Optimizing right-sided donor nephrectomy: the transition from hand-assisted laparoscopic to retroperitoneoscopic approach

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ABSTRACT

Laparoscopic living donor nephrectomy (DN) has become the gold standard for kidney procurement. Recently, hand-assisted retroperitoneoscopic (HARS) technique was developed to address intra-peritoneal complications of intestinal injuries and adhesions. The purpose of this study is to analyze our experience of transition from hand-assisted laparoscopic (HAL) to HARS DN, with special emphasis on right-sided kidneys.

In February 2009, after 3 years of experience with HAL DN, we implemented HARS technique at once for all DNs. The reasons for selecting right kidneys were multiple left renal arteries, apparently smaller kidney size, right renal cyst and minor renal stones. Four of the 103 HAL DNs and 42 of the 248 HARS DNs performed were right-sided. We analyzed the complications and outcome in our DN series. None of the patients had conversion to open DN, readmission or reoperation. The mean age was 44 years. Male to female ratio was 2/2 in HAL, 19/23 in HARS group. Mean BMI was 25.5 in HAL, 25.7 in HARS group. There were one donor with multiple arteries in HAL group and four in HARS group. One patient in HARS group had two renal veins. The mean operation time was 132.5 min for HAL approach vs. 135.2 min for HARS approach. The liver retractor was used in all cases with HAL approach which necessitated an extra port side and caused minor liver injury in one case. The liver retractor was used in the initial case with HARS approach. Two patients in HAL group had blood transfusion and one of them required sacrifice of a minor artery out of three renal arteries. The only complication related to HARS approach was major (more than 3 cm) peritoneal opening (n=3). Two patients had wound infection and two patients had incisional hernia. All transplanted kidneys had immediate function. Transition to HARS DN had no adverse impact on donor morbidity and quality of early graft function. Our experience suggests that learning curve in HARS approach is short and major complications are less compared to HAL approach. HARS approach enabled better visualization while avoiding the need for an extra port and liver retraction at right sided DN. Given the potential advantages of an extra peritoneal approach for the donor, HARS is an attractive alternative, particularly for surgeons with previous HAL experience. On the basis of our experience, we recommend the technique to increase the safety margin of right LDN.
**BACKGROUND**

Transplantation is the only treatment offering long-term benefit to patients with chronic kidney failure. Living donor nephrectomy is performed on healthy individuals who accept a surgical procedure to save the life of a loved one. It is important to offer the best surgical approach in order to increase the donor’s safety. In comparison to minimally invasive open techniques, laparoscopic kidney donation is associated with a better quality of life, less pain, shorter in hospital stay and earlier return to work. This method is expensive for the hospital, has a long operating time and requires an experienced, well-trained, surgeon(1). The hand-assisted retroperitoneoscopic technique may be an alternative to a complete laparoscopic, transperitoneal approach. The peritoneum remains intact and the risk of visceral injuries is reduced. Hand-assistance results in a faster procedure and a significantly reduced operating time(2,3). The feasibility of this method has been demonstrated recently, but it’s benefit especially at right sided donor nephrectomy can be more important.

**OBJECTIVE**

HAL was our initial minimal invasive nephrectomy technique for donors in our clinic. We have modified our hand assisted laparoscopic technique and started to perform retroperitonoscopic donor nephrectomy in February 2009. The hand-assisted retroperitonoscopic approach may be a viable alternative. With this method the surgeon inserts his hand to create a retroperitoneal space, which is thereafter insufflated with gas. The peritoneum stays intact and tactile sensation remains. The chance of a complication to the intestines is very small. Furthermore, this technique is easier and quicker to learn for the surgeon than the laparoscopic approach. We analyzed the complications and outcome in our DN series until December 2011. This study is especially emphasising on right nephrectomies.

**HAL and HARS DN TECHNICAL DETAILS IN OUR CENTER**

Initially a hand port was introduced through a median or pfannenstiel incision in HAL DN. We perform paramedian or pfannenstiel incision for HARS DN. Hand dissection was used to remove the peritoneum from the abdominal wall in HARS DN. We use two 12 mm trocars at right subcostal margin at anterior axillary line and subxiphoid region. Dissection was performed by hook cautery. We use stapler to cut the renal artery and renal vein at right nephrectomy.

