

LAPAROSCOPIC CHOLECYSTECTOMY BY SECTORISATION OF PORT SITES

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ABSTRACT

Objective: To evaluate the results of 160 consecutive laparoscopic cholecystectomies using sectorisation based port site selection to improve ergonomics for surgeons.

Design: Descriptive study.

Place and Duration of Study: PNS Shifa Karachi, Pakistan from Feb 2011 to Feb 2012.

Patients and Methods: In this prospective study, 160 consecutive patients had undergone laparoscopic cholecystectomy in a tertiary care hospital using sectorisation for trocar placement. All patients with symptomatic gallstones, acute calculous cholecystitis and empyema gallbladder were included. Patients with choledocholithiasis were excluded from the study. The collected data included age, sex, diagnosis, history of previous surgery, conversion to open surgery and its reasons, operative time, post-operative hospital stay, complications and laparoscopy related complications to the surgeon such as shoulder pain, wrist stress and pain, finger joint pain and stress exhaustion.

Result: One hundred and sixty patients underwent laparoscopic cholecystectomy with mean age 45 ± 12.9 years. Female to male ratio was 7.8: 1. A total of 110 patients had chronic cholecystitis / biliary colic, 34 patients were with acute cholecystitis and 16 patients had diagnosis of empyema gallbladder. The mean operative time was 35.3 ± 14.6 min. Conversion rate to open surgery was 1.2%. Complications included bleeding from cystic artery (n=1) and injury to common hepatic duct (CHD) (n=1). One patient developed port site hernia post operatively. There was no incidence of laparoscopy related complications in surgeon such as pain shoulder, strains on the wrist joint, stress exhaustion and hand-finger joint pain.

Conclusion: Sectorisation technique can be used in laparoscopic cholecystectomy in order to avoid the physical constraints of "laparoscopic shoulder", hand finger joint pain, tenosynovitis, stress exhaustion, and hand muscle injury without increasing any morbidity to the patients.

Keywords: Cholecystitis, Complications, Laparoscopic cholecystectomy.

INTRODUCTION

Cholecystectomy is one of the most commonly performed abdominal surgeries, and in developed countries most cases are performed laparoscopically. Majority (90%) of cholecystectomies in the United States are performed laparoscopically¹. Laparoscopic cholecystectomy is considered the "gold standard" for the surgical treatment of gallstone disease^{2,3}. This procedure results in less postoperative pain, better cosmesis, shorter hospital stay and early return to work than open cholecystectomy⁴⁻⁶. A new era in surgery began when Dimitri Ott, Georg Kelling, and Hans

Christian Jacobeus introduced laparoscopic surgery initially at the beginning of this century. The first laparoscopic cholecystectomy was performed by Erich Muhe in 1985 paving the way for the advancement of laparoscopy within the field of general surgery⁷. In 1995 the trend towards decreasing the number of incisions was seen in laparoscopic cholecystectomy, when surgeons from France reporting the successful completion of 655 laparoscopic cholecystectomies with 3 trocars⁸. Navarra performed a one wound laparoscopic cholecystectomy with transabdominal sutures in 1997⁹. In 2001, 70 laparoscopic cholecystectomies were performed with 2 trocars¹⁰. In 2004, the first natural orifice transluminal endoscopic surgery (NOTES) was performed by Kalloo et al in which there were no abdominal incisions¹¹. In April 2007, Single Port Access (SPA) surgery was developed, a technique

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to allow minimally invasive surgery to be performed entirely through a single incision¹². There is no uniform consensus about the placement of ports for advanced laparoscopic procedures. The port site is currently dictated by the surgeon's preference based on his individual experience. However, to facilitate smooth instrument manipulation along with adequate visualization during laparoscopy, usually trocars are placed in triangular fashion. According to the laparoscopic principles, trocars for the surgeon's right and left hand should be placed at least 10 cm apart. The telescope is usually oriented between these two trocars and slightly back from them in most of the operations. This ideal trocar orientation creates an equilateral triangle between the telescope, and the surgeon's left and right hand, with 10 to 15 cm on each leg. This is termed as triangulation (Figure-1). When optical trocar is placed as one of the lateral port trocar, it is called as sectorisation (Figure-2). This sectorisation is routinely used in laparoscopic appendectomy when optical trocar is inserted through umbilicus and operating trocars are inserted below and lateral to optical trocar. With the conventional approach of triangulation, there have been frequent reports of shoulder pain due to abduction of shoulder and strains at wrist of surgeon¹³. In order to overcome this problem of shoulder and wrist pain due to awkward position; we have adopted sectorisation technique of port placement in laparoscopic cholecystectomy. Here in, we describe our technique of laparoscopic cholecystectomy using a modified port site selection termed sectorisation rather than placement of trocars in triangulation.

