Patient-reported outcomes for open versus laparoscopic living donor nephrectomy

Background—Rates of living kidney donation have increased dramatically in recent years, in large part because of improved surgical techniques such as laparoscopic nephrectomy.
Objective—To compare patient-reported outcomes of laparoscopic nephrectomy versus open donor nephrectomy in 84 adult live kidney donors.
Outcome Measures—Outcomes included perceptions of pain and surgical scarring, number of surgical/medical complications, hospital length of stay, physical health problems related to donation, return to work, financial impact, health-related quality of life, and satisfaction with the donation experience.
Results and Conclusion—The 2 groups did not differ significantly in pain perceptions, number of surgical/medical complications, physical health problems, financial impact, health-related quality of life, or overall satisfaction. However, laparoscopic nephrectomy donors had significantly fewer hospital days and faster return to work time than open donor nephrectomy donors. The majority of donors report excellent health-related quality of life and no complications in the months following surgery. In addition, it appears that laparoscopic nephrectomy, in comparison to open donor nephrectomy, may reduce barriers to living kidney donation by reducing hospital length of stay and time away from work. Being able to return to work much sooner after surgery may significantly reduce the indirect costs (ie, lost wages) associated with living donation. (*Progress in Transplantation.* 2006;16:162-169)

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Living kidney donation represents a critical step toward increasing the number of kidney transplantations performed, reducing transplant waiting times, and extending the lives of those in need of transplantation. Living kidney donation affords several possible advantages, including permitting the use of deceased donor kidneys for kidney transplant patients without a suitable living donor match, the avoidance of dialysis for some kidney transplant patients, the preempting of a rapidly deteriorating quality of life, the use of potentially better quality organs, lower rates of acute rejection, and higher graft and patient survival rates.[1-3] In addition to benefiting the transplant recipient, living donation may have significant quality of life and psychological benefit for the donor.[4,5]

Laparoscopic donor nephrectomy (LDN), which permits the removal of a kidney via multiple smaller incisions, has emerged as the primary technique for most kidney donor programs in the United States.[3,6,7] Recent research suggests that LDN is associated with fewer complications, lower morbidity rates, and faster resumption of daily activities when compared to the traditional open donor nephrectomy (ODN).[3,7-10] Perhaps for these reasons, rates of living kidney donation have increased sharply in recent years, and LDN represents the de facto procedure of choice for most living donor programs.[3]

In light of the rising number of adults pursuing living kidney donation, it is essential that patient-reported outcomes be evaluated and presented to prospective donors to facilitate informed decision making.[3] Patient-reported outcomes are important to examine because other clinical measurements and outcomes associated with living donation (eg, graft quality and function, donor blood loss, and rate of infections) may not translate into recognizable benefits to donors. Moreover, because both ODN and LDN yield significant and comparable medical benefit to transplant recipients,

patient-reported outcomes provide more information about their relative effects on symptoms, functional status, and other quality-of-life issues. The purpose of this study was to extend previous research by describing patient-reported outcomes associated with LDN versus ODN. Patient-reported outcomes are essential in evaluating the benefits and limitations of surgical and medical procedures from the perspective of patients and they can eventually be used to guide the care of donors in clinical practice settings.

Methods

Nearly 1000 living donor nephrectomies have been performed at the University of Florida. The first LDN was performed in 1998, and it is now used exclusively in our center. To examine patient-reported outcomes associated with this technique, we selected a random sample of 100 adults who underwent ODN from January 1988 to December 2002, and 100 adults who underwent LDN from August 1998 to December 2002. These patients were mailed a letter describing the purpose and nature of the study, and they were asked to return an enclosed form indicating their willingness to participate in a telephone interview. Donors expressing a willingness to participate in the study were called to further discuss study procedures, obtain oral consent, and schedule a time for the interview. Participants were then called and interviewed at the scheduled time. Mean interview duration was 32.7 ± 9 minutes, with a range of 21 to 57 minutes.

