



Original Article

## Complications of Two Port Laparoscopic Cholecystectomy-Study of 50 Cases

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### Abstract

**Background:** For the management of Gallstone disease, laparoscopic cholecystectomy has been the the gold standard and is preferred over open cholecystectomy. As patients' demand has increased for improved postoperative quality of life and cosmesis, surgeons have continued to decrease the number of ports for laparoscopic cholecystectomy. To meet these expectations we adopted two-port techniques at Comilla, Bangladesh. For the last three years we have selected 50 patients where two-port laparoscopic cholecystectomy was trialled. The procedure were successfully performed in 47(94%) & conversion were required in 3(6%) with some accepted complications like epigastric port infection & herniation, post cholecystectomy syndrome, reactionary haemorrhage, bile leakage & biloma, significant epigastric port pain postoperatively & stricture of CBD. The present two port technique not only overcoming specimen extraction difficulties but also contributes to good cosmesis.

**Objectives:** To see the outcome of two port laparoscopic cholecystectomy.

**Methods:** Consecutive 50 patients were admitted in surgery ward of Central medical college, Comilla with gallstone disease over a 3 years period. Diagnosis is confirmed by ultrasound with the assessment of operative feasibility. Data collection sheet was maintained by Microsoft Excel. Data were analyzed manually.

**Results:** In this study 50 patients were included. Among them 34 (68%) were females and 16 (32%) were males (ratio = 2.1:1). Mean age was 35.7 years (range 20–55years). All patient were undergone two port laparoscopic cholecystectomy & successfully accomplished in 47 (94%), conversion were required in 3 (6%) patients. Most common (62%) sonological findings were cholelithiasis with normal size & shape of gall bladder. Mean operative time was 50 minutes. Among the per operative difficulties bleeding were 14%, perforation of gall bladder 10%, spillage of gallstones 6%, epigastric forceps manipulation difficulties 4%, conversion to open cholecystectomy 6%. Most of the patients(80%) admitted in hospital for 2-3 days. 4 (8%) patient had epigastric port infection & 1 (2%) patient developed this site herniation, 3 (6%) patient had post cholecystectomy syndrome, 1 (2%) patient had reactionary haemorrhage, 1 (2%) bile leakage & biloma, 4(8%) patient had significant epigastric port pain postoperatively, 1 (2%) patient developed delayed stricture of CBD. In all other patients wound healed nicely with minimal scarring, with very less postoperative pain, with no problem so far in 3 years follow up. Most patients (90%) returned to work within 2 weeks.

**Conclusion:** Two-port laparoscopic cholecystectomy is a safe procedure & cosmetically rewarding.

**Key Words:** Laparoscopic cholecystectomy, gall stone, two port, outcome.

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### Introduction

Cholecystectomy is the most common operation performed by general surgeons. Since the 1st open cholecystectomy by Langenbuch in 1882, it was the treatment of choice for symptomatic gallstones until 1987.<sup>1</sup> First report of laparoscopic

cholecystectomy (LC) using keyhole approach was by Professor Mouret of Lyon, France in 1987.<sup>2</sup>

Four port laparoscopic cholecystectomy (FPLC) is the gold standard treatment for elective

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procedure.<sup>3</sup> But consideration of advantages like small incision, less pain, faster return to activity, shorter hospital stay, decreased total cost & low morbidity LC can be safely performed by two port (TPLC), even by single port (SPLC) also.<sup>4</sup>

Laparoscopic cholecystectomy is now the procedure of choice in all the gall bladder diseases and there is increase in the skills of surgeons with newer equipment<sup>5</sup>. Two ports laparoscopic cholecystectomy is rarely performed as it demands greater expertise and skills. Also this technique is less expensive and less scar formation than four port laparoscopic cholecystectomy.<sup>6</sup>

Single port laparoscopic cholecystectomy offers more cosmetic benefits, but clashes of forceps during operation & extraction of specimen is difficult. Two port techniques can overcome the difficulties in extraction of larger stones & specimen.<sup>7</sup>

We have started a new journey by two-port technique in minimal invasive surgery at Central Medical College, Comilla in Bangladesh after completion of more than 2000 open cholecystectomy, 100 three-port & 800 four-port laparoscopic cholecystectomies. We have noted that two-port technique is associated with low morbidity and high cosmesis.