MATERIALS AND METHODS

A prospective study of 160 consecutive patients who had undergone laparoscopic cholecystectomy (LC) at PNS Shifa Karachi, a tertiary care hospital using a modified site for trocar placement during the period from Feb 2011 to Feb 2012. Patient selection for LC was based upon clinical diagnosis, findings of ultrasound examination, laboratory investigations and anaesthetist's assessment. All patients with

symptomatic gallstones, acute calculous cholecystitis and empyema gallbladder were included. Laparoscopic cholecystectomy was not attempted in patients with upper abdominal surgery, cholecystoduodenal fistula, and perforated gallbladder with abscess formation, cardiopulmonary disease or equipment failure. Patients with choledocholithiasis were excluded from the study. Laparoscopic cholecystectomy was performed by using single chip camera by Karl Storz. Energy source used was electro surgical diathermy only. Data was collected on personal computer prospectively and analyzed by Statistical Package for Social Sciences version 17. The collected data included age, sex, diagnosis, history of previous surgery, conversion to open surgery and its reasons, operative time, post-operative hospital stay, complications and laparoscopy related complications such as shoulder pain, wrist stress and pain, finger joint pain and stress exhaustion.. Follow up was done on 5th, 10th and 30th day. All the patients were asked to report in the surgical OPD in case of any late complications after 30th day of operation.

Surgical Technique

After induction of general anesthesia, the patients were placed in supine 150 reverse Trendelenburg position, with 30° left tilt. Nasogastric (NG) tube was inserted to decompress the stomach and pneumoperitoneum was created by Veress needle in 82% cases. In 18% cases open technique was used. Port placement was modified as shown in figure-2. A 10 mm laparoscope was inserted into the abdomen through the umbilical port. The falciform ligament and both lobes of the liver are examined closely for abnormalities and then second 5 mm port was usually inserted approximately 5 cm below the xiphoid process, but the precise position and angle depends on the location of the gallbladder as well as the size of the medial segment of the left lobe of the liver. Third 5 mm port was introduced through left of midline midway between the other two ports. Port 3 was used for traction on Hartman's pouch

and sub xiphoid port was used for dissection of Calot's triangle. After completing the dissection of Calot's triangle, a 5 mm telescope was introduced through sub xiphoid port and clips to cystic duct and artery were applied through umbilical port. Retrograde cholecystectomy was completed by conventional method and gall bladder was retrieved in an improvised endosac made by a surgical glove through umbilical port.

RESULTS

One hundred and sixty patients underwent

laparoscopic cholecystectomy with this new approach and their data were recorded prospectively and analyzed. The age of patients ranged from 19 to 78 years. The mean age was 45 ± 12.9 years. The female to male ratio was 7.8:1. Depending upon the preoperative diagnosis and laparoscopic findings, patients had diagnosis of Chronic cholecystitis / biliary colic 62.5% (n=110), acute cholecystitis 27.5% (n=34), and empyema gall bladder 10% (n=16). Pneumoperitoneum was established by closed

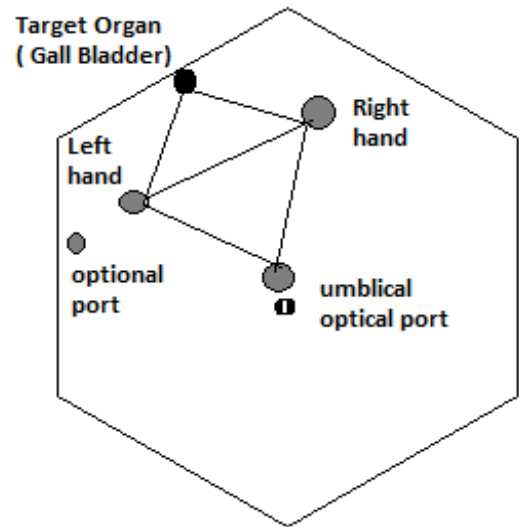


Figure-1: Triangulation (Equilateral triangle between the telescope, and the surgeon's left and right hand).

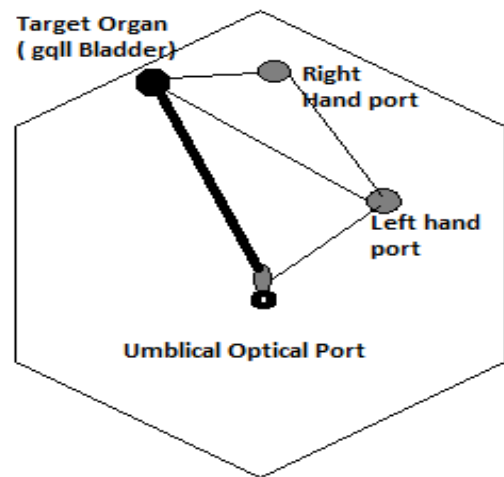
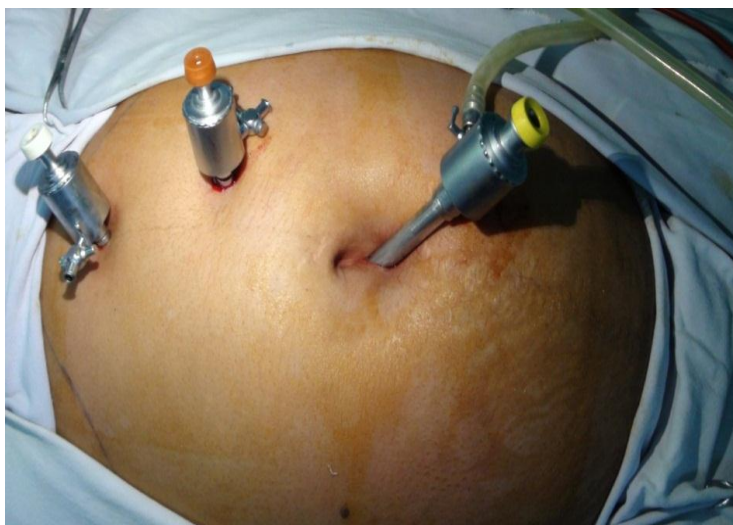