The semistructured interview comprised 58 questions and was designed to gather information about the donor's demographic characteristics, donation decision-making processes, medical/surgical complications, hospital length of stay (LOS), return to functional status, financial impact, current health-related quality of life (SF-36 Health Survey[11]), and overall satisfaction with the donation experience. Interview items were developed based on previous research,[4,12] clinical considerations, and our own pilot work. Interviewers were 3 research assistants who received 3 hours of training and behavioral rehearsal, as well as specialized education and training about living organ donation, kidney transplantation, and the protection of human research participants. Interview responses were recorded directly on the data collection tool developed for this study and coded on the basis of the response options for each of the questions. Data acquired were both quantitative (ie, continuous, categorical) and qualitative. One research assistant that was not involved in the interviews served as a reliability check and reentered the data from the original data collection tool. All data were entered and analyzed using the Statistical Package for the Social Sciences database (SPSS, Version 11, Chicago, Ill). The University of Florida Institutional Review Board approved all study procedures.

Univariate relationships between the interview items and donor surgery type (LDN or ODN) were examined using *t* tests for continuous variables, the Fisher exact test for variables with 2 categories, or a 2-tailed χ^2 test for variables with 3 or more categories. Statistical significance was evaluated using $P = .05$. Logistic regression analyses were also conducted to examine the predictive relationship between donor surgery type and specific patient-reported outcomes (ie, hospital LOS and return to work time), while controlling for other donor characteristics.

Results

Study Participants

Of the 200 letters that were mailed, 37 (18.5%) were returned as undeliverable (ie, donor lost to follow-up), 68 (34.0%) either did not return the reply form or selected the nonparticipation option, 11 (5.5%) indicated a willingness to participate but did not complete an interview (eg, failure to schedule, >2 missed appointments for telephone interview), and 84 (42.0%) completed the study interview. Thus, the final sample included 44 LDN and 40 ODN donors.

Donor sociodemographic characteristics are reported in the Table. The 2 groups did not differ significantly in age at donation, gender, ethnicity, marital status, education level, or employment status. The 2 groups differed significantly in time since donation ($P = .0001$) and donor-recipient relationship status ($P = .001$). There was a longer time since donation for ODN donors (112.2 ± 42.1 months) than for LDN donors (32.6 ± 11.8 months). Also, ODN donors were primarily siblings (37.5%), parents (35.0%), and spouses (10.0%), whereas the LDN donors were composed mainly of siblings (45.5%), adult children (27.3%), and friends (18.2%). Overall, the study sample was not different from the larger living kidney donor population at the University of Florida in terms of age, ethnicity, marital status, and employment status; however, the proportion of women in the study was considerably higher than the percentage of female kidney donors at this transplant center.

Patient-Reported Outcomes

Pain and Surgical Scarring. There was no significant group difference on pain experience. Overall, most donors (88.1%) reported having pain after surgery and being pain-free within 14 days after surgery (Figure 1). As noted in Figure 2, 43.6% of LDN donors and 54.3% of ODN donors experienced more pain than they expected after surgery. There was a significant difference between groups in ratings of surgical scarring ($\chi^2 = 6.01$, $P = .05$), with more LDN (43.2%) than ODN (27.5%) donors reporting that the scars were better than expected (Figure 3). A higher proportion of LDN donors also reported that the scars were worse than expected (22.7% vs 15.0%).

Sociodemographic characteristics, total sample and by donor surgery type

	Total sample (N = 84)	Donor surgery type		
		ODN (n = 40)	LDN (n = 44)	
	Mean ± SD or No. (%)	Mean ± SD or No. (%)	Mean ± SD or No. (%)	Test statistic
Age at donation, years	42.5 ± 10.0	42.6 ± 9.9	42.3 ± 10.1	t (82)=0.15, P=.88
Gender, female	63 (75.0)	28 (70.0)	35 (79.5)	Fisher exact test,* P=.32
Ethnicity, white	67 (79.8)	31 (77.5)	36 (81.8)	$\chi^2(4)=4.56$, P=.34
Marital status, married	58 (69.0)	29 (72.5)	29 (65.9)	$\chi^2(4)=2.70$, P=.61
Education, college graduate	43 (51.2)	16 (40.0)	27 (61.4)	$\chi^2(4)=6.24$, P=.18
Employed	75 (89.3)	34 (85.0)	41 (93.2)	Fisher exact test,* P=.30
Time since donation, months	70.5 ± 50.1	112.2 ± 42.1	32.6 ± 11.8	t (82)=12.0, P=.0001
Relationship to recipient				
Spouse	6 (7.1)	4 (10.0)	2 (4.5)	
Parent	16 (19.0)	14 (35.0)	2 (4.5)	
Child	17 (20.2)	5 (12.5)	12 (27.3)	$\chi^2(5)=19.6$,P=.001
Sibling	35 (41.7)	15 (37.5)	20 (45.5)	
Other relative	1 (1.2)	1 (2.5)	0 (0.0)	
Friend	9 (10.7)	1 (2.5)	8 (18.2)	
Smoking history, yes	38 (45.2)	14 (35.0)	24 (54.5)	Fisher exact test,* P=.08
Pack per year†	20.5 ± 20.0	17.9 ± 12.0	22.2 ± 24.1	t (33)=0.63, P=.53
Quit before surgery, yes	26 (68.4)	10 (71.4)	16 (66.7)	Fisher exact test,* P=.98
Body mass index, before surgery	25.3 ± 4.0	24.9 ± 4.0	25.7 ± 3.9	t (82)=0.92, P=.36
Body mass index, current	27.2 ± 4.8	27.3 ± 4.7	27.1 ± 5.0	t (82)=0.17, P=.86
Registered donor, before surgery	35 (41.7)	13 (32.5)	22 (50.0)	Fisher exact test,* P=.12
Registered donor, current	54 (64.3)	26 (65.0)	28 (63.6)	Fisher exact test,* P=.96

