



Use of a minimally invasive donor nephrectomy program to select technique for live donor nephrectomy

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Abstract

Background: Live donor nephrectomy (LDN) is a major surgical procedure with an accepted low mortality and morbidity. Minimally invasive donor nephrectomy (MIDN) has been shown to decrease the wound morbidity associated with the lumbotomy of the classic open technique. Transplant programs face the challenge of initiating their MIDN programs without jeopardizing the safety of the donor and the graft quality. We present the experience at the University of Calgary after the initiation of a MIDN program, with a preoperative selective approach using the 3 major techniques for LDN.

Methods: From December 2001 to May 2004, 50 consecutive, accepted, live kidney donors were evaluated and chosen to undergo nephrectomy by an open, laparoscopic, or hand-assisted technique. Patients were chosen for a particular technique based on the criteria of vascular anatomy, size of abdominal cavity, previous surgery, and technical implications for the recipient.

Results: A total of 15 open, 11 laparoscopic, and 24 hand-assisted nephrectomies were performed. There were no statistically significant differences in sex, age, or body mass index between the groups. There were statistically significant differences in surgical times ($P < .001$) and in the number of days spent in the hospital ($P < .001$). All kidneys had primary function. There were 2 conversions in the hand-assisted group and 1 blood transfusion in the open group. Death-censored graft survival was 100% with an observation time of 20 months (SD $\pm$ 9 months; range = 3–32 months). One graft from the hand-assisted group was lost from patient death with functioning graft 8 months after transplant.

Conclusions: The learning curve for MIDN does not necessarily need to impact donor or recipient outcomes. The initiation of an MIDN program can be implemented safely if the cases are selected carefully and the use of the classic open technique is kept as an alternative. © 2005 Excerpta Medica Inc. All rights reserved.

Keywords: Live donor nephrectomy; Laparoscopic nephrectomy; Hand-assisted nephrectomy; Kidney transplantation

Live donor nephrectomy (LDN) is a major surgical procedure. It was first introduced as the only source of renal allografts before cadaveric donation became available. It constitutes a unique case in medicine in which a human being undergoes a surgical procedure for the benefit of another. Because the donors are subject not only to discom-

fort but to the risk for incapacity or death, this act conflicts with the principle of “first do no harm.” Initially, it was seen as a life-saving procedure because live donors were the only source of allografts and dialysis was not available. With the introduction of dialysis, however, kidney transplantation was no longer regarded as a life-saving procedure but rather as an enhancer of quality of life. Once cadaver organs became available, live donors were no longer the only source of grafts. It was proposed that live donation had become an unnecessary risk and a debate arose [1–3].

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Table 1
Results grouped by nephrectomy technique

	Open (SD)	Hand assisted (SD)	Laparoscopic (SD)
Sex (M/F)	10/5	13/11	4/7
Age	41 (8)	44 (10)	39 (10)
Body mass index	28 (2)	26 (2)	26 (3)
Right kidney	9	2	0
Arteries > 1	3	2	2
Surgical time	188 (40)	235 (28)	213 (24)
Hospital stay	5 (.7)	4 (1)	3 (.5)
Conversions	NA	2	0
Complications	1*	0	0

* Blood transfusion from arterial bleeding.

NA = Not applicable.

The transplant community continues to accept live donation because there are not enough cadaver organs to meet the demand and the donation is performed voluntarily with informed consent [4]. Also, evidence has accumulated indicating that LDN entails a “low risk” and hence has an “acceptable” outcome [5]. Laparoscopically harvested renal grafts were introduced in 1995. This technique was proposed as a less invasive and more convenient procedure for the donor [6]. However, early data indicated an increase in complications [7,8]. With increased experience, the rate of complications has decreased to levels comparable with open live donor nephrectomy (OLDN) [9], indicating that a learning-curve phenomenon exists when centers start performing the procedure [10]. There is not sufficient data for minimally invasive donor nephrectomy (MIDN) to be able to estimate with accuracy the risk for complications and death, but later results seem to indicate an acceptable morbidity in comparison with the classic technique [11]. In its favor, MIDN has been shown to decrease the wound morbidity associated with the OLDN [12], and it is increasing in popularity. Transplant programs face the challenge of initiating their MIDN programs without jeopardizing the safety of the donor and the quality of kidneys for transplantation. Presented here is the initial experience at the University of Calgary when MIDN was introduced as a preferred option rather than as a substitution for the classic approach, saving that technique for more complex cases.