Figure-2: Sectorisation (Optical trocar is placed as one of the lateral port trocar).

method using Veress needle in 131 patients (82%) and open method in 29 cases (18%). For laparoscopic cholecystectomy 3 ports were used in 92.5% (n=148) cases while 4th port had to be introduced in 7.5% (n= 12) of difficult cases. The operating time from skin incision for insertion of Veress needle or open technique for establishing pneumoperitoneum and closure of skin wound ranged from 15 to 90 minutes mean time 35.3 ± 14.6 min. The conversion from laparoscopic to open cholecystectomy was required in 1.2% (n=2) cases. The reasons for conversion were due to bleeding from cystic artery (n=1) and injury to common hepatic duct (CHD) (n=1) during dissection of Calot's triangle in a case of acute cholecystitis. One patient developed port site hernia post-operatively which was repaired. There was no mortality. There was no incidence of laparoscopy related complications in surgeon such as pain shoulder, strains on the wrist joint, stress exhaustion and hand-finger joint pain.

DISCUSSION

Excellence was associated with big incisions at the dawn of surgery. But laparoscopic surgical developments have changed the mind set of surgeons from smaller incisions to scar-less surgery. In the wake of all advances in laparoscopy, come the drawbacks. Laparoscopic surgery provides patients with less painful surgery but is more demanding for the surgeon. There have been multiple reports of, thenar neuropathy, carpal tunnel syndrome, neck pain, eye strain, and cervical spondylosis among surgeons performing multiple laparoscopic procedures in high-volume centres¹⁴⁻¹⁶. In laparoscopic cholecystectomy, the optimal ergonomic orientation is provided when the surgeon stands behind the telescope but this frequently requires that a camera operator reach between the surgeon's hands to guide the telescope. So in American approach, in which the surgeon and camera operator stands on left side of patient side by side, the surgeon has to keep his left shoulder constantly abducted so that the camera assistant can maneuver the telescope under the abducted shoulder. There is also 10-20

degree flexion at the wrist joint of the surgeon's left-hand while grasping instruments with abducted arm which causes strains on the surgeon's wrist. In the French approach, the surgeon stands between the abducted legs of the patient and the camera assistant stands on the left side of patient. But still with this technique the camera assistant has to reach between the surgeon's hands to guide the telescope. It is really tire some for the surgeon to keep shoulder abducted and flexion at wrist in long and difficult surgeries. There have been frequent reports of shoulder pain due to abduction of shoulder (chicken wing scapula) during laparoscopy termed as "laparoscopic shoulder", backache, hand finger joint pain, tenosynovitis, stress exhaustion, and hand muscle injury¹³. In order to overcome this problem we tried this new port site in which the second port was introduced on the left side of midline to retract the gallbladder. With this approach surgeon can work with both elbows at the sides and the camera operator doesn't have to reach between the hands of the surgeon to guide the telescope. Both the wrists of surgeon remain in functional position of comfort during the procedure. We have performed 160 cases with this new technique so far and there was no problem of swaddling of instruments. The operative time ranged from 15 to 90 minutes with mean operation time of 35.3 ± 14.6 minutes which is quite less as compared to other studies¹⁷. The overall conversion rate reported varies from 2.6% to 10.3%. In a study, Shamim et al has reported conversion to open cholecystectomy in 5.1% patients with chronic cholecystitis and 24.4 % patients with acute cholecystitis¹⁸. In this study, all the cases with gall stones irrespective of the status of the gall bladder were operated laparoscopically. Out of 160 cases only 2 cases (1.2%) were converted to open cholecystectomy. Conversion rate is acceptable with this new technique. The reported mortality rate for laparoscopic cholecystectomy is about 0.1%. No mortality was seen in this study. Complications in surgeons related to laparoscopy such as pain shoulder, strains on the wrist joint, stress

exhaustion and hand-finger joint pain were not seen.

CONCLUSION

Sectorisation technique can be used in laparoscopic cholecystectomy in order to avoid the physical constraints of "laparoscopic shoulder", wrist joint strain, hand finger joint pain, stress exhaustion, and hand muscle injury in surgeons without increasing morbidity to the patients.

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