Abbreviations: LDN, laparoscopic donor nephrectomy; ODN, open donor nephrectomy.

*Only P value is reported because Fisher exact test does not yield formal test statistic or critical value.
†Pack per year indicates average number of packs per day, X number of years smoked.

Hospitalization, Medical/Surgical Complications, and Recovery. LDN donors (2.3 ± 1.2) had a significantly shorter hospital LOS than did ODN donors (4.8 ± 2.0), t=7.1, P<.0001. Logistic regression analysis was used to examine the relative contribution of surgery type in predicting hospital LOS (median split), while controlling for donor age, sex, medical/surgical complications, body mass index (BMI), and smoking history. The total model was significant (χ^2=41.4, P<.0001) and predicted hospital LOS in 83.3% of the cases. More medical/surgical complications (odds ratio [OR]=4.4) and ODN surgery type (OR=26.3) were the only 2 significant predictors of longer hospital LOS.

The majority of donors (71.4%) reported no significant medical/surgical complications. Also, recovery time was as expected or faster than expected for most donors (69.0%). However, 23.8% of donors reported having 1 or more physical health problems since donation that they attributed to donor surgery. Two of the LDN and none of the ODN patients reported a hospital readmission secondary to donor surgery complications. Twenty percent of donors reported not having a primary care physician following donor surgery and 10% reported not being covered by any private or public health insurance plan.

Employment. Of patients who were employed immediately preceding donor surgery (n=75), virtually all (96%) returned to their same job after donation. Two donors (1 ODN, 1 LDN) reported a loss of employment and 5 donors (1 ODN, 4 LDN) experienced a job change because of donor surgery. Also, of patients who were not employed before donor surgery (n=9), 2 (1 ODN, 1 LDN) attributed difficulty finding suitable employment to their donor surgery and associated recovery.

LDN patients returned to work in significantly fewer days (34.3 ± 16.2) than did ODN donors (45.5 ± 28.1; t=2.1, P=.04). As shown in Figure 4, 33.3% and 97.4% of LDN donors returned to work within 4 and 8 weeks of donor surgery, respectively, versus 21.2% and 75.7% for ODN donors, respectively (χ^2=8.01,

