Umbilicus Saving Three-Port Laparoscopic Cholecystectomy

**Corresponding Author:**
Dr. Masahiko Hirota,  
MD, PhD, Departments of Surgery, Kumamoto Regional Medical Center - Japan

**Submitting Author:**  
Dr. Daisuke Hashimoto,  
MD, PhD, Departments of Surgery, Kumamoto Regional Medical Center - Japan

**Previous Article Reference:** [http://www.webmedcentral.com/article_view/2250](http://www.webmedcentral.com/article_view/2250)

**Article ID:** WMC002438

**Article Type:** Original Articles

**Submitted on:** 12-Nov-2011, 02:53:34 AM GMT  
**Published on:** 12-Nov-2011, 12:45:08 PM GMT

**Article URL:** [http://www.webmedcentral.com/article_view/2438](http://www.webmedcentral.com/article_view/2438)

**Subject Categories:** LAPAROSCOPY

**Keywords:** Laparoscopic Cholecystectomy, Minimally Invasive Surgery, Postoperative Analgesia, Cosmetic, Acute Cholecystitis, Chronic Cholecystitis

**How to cite the article:** Hashimoto D, Hirota M, Yagi Y, Baba H. Umbilicus Saving Three-Port Laparoscopic Cholecystectomy. WebmedCentral LAPAROSCOPY 2011;2(11):WMC002438
Umbilicus Saving Three-Port Laparoscopic Cholecystectomy

Author(s): Hashimoto D, Hirota M, Yagi Y, Baba H

Abstract

Background: Three-port laparoscopic cholecystectomy (LC) has been reported to be technically acceptable. However, whether it offers any additional advantages remains controversial. Recent laparoscopic surgery accepts an incision around the umbilicus. However, the umbilicus is a significant aesthetic unit of the abdominal area, especially in young ladies. Hence, we devised a new technique to save the umbilicus during 3-port LC. Our aim was to compare clinical outcomes of the umbilicus saving 3-port LC versus standard 4-port LC.

Methods: Medical records of 55 patients to whom either umbilicus saving 3-port LC or 4-port LC was planned were reviewed.

Results: Umbilicus saving 3-port LC was planned in 18 patients and standard 4-port LC in 37 patients. There was no significant difference in operating time and conversion rate to open procedures between the two techniques. In 3-port LC, no post-operative complications occurred. Analgesia requirements were less frequent in 3-port LC, although it was not significant.

Conclusion: We found that the use of 3-ports in LC did not affect procedure's safety, conversion rate, or operating time. This procedure has advantages including fewer scars and saving the umbilicus.

Introduction

The first laparoscopic cholecystectomy (LC) was performed in 1987 by Phillip Mouret and later established by Dubois, Perissat, Reddick, and others in 1990s [1-3]. Since then, there have been many changes and improvements in the technique. Traditional LC is performed using 4-port technique. The fourth (lateral) trocar is used to grasp the fundus of the gallbladder so as to expose Calot's triangle [2, 4]. With increasing surgeon experience, LC has undergone many refinements including reduction in port size and number. It has been argued that the fourth trocar may not be necessary, and laparoscopic cholecystectomy can be performed safely without using it [5-11]. Cooperative manipulation of the surgical instruments is very important for this procedure, for exposing Calot's triangle and dissecting the gallbladder from the hepatic bed when using the 3-port techniques. Several studies have reported that 3-port laparoscopic cholecystectomy is technically acceptable [5-11]. Recent laparoscopic surgery accepts an incision around the umbilicus. However, the umbilicus, in the opinion of the authors, is a significant aesthetic unit of the abdominal area [12-16]. It should have a natural, vertically long and deep depression without conspicuous scars, especially in young ladies. We avoid the injury around the umbilicus, by setting the port for laparoscope and gallbladder removal in right lower quadrant of the abdomen. The wound in right lower quadrant can be covered with underwear. Furthermore, in the era of laparoscopic surgery, less postoperative pain and early recovery are major goals to achieve better patient care and cost effectiveness. However, whether it offers any additional advantages remains controversial. Our aim was to compare the clinical outcomes of the umbilicus-saving 3-port LC versus standard 4-port LC.

