International Journal of Medical and Health Research
ISSN: 2454-9142; Impact Factor: RJIF 5.54
Received: 24-05-2019; Accepted: 26-06-2019
www.medicalsciencejournal.com
Volume 5; Issue 7; July 2019; Page No. 190-194

Evaluation of three ports vs classical four ports laparoscopic cholecystectomy in patients from Uttar Pradesh

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Abstract
It has been shown that three port LC, two port LC, Needle scope cholecystectomy with micro-instrument and even single incision LC have shown to be feasible. These new techniques took similar time to perform operation and caused less post-operative pain reducing analgesic requirement, had cosmetic benefits and at the same time reduce the cost of one port, Thus being cost effective than standard LC. Hence the present study was planned to evaluate the observations and complications in three ports vs Classical Four Ports Laparoscopic cholecystectomy.

The present study was planned in Department of Surgery, Rama Medical College Hospital and Research Centre, Mandhana, Kanpur, Uttar Pradesh, India from Oct 2010 to May 2011. Total 50 patients were symptomatic gall stone disease were enrolled in the present study. Group I patients were subjected to three-port laparoscopic cholecystectomy and Group II patients were subjected to conventional four port laparoscopic cholecystectomy.

From the present study it can be concluded that three port method of laparoscopic cholecystectomy is a safe procedure with no extra complications in the hands of an experienced surgeon. The three port laparoscopic cholecystectomy group is preferable as there is fewer requirements of analgesics, cosmetically better, cost effective and there is less crowding around the operating table as there is no need of second assistant in three port laparoscopic cholecystectomy, thus reducing the required manpower and hospital cost.

Keywords: three ports, classical four ports, laparoscopic cholecystectomy, LC, etc

Introduction

Cholecystectomy is the surgical removal of the gallbladder. Cholecystectomy is a common treatment of symptomatic gallstones and other gallbladder conditions [1]. In 2011, cholecystectomy was the 8th most common operating room procedure performed in hospitals in the United States [2]. Cholecystectomy can be performed either laparoscopic ally, using a video camera, or via an open surgical technique [3].

The surgery is usually successful in relieving symptoms, but up to 10% of people may continue to experience similar symptoms after cholecystectomy, a condition called post cholecystectomy syndrome [4]. Complications of cholecystectomy include bile duct injury, wound infection, bleeding, retained gallstones, abscess formation and stenosis (narrowing) of the bile duct [4].

Pain and complications caused by gallstones are the most common reasons for removal of the gallbladder [5]. The gallbladder can also be removed in order to treat biliary dyskinesia or gallbladder cancer [6].

Gallstones are very common but 50–80% of people with gallstones are asymptomatic and do not need surgery; their stones are noticed incidentally on imaging tests of the abdomen (such as ultrasound or CT) done for some other reason [7] of the more than 20 million people in the US with gallstones, only about 30% will eventually require cholecystectomy to relieve symptoms (pain) or treat complications [8].

Biliary colic, or pain caused by gallstones, occurs when a gallstone temporarily blocks the bile duct that drains the gallbladder [9]. Typically, pain from biliary colic is felt in the right upper part of the abdomen, is moderate to severe, and goes away on its own after a few hours when the stone dislodges [10]. Biliary colic usually occurs after meals when the gallbladder contracts to push bile out into the digestive tract. After a first attack of biliary colic, more than 90% of people will have a repeat attack in the next 10 years [1]. Repeated attacks of biliary colic are the most common reason for removing the gallbladder, and lead to about 300,000 cholecystectomies in the US each year [8, 11].

Cholecystitis, or inflammation of the gallbladder caused by interruption in the normal flow of bile, is another reason for cholecystectomy [12]. It is the most common complication of gallstones; 90-95% of acute cholecystitis is caused by gallstones blocking drainage of the gallbladder [13]. If the blockage is incomplete and the stone passes quickly, the person experiences biliary colic. If the gallbladder is completely blocked and remains so for a prolonged period, the person develops acute cholecystitis [14].

Pain in cholecystitis is similar to that of biliary colic, but lasts longer than 6 hours and occurs together with signs of infection such as fever, chills, or an elevated white blood cell count [1]. People with cholecystitis will also usually have a

positive Murphy sign on physical exam - meaning that when a doctor asks the patient to take a deep breath and then pushes down on the upper right side of their abdomen, the patient stops their inhalation due to pain from the pressure on their inflamed gallbladder [1].

5-10% of acute cholecystitis occurs in people without gallstones, and for this reason is called acalculous cholecystitis. It usually develops in people who have abnormal bile drainage secondary to a serious illness, such as people with multi-organ failure, serious trauma, recent major surgery, or following a long stay in the intensive care unit [14]. People with repeat episodes of acute cholecystitis can develop chronic cholecystitis from changes in the normal anatomy of the gallbladder [14]. This can also be an indication for cholecystectomy if the person has ongoing pain.