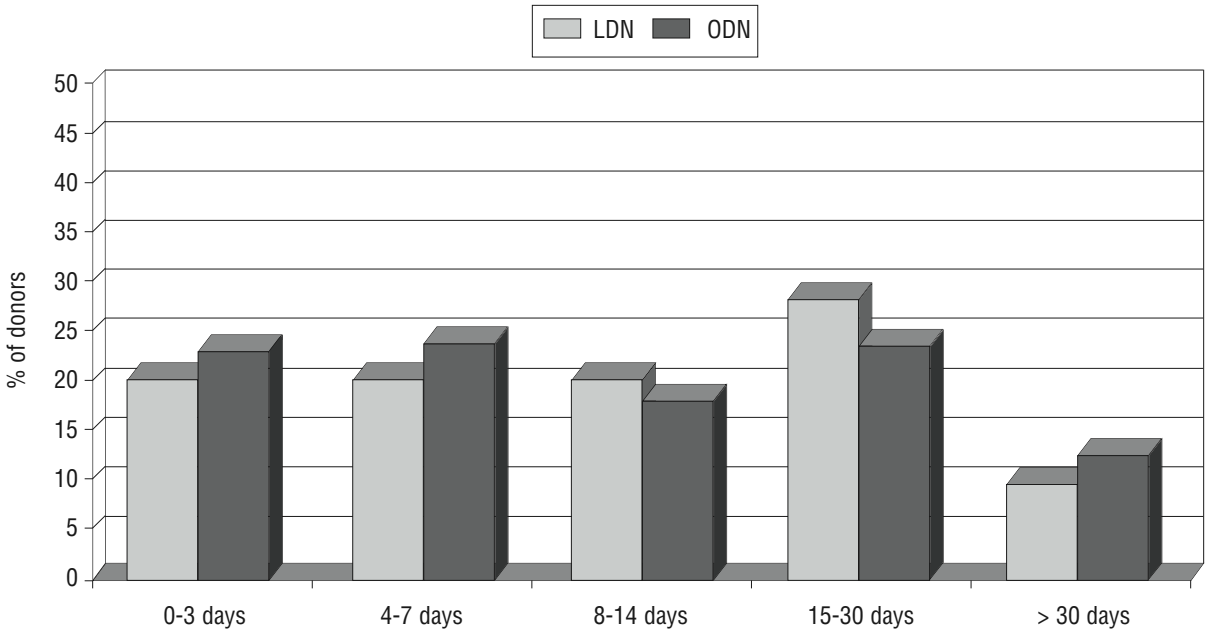


Figure 1 Duration of pain for laparoscopic donor nephrectomy (LDN) and open donor nephrectomy (ODN) donors.

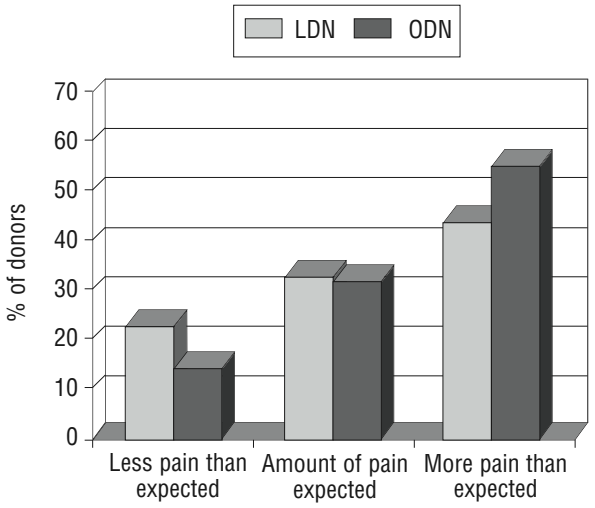


Figure 2 Expectations of pain for laparoscopic donor nephrectomy (LDN) and open donor nephrectomy (ODN) donors.

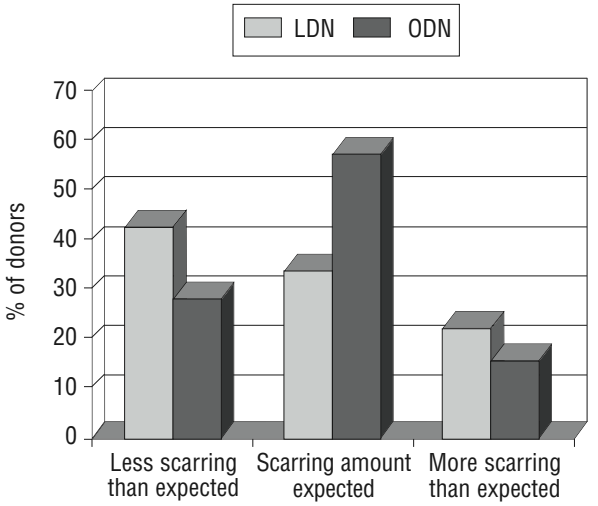


Figure 3 Expectations of surgical scarring for laparoscopic donor nephrectomy (LDN) and open donor nephrectomy (ODN) donors.

$P = .03$). Logistic regression analysis was used to examine the relative contribution of surgery type in predicting return to work (median split), while controlling for donor age, sex, medical/surgical complications, hospital LOS, BMI, and smoking history. The total model was not statistically significant ($\chi^2 = 5.2$, $P > .05$) and none of the variables significantly predicted return to work time.

