THE ROLE OF LAPAROSCOPIC SURGERY FOR THE TREATMENT OF HCC

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Laparoscopic Liver Resection

- Technical Difficulty
- Risk of Gas Embolism
- Difficult Bleeding Control
- Palpation Difficulty
- Insufficient Development of Instrument
History of Laparoscopy in Benign Disease of Liver


History of Laparoscopy in Malignant Tumor of Liver

- Wayand W et al. Laparoscopic resection of liver metastasis Chirurg 1993;64:195-7


- Kaneko H et al. Laparoscopic partial hepatectomy and left lateral segmentectomy: technique and results of a clinical series. Surgery 1996;120:468-75
Contents

Why laparoscopic surgery in liver resection?

Is current limitation on the location still unbreakable?

SNUBH experiences
Protection of the Liver by Rib Cage

The Liver

Right Lobe  Left Lobe

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Incision size between open vs. Laparoscopic Procedure

Laparoscopic surgery does not require huge incision.
No Anastomosis or Suture

So, laparoscopic surgery can be beneficial in liver resection.
Why Huge Incision?

If it is a safe operation with similar or less morbidity compared to open surgery.
Surgical Safety  Oncologic Safety

Becoming more standardized

“ AGREED  
(same as "yes")

Wait and See
Difficult Locations
Indications of Laparoscopic Resection

• Contraindication
  – Large tumor (deeply seated or posteriorly located in the right lobe)
  – Tumor close to the portal bifurcation or suprahepatic junction.

• Indication
  – Small, superficial, or peripheral
  – Segment 2, 3, 4, 5, 6

Difficult Locations

- I
- VII
- VIII
- IVa ?
Stone Carving Techniques
Liver Carving Techniques
Case Report

Total Laparoscopic Right Posterior Sectionectomy for Hepatocellular Carcinoma

YOOS-EOOK YOON, MD, HO-SEONG HAN, MD, PhD, YOO SHIN CHOI, MD, JIN-YOUNG JANG, MD, KYUNG-SUK SUH, MD, SUN-WHE KIM, MD, KUHN UK LEE, MD, and YONG-HYUN PARK, MD

- World wide first report.
- Totally laparoscopic right posterior sectionectomy is feasible.
Glissonian approach at the hilum

- Major Glissonian pedicle to right posterior section was dissected and transected with endo-GIA.
The hepatic parenchyma was transected with Harmonic scalpel® along demarcated line created by the ischemia.

The small branches of hepatic veins were controlled with endoclips and large branches of right hepatic vein were transected with endo-GIA.
Liver Resection in Difficult Part

Improvement in laparoscopic skills
Better surgical field by a flexible laparoscope

It has become possible to apply laparoscopic techniques to difficult part of the liver.
Outcomes of Laparoscopic Liver Resection for Lesions Located in Right-Sided Liver

Jai Young Cho, Ho-Seong Han, Yoo-Seok Yoon, Sang-Hyun Shin

Archives of Surgery 2008, in press

- 46 consecutive laparoscopic liver resections in the right side of the liver.
- Laparoscopic right-sided liver resection is feasible and safe.
Feasibility of laparoscopic liver resection for tumors located in the posterosuperior segments of the liver, with a special reference to overcoming current limitations on tumor location.

Jai Young Cho, MD, PhD, Ho-Seong Han, MD, PhD, Yoo-Seok Yoon, MD, PhD, and Sang-Hyun Shin, MD, Seoul, Korea

82 laparoscopic liver resection for tumors
- Group AL (II, III, V, VI, and the inferior part of IV): n = 54
- Group PS (I, VII, VIII, and the superior part of IV): n = 28

Laparoscopic liver resection for tumors located in PS is feasible.
Limitation on the Locations

Previous limitations are being broken gradually!
Moment of Break

Drink Beer!
Experiences of laparoscopic liver resection including lesions in the posterosuperior segments of the liver

Jai Young Cho · Ho-Seong Han · Yoo-Seok Yoon · Sang-Hyun Shin

Surgical Endoscopy 2008
Trocars for Laparoscopic Right-Side Liver Resection

Lithotomy Position

Surgeon

First Assistant

Camera Man
Trocars for Laparoscopic Left-Side Liver Resection

Supine Position

Surgeon

Camera Man

First Assistant
Surgical Technique

- **Flexible laparoscope**, laparoscopic sono
- Liver mobilization for Right-side liver resection
  - Right liver was fully mobilized from the inferior vena cava as possible
  - Multiple small hepatic veins were carefully divided.
- Inflow control
  - **Glissonian approach** for major liver resection
  - No Pringle’s maneuver for non-anatomical resection.
- Parenchymal transection
  - Superficial: harmonic scalpel or SonoSurg®
  - Deep: laparoscopic **CUSAL**
Patients

150 consecutive laparoscopic liver resections
(in SNUBH, January 2004 ~ April 2008)

