Laparoscopic living donor hepatectomy

- Single center, Two surgeons' experience

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The first validation for a laparoscopic donor hepatectomy
The first validation for a laparoscopic donor hepatectomy

Laparoscopic LLS for A-C LDLT yields at least similar short-term donor outcomes as LDN.

Laparoscopic approach should be considered a new standard practice for retrieval of left lateral section liver grafts as it is for kidney donation.
Samsung medical center

• From May 2013 to May 2017

• 92 Pure laparoscopic donor hepatectomy
Samsung medical center

- Two surgeons
  - Surgeon 1
    - CH David Kwon  74 cases
      (May 2013 to Jan 2017)
  - Surgeon 2
    - GS Choi  18 cases
      (Dec 2016 ~ )
Annual number of laparoscopic donor hepatectomy in SMC

- 2013: 13
- 2014: 20
- 2015: 17
- 2016: 17
- 2017 JUNE: 17

Legend: Right, Left
In Samsung medical center

• 92 cases, laparoscopic donor hepatectomy

<table>
<thead>
<tr>
<th>Location</th>
<th>Count</th>
</tr>
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<tbody>
<tr>
<td>Rt.</td>
<td>80</td>
</tr>
<tr>
<td>Ext. Rt.</td>
<td>4</td>
</tr>
<tr>
<td>Ext. left</td>
<td>4</td>
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<tr>
<td>Left lateral section</td>
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Donors’ demographics

• Male : Female = 51 : 41

• Age 30.0 (17 ~ 58)

• BMI 23.6kg/m² (17.81kg/m² ~ 28.55 kg/m²)
Outcome of operation

• Operation time         6 ho 30min    (11ho 24min – 3ho 56 min)

• Graft weight                   723 g                  (394g – 1535g)

• Warm ischemic time   5 min 03 sec       ( 2min 46sec – 11min )

• Amount of bleeding      350 cc                  (50cc – 1000cc)

• No transfusion
Operation time

![Graph showing operation times for Kwon and Choi over the years 2013 to 2017.](image-url)
Estimated blood loss

<table>
<thead>
<tr>
<th>Year</th>
<th>Kwon</th>
<th>Choi</th>
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<tbody>
<tr>
<td>2013</td>
<td></td>
<td></td>
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<tr>
<td>2014</td>
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<td></td>
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<tr>
<td>2015</td>
<td></td>
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</tr>
<tr>
<td>2016</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>2017</td>
<td></td>
<td>400</td>
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<tr>
<td></td>
<td></td>
<td>50</td>
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</tbody>
</table>
**Warm Ischemic Time (min)**

- Kwon
- Choi
Conversion Rate

6/ 92 (6.5%)

Left : 1 / 8 (12.5%)  
Right : 5 / 84 (5.9 %)

PV injury : 3 cases

PV stenosis : 1 cases

Remnant bile duct injury : 1 case

Steatosis & small remnant volume : 1 case
Annual number of LDRH in SMC

- 2013: 13
- 2014: 20
- 2015: 17
- 2016: 17
- 2017 JUNE: 17
Open conversion in LDRH annual data
Results

Hospital stay

: median 11 days (8 days-29 days)

Incidence of Major complication  ( type III  )

: 11/ 92 ( 12% )

occurred to donors donated its right liver

Left    :  0 / 8  
Right   :  11/ 84 ( 13.1 % )
Annual Complication in LDRH

- 2013: 11 Without Complication, 2 Complication
- 2014: 16 Without Complication, 4 Complication
- 2015: 15 Without Complication, 2 Complication
- 2016: 14 Without Complication, 3 Complication
- 2017 MAY: 15 Without Complication, 1 Complication
Major Complications (IIla, IIlb)

**Vascular complications (3 cases)**

- **Portal vein stenosis 2**
  - Re-operation (Conversion case)
  - percutaneous balloon angioplasty

- **Bleeding from hepatic artery stump**
  - open surgical repair

**Biliary complications (8 cases)**

- **Biliary stenosis 1**
- **Biliary leakage 7**
  - 6 cases: treated with ERCP and/or PCD
  - 2 cases: laparoscopic re-explo.
    - 1: caudate bile duct repair
    - 1: dislocation of clip on cystic duct
Donors’ IIIa & IIIb complication rate
**Anonymous**

**Background.** Only a limited number of centers have performed laparoscopic living donor hepatectomy to date. In particular, laparoscopic right hepatectomy is rarely performed because the procedure can only be performed by surgeons with significant experience in both laparoscopic liver surgery and liver transplantation with living donor liver grafts. **Methods.** Between November 2014 and February 2015, in a pure laparoscopic approach program for living right lobe donors at Asan Medical Center, 92 living donors underwent right hepatectomy for adult living donor liver transplantation. Among these, 3 pure laparoscopic living donor right hepatectomies were performed in 3 young female donors. **Results.** The intraoperative and postoperative courses for all 3 donors and recipients were uneventful without any complications. Laparoscopic living donor hepatectomy has definite advantages over conventional open surgery, including decreased wound morbidity and faster recovery. **Conclusions.** According to the data of the present report, pure laparoscopic living donor right hepatectomy in properly selected living donors (only 4% of potential donors in this cohort) appears to be a safe and feasible procedure in adult living donor liver transplantation.