### Materials and Methods

Between January 2015 to December 2017 a total 3 years period, 50 patients were selected according to inclusion & exclusion criteria in this prospective study. All patients were admitted in the Department of surgery of Central Medical College Hospital, Comilla with the diagnosis of cholelithiasis (Symptomatic-acute /chronic cholecystitis, silent stone > 2cm), acute cholecystitis admitted in hospital within 24 hours of attack, wall thickness of gall bladder was less than 3 mm in USG & patient with no jaundice were included. Patients whose body mass index (BMI) is not greater than 30 kg/m<sup>2</sup>. Obese patients were avoided due to difficulty in forceps manipulation in epigastric site. Selected patients were evaluated properly suited for this procedure by good quality of ultrasonogram to see gallbladder calculi, its wall thickness, and condition of CBD, features of

acute inflammation or malignancy. Patients not willing to give informed consent, elderly patient (more than 60 years) with co morbid illness (bronchial asthma, COPD, IHD), acute cholecystitis mimicking condition like acute pancreatitis & patients with BMI > 30 kg/m<sup>2</sup> were excluded in the study. All patients with their accompanying responsible persons were given an explanation of the study and informed consents were obtained. Their knowledge and attitude about the procedure were assessed by talking interview using a standardized questionnaire.

### Surgical Technique

All patients were undergone two port laparoscopic cholecystectomy under G/A in supine reverse Trendelenburg position with tilting the bed slightly to the left side where surgeon & camera man stand. Pneumoperitoneum was created using CO<sub>2</sub> gas by placing a supraumbilical/infraumbilical 5mm Hasan's trocar blindly with maintaining intra-abdominal pressure 12 mm Hg (Port 1). A 30° telescope was passed & operability of every case were assessed in terms to achieve "critical view of safety". Then a 5 mm trocar was placed below the right sternocostal angle as epigastric port (Port 2). Afterward, a slight right side angling of the port was done to bring it through the angle between falciform ligament and the anterior peritoneum (Port 3). A 5mm grasper & a Maryland are introduced through the epigastric port. Dissection was carried out to achieved critical view, i.e skeletonization of two duct (cystic duct & artery). For application of clip into the duct; we were used 5mm clip applicator. After dividing the ducts with scissor, final dissection of gallbladder was carried out by monopolar hook. Before separation of gallbladder from the fossa haemostasis was achieved & security of cystic pedicle (artery & duct) is confirmed. Before removal of specimen port 2 & 3 were made into one by extension of incision. Due to the presence of two ports in the same wound the range of their movement may be limited. So, careful attention should be paid to proper alignment of ports during placement at epigastric site. Though there is three ports, but after removal of gallbladder from abdomen two epigastric ports

are became one by adding two incisions. Hence it is termed as two port technique. If there were any difficulty to remove the specimen, extension of epigastric incision made it easier. After infiltration of 2% lidocaine into the epigastric port to reduce postoperative pain, it was closed in two layers. Supraumbilical port was closed with skin suture only. Once there was difficulty due to haemorrhage or adhesions in Calot's triangle, conversion was done. In acute cases we were used drain with third port in right hypochondrium. Patients allowed to oral form after 12 hours & discharged on 2nd/3rd POD. Skin stitches were removed on 7th POD.



Figure 1: Position of patient & surgical team.