Financial Impact. There were no significant group differences on any of the financial impact questions ($P > .05$). The majority of donors (69.6%) reported having enough sick leave and vacation time to absorb the entire time necessary to recover from donor surgery. Those who did not have ample sick or vacation time available lost an average of 38.9 (± 37.9) days (range, 0-150) at an average of $3104 (± $4571.10) in estimated lost wages (range, $0-$20 000). Twelve percent of donors reported that the transplant recipient provided some financial assistance in covering lost wages.

Donors also reported out-of-pocket (ie, nonreimbursed) expenses for travel to and from the transplant center, lodging, meals while away from home, and medical visits not covered by the transplant recipient's insurance policy (Figure 5). Collectively, these out-of-pocket expenses ranged from $320 to $4300 (mean,

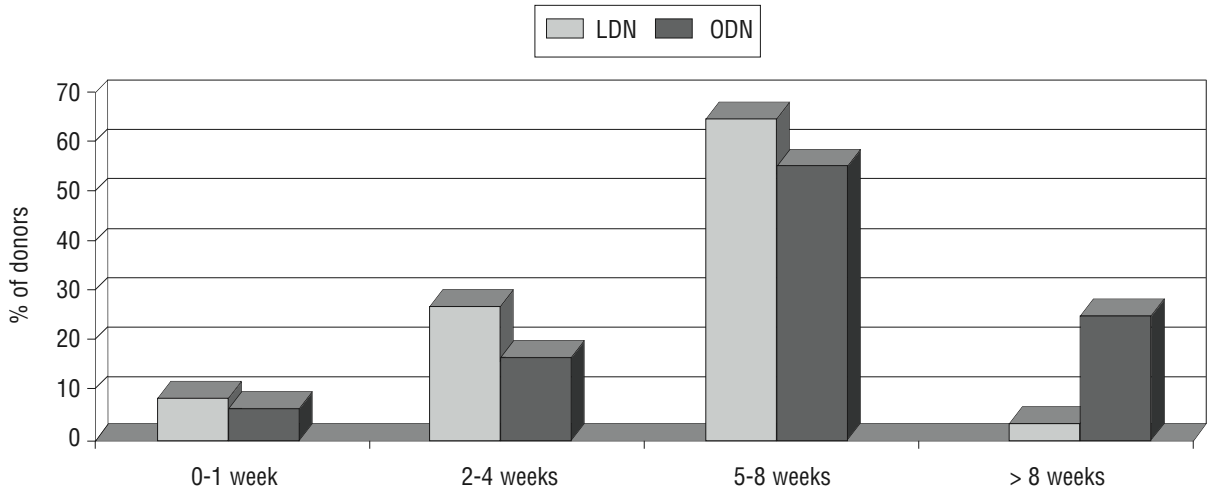


Figure 4 Return to work (days) for laparoscopic donor nephrectomy (LDN) and open donor nephrectomy (ODN) donors.

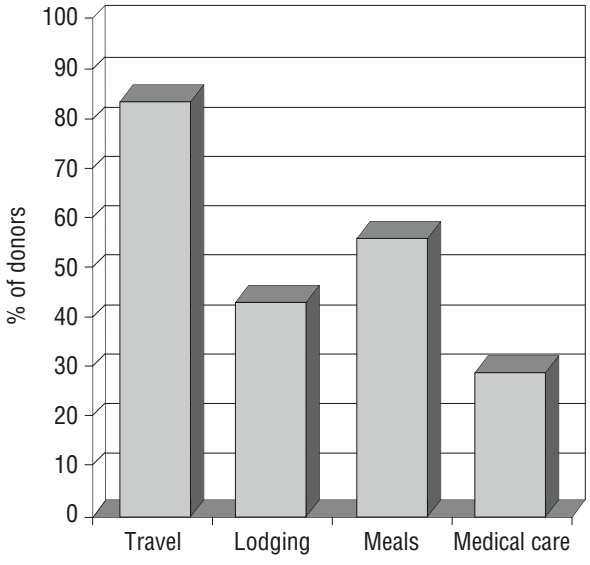


Figure 5 Percentage of donors with expenses not covered by recipient's insurance, by expense type.

