HOW TO PERFORM LAPAROSCOPIC ANATOMICAL LIVER RESECTION?

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Contents

- Introduction of Lap anatomic liver resection
- Useful techniques for Lap anatomic liver resection
- Video clips on Lap anatomic liver resection
Introduction of Lap Anatomic Liver Resection

- Consensus meeting
- Efforts to apply to difficult locations.
- Adoption of anatomic liver resection.
International Consensus Conference
On Laparoscopic Liver Surgery
LOUISVILLE CONSENSUS Nov 7 – 8, 2008
Recommendations for Laparoscopic Liver Resection

A Report From the Second International Consensus Conference Held in Morioka
After 2\textsuperscript{nd} Consensus Meeting in Iwate

• Minor LLR is confirmed to be as standard practice but is still in an assessment phase with lower quality of studies.

• Major liver resections has a risk due to its novelty, and not standard procedure.
<table>
<thead>
<tr>
<th>Question</th>
<th>minor LLR</th>
<th>Major LLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. Short-term outcome (complications, margin negativity, length of stay)</td>
<td>3</td>
<td>2b</td>
</tr>
<tr>
<td>Q2. Long-term outcome (overall survival)</td>
<td>3</td>
<td>2b</td>
</tr>
<tr>
<td>Q3. Cost</td>
<td>3</td>
<td>2b</td>
</tr>
<tr>
<td>Q4. Pain and QOL</td>
<td>3</td>
<td>2b</td>
</tr>
<tr>
<td>Q5. Robotic liver resection</td>
<td>2a</td>
<td>2a</td>
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<tr>
<td>Q6. Laparoscopic donor hepatectomy (Pediatric)</td>
<td>2b</td>
<td>2b</td>
</tr>
<tr>
<td>Q6. Laparoscopic donor hepatectomy (Adult to Adult)</td>
<td>2a</td>
<td>2a</td>
</tr>
</tbody>
</table>

**LLR: Laparoscopic Liver Resection**
- **3** (Assessment phase); it has become standard practice
- **2a** (Development in progress); highest degree of risk due to novelty
- **2b** (Exploration); there is still risk associated with novelty, not yet become standard practice

*Based on case series and observational studies with experts’ opinion*
Efforts to Overcome Limitation on Location in SNUBH.
Case Report

Total Laparoscopic Right Posterior Sectionectomy for Hepatocellular Carcinoma

YOO-SEOK 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
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


- Outcomes of laparoscopic liver resection for tumors located in PS is comparable as tumors located in AL.
Total laparoscopic liver resection for hepatocellular carcinoma located in all segments of the liver

Yoo-Seok Yoon · Ho-Seong Han · Jai Young Cho · Keun Soo Ahn

Overall survival
Median F/U period: 21.3 months

Disease free survival
3 year: 90.4%
3 year: 60.4%
Centrally Located Tumor?

Patients with tumors which are either large (>5 cm), central, multiple, bilateral or with connections with the liver hilum, major hepatic veins or the IVC are not at the moment candidates for a laparoscopic approach in most centers;

Laparoscopic liver resection for centrally located tumors close to the hilum, major hepatic veins, or inferior vena cava

Yoo-Seok Yoon, MD, PhD, Ho-Seong Han, MD, PhD, Jai Young Cho, MD, PhD, Ji Hoon Kim, MD, and Yujin Kwon, MD, Seoul, Korea

Yoon YS, Han HS et al. Surgery, 2013
Laparoscopic Approach for Centrally Located Tumor

Defined as apart
less than 1 cm from the hilum or major hepatic veins (MHV)
Patients