Laparoscopic hepatectomy for HCC: n = 57 (38%)
## Indications

<table>
<thead>
<tr>
<th>Demographic factors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>57.7 ± 11.7 (26 ~ 87)</td>
</tr>
<tr>
<td><strong>Gender (M/F)</strong></td>
<td>43/14</td>
</tr>
<tr>
<td><strong>Child-Pugh Classification</strong></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>50 (87.7%)</td>
</tr>
<tr>
<td>B</td>
<td>6 (10.5%)</td>
</tr>
<tr>
<td>C</td>
<td>1 (1.8%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tumor factors</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Size (cm)</strong></td>
<td>3.3 ± 1.6 (1.5 ~ 8.5)</td>
</tr>
<tr>
<td><strong>Single/Multiple</strong></td>
<td>51/6</td>
</tr>
<tr>
<td><strong>Superficial/Deep</strong></td>
<td>39/18</td>
</tr>
</tbody>
</table>
Location of HCC

- PS (postero-superior; n=20)
- Conversion

N = 20
# Types of Operation

<table>
<thead>
<tr>
<th>Type of resection</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anatomical</td>
<td>29</td>
<td>(50.9%)</td>
</tr>
<tr>
<td>Non-anatomical</td>
<td>28</td>
<td>(49.1%)</td>
</tr>
</tbody>
</table>

## Major liver resection
- Right hemihepatectomy (n)       | 5     |
- Left hemihepatectomy (n)        | 2     |
- Right posterior sectionectomy (n)| 8     |

## Minor liver resection
- Left lateral sectionectomy (n)  | 8     |
- Segmentectomy (n)               | 18    |
- Tumorectomy (n)                 | 15    |
- Caudate lobectomy (n)           | 1     |
# Intraoperative and Postoperative Results

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conversion (n)</td>
<td>8 (12.3%)</td>
</tr>
<tr>
<td>Surgical margin (cm)</td>
<td>1.6 ± 1.6</td>
</tr>
<tr>
<td>Operative time (min)</td>
<td>272.1 ± 116.7</td>
</tr>
<tr>
<td>Blood loss (ml)</td>
<td>610.2 ± 452.2</td>
</tr>
<tr>
<td>Intraoperative transfusion (n)</td>
<td>18 (31.6%)</td>
</tr>
<tr>
<td>Postoperative hospital stay (day)</td>
<td>9.9 ± 5.5</td>
</tr>
<tr>
<td>Morbidity (n)</td>
<td>13 (22.8%)</td>
</tr>
</tbody>
</table>
Overall Postoperative Outcomes

- **Mean follow-up: 21.6 mo (1 ~ 57)**
- **No operative mortality, reoperation or major complications**

- **All have been Improved by conservative management**
  - Intra-abdominal fluid collection (n = 7)
  - Bile leakage at the cut surface (n = 3)
  - Ascites (n = 2)
  - Ileus (n = 1)
### Survival Rate after Resection

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>3 YSR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makuuchi 1998</td>
<td>367</td>
<td>73%</td>
</tr>
<tr>
<td>Hanazaki 2000</td>
<td>386</td>
<td>51.1%</td>
</tr>
<tr>
<td>Grazi 2001</td>
<td>264</td>
<td>63.1%</td>
</tr>
<tr>
<td>Kanematsu 2002</td>
<td>303</td>
<td>67%</td>
</tr>
<tr>
<td>서울대학교병원 1997</td>
<td>396</td>
<td>68.7%</td>
</tr>
<tr>
<td>삼성서울병원 2002</td>
<td>108</td>
<td>75.5%</td>
</tr>
<tr>
<td>원자력병원 2003</td>
<td>201</td>
<td>68.4%</td>
</tr>
</tbody>
</table>
Survival Rate after LLR in SNUBH

Overall Survival

Disease-free Survival

3YSR: 85.7%
3YSR: 64.8%
Site of Recurrence (n = 15)

- **Intrahepatic**: 86.7%
- **Extrahepatic**: 6.7%
- **Inta and extra**: 6.7%

- **Ipsilateral**: 14.3%
- **Contralateral**: 42.9%
- **Bilateral**: 42.9%
Mode of Recurrence (n = 15)

Number of Recurrence

Mode of Recurrence

- **Single**: 40%
- **Multiple**: 60%

- **Metachronous**: 80.0%
- **Local recur**: 6.7%
- **Distant**: 13.3%
Treatment of Recurrence (n = 15)

- TACE: n = 9
- TACE + RFA: n = 4
- Laparoscopic re-resection: n = 1
- No treatment: n = 1
Comparison with Open Surgery (1)

Operation time

Blood loss

\( P = 0.792 \)

\( P = 0.511 \)
Comparison with Open Surgery (2)

**Tumor size**

- Laparoscopy: 5
- Open: 10

\[P = 0.002\]

**Hospital stay**

- Laparoscopy: 15
- Open: 20

\[P = 0.008\]
Comparison with CRLM (1)

Operation time

$P = 0.137$

Blood loss

$P = 0.165$
Comparison with CRLM (2)

Hospital stay

$P = 0.285$

Transfusion

$P = 0.008$
Laparoscopic liver resections has been proved beneficial in some cases such as left lateral sectionectomy and tumorectomy.

It can be a long way to prove its efficacy in any kind of operations for liver disease including major resection.

But someday, it might be.
Patience and perseverance have a magical effect before which difficulties and obstacles vanish.

- John Quincy Adams
Thank you very much!