A serious complication of cholecystectomy is biliary injury, or damage to the bile ducts [15]. Laparoscopic cholecystectomy has a higher risk of bile duct injury than the open approach, with injury to bile ducts occurring in 0.3% to 0.5% of laparoscopic cases and 0.1% to 0.2% of open cases [16]. In laparoscopic cholecystectomy, approximately 25-30% of biliary injuries are identified during the operation; the rest become apparent in the early post-operative period [3].

Damage to the bile ducts is very serious because it causes leakage of bile into the abdomen. Signs and symptoms of a bile leak include abdominal pain, tenderness, fever and signs of sepsis several days following surgery, or through laboratory studies as rising total bilirubin and alkaline phosphatase. Complications from a bile leak can follow a person for years and can lead to death. Bile leak should always be considered in any patient who is not recovering as expected after cholecystectomy [15]. Most bile injuries require repair by a surgeon with special training in biliary reconstruction. If biliary injuries are properly treated and repaired, more than 90% of patients can have a long-term successful recovery [16].

Laparoscopic cholecystectomy uses several (usually 4) small incisions in the abdomen to allow the insertion of operating ports, small cylindrical tubes approximately 5 to 10 mm in diameter, through which surgical instruments are placed into the abdominal cavity. The laparoscope, an instrument with a video camera and light source at the end, illuminates the abdominal cavity and sends a magnified image from inside the abdomen to a video screen, giving the surgeon a clear view of the organs and tissues. The cystic duct and cystic artery are identified and dissected, then ligated with clips and cut in order to remove the gallbladder. The gallbladder is then removed through one of the ports [17].

The biliary diseases constitute major portion of digestive tract disorders. Among these cholelithiasis being the fore runner causing general ill health, thereby requiring surgical intervention for total cure [18]. Since its foundation in1987 by Philip Mouret of Lyon, Laparoscopic cholecystectomy (LC) has been the procedure of choice for symptomatic gall bladder disease [19]. Traditionally LC is performed using four port techniques [20-21]. Reducing the size and number of ports did not affect the safety of the procedure [22]. These modifications actually reduced the pain and analgesia requirement [23]. It has been shown that three port LC, two port LC, Needlescope cholecystectomy with micro-instrument and even single incision LC have shown to be feasible. These new techniques took similar time to perform operation and caused less post operative pain reducing analgesic requirement, had cosmetic benefits and at the same time reduce the cost of one port, thus being cost effective than standard LC. Hence the present study was planned to evaluate the observations and complications in three ports vs Classical Four Ports Laparoscopic cholecystectomy.

Methodology

The present study was planned in Department of Surgery, Rama Medical College Hospital and Research Centre, Mandhana, Kanpur, Uttar Pradesh, India from Oct 2010 to May 2011. Total 50 patients were symptomatic gall stone disease were enrolled in the present study. Group I patients were subjected to three-port laparoscopic cholecystectomy and Group II patients were subjected to conventional fourport laparoscopic cholecystectomy.

Three-port method

Two 10 mm trocars (in the epigastrium for working port and supraumblical region for camera port) and one 5mm trocar (right mid clavicular subcostal region) was inserted. A grasping forceps was then inserted through the third port to hold the infundibulum, moving it right and left or back and forth to display the Calot's triangle. The instruments used to perform dissection were passed through the epigastric port. This was followed by dissection of the Calot's triangle and the gall bladder from liver bed. Special maneuvering of the grasping forceps was done, in which the shaft of the forceps was moved in opposite direction to the movement of the jaw to retract the liver. This maneuver practically achieved similar exposure in the region of Calot's triangle as is done by fundal grasper. Finally, cystic duct and cystic artery were clipped, and gall bladder was extracted through the epigastric port. In case of bile spillage, irrigation was done and a drain (Romovac) No.14/16 was placed in the sub-hepatic pouch of Morrison's, inserted through the 5mm port and was positioned under vision. Skin incisions were closed by 2-0 ethilon. Incision sites were subcutaneously infiltrated with 0.5% Bupivacaine in all cases.

Four port method

In addition to the above-mentioned ports, another 5mm port was inserted in the anterior axillary line in right flank region. This was used to grasp the fundus of the gall bladder to facilitate the dissection of the Calot's triangle and provide traction to the gall bladder. Rest of the procedure was the same as that mentioned for the threeport technique. Patients were discharged either on the same evening or next morning. All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

Following was the inclusion and exclusion criteria for the present study.