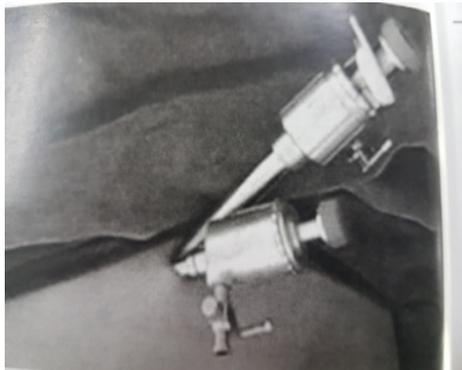


Figure 2: Assembly of trocar at epigastric port

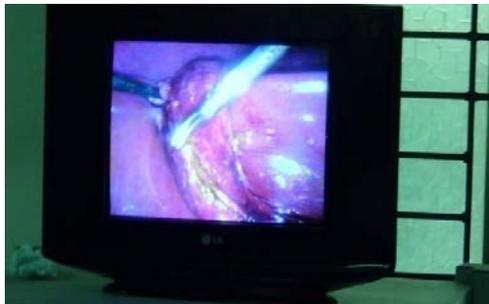


Figure 3: Laparoscopic view of dissection

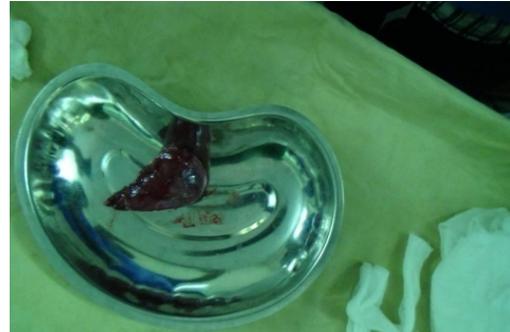


Figure 4: After removal of specimen



Figure 5: After skin closure

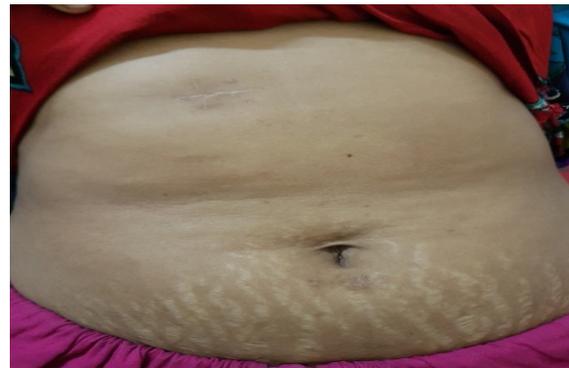


Figure 6: Final scar after 6 months

### Results

In this study 50 patients were included. Among them 34(68%) were females and 16(32%) were males (ratio = 2.1:1). Mean age was 35.7 years (range 20–55years).All patient were undergone two port laparoscopic cholecystectomy & successfully accomplished in 47(94%),conversion were required in 3(6%) patients. All (100%) patients were operated under general anaesthesia &specimen was sent for histopathological

examination. Most common (62%) sonological findings were cholelithiasis with normal size & shape of gall bladder. The mean operative time was 50 minutes & longer operative time (60-90 m) was required in acute cases.

Among the peroperative difficulties bleeding were 14%, perforation of gall bladder 10%, spillage of gallstones 6%, epigastric forceps manipulation 4% & Conversion to open cholecystectomy 6%. Six percent patients had higher oozing from gall bladder fossa where a drain was kept in situ with creation of 3rd port. All patients received intravenous single dose cefuroxime and then switch over to oral form. Drain was applied to three patients & removed on the 2nd or 5th postoperative day, one of which had excessive bile leakage was noticed and stopped spontaneously probably due to leakage from accessory cholecystohepatic duct.

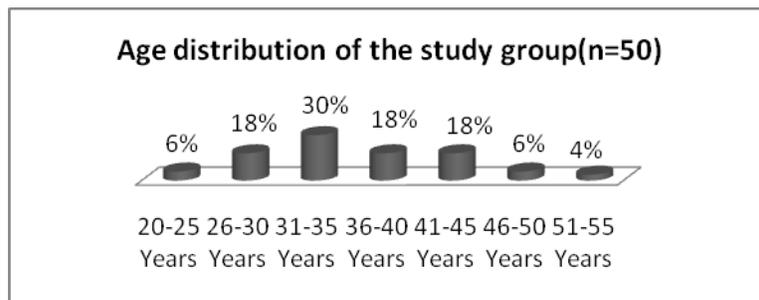
Most of the patients (80%) admitted in hospital for 2-3 days. In 100% cases skin sutures were removed during follow-up around 7th POD. 4(8%) patient had epigastric port infection& 1(2%)