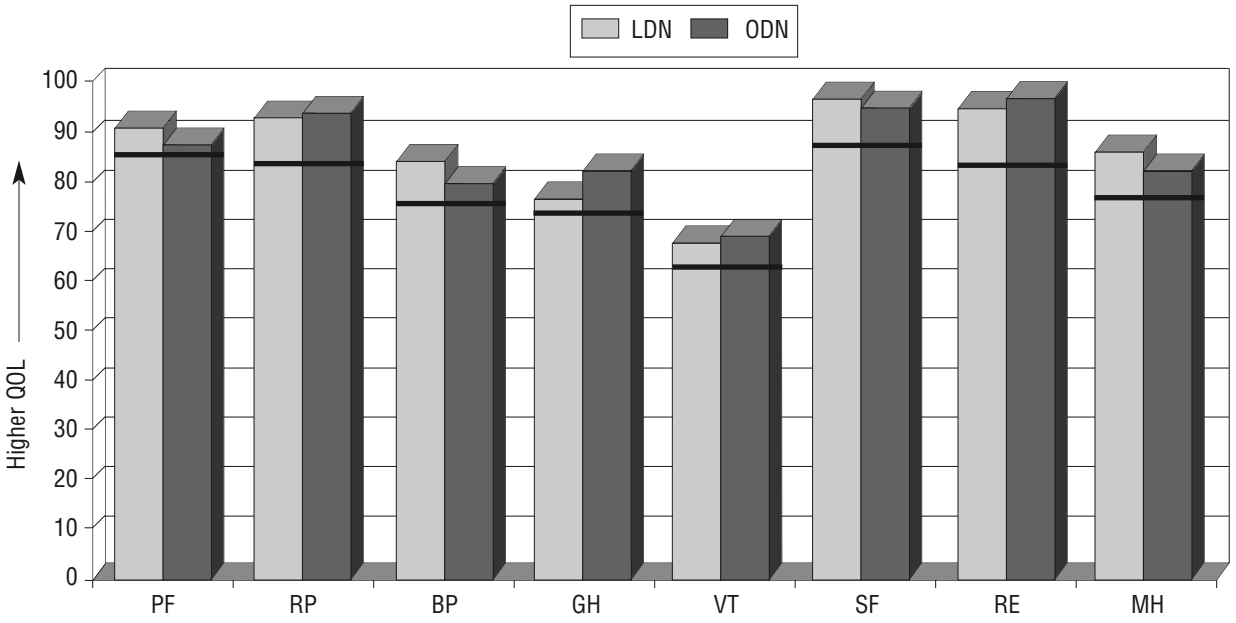
$1115.90 ± $1130.90). Twenty percent reported receiving some financial assistance from the transplant recipient to help offset these donation-related expenses. The majority (83.3%) felt fully informed about the likely out-of-pocket expenses before donor surgery. Overall, 5 donors (6%; 2 ODN, 3 LDN) reported significant financial hardship as a result of their decision to be a living organ donor.

Health-Related Quality of Life and Donor Satisfaction. LDN and ODN donors did not differ significantly in any of the SF-36 subscales (Figure 6). Also, there was no significant group difference in satisfaction ratings, with both LDN (4.6 ± 0.9) and ODN (4.7 ± 0.7) donors reporting high levels of satisfaction with the donation experience using a 1 (not at all satisfied) to 5 (completely satisfied) scale. Another proxy measure of satisfaction is the finding that there was a 54.3% increase in the number of registered organ donors after surgery. Specifically, 19 of the 49 individuals who were not registered organ donors at the time of their donor surgery decided to formally register after their living donation experience. None of the previously registered donors decided to opt out after their living donation experience.

Discussion

Recent studies have shown that laparoscopic techniques may have several advantages over open procedures for living kidney donors.[1,3,6-10] Our study extends these findings by examining patient-reported outcomes across several dimensions. Specifically, we found that ODN and LDN donors did not differ significantly on measures of pain experience, medical or surgical complications, ability to return to work, financial impact, health-related quality of life, or overall satisfaction. However, when compared to ODN donors, LDN donors reported significantly better-than-expected surgical scarring, shorter hospital LOS, and faster return to work.

The most significant finding in this study is that LDN leads to significantly shorter hospital LOS. Indeed, having had LDN and fewer patient-reported medical/surgical complications were the 2 most influential variables in predicting hospital LOS in the multivariate model. There are many factors that can account for longer hospital LOS, including age, medical/surgical complications, BMI, and smoking history, among others. However, even when controlling for these factors, we found that donor surgery type was the most salient predictor of LOS—ODN donors were 26 times more likely than LDN donors to experience a longer hospital LOS.