(Transplantation 2017;101:1106-1110)

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**Strict indication of Lap. Donor hepatectomy**

1. **single and longer segments in the right hepatic artery, right portal vein and right hepatic duct.**

2. **fewer segment 5 and 8 veins and no sizeable inferior hepatic vein**

3. **estimated grafts weight < 650 g**

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*Kim et al Transpl 2017;101:1106-1110*
How long?                             Classified by 1cm
If donor has a long right hepatic duct?

• Long Neck Group  
  Long (>1cm) right hepatic duct (n=54)  
  1 case biliary leakage  
  leakage from cystic duct  
  due to dislocation of clip

• Short Neck Group  
  Short (<1cm) right hepatic duct (n=30)  
  6 cases biliary leakage  
  1 case biliary stricture

p=0.01
**Donors’ IIIa & IIIb complication rate**

Donor Morbidity Including Biliary Complications in Living-Donor Liver Transplantation: Single-Center Analysis of 827 Cases

Mijae Shin, Sanghyun Song, Jong Min Kim, Choong Hyuck David Kwon, Sung-Joo Kim, Suk-Koo Lee, and Jae-Won Jho

**Background.** Because of the shortage of deceased-donor livers for transplantation, living-donor liver transplantation (LDLT) has become an indispensable treatment strategy for end-stage liver disease. The critical prerequisite for LDLT is the maximal safety of healthy donors.

**Methods.** From June 1996 to November 2010, a total of 827 completed donor heptectomies were performed in our center. We analyzed donor morbidity associated with LDLT.

**Results.** There was no donor mortality. No complications were observed in 744 (90.0%) donors, and 83 (10.0%) donors experienced complications. Wound complications were most common, occurring in 48 (5.8%) patients. According to modified Clavien classification, grade I, grade II, grade IIIa, and grade IIIb complications were experienced in 56 (67.5%), 2 (2.4%), 15 (18.1%), and 10 (12.0%) donors, respectively. Surgical or interventional management was successful in all grade IIIa and grade IIIb donors. The incidence of biliary complications was significantly higher in younger donors. Donor morbidity did not decrease below the attained level even after time had passed.

**Conclusions.** This study demonstrates the safety of donor heptectomies. Complications were relatively minor and easily controlled. The incidence of biliary complications and donor age was inversely correlated. The procedural experience of the surgeons was not associated with the donor complication rate.

**Keywords** Donor complications, Live donor liver, Living donor liver transplantation, Morbidity.

(Transplantation 2012;95: 942–948)
Recipient’s outcome  
LDRH  84 recipients – unpublished data

Follow-up interval  
: 20.9 month (1 month - 49 month)

No primary non-function

Overall survival 94% at 2 year  
(2 cancer recur, 3 sepsis)

Graft survival 92.8% at 2 year
To be minimally invasive

• To Donors

  Reduce biliary complication and conversion!

• To Surgeons

  Reduce operation time
  Protect from Radiation
To be minimally invasive

• To Donors

  Reduce biliary complication and conversion!

• To Surgeons

  Reduce operation time
  Protect my thyroid and testis from Radiation
Indication
**Indication**

Type 1

Type 2

Type 3a

Type 3b

Type 4a

Type 4b
Operation time

Open conversion

Kwon
Choi

2013 2014 2015 2016 2017

11:24 10:48 9:36 8:24 7:12 6:00 4:48 3:36 2:24 1:12 0:00

4:54 5:04 3:56

0:00 1:12 2:24 3:36 4:48 6:00 7:12 8:24 9:36 10:48 11:24 12:00
Operation time

Complication

Kwon

Choi

2013 2014 2015 2016 2017
To be minimally invasive

• To Donors

  Reduce complication and conversion!

• To Surgeons

  Reduce operation time
  Protect from Radiation
Duplex USG guided bile duct division

• Strength
  real time
  3-dimensional approach
can be tracing – DDx. From artifact
magnifying view

• Weakness
  device dependent
articulation of prove / resolution power
Estimated blood loss

![Estimated blood loss graph](image-url)

- Estimated blood loss values from 2013 to 2017 are indicated.
- The graph shows the comparison between Kwon and Choi in blood loss over the years.
Conclusion

• Hyper-selection of donor reduce donor’s major complication and near miss events.
Conclusion

• Hyper-selection of donor reduce donor’s major complication and near miss events.

• Standardization of surgical procedure help to shorten your learning curve. (operation time and blood loss)
Thank you for your attention!

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