patient developed this site herniation, 3(6%) patient had post cholecystectomy syndrome,1(2%) patient had reactionary haemorrhage, 1(2%) bile leakage & bilioma,4(8%) patient had significant epigastric port pain postoperatively,1(2%) patient developed delayed stricture of CBD. The biliary stricture was managed with Roux-en-Y hepaticojejunostomy. Patients with haemorrhage and bile leakage were improved conservatively and biloma needed combined sonological & endoscopic intervention. In all other patients wound healed nicely with minimal scarring, with very less postoperative pain, with no problem so far in 3 years follow up. All patients are asked to come for follow up initially in 1st month, then on 6 month, for next 1st year,2nd year & 3rd year. But most of the patient (65%) did not follow the complete schedule of follow up. We presume, people who were lost to follow up had no complaints. Most patients (90%) returned to work within 2 weeks.

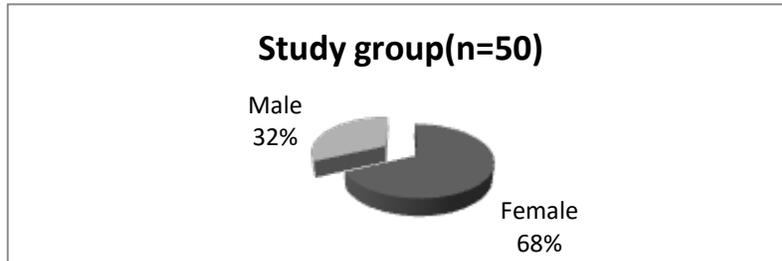
**Results:**

**Graphical representation of the study(n=50):**

**Age distribution:**



**Sex variant of the study group:**

**Ultrasonographic findings (n=50):**

Findings	No of patients	Percentage (%)
Cholelithiasis with gall bladder wall < 3 mm	31	62
Chronic calculus cholecystitis	13	26
Acute calculus cholecystitis	06	12

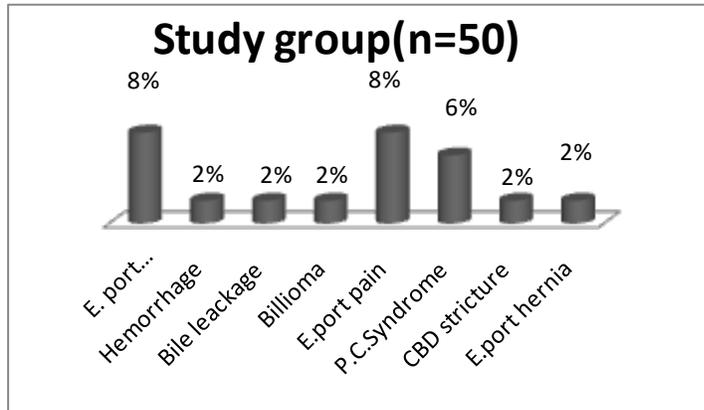
**Operative time:**

Diagnosis	Time in minutes
Cholelithiasis with gall bladder wall < 3 mm	30-40 m
Chronic calculus cholecystitis	45-60 m
Acute calculus cholecystitis	60-90 m

**Peroperative difficulties (n=50):**

Difficulties	No of patients	Percentage (%)
Bleeding :		
From epigastric port	01	2
From umbilical port	01	2
From gall bladder fossa	03	6
From cystic artery	02	4
Perforation of gall bladder	05	10
Spillage of gallstones	03	6
Epigastric forceps manipulation	02	4
Conversion to open cholecystectomy	03	6

