

# Laparoscopic Nephrectomy: Safe and Comfortable Surgical Alternative for Living Donors and for Good Results of Graft Function

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## ABSTRACT

Laparoscopic nephrectomy for kidney donation from living related donors has the advantages of a less invasive surgical access, better cosmesis, and a shorter hospital stay for the donor. However, some workers have reported up to 10% life-threatening complications for the donor using this technique. The purpose of our study was to evaluate hand-assisted laparoscopic nephrectomy for living donors of kidney transplants in terms of graft function. Thirty donors who underwent open nephrectomy (ON) were compared with 27 who had hand-assisted nephrectomy (HALN). Surgery and ischemia times, hospital stay, bleeding, graft function, remaining kidney function, and complications were compared in both groups. Mean surgery time was 126.9 minutes for ON and 98 minutes for HALN ( $P = .0005$ ), warm ischemia time was 3 minutes versus 6 for ON vs HALN, respectively ( $P = .02$ ). Hospitalization stay was 6.3 days for ON versus 4.8 days for HALN ( $P = .0015$ ). Differences in change in hematocrit and in serum creatinine levels were not significant; graft outcomes were also similar. Complications were minimal. We conclude that HALN is a valid, safe technique to obtain kidneys from living related donors, significantly reducing the hospital stay and allowing return to normal activities sooner, with risks falling within those reported in the literature.

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**T**HE INTRODUCTION of laparoscopic nephrectomy (LN) in 1995 for living related kidney donation offers an alternative for a less invasive surgical access, better cosmesis, and a shorter hospital stay for the donor.<sup>1-3</sup>

Some publications have described important life-threatening complications, up to 10% in a previously healthy population, despite the simple technique that is easily reproducible.<sup>4</sup>

The international literature has described a significant difference favoring open nephrectomy (ON) both in terms of surgery time and warm ischemia time, compared with LN, either conventional or hand-assisted.<sup>1-3</sup> The study purpose was to evaluate the hand-assisted laparoscopic nephrectomy technique (HALN) in the evolution of living donors for kidney transplant and its results on graft function in our center.

## METHODS

We compared the evaluation of living donors in which LN was performed from January 2001 through January 2004 with a group of living donors from 1995 to 2004, who required ON during the same time period, because technical reasons precluded LN: for example, multiple arteries or a short right renal vein. Surgery time, warm ischemia time, days of hospitalization, bleeding, renal func-

tion in the postsurgical period, and complications associated with surgery were registered in donor patients undergoing HALN or ON. Graft function was evaluated at 7, 30, and 90 days posttransplantation in both groups of graft recipients.

Statistical analysis was performed using the two-tailed Student *t* test or chi-square test as appropriate. The level of significance was  $P < .05$ .

## RESULTS

Table 1 shows no significant differences in some demographic features of kidney donors between both groups of patients. The average surgery time was  $126.9 \pm 24.4$  minutes for ON and  $98 \pm 13.3$  minutes for HALN ( $P = .0005$ ). The warm ischemia time was  $3 \pm 1.2$  minutes for ON and  $6.0 \pm 2.6$  minutes for HALN ( $P = .02$ ). The hospitalization was  $6.3 \pm 1.4$  days for ON (range 4 to 9 days) and  $4.8 \pm 1.8$  days for HALN (range 3 to 10 days;  $P = .0015$ ). The fall of

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**Table 1. Baseline Characteristics of Open Nephrectomy and Hand-Assisted Laparoscopic Nephrectomy Patients**

Donors	Open nephrectomy	Hand-assisted LN	Total
Number of patients	30 (52.7%)	27 (47.3%)	57
Men	17 (56.7%)	7 (25.9%)	24 (42.1%)
Women	13 (43.3%)	20 (74.1%)	33 (57.9%)
Mean age (y)	38.6 ± 10.4 (M: 35.7/F: 42.3)	39.6 ± 7.6 (M: 43.4/F: 38.3)	39.1 ± 9.1 (M: 39.5/F: 40.3)
Left/right nephrectomy	20/10	20/7	40/17 (70.2%/29.8%)

**Table 2. Recipient Characteristics**

Recipients	Open nephrectomy	Hand-assisted laparoscopic nephrectomy	P
Surgery time (min)	47.6 ± 11.9	34 ± 12.6	.05
Total ischemia time (min)	41.7 ± 20.0	58.7 ± 25.4	.02
Creatinine at day 7 (mg/dL)	2.12 ± 2.12 (0.7–9.46)	2.55 ± 2.55 (0.91–10.2)	.15
Creatinine at 1 month (mg/dL)	1.49 ± 0.45 (0.77–2.5)	1.63 ± 0.5 (0.87–3.31)	.21
Creatinine at 6 months (mg/dL)	1.46 ± 0.50 (0.75–2.98)	1.53 ± 0.41 (0.92–2.22)	.21

hematocrit was 7.0% ± 3.4% for ON and 7.2% ± 3.9% for LN ( $P = .89$ ).

Serum creatinine had a trend to increase. In the ON donor group it went up with a 1:1.3 relation (presurgical 0.85 ± 0.1 to 1.12 ± 0, and 18 at 1 month postsurgery). In HALN, it went up from a 1:1.2 relation (presurgical 0.88 ± 0.19 to 1.08 ± 0, and 21 postsurgical). However, the differences between the presurgical and the postsurgery ratio of serum creatinine of both groups were not statistically significant ( $P = .27$ ).

We had one complication in ON, was a wound infection that was treated successfully with antimicrobial therapy. In the HALN group, we had one patient with intrasurgical arterial bleeding, which immediately resolved. There were two patients with postsurgical hemoperitoneum; the HALN patient required open surgery (one of them twice) with good outcomes.

There were 30 recipients of ON and 27 of HALN, in concordance with donors. In each group 80% were men. The average age was 32.7 ± 9.9 years for ON and 39.2 ± 12.0 for HALN ( $P = .038$ ). The relationship with the donor was in the ON group: 66.7% brothers, 23.3% sons, and 10% husband or wife; while in HALN 62.9% were brothers, 11.1% sons, and 25.9% spouses.

Open surgery was 40% longer ( $P = .05$ ) probably because more difficult cases underwent ON, but it was associated with a 40% lower total ischemia time than HALN ( $P = .02$ ). In spite of these differences, graft outcomes, according to serum creatinine on the seventh day and at 1 and 6 months, were similar (Table 2).

## DISCUSSION

HALN is a valid, safe technique to obtain kidneys grafts from living donors. It has risks that fall within the expected average according to medical reports. It significantly reduces the hospitalization stay for patients, improving their early reincorporation to normal activities. In spite of donor patients losing 50% of their nephron mass, it is not expected that they will suffer any deterioration in renal function.<sup>5</sup> Nevertheless, it is recommended that they be examined periodically. Graft function using the HALN technique is comparable to the one obtained from the ON, which makes HALN a valid surgical alternative to obtain kidneys from living donors. Furthermore, it may be a good way to increase the pool of living unrelated donors.

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