Three Ports versus Four Ports Laparoscopic Cholecystectomy

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Abstract

Background: Three ports Laparoscopic cholecystectomy is easy and safe. It is associated with less postoperative pain, analgesia requirement and as compared to four ports laparoscopic cholecystectomy.

Patients and Methods: This randomized control trail included 60 patients who had elective laparoscopic cholecystectomy. It was conducted at Department of Surgery, Pakistan Institute of Medical Sciences, Islamabad from January 2013 to June 2013.

Results: The mean age in both groups was 44 years and the age range was 18-72 years. Three ports laparoscopic cholecystectomy (43 min) took less time to complete than four ports laparoscopic cholecystectomy (51 min). Patients in three ports laparoscopic cholecystectomy experienced less pain as compared to four ports group.

Conclusion: Three ports laparoscopic cholecystectomy is safe and effective procedure and it did not compromise the patient safety.

Key Words: Cholecystectomy, laparoscopy, cholelithiasis
Introduction

Laparoscopic Cholecystectomy has become the gold standard treatment for the symptomatic gall stones.\(^1\) Laparoscopic Cholecystectomy is the procedure which revolutionized the general surgery practice.\(^2\) There have been many changes, innovations, improvements and modifications in laparoscopy technique since its start.\(^3\)

Commonly laparoscopic cholecystectomy is performed using four ports technique. In four ports laparoscopic cholecystectomy the umbilical port is used for camera, epigastric port and the third port are working ports for retraction or dissection. Fourth port is used to apply traction on the gallbladder to facilitate in dissection. Some surgeons however thought that the fourth port is not necessary in most cases retraction could be applied through the third port graspers.\(^4\) They showed that three ports technique is safe, effective, and economic as compared to four ports technique.\(^5,6\) Studies have shown that there is reduced postoperative pain and analgesia requirement, lower incidence of chest infections, pyrexia, wound infection, lower morbidity and cost effectiveness of three ports laparoscopic cholecystectomy compared to four ports laparoscopic cholecystectomy.\(^5-7\)

This study was aimed to compare both procedures in terms of complications, time taken to complete the procedure, hospital stay and cost effectiveness in local perspective. So as to select better option for routine procedure to expedite patient recovery process and decreasing burden on the health care infrastructure.
**Patients and Methods**

This Randomized Controlled Trial included 60 patients who underwent elective laparoscopic cholecystectomy for symptomatic gallstones at the Department of Surgery Pakistan Institute of Medical Sciences, Islamabad during a period of six months from January 2013 to June 2013.

All patients were admitted from Surgical outdoor of Pakistan Institute of Medical Sciences Islamabad. Detailed history, thorough clinical examination and relevant investigations were performed. Well understood informed consent obtained from all patients about inclusion in the study and both procedure. All adult patients (both gender, 18 years or above) undergoing elective laparoscopic cholecystectomy for symptomatic cholelithiasis were included while patients requiring common bile duct exploration for ductal calculi, patients with carcinoma of gall bladder, patients with bleeding disorders and co-morbid conditions such as diabetes mellitus and ischemic cardiac disease were excluded from the study.

These patients were randomized on computer generated table of random numbers into group A and Group B. In Group A patients four ports were passed to perform laparoscopic cholecystectomy and in Group B patients three ports were passed to perform the procedure. The relevant data was collected on a well-structured proforma. Patients were admitted one day before surgery. Laparoscopic cholecystectomy was performed by consultant surgeons. Closed method (Veress needle) was used to create pneumoperitoneum. Umbilical port, epigastric port and third port 5 cm below the right costal margin in the mid clavicular line were used in both procedures. Fourth port is passed 5 cm below the costal margin in the anterior axillary line.
Post-operatively patients were assessed for pain (assessed by using a visual analogue pain scale), early mobility (time in hours since operation), wound infection, pyrexia, respiratory complications and postoperative hospital stay and follow up was done at day 7.

Data was compiled and analyzed using SPSS version 16. Mean and standard deviation calculated for age, operative time, and length of hospital stay. Frequency and percentage calculated for gender, pain, nausea, mobility (time in hours since operation), wound infection, pyrexia and respiratory complications. Chi Square Test applied at 5% level of significance to compare complications such as pain, nausea/vomiting, pyrexia, wound infection and respiratory tract infection in patient of both groups. Independent sample t-test is used to compare the quantitative variables. A p value less than 0.05 considered significant.
RESULTS

Out of 60 patients 53 (88%) patients were females while only 7 (12%) were males (Graph-1). The female to male ratio was 7.5:1. The mean age in both groups was 44 years and the age range was 18-72 years (SD =±12.9) (Graph: 2).