**Postoperative Complications (n=50):**



#### Hospital stay (n=50):

Days	No of patients	Percentage (%)
2-3 d	40	80
4-5 d	08	16
5-7 d	02	4

#### Postoperative follow up(n=50):

Time of follow up	No of patients	Percentage (%)
1 <sup>st</sup> month	50	100
3 <sup>rd</sup> month	20	40
6 <sup>th</sup> month	08	16
1 <sup>st</sup> year	04	8
3 <sup>rd</sup> year	02	4

#### Discussion

In this prospective study 50 patients were selected over a period of 3 years period (from January 2015 to December 2017). All the patients were undergone two port laparoscopic cholecystectomy (TPLC) by the Department of Surgery of Central Medical College, Comilla, Bangladesh.

Carl Johann August Langenbuch of Berlin performed the first elective cholecystectomy in 1882 on a patient who had been suffering from symptomatic cholelithiasis for 10 years. Although the patient was found “smoking a cigar” the following day, he was not discharged from the hospital for two months.<sup>8</sup> But following introduction of laparoscopic cholecystectomy (LC) many centre now perform it successfully as a day case surgery.

The main thrust has been on the reduction of pain and improve cosmesis & overcoming the specimen extraction difficulties.<sup>9,10</sup> From this ground we have chosen this technique for good outcome.

The mean age of present series was 35.7 years (20-55 years) where female: male ratio was 2.1:1 and selected maximum age group was 30-35 years (30%). Aswini KM & Prakash S showed in their initial experience of 25 cases with TPLC the mean age was 40.5 years (27-55 years) & female: male ratio was 1.5:1.<sup>11</sup>

Most common sonological findings (62%) were cholelithiasis with normal size & shape of gall bladder. Ultrasonography has a specificity and sensitivity of 90-95% and can detect stones as small as 2 mm in diameter is mentioned by Hasan et al.<sup>12</sup>

For the treatment of gallstones we were selected symptomatic & silent stones with acute cases admitted within 24 hours to avoid operative difficulties. In 1992 NIH consensus development conference statement on gallstones and laparoscopic cholecystectomy concluded that the sole indication for laparoscopic cholecystectomy is symptomatic cholelithiasis.<sup>13</sup>

In this study 80% cases were done within 50 minutes of time. The operative time was 47.2 ( $\pm 13.21$ ) min. The operative bleeding was 11 ( $\pm 8.15$ ) ml. The time consumed by suture retraction of the gallbladder was 4 ( $\pm 1.55$ ) min. There was no conversion to open surgery. Postoperative complications including bile leak, bleeding, and biliary injury did not occur. Postoperative scars showed more cosmetic than that of the four or three-port LC. Retained common bile duct stone was found in 1 patient and was successfully extracted by retrograde endoscopy.<sup>14</sup>

Among the preoperative difficulties bleeding were 14%, perforation of gall bladder 10%, spillage of gallstones 6%, epigastric forceps manipulation 4% & Conversion to open cholecystectomy 6%. Conversion was needed in 3(6%) cases due to failure to achieve critical view of safety. Larkin JD & Edward GC described in single centre series of 10,174 patients, conversion was 8.2%, mortality 0.2%, BDI 0.31%.<sup>15</sup> The procedure was successful in 99 out of 107 cases (success rate, 92.5%). A third trocar was added in the remaining 8 cases (7.5%) due to extensive and dense adhesion.

By two port technique we were no longer out of complications. The reasonable complications of our series were 4(8%) patient had epigastric port infection & herniation 1(2%), 3(6%) patient had post cholecystectomy syndrome, 1(2%) patient had reactionary haemorrhage, bile leakage & bilioma, 4(8%) patient had significant epigastric port pain postoperatively, 1(2%) patient developed delayed stricture of CBD. All the complications were

managed according to their merits & there was no mortality.