Materials and Methods

From December 2001 to May 2004, 50 consecutive LDN procedures were performed at our center after a preoperative assignment of whether a minimally invasive surgery or an open technique would be performed. The criteria for selecting the technique were vascular anatomy, the size of the abdominal cavity, previous abdominal surgery, and the technical implications for the recipient. Right kidneys were not excluded for MIDN. Body mass index was not considered in the decision. All donors underwent a standard donor

evaluation and approval as per previous protocols, and informed consent for either the MIDN or OLDN technique was obtained. Vascular anatomy was evaluated with magnetic resonance angiography in all cases. Preoperative preparation was as per protocol, except for the use of an enema the night before surgery for patients scheduled for MIDN. After 50 consecutive cases, we reviewed the incidence of the procedure used, donor demographics, outcomes (defining complications as the need for medical intervention outside the protocol), hospitalization days, surgical times, graft characteristics, and recipient outcomes. Delayed graft function was defined as the need for dialysis posttransplant. A comparison was made between the groups using the Fisher exact test for discrete variables and the *t* test was applied for continuous variables using a statistical software package [13].

Results

There were no statistically significant differences in sex, age, or body mass index between the groups (Table 1). For patients chosen to undergo an OLDN, the vascular anatomy was a factor in 12 patients (3 had multiple arteries and 9 were right kidneys), the size of the abdominal cavity was a factor in 3 patients, but previous surgery was not a factor. Favorable recipient conditions allowed for 2 right hand-assisted (group H) nephrectomies. We obtained 39 left and 11 right kidneys. There were 7 kidneys with more than 1 artery. There were statistically significant differences in

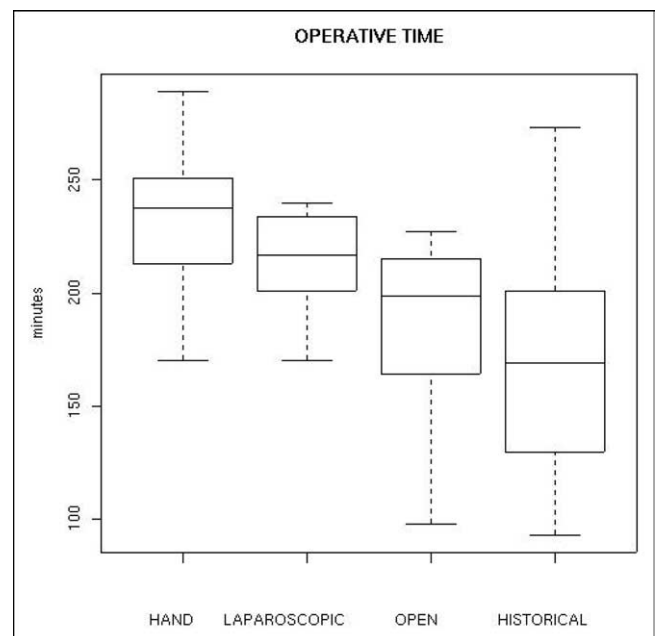


Fig. 1. Mean surgical time was as follows: group H = 235 (SD $\pm$ 29), group L = 213 (SD $\pm$ 24), group O = 188 (SD $\pm$ 40), historically = 171 (SD $\pm$ 47). *P* values were as follows: group H versus group L = .024, group O versus historically = .2, MIDN (groups H and L) versus group O < .001.

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