



Impact of Hand-Assisted Laparoscopic Living Donor Nephrectomy on Donor's Quality of Life, Emotional, and Social State

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ABSTRACT

Background. Laparoscopic donor nephrectomy has become the preferred method for live kidney donation in many centers. Herein we have reported on donor-related quality of life (QoL) and social state after laparoscopic hand-assisted nephrectomy (HALDN) for living kidney donation.

Patients and Methods. Between December, 2003 and May, 2008, we performed 48 HALDN. To evaluate QoL, we mailed to the donors a structured questionnaire based on a combination of the WHOQOL-BREF questionnaire and the 36-item health survey (SF-36) with slight modifications. The QoL scores were compared with data from a matched group of the German healthy population. We evaluated clinical results in donors and recipients by reviewing the records, and calculated 1-year graft survival according to the Kaplan-Meier method.

Results. In all domains, the QoL scores were higher than those among the normal population. The higher QoL was independent of time since donation. When asked to rate their health at the time of the questionnaire, 91% rated it as good, very good, or excellent, 6% as fair, and 3% as poor. When asked to rate the pain around their scar, 91% rated it as mild or absent: Of the patients, 94% were likely to say that they would donate again, if it were possible. For 6% of the patients the overall experience was stressful.

Conclusion. HALDN is safe. QoL changes after kidney donation are low and comparable to those of the healthy population.

LIVING DONOR kidney transplantation has gained widespread acceptance as an effective procedure for patients with terminal kidney disease. Its clinical and social significance has increased in recent years as the gap between needed and available donor organs has continuously been growing, because of a decline in the number of deceased kidney donations. The safety and efficiency of living donor nephrectomy are of utmost concern to the donor and the recipient. Therefore, optimizing living donor management, including screening, surgery, and anesthesia remains important.¹ Although the benefits of living donor organs for recipients are well documented, available data examining quality of life (QoL) issues among living donors are currently limited.²

With growing clinical experience, the technique of donor nephrectomy has experienced a steady evolution. Traditionally, the kidney was removed through a flank incision, often including a rib resection to allow sufficient access. This procedure resulted in postoperative pain, incisional hernias,

and chronic neuralgia.³ Concurrently the open donor nephrectomy technique has been refined to a muscle-sparing mini-incision without rib resection thereby improving donor convalescence.^{4,5} The method of live kidney donation experienced a further development with the introduction of which Laparoscopic donor nephrectomy (LDN) was first performed in 1995.⁶ In less than a decade, this procedure has been adopted by many centers due to its minimal invasiveness,^{7,8} thereby reducing, postoperative pain, hospital stay, time to return to work, and wound-associated complications.^{9,10} However, there is some controversy about the adverse effects of the possibly longer warm

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ischemia time on recipient-graft function associated with LDN.¹¹ Furthermore, pneumoperitoneum has potential risks of compression of the great vessels and reducing renal blood flow.¹² Hand-assisted laparoscopic donor nephrectomy (HALDN) was introduced to address disadvantages of LDN,¹³ since this approach permits the surgical team to use the necessary extraction incision to their advantage throughout the procedure. The potential advantages of hand-assisted donor nephrectomy include shorter operative time, less learning curve related to the presence of robust tactile feedback, ability to manually assist in dissection, prevention of kidney torsion after the lateral attachments have been dissected, and ease of obtaining hemostasis by manual compression of bleeding vessels. However, there is little research available on the quality of life (QoL) of donors after HALDN. Herein, we have reported the donor-related QoL and social state after HALDN for living kidney donation.

PATIENTS AND METHODS

From December 2003 to May 2008, we performed 48 HALDN. To evaluate QoL, we mailed to the donors a structured questionnaire. Of the 48 questionnaires, none were returned by the postal service, leaving 100% that were presumed to have been delivered. Of the 48 donors who were apparently reached, 44 (91.6%) responded.