Patients and Methods

The medical records of 55 patients to whom LC was planned between December 2009 and October 2010 at Kumamoto Regional Medical Center were reviewed. Patients were identified by reviewing the medical and operating records. Six surgeons, including two trainees, carried out standard 4-port LC. The umbilicus-saving 3-port LC was carried out by 2 surgeons of them according to a decision of each operator. Written informed consents were taken from all the patients before the operation. Variables such as conversion to open procedure, operating time, bleeding, complications, and analgesia requirements (pentazosine or non-steroidal anti-inflammatory drugs, within 48 h after surgery and within hospital stay after surgery) were compared. Patients with grade II or grade III acute cholecystitis (AC), which is defined in the diagnostic criteria and severity assessment of acute cholecystitis (Tokyo Guidelines) [17, 18], undergone open standard cholecystectomy with laparotomy, and were excluded from this study. The medical records of 55 patients to whom LC was planned between December 2009 and October 2010
at Kumamoto Regional Medical Center were reviewed. Patients were identified by reviewing the medical and operating records. Six surgeons, including two trainees, carried out standard LC. Two of them carried out umbilicus-saving 3-port LC. Written informed consents were taken from all the patients before the operation. Variables such as conversion to open procedure, operating time, bleeding, complications, and analgesia requirements (pentazosine or non-steroidal anti-inflammatory drugs, within 48 h after surgery and within hospital stay after surgery) were compared. Patients with grade II or grade III acute cholecystitis (AC), which is defined in the diagnostic criteria and severity assessment of acute cholecystitis (Tokyo Guidelines) [17, 18], undergone open standard cholecystectomy with laparotomy, and were excluded from this study.

Laparoscopic cholecystectomy

Techniques

Avoiding damage of umbilicus, the umbilicus-saving 3-port technique involves inserting a trocar at the right lower quadrant of the abdomen, using the open technique through which a laparoscope (Olympus, Tokyo, Japan) was introduced (Illustration 1a, c). Five millimeters trocars (Covidien, Dublin, Ireland) were inserted about 3 cm below the xiphosternum and at the right upper quadrant just below the costal margin (Illustration 1a, c). The operating surgeon conducted the procedure from the left side of the patients together with the assistant holding the laparoscope, while the TV monitor was located on the upper right side of the patients. The operating surgeon holds the dissecting instruments with his right hand while holding the gallbladder at the infundibulum with a grasper, moving the infundibulum to display Calot’s triangle (Illustration 1b). The cystic duct and cystic artery were detected, clipped, and divided. The gallbladder was then dissected from the hepatic bed and extracted from the wound of the right lower quadrant. A drain was inserted from the right upper incision to under the hepatic bed in patients with acute cholecystitis (Illustration 1d).

In 4-port LC, a 10 mm open trocar at the juxta-umbilicus region, a 10 mm trocar 3 cm below the xiphosternum and two 5 mm subcostal trocars were used (Illustration 2a). The fourth (lateral) trocar is used to grasp the fundus of the gallbladder so as to expose Calot’s triangle (Illustration 2b). A drain was inserted from the subcostal incision to under the hepatic bed in patients with acute cholecystitis (Illustration 2c).

Statistical tests

The Student’s t test was used to evaluate the difference in each parameter. A p value

Results

Patient characteristics and conversion rate

The umbilicus saving 3-port LC was planned in 18 patients and 4-port LC was planned in 37 patients (Illustration 3). In 3-port LC, 9 were female and 9 were male, and the age range was 36 – 83 years, with an average of 59±16 years. In 4-port LC, 20 were female and 17 were male, and the age range was 31 – 85 years, with an average of 57±15 years. Two (11.1%) patient was diagnosed with AC and 16 (88.9%) patients were diagnosed with chronic cholecystitis (CC) by histology in 3-port LC. Five (13.5%) patients were diagnosed with AC and 32 (86.5%) patients were diagnosed with CC by histology in 4-port LC. The 3-port LC was converted to open procedure in 1 AC patient (5.6%), while 4-port LC was converted to open procedure in 8 (21.6%) patients (3 patients AC and 5 patients CC). The reasons of conversion were intra-operative bleeding in one patient in 4-port LC and inflammation and adhesion in the other 8 patients. These 9 patients were excluded from analysis of operating time, bleeding, complications, postoperative analgesia requirement. One (5.6%) case of the 3-port LC group needed a fourth port to complete the procedure.

Operating time, bleeding and postoperative complication

The mean operating time for 3-port LC procedure was 76±45 minutes versus 61±20 minutes for 4-port technique (Illustration 4). The mean bleeding in 3-port LC procedure was 12±49 g versus 9±38 g for 4-port technique (Illustration 4). No significant difference of operating time and bleeding between the two techniques. There were no common bile duct injuries or deaths in both groups. No post operative complication was reported in 3-port LC, while one patient (3.4%) experienced post operative complication in 4-port LC. A female patient suffered from perforation of small intestine and peritonitis after 4-port LC. She was re-operated and excluded from analysis of postoperative analgesia requirement.

Postoperative analgesia requirement

The mean times of analgesia intake for each patient during the first 48 hours after 3-port and 4-port LC were 1.9±0.9 times and 2.7±2.3 times respectively (Illustration 4). Those during the entire hospital stay
after 3-port and 4-port LC were 2.2±1.2 times and 3.6±3.3 times respectively (Illustration 4). Thus, analgesia requirements after 3-port LC were less frequent than those after 4-port LC, although no significant difference was observed.