To reduce trocar site pain we have infiltrated 2% lidocaine at trocar site which was similar to Al Salamah SM.<sup>16</sup> Jacques P & Horacio JA described risk of wound infection following LC is less than 1%, incisional hernia 0.5%.<sup>2</sup> Mumtaz Wani et al. mentioned in his 311 cases series with 2.9% morbidity & no mortality.<sup>17</sup> Chan JC et al reported 3 cases of port site infection in their series.<sup>18</sup>

Dennis L wrote in his paper estimated incidence of postcholecystectomy syndrome was 40%, bile duct injury (BDI) was 0.3-2.7%, trocar related injury 0.2%,<sup>19</sup> overall incidence of port-site hernia was reported 0.65-2.8%.<sup>20</sup> Alastair LY et al, presented their series with most feared complication is bile duct injury and incidence 0.3-1.9%.<sup>8</sup> They also mentioned biloma, biliary peritonitis as a consequence of BDI in their paper. BDI risk can be reduced by adhering to Strasberg's "critical view of safety" approach<sup>8</sup> which is similar to our technique. Ahmad MZ noticed in his 30 cases series where one patient had biloma due to leakage from duct of Luschka which was managed by CT-guided drainage & endoscopic decompression which was almost similar to us.<sup>21</sup> LC is the gold standard technique for the removal of gall bladder. Al Salamah SM wrote in his article four-port is easier task but greater number of ports causes more pain, but two port is superior than previous in terms of cosmesis, less pain and operative difficulty is more in inflamed cases.<sup>16</sup>

Present series showed 80% patient discharged from the hospital within 2-3 days. The hospital stay was shorter in the two-port group ( $1.68 \pm 0.7769$  days).<sup>7</sup>

Waqar SH et al mentioned two port LC is safe & feasible in his comparative study on two port vs four port technique.<sup>22</sup> Chan JC et al, showed in their single port LC study of 173 patients, single port technique has more cosmesis, less painful but clashing of forceps during the procedure make it difficult.<sup>18</sup> Ming G Tian et al told overall pain score, analgesia requirements, hospital stay, and patient satisfaction score on surgery and scars were high in two port technique.<sup>23</sup>

Our present series proved that the main advantages of two port LC can be performed safely, principle as the previous conventional technique, reduce number of port, less painful, better for specimen delivery, higher cosmesis with shorter hospital stay. So it is recommended for elective cases. Sreenivas S et al showed that two ports laparoscopic cholecystectomy is rarely performed as it demands greater expertise and skills. Also this technique is less expensive and less scar formation than four port laparoscopic cholecystectomy.<sup>10</sup>

### Conclusion

For the management of cholelithiasis two-port laparoscopic cholecystectomy can be safe and efficacious when man behind the machine is skilled and experienced. A preoperative proper evaluation can make the operative task easier.