Preoperative Management and Surgical Technique

Our donor workup includes medical history, physical examination, and an array of tests (hematology, coagulation, blood chemistry, urine analysis), kidney and chest imaging, infectious disease screening with viral studies, immunologic analysis of donor-recipient match, and EKG. Overall, about 70% of donors undergo most of their evaluation through their local physician; the results are forwarded to the transplant team for evaluation and review. If the results are satisfactory, the donor is then evaluated by the donor surgical team. The remaining 30% of donors, including all unrelated donors, undergo their workup at our center. Related donors who seem to be at higher risk for psychosocial complications are also required to undergo an evaluation by a clinical psychologist, who determines the suitability by evaluation of their motivation and willingness, potential consequent hardships and social support. Efforts are made to eliminate individuals who do not have purely altruistic reasons and those with unrealistic expectations. All HALDN operations were performed by one surgeon (PF). The HALDN technique has been described by multiple authors. After extirpation of the kidney, we performed perfusion with HTK (Custodiol, Koehler Chemie, Alsbach-Haenlein, Germany). The recipient was prepared simultaneously in a neighboring operating theatre, which reduced the cold ischemia time to <30 minutes. Renal transplantation was performed using the standard technique of preperitoneal placement in the iliac fossa. The immunosuppressive protocol consisted of (tacrolimus, methylprednisolone, and mycophenolate mofetil). Patients with a particular immunologic risk received additional therapy with antithymocyte globulin (ATG) or the interleukin (IL)-2R inhibitor basiliximab for induction therapy. Primary and late function of grafts were evaluated by the patient's clinical records. Primary graft function was classified as no dialysis required, signifying an absence of delayed graft function (DGF) on postoperative day (POD) 1 through POD 7. To determine late function at 12 months after the transplantation, we

evaluated whether and how many grafts had lost function within a year.

Quality of Life Assessment

As a measure of quality of life we used a questionnaire based on a combination of WHOQOL-BREF questionnaire and the 36-item health survey (SF-36) with slight modifications. Our questionnaire assessed the domains of physical health, pain, social functioning, general mental health (psychological distress and well-being), change of profession, and the willingness to donate again, if they could. Subscale scores were transformed to 0–100 scales, with a higher score indicating a better QoL. Widely used to measure quality of life in populations with various illnesses and in healthy people, items of the 2 questionnaires allowed us to compare the responses of our donors with norms for the German population.

Statistical Analysis

Statistical analysis was performed using SPSS 12.0 (SPSS Inc., Chicago, Ill). We analyzed categorical variables with the chi-square test and, when applicable, Fisher's exact test, and continuous variables by the Mann-Whitney U test. The 1-year rate of graft survival was calculated by a Kaplan-Meier analysis. The level of significance was set at $P < .05$.

RESULTS

Characteristics of our respondents are summarized in Table 1. Among 44 donors who responded were 25 women and 19 men. Their age at donation ranged from 32 to 61 years (mean, 44.1 ± 13.1). The median time after kidney donation was 21.1 ± 6.2 months (range, 5–40). Right-sided HALDN was performed in 29 and left-sided, in 15 patients. At the time of the assessment, 77% of patients were employed. Among the 23% not working, the reasons included personal choice (6%) and retired (17%). At the time of donation, 66% were married; 22%, not married but in a long-term relationship; 8%, separated; and 4% widowed.

The procedures were all performed as planned without any conversion to an open or formal lumbotomy. Right-sided HALDN was performed in 29 and left-sided in 15 donors. The

Table 1. Demographic Data of Donor-Population Operated by HALDN

Categories	HALDN
Patients (n)	44
Time-period of operation	12/2003–05/2008
Age (y)	44.1 ± 13.1 (32–61)
Female/male	25/19
Body mass index (kg/m ²)	24.1
Marital status	
Single	12%
Married	66%
Partnered	22%
Employment	
Full time/part time	77%
Retired	17%
Other	6%
Time since donation (Median; months)	21.1 ± 6.2 (5–40)