Discussion

There have been many modifications in the technique of LC. The use of the fourth trocar which is generally used for fundic retraction was pointed out to be unnecessary by some surgeons [5-11]. In this retrospective single centre non-randomized study, we compared the safety and the advantages of 3-port LC with 4-port LC. Although our sample size was small, the 3-port technique did not increase the bleeding and operating time and there were no post-operative complication such as common bile duct injuries, when performed on usual acute and chronic cholecystitis. It indicated that the 3-port technique was safe, comparable with previous reports [19-22]. In our study, conversion rate was 21.6% in 4-port LC and 5.6% in 3-port LC. We believe that the high conversion rate in 4-port LC is the reflection of first priority in patients' safety. Our small sample size might also affect the conversion rates.

Although it was not significant and sample size of this study was small, analgesia requirement after 3-port LC was less frequent than those after 4-port LC in this study. This indicates that 3-port LC may bring not only cosmetic benefits but also post-operative recovery.

The most recent development in laparoscopic cholecystectomy is single-incision laparoscopic surgery (SILS) [23-25]. This procedure may have a possibility to be more cosmetic, although it requires special instruments and technique. Although the wound is single, there appears the scar in and around the umbilicus. The umbilicus should have natural and deep appearance. Primary reconstruction of the umbilicus due to surgery or trauma has been the goal of plastic surgeons from the early times of modern plastic surgery [12-16]. Also, for young ladies, the umbilicus is one of their charm points. The umbilicus saving 3-port LC is practicable in wherever institutions the standard LC is performed, and saves the scar in and around the umbilicus. The scar of the first port can be covered by underwear.

Conclusion

In conclusion, we found that the use of 3-ports in LC did not affect the procedure's safety, conversion rate, and operating time. This procedure has advantages including fewer scars, and saving the umbilicus.

References

13. Lintilhac J, Tichadou M: The umbilicus in plastic
surgery of the abdomen. Transposition or reconstruction.[Article in French]. Maroc Med 1966; 45:266-271
Illustrations

Illustration 1

The umbilicus-saving 3-port laparoscopic cholecystectomy. (a) Trocar sites. White circles show 5 mm trocars and doubles circles show open trocars for laparoscope insertion. (b) Operating technique. (c) Trocar sites. A red broken circle shows an umbilicus. (d) Abdominal findings after operation.
Illustration 2

The standard 4-port laparoscopic cholecystectomy. (a) Trocar sites. White circles show 5 mm trocars, a black circle shows 10 mm trocar and doubles circles show open trocars for laparoscope insertion. (b) Operating technique. (c) Abdominal findings after operation.
Illustration 3

Illustration 3. Patient characteristics

<table>
<thead>
<tr>
<th></th>
<th>3-port LC</th>
<th>4-port LC</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>18</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Sex ratio (female : male)</td>
<td>9 : 9</td>
<td>20 : 17</td>
<td>P=0.99</td>
</tr>
<tr>
<td>Age (years)</td>
<td>59±16</td>
<td>57±15</td>
<td>P=0.71</td>
</tr>
<tr>
<td>Histology (AC : CC)</td>
<td>2 : 16</td>
<td>5 : 32</td>
<td>P=0.85</td>
</tr>
<tr>
<td>Conversion to open surgery (%)</td>
<td>1 (5.6%)  8 (21.6%)</td>
<td>P=0.24</td>
<td></td>
</tr>
</tbody>
</table>

LC; laparoscopic cholecystectomy, AC; acute cholecystitis, CC; chronic cholecystitis
Illustration 4

Illustration 4. Patient Outcomes

<table>
<thead>
<tr>
<th></th>
<th>3-port LC</th>
<th>4-port LC</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating time (min)</td>
<td>76±45</td>
<td>61±20</td>
<td>P=0.12</td>
</tr>
<tr>
<td>Bleeding (g)</td>
<td>12±49</td>
<td>9±38</td>
<td>P=0.96</td>
</tr>
<tr>
<td>Postoperative complication</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Analgesia requirement (times)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>within the first 48 hours</td>
<td>1.9±0.9</td>
<td>2.7±2.3</td>
<td>P=0.15</td>
</tr>
<tr>
<td>within hospital stay</td>
<td>2.2±1.2</td>
<td>3.6±3.3</td>
<td>P=0.11</td>
</tr>
</tbody>
</table>

LC; laparoscopic cholecystectomy
Disclaimer

This article has been downloaded from WebmedCentral. With our unique author driven post publication peer review, contents posted on this web portal do not undergo any prepublication peer or editorial review. It is completely the responsibility of the authors to ensure not only scientific and ethical standards of the manuscript but also its grammatical accuracy. Authors must ensure that they obtain all the necessary permissions before submitting any information that requires obtaining a consent or approval from a third party. Authors should also ensure not to submit any information which they do not have the copyright of or of which they have transferred the copyrights to a third party.

Contents on WebmedCentral are purely for biomedical researchers and scientists. They are not meant to cater to the needs of an individual patient. The web portal or any content(s) therein is neither designed to support, nor replace, the relationship that exists between a patient/site visitor and his/her physician. Your use of the WebmedCentral site and its contents is entirely at your own risk. We do not take any responsibility for any harm that you may suffer or inflict on a third person by following the contents of this website.