Table II. Profiles of the 13 patients

<table>
<thead>
<tr>
<th>Patient</th>
<th>Indication</th>
<th>Location</th>
<th>Vessels close to the tumor</th>
<th>Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>M/45</td>
<td>HCC</td>
<td>S7</td>
<td>RHV</td>
<td>Extended right posterior sectionectomy (+RHV)</td>
</tr>
<tr>
<td>F/30</td>
<td>HCC</td>
<td>S6</td>
<td>RPPV, IVC</td>
<td>Right posterior sectionectomy</td>
</tr>
<tr>
<td>M/49</td>
<td>HCC</td>
<td>S4</td>
<td>MHV</td>
<td>Central bisectionectomy</td>
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<tr>
<td>F/75</td>
<td>CCC</td>
<td>S4/S5</td>
<td>RAPV, MHV</td>
<td>Central bisectionectomy</td>
</tr>
<tr>
<td>M/63</td>
<td>HCC</td>
<td>S4</td>
<td>MHV</td>
<td>Extended S4 segmentectomy (+MHV)</td>
</tr>
<tr>
<td>F/63</td>
<td>HCC</td>
<td>S8</td>
<td>MHV, RHV</td>
<td>Right anterior sectionectomy</td>
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<tr>
<td>F/78</td>
<td>HCC</td>
<td>S6</td>
<td>RPV, IVC</td>
<td>Right hepatectomy</td>
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<tr>
<td>M/43</td>
<td>Metastasis</td>
<td>S7</td>
<td>RHV, IVC</td>
<td>Right hepatectomy</td>
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<tr>
<td>F/26</td>
<td>HCC</td>
<td>S4</td>
<td>LHV, MHV, IVC</td>
<td>Left hepatectomy</td>
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<tr>
<td>M/55</td>
<td>HCC</td>
<td>S2/3, S1</td>
<td>IVC</td>
<td>Left lateral sectionectomy, caudate lobectomy</td>
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<tr>
<td>F/28</td>
<td>FNH</td>
<td>S1/S4</td>
<td>LHV, MHV, IVC</td>
<td>Left hepatectomy + caudate lobectomy</td>
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<tr>
<td>M/63</td>
<td>HCC</td>
<td>S1</td>
<td>IVC</td>
<td>Caudate lobectomy</td>
</tr>
<tr>
<td>M/66</td>
<td>CCC</td>
<td>S1</td>
<td>IVC</td>
<td>Caudate lobectomy</td>
</tr>
</tbody>
</table>

CCG, Cholangiocarcinoma; F, female; FNH, focal nodular hyperplasia; IVC, inferior vena cava; LHV, left hepatic vein; M, male; MHV, middle hepatic vein; RAPV, right anterior portal vein; RHV, right hepatic vein; RPPV, right posterior portal vein; RPV, right portal vein.

Yoon YS, Han HS et al. Surgery, 2013
Comparison between Open & Laparoscopy

**Overall Survival**

Yoon YS, Han HS et al. *Surgery, 2013*
Outcomes of laparoscopic right posterior sectionectomy in patients with hepatocellular carcinoma in the era of laparoscopic surgery

Jai Young Cho, MD, PhD, Ho-Seong Han, MD, PhD, Yoo-Seok Yoon, MD, PhD, YoungRok Choi, MD, and Woohyung Lee, MD, Seoul, Republic of Korea

Surgery 2015,
Comparison between Laparoscopic & Open Liver Resection after RPS in HCC

Cho JY, Han HS et al. Surgery 2015
From Difficult Cases to Anatomic Liver Resection
Anatomic Liver Resection

HCC is usually associated with poor liver function. Volume preserving as possible. Resection of only the involved segment.

Anatomic resection including bi & mono-segmentectomy
Anatomical Resection is Beneficial in Oncology

HCC invades Portal Vein
HCC intrahepatic metastasis
HCC becomes a source of tumor thrombus

Anatomic More Limited Resection

- More division of left lateral segment into S2 & S3
- More division of S4 segment to S4a & S4b
Tailored Operation Depending on Patient’s Status

• Liver resection can be tailored according to
  Extent of resection
  Combined procedure

• Any combination of anatomic resection can be feasible.
# Our Reports on Laparoscopic Anatomic Liver Resection