**MATERIALS AND METHODS**

We have initiated HAL DN technique in our clinic in 2006. We performed HAL DN until February 2009 and then we implemented HARS technique at once for all DNs. We performed both techniques for both right and left donor nephrectomy. The reasons for
selecting right kidneys were multiple left renal arteries, apparently smaller kidney size, right renal cyst and minor renal stones. We had four right sided DN out of 103 HAL DNs in between 2006 and 2009. In between February 2009 and December 2011, 42 of the 248 HARS DNs performed were right-sided. All procedures were performed by the same surgeon. We performed median incision for HAL DN. The donors who had HARS DN had paramedian incision except three donors who had pfinnenstiel incision because of cosmetic concern. None of the patients had conversion to open DN, readmission or reoperation. The mean age was 44 years. Male to female ratio was 2/2 in HAL, 19/23 in HARS group. Mean BMI was 25.5 in HAL, 25.7 in HARS group. There were one donor with multiple arteries in HAL group and four in HARS group. One patient in HARS group had two renal veins. The mean operation time was 132.5 min for HAL approach vs. 135.2 min for HARS approach. The liver retractor was used in all cases with HAL approach which necessitated an extra port side. One case with HAL approach had minor liver injury secondary to liver retraction. The liver retractor was used in the initial case with HARS approach but no extra trocar was required after the initial case. Two patients in HAL group had blood transfusion. One of these patients had major bleeding with two units of blood transfusion and sacrifice of a minor artery out of three renal arteries. The arterial bleeding in this case was repaired without conversion to open nephrectomy. The other donor had one unit of blood transfusion without significant bleeding. The only perioperative complication related to HARS approach was major (more than 3 cm) peritoneal opening (n=3). Two patients had wound infection and two patients had incisional hernia after HARS approach. The incisional hernias were from the paramedian incision. All transplanted kidneys had immediate function. There was no ureter complication in our series.

Placement of hand port after dissecting retroperitoneal space

The surgeon Left hand inside and right hand using hook cautery. The assistant holding camera trough the subxiphoid port
The abdominal incisions, Pfannensteil (right) or paramedian (below) for hand port and two 12 mm trocars

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<tr>
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<th>Hand assisted laparoscopic</th>
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**SUMMARY**

Transition to HARS DN had no adverse impact on donor morbidity and quality of early graft function. We did not have any major complication, especially blood loss are less compared to HAL approach in our series. HARS approach is avoiding the need for an extra port and liver retraction at right sided DN. Given the potential advantages of an extra peritoneal approach for the donor, HARS is an attractive alternative, particularly for surgeons with previous HAL experience.

**DISCUSSION**

We believe that hand assistance and retroperitonoscopic endoscopic approach is the best alternative for DN as it increases donor’s safety. Hand assistance facilitates the procedure and the advantage in achieving hemostasis in the case of major bleeding. The hand-assisted technique also shortens operating time (4).
The transperitoneal approach carries the risk of visceral injuries that can progress into life-threatening complications(5,6). Gastrointestinal complications are also the major postoperative problem after transperitoneal LDN, leading to prolonged ileus, internal herniation, and readmission(6). The retroperitoneal approach minimizes this risk, and in this series study, there were no visceral injuries or postoperative ileus.

In our experience, adequate retroperitoneal space can be created with manual dissection, assisted by the insufflated gas. Balloon dilatation is not necessary to create the retroperitoneal space. We have encountered tears in the peritoneum, but it does not cause any technical difficulty during the procedure. We had two cases with incisional herniation from the paramedian incision after HARS DN. Paramedian incision can cause increased risk for donor nephrectomy.

In this study, we especially analyzed two endoscopic nephrectomy techniques for right sided kidneys. According to our data, HARS technique increases the safety margin of LDN. Two cases with HAL DN technique had bleeding and required blood transfusion. We had no major complication after switching to HARS DN. On the basis of our experience, we recommend the technique to increase the safety margin of right LDN.

REFERENCES