Abbreviations: BP, bodily pain; GH, general health; MH, mental health; PF, physical functioning; QOL, quality of life; RE, role-emotional; RP, role-physical; SF, social functioning; VT, vitality.
Solid bar indicates mean score for the general population.

Figure 6 SF-36 Health Survey scores of laparoscopic donor nephrectomy (LDN) and open donor nephrectomy (ODN) donors.

We also found that, in general, living organ donation does not negatively affect the donor's ability to return to work. Virtually all donors who wanted to return to the job they had before surgery were able to do so without any difficulty. However, more LDN (n=4) than ODN (n=1) donors changed jobs for reasons they attributed to donor surgery. Nevertheless, LDN allowed patients to return to work much more quickly after surgery than ODN. Interestingly, surgery type was not a significant predictor of return to work time in the multivariate model, which suggests that other variables not measured in this study may account for how quickly patients resume occupational activities. At some transplant centers, including ours, medical clearance for resuming work is based, in large part, on the specific nature of the patient's job responsibilities. Occupations requiring significant manual labor and heavy lifting, for instance, may necessitate longer recovery periods than those involving more sedentary office-based activities. It is also possible that those who changed jobs because of donor surgery had more physically strenuous jobs that necessitated the transition. Perhaps donor surgery type and the job type interact to significantly influence how long it will take to resume normal job activity.

Buell et al[9] found that LDN patients experience less severe pain and require less pain medication than ODN donors. These findings highlight another important benefit of LDN surgery. However, because pain experiences are greatly influenced by expectations before surgery, we sought to evaluate whether the pain experienced by donors was less or worse than expected, or about the same as was expected. In such an assessment paradigm, we would expect most patients to report that the pain was about as expected, with no significant variation between groups. However, we found that roughly half of the donors in both groups reported experiencing more pain than expected. This finding suggests that we may have underestimated the amount of pain donors would likely experience or perhaps did not communicate effectively with prospective donors the pain experience that they would likely encounter. Given the retrospective nature of this study and the influence of time on memory processes for past pain experiences, we conducted post hoc analyses and found that time since donation was not significantly associated with pain perception. Regardless, our assessment of prospective donors now more systematically includes an evaluation of pain tolerance and sensitivity, pain coping strategies, and a careful explanation of pain intensity and duration after donor surgery.

Regarding surgical scarring, the majority of ODN donors found the extent of scarring to be about what they expected. In contrast, nearly half of LDN donors reported that the scarring was significantly better than they had expected, while a fifth of them reported that it was worse than expected. As part of the educational process, it seems essential to include a detailed overview of the cosmetic changes that may occur as a result of surgery. Using both verbal descriptors as well as visual illustrations of the typical scarring associated with LDN may best help prospective donors to calibrate their expectations appropriately.

There were no significant differences between ODN and LDN donors in the perceived financial impact of donation. This is an expected finding because the majority of donor expenses are covered by the recipient's insurance plan, regardless of surgery type. Nevertheless, it has long been recognized that living donors incur both direct and indirect expenses that are not typically reimbursed.[13] These include lost wages, lost vacation/sick leave, costs for travel, daycare, lodging, meals, medical visits, and other incidentals that may occur secondary to the donation experience. Transplant financial coordinators can help to evaluate the prospective donor's financial circumstances and to provide education regarding any likely out-of-pocket expenses. This seems especially important because 5 donors experienced significant financial hardship secondary to donation. We did not evaluate the distribution of out-of-pocket expenses, although we suspect that the majority of costs were associated with lost wages. Although LDN results in shorter hospitalization and faster return to work, this group of donors reported out-of-pocket expenses similar to those in the ODN group. Clearly, the nature of both direct and indirect expenses for donors warrants more detailed analysis in future studies.

As an elective surgery, most donors can coordinate the scheduling of donor surgery to maximize allotted vacation time and sick leave. However, even if such time is available, using it all for the donor surgery and recovery period may mean not having that time available for their own health needs or those of their family members at a later time. For those without ample leave time or with limited resources, the costs can be significant and some recipients have chosen to use their own personal funds to help their donors financially. This type of financial assistance raises ethical, and perhaps legal, issues. The Organ Donation and Recovery Improvement Act of 2004,[14] which provides donors with financial assistance for travel, subsistence expenses, and incidental nonmedical expenses, should ease the financial burden for donors once it is fully implemented. Similarly, more employers and states, in addition to the federal government,[15] are providing donors with paid leave above and beyond the leave time already accumulated by the employee, which should further reduce out-of-pocket expenses for donors and transplant recipients.