Table 2. Operative and Postoperative Data of the Study Population

Categories	HALDN
Donors (n)	44
Operative time (min)	
Median	138
Range	113–180
Warm ischemia time (sec)	
Median	52
Range	25–132
Hospitalization period (d)	
Median	3.7
Range	5–7
Operative blood loss (mL)	
Median	121
Range	48–420
Intraoperative complications	4.2%
Postoperative complications	0%
Incisional hernia	3%

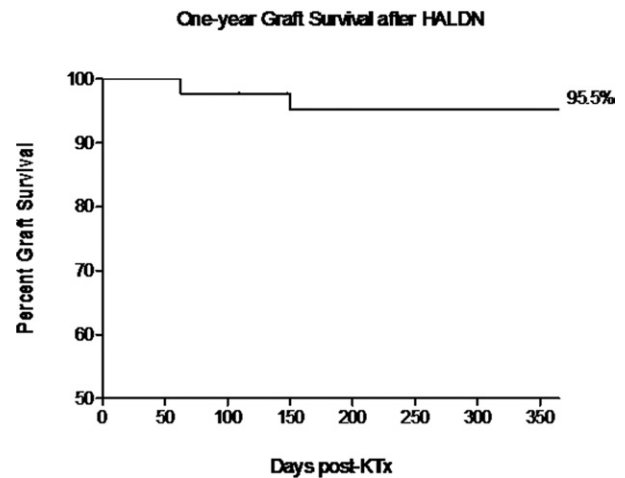
clinical results are summarized in Tables 2 and 3. Intraoperative complications occurred in 2 donors (4.2%): namely, prolonged bleeding in 1 case (total blood loss 420 mL), and a small capsular tear of the spleen in another case. The lesion was recognized immediately and treated without conversion. One donor required transfusion 2 days after operation. Re-interventions were not indicated. In our series, there were no deaths, myocardial infarctions, deep wound infections, repeated explorations for bleeding, deep venous thromboses, pulmonary emboli, extirpation of extrarenal organs, or arrhythmias. No kidney was lost due to a technical reason. Further, we retrospectively reviewed the data of recipients of 44 hand-assisted laparoscopically recovered kidneys. The data are presented in Table 3. However, during the 1-year period, 1 graft lost its function to chronic rejection, whereas 1 patient died (Fig 1).

The mean QoL scores for the HALDN group and for the German population are displayed in Figure 2. Overall, donors reported a better quality of life than the general

Table 3. Demographic Data and Graft Function in Recipients of HALDN Recovered Grafts

Categories	HALDN
Number of recipients	44
Time-period of operation	12/2003–05/2008
Age (mean \pm SD)	45.4 \pm 11.2
Ratio male/female	1.3
Immunosuppression regimen	
Triple	30/44
Triple+1	14/44
Delayed graft function	2/44 (4.5%)
Graft loss during 1 year	2/44 (4.5%)
One-year posttransplant graft survival	95.5%
Mean Δ creatinine at POD1 (mg/dL)	–4.6
Creatinine (M \pm SD) 1 year post-transplant	1.18 \pm 0.21

HALDN, hand-assisted laparoscopic donor nephrectomy; M, mean; SD, standard deviation; POD, postoperative day.

**Fig 1.** One-year graft survival in recipients of laparoscopic hand-assisted (HALDN) recovered kidney grafts.

german population in all domains (Fig 2). When asked to rate their general health at the time of the questionnaire, 91% rated it as good, very good, or excellent; 6% as fair; and 3% as poor (Fig 3A). When asked to rate pain around their scar, 90% rated it as mild or absent; 6% moderate and 4% severe or very severe. Overall, 94% of the patients stated that they would donate again, if it were possible (Fig 3B). For 6% of patients the overall experience was stressful. For 17% of donors the whole process was associated with major changes in their daily life. Eighteen percent of donors stated that the donation procedure had a negative impact on their life, including 26% who expressed health concerns, and 26%, emotional problems (Fig 3C). Eighty-six percent of donors stated that they felt better about themselves after donating one of their kidneys.