### References

1. Raymund AGO, Chester CT, Amin JI, Mandoza MC. Laparoscopic Cholecystectomy. In: Kim ST, Raymund AGO, Chester CG. Pales handbook of basic laparoscopy. 1st ed. Philippines. Raymund Andrew G. Ong Publishing, 2014: p 199-214.
2. Palanivelu C. Laparoscopic Cholecystectomy. In: Jacques P & Horacio JA. Art of laparoscopic surgery-Textbook and Atlas. 1st ed. New Delhi. Jaya Publications, 2005 : p 555-83.
3. Jarangin WR, Jacques B et al. Laparoscopic Cholecystectomy and choledocholithotomy. In: Alexander N and Nathaneil S. Blumgart's Surgery of the Liver, Biliary Tract, and Pancreas. 5th ed. Philadelphia. Elsevier Saunders. Philadelphia, 2012 : p511-31.
4. Doherty MG. Biliary Tract. In: Doherty GM, Lawrence WW. Current surgical diagnosis & treatment. McGraw Hill Companies. 12th ed. USA, 2003: p 573-616.
5. Cuschieri A, Steele CJR, Moossa RA. Disorders of the biliary tract. In: Cuschieri A. Essential surgical practice. 4th ed. London. Arnold publishers Ltd, 2002 : p 408-25.
6. Williams SN, Bulstrode K.J.C, O'Connell RP. The gallbladder and bile ducts. In: Conlon K. Bailey & Love's short practice of surgery. 26th ed. New York. Taylor and Francis Group, 2013: p 1197-1214.
7. Two-port vs four-port laparoscopic cholecystectomy: A prospective randomized controlled trial. Available from: [https://www.researchgate.net/publication/24491012\\_Twoport\\_vs\\_fourport\\_laparoscopic\\_cholecystectomy](https://www.researchgate.net/publication/24491012_Twoport_vs_fourport_laparoscopic_cholecystectomy): A prospective randomized controlled trial [accessed May 25 2018].
8. Michael D and Taylor I. Management of Bile Duct Injuries. In : Alastair LY and Lodge JPA. Recent Advances in Surgery 38. New Delhi. Jaypee Brothers Medical Publishers (P) Ltd, 2017: p 53-63.
9. Zinner MJ, Ashley WS. Cholecystectomy (Open and Laparoscopic). In: Alexander PN et al. Maingot's Abdominal Operations. 11th ed. USA. The McGraw-Hill's Companies, 2007: p 847-863.
10. Sreenivas S, Ravindra SM et al. Two-port mini laparoscopic cholecystectomy compared to standard four-port laparoscopic cholecystectomy. J Minim Access Surg. 2014 ; 10(4): p 190-196.
11. Misro AK, Prakash S. Two-Port Laparoscopic Cholecystectomy: An Initial Experience of 25 Cases With A New Technique. World Journal of Laparoscopic Surgery. 2016;9 (1): p 1-4.
12. Gabriel EN. Gallstones, Niger J Surg. 2013; 19(2):p 49-55.
13. Philipp RS, Frank L, Matthias G. Gallstone disease: Optimal timing of treatment. Journal of hepatology. 2017 ; 67: 3: p 645-47.
14. Study of the Two Port Vs Four Port Laparoscopic Cholecystectomy. Available at: <https://www.laparoscopyhospital.com/Comparative.html>. [Accessed on : January 03, 2018].
15. Larkin JD and Edward GC. Laparoscopic Cholecystectomy. In: Theodore NP et al. Atlas of laparoscopic Surgery. 3rd ed. New Delhi. Jaypee Brothers Medical Publishers Ltd, 2008: p153-80.
16. Al Salamah SM. Outcome of laparoscopic cholecystectomy in acute cholecystitis. J Coll Physicians Surg Pak. 2005 ;15 (7): p 400-3.
17. Mumtaz Wani, Hilal Wani, Muddassir Shahdhar, Shahid Hameed, Shabir Mir, Mudasir Magray. Two-port and four-port laparoscopic cholecystectomy: Differences in outcome, Archives of international surgery. 2014; 4 : 2: p 72-77.
18. Chan JC, Young HR et al. Single-Port Laparoscopic Cholecystectomy for Gall Bladder Polyps. JSLS. 2015; 19 (3): p 183-85.
19. Dennis Lee. Laparoscopic Cholecystectomy. Available at: <https://www.medicinenet.com/cholecystectomy/article.html>. [Accessed on: January 03, 2018].

20. Sherwinter AD. Laparoscopic Cholecystectomy Technique: Updated:Jan17,201. Available at:[https:// emedicine. medscape. com/ article/1582292- technique # c2](https://emedicine.medscape.com/article/1582292-technique#c2). [Accessed on : January 03, 2018].
21. Ahmad MZ. Single-Port Laparoscopic Cholecystectomy: Scarless Cholecystectomy. Minimally Invasive Surgery. 2012 : p 5 .
22. Waqar SH, Shah SF, Khan IA, Ch TS, Abdullah MT, Malik ZI, Zahid MA. Two-port laparoscopic cholecystectomy--a new technique.J Ayub Med Coll Abbottabad. 2008; 20 (4): 167-8.
23. Ming G Tian, Pei J Zhang, Y Yang, Fan J Shang, and J Zhan. Two-port laparoscopic cholecystectomy with modified suture retraction of the fundus: A practical approach.J Minim Access Surg. 2013; 9(3): 122–125.

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