Overall, the majority of donors, regardless of surgery type, reported very high levels of health-related quality of life and high levels of satisfaction with their decision to be a living organ donor. High quality of life is not surprising considering that donors are selected on the basis of their superior physical health status and lack of any significant functional impairment. As such, these individuals tend to score higher than normative populations on general health status measures. None of the study participants reported any regrets about their decision and all of them said that they would make the same decision again. Although LDN provides some advantages over ODN, a significant majority of living donors report a positive donation experience and report no significant quality-of-life decrements, regardless of their pain experience, scarring, hospital LOS, return to work time, and financial impact.

Findings from this study should be evaluated within the context of certain methodological limitations. First, the sample may be biased toward those donors who found the experience to be rather positive. Those who were otherwise negatively affected by their experience may have chosen not to participate in the study. Also, we encountered some difficulty in finding previous living donors, because nearly one fifth of the patients had unknown whereabouts. Because donors tend to be very healthy, they may not routinely seek medical care at the same tertiary care facility in which the donor surgery was performed, thus making it difficult to find them if they relocate at any time following surgery. We have not seen any data regarding success rates in tracking living donors. To the degree that our experience is representative, researchers hoping to survey living donors retrospectively may want to consider using multiple strategies to find such donors, including contacting the transplant recipient if this is allowed by the institutional review board. Second, because this study was focused on patient-reported outcomes, it is necessarily limited by its self-report methodology. Third, the retrospective nature of the study and the longer time since donation for ODN participants may have contributed to some recall bias. Finally, our sample size was relatively small and some significant effects may not have emerged because we lacked the power to detect them.

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References

1. Ojo AO, Heinrichs D, Emond JC, et al. Organ donation and utilization in the USA. *Am J Transplant*. 2004;4(suppl 9):27-37.
2. Tarantino A. Why should we implement living donation in renal transplantation? *Clin Nephrol*. April 2000;53:55-63.
3. Matas AJ, Bartlett ST, Leichtman AB, Delmonico FL. Morbidity and mortality after living kidney donation, 1999-2001: survey of United States transplant centers. *Am J Transplant.* 2003;3:830-834.
4. Johnson EM, Anderson JK, Jacobs C, et al. Long-term follow-up of living kidney donors: quality of life after donation. *Transplantation*. 1999;67:717-721.

5. Jordan J, Sann U, Janton A, et al. Living kidney donors' long-term psychological status and health behavior after nephrectomy—a retrospective study. *J Nephrol.* 2004;17:728-735.
6. Ratner LE, Ciseck LJ, Moore RG, Cigarroa FG, Kaufman HS, Kavoussi LR. Laparoscopic live donor nephrectomy. *Transplantation*. 1995;60:1047-1049.
7. Tooher RL, Rao MM, Scott DF, et al. A systematic review of laparoscopic live-donor nephrectomy. *Transplantation*. 2004;78:404-414.
8. Su LM, Ratner LE, Montgomery RA, et al. Laparoscopic live donor nephrectomy: trends in donor and recipient morbidity following 381 consecutive cases. *Ann Surg*. 2004;240:358-363.
9. Buell JF, Lee L, Martin JE, et al. Laparoscopic donor nephrectomy vs. open live donor nephrectomy: a quality of life and functional study. *Clin Transplant.* 2005;19:102-109.
10. El-Galley R, Hood N, Young CJ, Deierhoi M, Urban DA. Donor nephrectomy: a comparison of techniques and results of open, hand assisted and full laparoscopic nephrectomy. *J Urol*. January 2004;171:40-43.
11. Ware JE. *SF-36 Health Survey: Manual and Interpretation Guide.* Boston, Mass: Nimrod Press; 1993.
12. Fehrman-Ekholm I, Brink B, Ericsson C, Elinder CG, Duner F, Lundgren G. Kidney donors don't regret: follow-up of 370 donors in Stockholm since 1964. *Transplantation*. 2000; 69:2067-2071.
13. Jacobs C, Thomas C. Financial considerations in living organ donation. *Prog Transplant.* 2003;13:130-136.
14. Organ Donation and Recovery Improvement Act, Pub L No. 108-216 (2004).
15. Organ Donor Leave Act, Pub L No. 106-56 (1999).