al. in their study observed that frequency of wound infection was three times common in open cholecystectomy as compared to laparoscopic cholecystectomy in acute cholecystitis. In Carbajo Caballero et al.'s study the rate of complications was more in the open procedure than in laparoscopic cholecystectomy<sup>[36]</sup>. Complication rate is higher in open than in laparoscopic surgery <sup>[30, 37]</sup>. In our study 12% of patients who underwent open cholecystectomy had excessive bleeding, 16% had wound infection. In laparoscopic surgery the rate of complications was found to be 12% for bleeding which was minimal, 4% for wound infection.

Post-operative hospital stay for open Cholecystectomy is more than 5 days in most studies whereas it is 5 or less in cases of laparoscopic cholecystectomy patients <sup>[38-40]</sup>. Also according to Verma G *et al.*<sup>[37]</sup> 92% of patients in our study had an hospital stay of less than 5 days but all patients who underwent open surgery were hospitalized postoperatively for more than 5 days.

In the studies conducted by Carbajo *et al.*<sup>[30]</sup>, Supe AN *et al.*<sup>[36]</sup> and Verma GR *et al.*<sup>[37]</sup> patients who underwent laparoscopic cholecystectomy could get back to their routine work faster. The mean time taken for laparoscopic patients to resume routine activity was 12.8 days and 34.8 days in open surgery as seen in Steven HP *et al.*'s study<sup>[41]</sup>. In our study only 2 patients who had laparoscopic surgery took more than 1 week to resume routine work whereas all patients who underwent open surgery took up to 2 weeks and more to resume routine work.

According to Stevens HP *et al.* the cost involved in open surgery is found to be more than in laparoscopic surgery <sup>[41]</sup>. In one study there was not much cost difference between both procedures <sup>[36]</sup>. According to our study, no much cost differences between laparoscopic surgery and open surgery.

## CONCLUSION

Thus, According to worldwide comparative study, the comparison between open cholecystectomy and laparoscopic cholecystectomy in many case series have been published but results are always favor of laparoscopic cholecystectomy. However, open cholecystectomy is preferred method for surgeon in the beginning of their career and in case of difficult cholecystectomy. So laparoscopic cholecystectomy case series have several advantages like less post operative pain and its duration, smaller incision, bleeding is easily controlled with less perioperative blood loss, less chances of wound infection, no risk of wound dehiscence, better cosmesis, earlier return to their full activity, shorter hospitalization so can be discharged early from hospital and also decreased total cost. So, our study concludes that laparoscopic cholecystectomy is more effective than open cholecystectomy.



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