Table-1 shows the comparison of both groups. There was no major complication in our study such as vascular injury, bile duct injury or any other visceral injury. No patient required re-exploration for any complication. There was no mortality in our study.
DISCUSSION

Since its start there have been a number of modifications in the technique of Laparoscopic Cholecystectomy.\textsuperscript{8} Traditionally it is done by four ports technique.\textsuperscript{9} The use of the fourth trocar which is generally used for fundic retraction seemed unnecessary by some surgeons.\textsuperscript{10} Leow in his prospective trial addressed the safety and the advantages of the three ports technique in terms of analgesia requirement and cosmetically more acceptable.\textsuperscript{11} Mayir found three ports laparoscopic cholecystectomy to be safe and feasible.\textsuperscript{12} All these procedures were performed on elective cases but Al-Azawi performed three ports cholecystectomy on acute cholecystitis and found it to be safe and effective as well.\textsuperscript{7}

As a trend towards more minimal access surgery we found three ports laparoscopic cholecystectomy took less time (mean 43min) to complete than four ports laparoscopic cholecystectomy (man 51 min). This difference is significant (p=0.002). The study conducted by Kumar in Nepal also reported that three ports group had shorter mean operative time (47.3+/-29.8 min vs 60.8+/-32.3 min) than four ports group.\textsuperscript{4}

The patient in three port laparoscopic cholecystectomy group had experienced less pain (p= 0.015) as compared to four port laparoscopic cholecystectomy group and similarly the analgesia requirement was less in our study as in three port group as compared to four port group (p=0.32). Similar result was shown by Kumar that less pain experienced less analgesia requirement by three port group as compared to four port laparoscopic cholecystectomy group.\textsuperscript{4} But the studies conducted by Cerci in and Sun reported no difference in the severity of the pain in both groups and analgesic requirement was same in both groups.\textsuperscript{5,13}
The mean hospital stay in our study was almost same (p=0.052) in both groups but Al-Azawi reported a significant decrease of hospital stay in three port laparoscopic cholecystectomy group. Other complications such nausea, vomiting, pyrexia, pulmonary infection and wound infections were same in both group and there was no statistical difference between the two groups.

Thus our study showed three ports laparoscopic cholecystectomy did not compromise the overall patient safety rather offered additional advantage in terms of less postoperative pain, decrease analgesia requirement and less hospital stay and cost-effective (one port less) benefit.

But the three port laparoscopic cholecystectomy is not the only innovation in the laparoscopic cholecystectomy procedure. Surgeons are performing two ports laparoscopic cholecystectomy in which sutures are used to provide the retraction to the fundus of the gallbladder. They further used the suture to lift the abdominal with low pressure pneumoperitonuem. Single port laparoscopic cholecystectomy has become routine in many centers. It has the advantage of single scar but it has increase in learning curve. And clips are replaced by clipless laparoscopic cholecystectomies. As a shift towards the scarless surgery NOTES (Natural Orifice Transluminal Endoscopic Surgery) is becoming popular in which either transgastric or transvaginal route is used for ports. Studies have shown their safety and patients acceptance as a scar less surgery.
CONCLUSION

Three ports laparoscopic cholecystectomy is technically easy, safe and associated with less postoperative complications as compared to four ports laparoscopic cholecystectomy.
References:


Graph-1: Gender Distribution (n=60)

- Male: 7, 12%
- Female: 53, 88%
Graph-2: Age Distribution

SD = ±12.9
<table>
<thead>
<tr>
<th>Variables</th>
<th>Three Ports (n=30)</th>
<th>Four Ports (n=30)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative Time (min)</td>
<td>43 min</td>
<td>51 min</td>
<td>0.002</td>
</tr>
<tr>
<td>Pain (VAS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>23 (38.33%)</td>
<td>4 (6.67%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Moderate</td>
<td>5 (8.33%)</td>
<td>21 (35%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Severe</td>
<td>2 (3.33%)</td>
<td>5 (8.33%)</td>
<td>0.027</td>
</tr>
<tr>
<td>Mean Analgesia Requirement</td>
<td>2775 mg</td>
<td>3575 mg</td>
<td>0.032</td>
</tr>
<tr>
<td>Nausea &amp; Vomiting</td>
<td>17 (28.33 %)</td>
<td>15 (25%)</td>
<td>0.572</td>
</tr>
<tr>
<td>Pyrexia</td>
<td>2 (3.33%)</td>
<td>3 (5 %)</td>
<td>0.521</td>
</tr>
<tr>
<td>Pulmonary Infection</td>
<td>1 (1.66 %)</td>
<td>1 (1.66%)</td>
<td>0.125</td>
</tr>
<tr>
<td>Wound Infection</td>
<td>1 (1.66 %)</td>
<td>1 (1.66 %)</td>
<td>0.125</td>
</tr>
<tr>
<td>Mean Hospital Stay ( hours)</td>
<td>25 hours</td>
<td>28</td>
<td>0.052</td>
</tr>
</tbody>
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