DISCUSSION

QoL assessments are often used to evaluate the outcomes of medical interventions. They conceptualize in a self-rating multidimensional construct, physical, mental, and social aspects of a subject. Most studies have investigated perioperative complications and recovery shortly after donor nephrectomy. To date, there have been only a few published studies that have assessed QoL after laparoscopic donor nephrectomy.^{14,15}

In the present study, we showed an excellent QoL among living kidney donors after the HALDN operation, which was independent of time following donation. As evidenced by their QoL scores, our patients reported a better quality of life than the German national norm. The results of our study also supported the notion that kidney donation is safe, because only 2 perioperative minor complications (4.2%) were noted among the 48 donor operations. There was no donor death. No kidneys were lost for technical reasons.

The observed high QoL in our study population was consistent with other published reports.¹⁶ For instance,

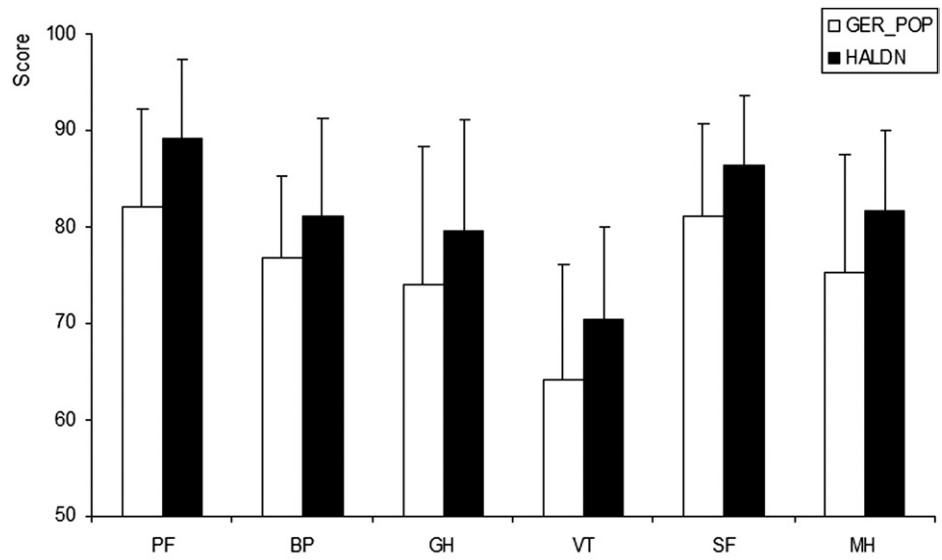


Fig 2. Mean quality of life (QoL) scores for the donors from the HALDN group and for the German population (GER_POP).

PF=physical function, BP=bodily pain, GH= general health, VT = vitality, SF=social function, MH=mental health; GER-POP= German Population

Johnson et al¹⁷ described QoL of living kidney donors using the SF-36 survey. Among 979 American donor to whom they sent a questionnaire, 60% responded. Donors scored better than the general US population in 7 of 8 categories. The donors' average scores were much better than those of individuals with the disease states of congestive heart failure and depression. However, 12% recalled the experience as being stressful or extremely stressful, and 4% regretted the donation. Kok et al⁵ reported a randomized controlled trial comparing the quality of life in living donors after a laparoscopic versus a mini-incision open donor nephrectomy. The authors reported that patients who had undergone laparoscopy showed better scores for physical

fatigue (MFI-20) and physical function (SF-36) at 1 year. Giessing et al¹⁸ evaluated the impact of kidney donation on German donor's QoL. Among 106 donors there was a 90% response rate. Most donors reported an equal or better QoL than the healthy population. For 3 items (physical functioning, role—physical, and general health), kidney donors showed significantly better score than the reference population. For another 4 items—bodily pain, vitality, social functioning, and mental health—their scores were better albeit not significantly than the reference population. Perry et al⁵ retrospectively evaluated health-related QoL of patients who underwent laparoscopic versus mini-incision open donor nephrectomy. The overall QoL for both proce-