Inclusion criteria: All patients with symptomatic gall stone disease and gall bladder polyp with base more than 1cm in diameter, confirmed on ultrasound, were included in the study.

Exclusion criteria: Patients who were unwilling to be a part of the study along with patients who were jaundiced, had radiologically demonstrable CBD stones or those who were unfit for laparoscopic procedure

Results & Discussion

Laparoscopic cholecystectomy has been the gold standard surgery for gallbladder disease in the last two decades. But improvisation and innovation in minimal access surgery has

led to the evolution of three-port cholecystectomy, two-port cholecystectomy, and recently, the world is mesmerized with the advent of single incision laparoscopic surgery.

The data from the two study groups were collected and presented as below. In the era of laparoscopic surgery, less postoperative pain and early recovery are major goals to achieve better patient care and cost effectiveness. Several studies demonstrated that less post operative pain was associated with reduction in either size or number of ports [24-25]. The use of fourth trocar is considered unnecessary by some surgeons while few of them used futures to retract gallbladder fundus. In our present study we have experienced the almost same demographic profile as in other studies [26-29].

Table 1: Demographic Details

Parameters	Group I	Group II
Operation Procedure	**Three-port method**	**Four port method**
Number of Cases	25	25
Age	25 – 59 years	26 – 63 years
Sex		
Male	6	5
Female	19	20
Symptoms		
Acute	5	6
Chronic	20	19

Table 2: Observation during Operation

Parameters	Group I	Group II
Operation Procedure	**Three-port method**	**Four port method**
Number of Cases	25	25
Complications		
Bleeding from cystic artery	1	1
Bile Duct Injury	1	0
Visceral Organ Injury	0	1
Others	1	0
No Complications	22	23

Table 3: Post-operative complications

Complications	Group I	Group II
Operation Procedure	**Three-port method**	**Four port method**
Number of Cases	25	25
Wound Infection	1	1
Wound hematoma	0	1
Abdominal Pain	1	0
Port Site Hernia	0	0
No complications	23	23

Gall stone disease is a female preponderant disease, mostly affecting middle aged females. Few studies have linked the etiology to estrogen hormone [30]. Most of the patients in either groups had multiple calculi with chronic symptoms.

Not a single case required fourth port to complete the procedure On the other hand conversion rate to open cholecystectomy is same as that in four port cholecystectomy. Complications (bleeding, infection) are comparable to four port cholecystectomy. We don't come across any serious bile duct injury in our procedure. Most recent studies done in Nepal [31] and India [32] also declare three port laparoscopic surgery safe and having few scars.

The results show that the three-port technique yields the same success rate as the four-port one. Furthermore, the results of three-port technique were more favorable in that it reduced pain, so that fewer analgesic injections were needed for pain control. The three-port group took fewer analgesic tablets compared with the four-port group, which was statistically significant. Similar results were shown by a study conducted in Ireland, Nepal and other places [33-36]. The hospital stay was statistically significant in our study group, patients in three-port group were had shorter hospital stay compared to four-port group. The post-operative nausea and vomiting were comparable in both groups.

The three-port technique did not change the rate of conversion when compared to the four-port technique or to data published in the literature also the operating time did not increase as a result of this technique when performed in both types of cholecystitis, even when compared to published series [37-38]. Diclofenac and pethidine were the most common postoperative analgesics prescribed after LC [39-40]. Vomiting and excessive sedation are known side effects of pethidine.

Patients who underwent three-port procedure needed less pethidine than those who underwent four-port LC. On the other hand diclofenac intake did not relate to the number of ports used. Although the length of hospital stay is longer than expected for both groups due to the fact that patients were admitted one day prior to surgery at the time of conducting the study. The introduction of the three-port technique improved the length of hospital stay, adding another cost-effective benefit to the procedure; looking for possible causes for this reduction we found a strong correlation between the amount of opiates consumed and the length of hospital stay which may in part explain this reduction.

The difficulty level in three-port laparoscopic cholecystectomy was higher as compared to four-port laparoscopic cholecystectomy in the following situations: thick walled gall bladder, gall bladder packed with stones, large stone impacted at Hartman's pouch, empyema of gall bladder, severe pericholecystic adhesions, frozen Calot's triangle and acute cholecystitis.

Conclusion

From the present study it can be concluded that three port method of laparoscopic cholecystectomy is a safe procedure with no extra complications in the hands of an experienced surgeon. The three port laparoscopic cholecystectomy group is preferable as there is fewer requirements of analgesics, cosmetically better, cost effective and there is less crowding around the operating table as there is no need of second assistant in three port laparoscopic cholecystectomy, thus reducing the required manpower and hospital cost.

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