Parenchymal preserving-anatomical liver resection in patient with small future liver remnant

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Introduction

- Underlying liver function
- Future liver remnant volume

Postoperative liver failure

- Surgical factors
  (bleeding and postoperative abdominal infection)
Future liver remnant volume

- In normal liver, >30% of total liver volume
- In chronic liver disease
  not clearly documented,
  but in general >40% of total liver volume

In patient with small future liver remnant

- Portal vein embolization is commonly used to induce the hypertrophy of future liver remnant.
- But, parenchymal preserving liver resection is feasible according to the vascular anatomy and the tumor location.
Vascular anatomy - hepatic vein

Various patterns of the right hepatic vein

Type I
- 32 or 38.6%
- Large RHV and drains the wide area of the right lobe
- Small short hepatic veins

Type II
- 31 or 37.3%
- Medium sized RHV
- A posterior or posteroinferior vein (0.5 to 1cm)

Type III
- 20 or 24.1%
- Small and short RHV
- A large sized posteroinferior vein (up to 1.0cm)

Nakamura et al. Surgery, gynecology & obstetrics 1981
The main drainage vessel of the right posteroinferior segment - referred to as the inferior, dorsolateral, dorsal inferior, anterolateral, or posterior inferior right hepatic vein - Commonly named as “inferior right hepatic vein”

**Inferior right hepatic vein (IRHV)**
- occasionally more than 1 cm in diameter
- 20 to 24% incidence
- drains the posteroinferior segment (S6), and part of S7 or S5

**Clinical significance of IRHV**
- Anatomic resections removing the entire right hepatic vein with preserving S6
Four hepatectomies preserving IRHV

1. Bisegmentectomy 7-8

2. Resection of the Rt. anterior section and the Rt. posterosuperior area

3. Extended medial bisegmentectomy

4. Extended left trisectionectomy

Makuuchi et al. Surgery, gynecology & obstetrics 1987
IRHV-preserving trisegmentectomy 5, 7, and 8

F/31
Two liver metastases in the right superior and anterior area from colorectal cancer

Lt. liver = 23.4%  ➡️  Lt. liver + S6 = 39.4%

Choi et al. J Gastrointest Surg 2013
IRHV-preserving trisegmentectomy 5, 7, and 8
# IRHV-preserving trisegmentectomy 5, 7, and 8

<table>
<thead>
<tr>
<th>Case</th>
<th>Dx.</th>
<th>Age/ gender</th>
<th>Left lobe Volume (%)</th>
<th>+ S6 Volume (%)</th>
<th>Tumor number</th>
<th>Maximum tumor size (cm)</th>
<th>OP time (min)</th>
<th>Bleed Loss (ml)</th>
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<tr>
<td>1</td>
<td>CCC</td>
<td>63/M</td>
<td>21.1</td>
<td>38.0</td>
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<td>8</td>
<td>416</td>
<td>1700</td>
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<td>2</td>
<td>CRM</td>
<td>75/F</td>
<td>24.2</td>
<td>47.5</td>
<td>1</td>
<td>8.5</td>
<td>348</td>
<td>300</td>
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<tr>
<td>3</td>
<td>HCC</td>
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<td>22.5</td>
<td>42.0</td>
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<td>3.6</td>
<td>360</td>
<td>700</td>
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<tr>
<td>4</td>
<td>CRM</td>
<td>31/F</td>
<td>23.0</td>
<td>45.2</td>
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<td>3</td>
<td>350</td>
<td>600</td>
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<table>
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<tr>
<th>Case</th>
<th>T/F</th>
<th>Postop Cx.</th>
<th>HOD</th>
<th>Adjuvant Tx.</th>
<th>Recurrence</th>
<th>Disease free time</th>
<th>Survival (months)</th>
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<tr>
<td>1</td>
<td>600</td>
<td>-</td>
<td>15</td>
<td>5-FU/Carbo #6</td>
<td>Mediastinal LN</td>
<td>37</td>
<td>66 (alive)</td>
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<tr>
<td>2</td>
<td>-</td>
<td>Bile leak</td>
<td>50</td>
<td>FOLFOX</td>
<td>Seeding</td>
<td>9</td>
<td>11 (died)</td>
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<tr>
<td>3</td>
<td>-</td>
<td>-</td>
<td>14</td>
<td>-</td>
<td>-</td>
<td>32</td>
<td>32 (alive)</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>-</td>
<td>14</td>
<td>FOLFOX</td>
<td>-</td>
<td>2</td>
<td>2 (alive)</td>
</tr>
</tbody>
</table>
Vascular anatomy - portal vein

Nakamura et al. Transplantation 2002
Type B portal vein

M/51
6.3 cm sized HCC in the right posterior liver

Lt. liver = 33.9%
Lt. liver + S8 = 42.0%
S8 – preserving right hepatectomy
S8 – preserving right hepatectomy

CT scan at 7 days after operation
Parenchymal resection along the right anterior portal pedicle

Anterior fissure

Main portal fissure

DS

VS

PS

RDP

RPP

P1

P2

P3

P4

IVC

Resection of PS & DS instead of the right hemiliver

Arch Surg 2002;137:1118-1124 Kogure et al.
Parenchymal resection along the right anterior portal pedicle

4.1cm sized HCC in the right posterior section

Lt. liver = 32.2%  →  Lt. liver + Ventral segment of Rt. Anterior section = 48.5%
Parenchymal resection along the right anterior portal pedicle

- Right anterior PV
- Right posterior PV
- Right dorsal PV
- Right ventral PV
- PV supplying S6
- PV supplying S7
- MHV
- RHV
- Transection line

No ischemia & congestion in VS
Parenchymal resection along the right anterior portal pedicle

Bilobar multiple liver metastases
• When major hepatectomy is necessary in a patient with small future liver remnant, parenchymal preserving anatomical liver resection can be another option according to the vascular anatomy and the tumor location without preoperative portal vein embolization.
Thank you for your attention!