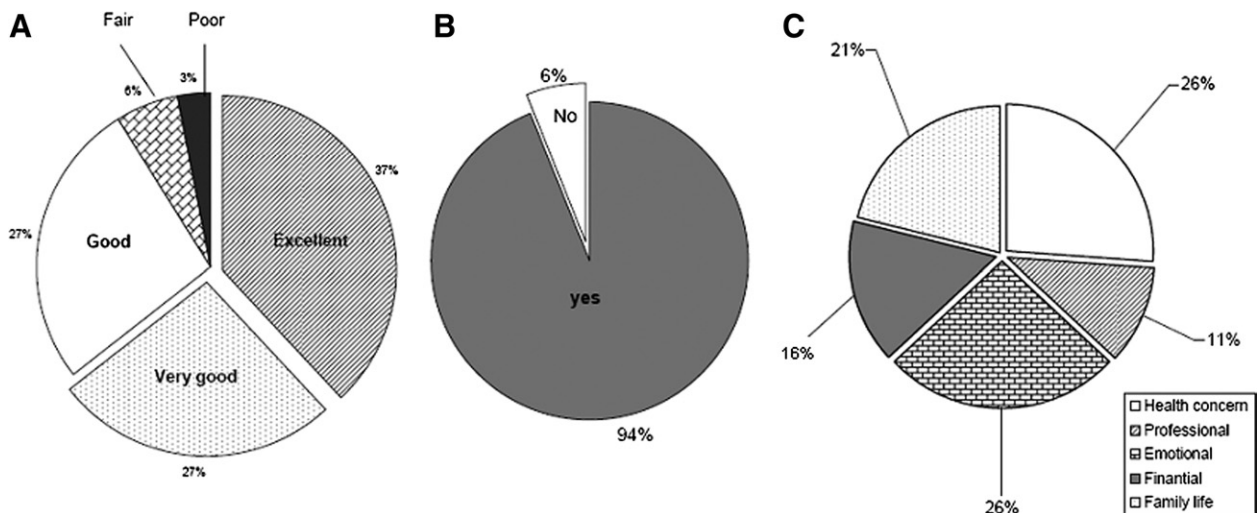


Fig 3. General health situation (A) and willingness to donate again (B) in donors operated by HALDN. Overall, 18% of donors experienced a negative impact of the donation procedure on their life (C).

dures was comparable to or higher than an age-matched general US population. However, health-related QoL was significantly higher among the laparoscopy than the mini-incision group in the 3 domains that measure “bodily pain,” “physical functioning,” and “emotional role functioning.” The scores in the other 5 categories generally favored the laparoscopy group, but did not achieve statistical significance. Buell et al¹⁹ also examined QoL of laparoscopic versus open nephrectomy donors observing that the overall QoL were comparable to the general US population. A small number (6% in our study) of donors would not donate a kidney again. For 6% of patients the overall experience was stressful. Additionally, 17% of donors stated that the whole process was associated with major changes in their daily lives. However, the vast majority (94%) of donors, reflecting on their overall experience, would still make the same decision again and would recommend the procedure to family and friends facing similar situations. A multivariate analysis by Johnson et al¹⁷ revealed that relatives other than the first degree and donors whose recipients died within 1 year after transplantation were more likely to say that they would not donate again. The authors suggested that it might be necessary for donors who were not first-degree relatives to undergo more rigorous psychosocial evaluations.

However, like many other studies evaluating the impact on kidney donors’ QoL, our study also had limitations, such as small cohort size, retrospective nature, and unmatched reference cohort. The retrospective, cross-sectional study design required patients to recall specific information during their recuperation after surgery. Therefore, the study results may bear some degree of recall bias.

In conclusion, this study showed that the quality of life among living kidney donors was not affected by HALDN. The QoL changes and risks after kidney donation were low and comparable to those of an healthy population.

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