<table>
<thead>
<tr>
<th>Type of resection</th>
<th>Year</th>
<th>Journal</th>
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</thead>
<tbody>
<tr>
<td>Left lateral sectionectomy</td>
<td>2006</td>
<td>J Pediatr Surg</td>
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<tr>
<td>Right posterior sectionectomy</td>
<td>2006</td>
<td>J Laparoendosc Adv Surg Tech A</td>
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<tr>
<td>Central bisectionectomy</td>
<td>2009</td>
<td>J Laparoendosc Adv Surg Tech A</td>
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<tr>
<td>Right hepatectomy</td>
<td>2010</td>
<td>Ann Surg Oncol</td>
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<td>S5 segmentectomy</td>
<td>2011</td>
<td>J Laparoendosc Adv Surg Tech A</td>
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<tr>
<td>S4 segmentectomy</td>
<td>2011</td>
<td>Surg Laparosc Endosc Percutan Tech</td>
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<tr>
<td>Right anterior sectionectomy</td>
<td>2012</td>
<td>J Laparoendosc Adv Surg Tech A</td>
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<tr>
<td>S4a segmentectomy</td>
<td>2015</td>
<td>J Laparoendosc Adv Surg Tech A</td>
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<tr>
<td>Extended RPS</td>
<td>2015</td>
<td>Surgery</td>
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<tr>
<td>Living donor right hepatectomy</td>
<td>2015</td>
<td>Surgical Endoscopy</td>
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<tr>
<td>S4a, S4b, ext-S4</td>
<td>2015</td>
<td>J Laparoendosc Adv Surg Tech A,</td>
</tr>
<tr>
<td>Bisegmentectomy S3 and 4</td>
<td>2016</td>
<td>Surg Laparosc Endosc Percutan Tech In press</td>
</tr>
</tbody>
</table>

Han HS, Yoon YS, Cho JY et al.
Contents

• Introduction of Lap anatomic liver resection
• Useful techniques for Lap anatomic liver resection
• Video clips on Lap anatomic liver resection
Useful Technics in Laparoscopic Anatomic Liver Resection

• Pringle maneuver.
• Glissonian pedicle approach.
• Intercostal trocar use.
Pringle maneuver effectiveness

Performing the Pringle maneuver during liver transection resulted in less blood loss and better preservation of liver function in the early postoperative period.

Fig. 2 Laparoscopic Pringle’s maneuver using umbilical tape and a long tube

Lee WH, Han HS et al. JHBPS 2014
Glissonean Pedicle Approach in Laparoscopic Anatomical Liver Resection

YoungRok Choi, Ho-Seong Han, Ahmad Mohammnad Sultan, Yoo-Seok Yoon, Jae Young Cho

Department of Surgery, Seoul National University College of Medicine, Seoul National University Bundang Hospital, Korea

Hepato-Gastroenterology 51 (2014)

Choi YR, Han HS, Sultan AM, Yoon YS, Cho JY


Anatomic Resection using Glissonian Approach

- Liver resection designed
  Depending on tumor locations
  Remaining liver volumes and functions
- Any anatomic resection can be feasible.
Role of intercostal trocars on laparoscopic liver resection for tumors in segments 7 and 8

Woohyung Lee · Ho-Seong Han · Yoo-Seok Yoon · Jai Young Cho · Young Rok Choi · Hong Kyung Shin

Fig. 1 Trocar placement at the 7th or 9th intercostal space (White arrow, 7th intercostal trocar; black arrow, 9th intercostal trocars)
Comments on Techniques

- Pringle maneuver is useful in minimizing bleeding.
- Anatomic LLR will prevail using Glissonian pedicle approach.
- Intercostal trocar is useful for tumor located in superior segment.
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S4 Segmentectomy

Ho-Seong Han, Yoo-Seok Yoon, Jai Young Cho, Dae Wook Hwang, Young Ki Kim

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Laparoscopic Anatomical
S2 Segmentectomy

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Laparoscopic Anatomical S3+4 Segmentectomy

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ANATOMIC S8 LAPAROSCOPIC LIVER RESECTION

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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.
If you can dream it, you can do it.

Walt Disney
World Congress of IASGO 2016

26th World Congress of the International Association of Surgeons, Gastroenterologists and Oncologists

SEPTEMBER 8 – 10, 2016
Sheraton Grande Walkerhill Hotel, Seoul, Korea

Deadline for Abstract Submission: May 31, 2016
Notification of Abstract Acceptance: June 30, 2016
Deadline for Early Registration: July 29, 2016
Deadline for Regular Registration: August 19, 2016
Thank you very much

GyeongBok Palace  景福宮 in Korea