

## Editorial

# Laparoscopic Donor Nephrectomy After Seven Years

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Seven years after Ratner's report of the first clinical laparoscopic donor nephrectomy, the United Network for Organ Sharing announced, with great media attention, that the number of living donation procedures performed in the United States during 2001 exceeded the number of cadaver donations for the first time (1). In 1994, the last full year before the advent of laparoscopic nephrectomy, there were 3007 live donor kidney transplants. In the subsequent 7 years, the yearly rate of live donor kidney transplants has almost doubled to 5949 cases. This remarkable development can be directly traced to Gill, Ratner, and Kavoussi's insight, later supported by clinical data, that a less invasive way to perform donor nephrectomy would lead to less postoperative pain and hasten the recovery of kidney donors (2–4). Another factor leading to increased reliance on live kidney donation followed the report that 1-year graft survival for living unrelated transplants and haplo-identical related donor transplants was essentially equal (5). The increased use of unrelated donors, as well, may be attributable to laparoscopic nephrectomy. As a friend or spouse also feels responsible for the convalescent care of the recipient, the prospect of rapid recovery makes kidney donation more psychologically acceptable to both. As the age of the cadaver donor population is rising, the gap in long-term outcome between live and elderly (expanded, marginal) cadaver donor transplants is quite significant. These facts have added impetus within transplant centers to emphasize the value of live donor transplantation to recipients.

Our data, collected from surveys of prospective and actual donors and recipients, strongly suggests that a major factor in the increased acceptance of live donor transplantation is laparoscopic technology itself. Our initial hypothesis was that minimally invasive surgery would logically have the most influence on potential donors' attitudes toward living donor kidney transplantation; however, our formal surveys show that it is recipients that are most influenced by the availability of the laparoscopic technology. Potential recipients' concern about

the donor's welfare is dominant in their decision to consider a live donor. The availability of laparoscopic nephrectomy strongly influenced the majority of recipients of live donor kidneys to conceptually embrace live kidney donation. Our data showed that the technique of donor nephrectomy was not at all relevant to the donors' decision to proceed (6).

The benefits of laparoscopic donor nephrectomy are clear-cut. They include more rapid return to normal activity and fewer major wound complications such as chronic pain, bulge or frank hernia. Early return to work is vital to many donors and may partially explain the disquieting disparity in rates of live donation between men (43%) and women (57%). The decision to consider donation, for some, is distilled to simple pragmatics: they cannot take unpaid leave from work or fear disability, thereby leaving their family unsupported. After open nephrectomy, up to 15% of donors experience chronic pain or a persistent disfiguring bulge or hernia in the flank. With today's technology, this outcome might be deemed reasonable to be rid of a renal cell carcinoma but not after giving a kidney for another's benefit.

The dissemination of the laparoscopic technique throughout the United States has not been without significant concerns. Higher rates of acute tubular necrosis (ATN), ureteral necrosis, and graft thrombosis have been documented (7–9). Between January 1, 1999 and 1 July, 2001 there were two deaths and one persistent vegetative state after 10828 donor nephrectomy cases reported in a survey of transplant centers (10). Of these most serious complications, all three were among 5186 laparoscopic donors compared with no deaths among 5660 open donors. This difference is not statistically significant, but careful further observation is needed to determine if there is a relationship between center experience with laparoscopic donor nephrectomy and rates of complication. The significant learning curve for the procedure is widely acknowledged from surgeon experiences but objective data are limited to small studies.

Laparoscopic nephrectomy is technically very challenging and may have increased operative risk in inexperienced hands. A technical middle ground between open and laparoscopic nephrectomy is proposed in Buell's carefully performed comparison of hand-assisted laparoscopic donor nephrectomy (HALDN) with traditional open nephrectomy. The significant findings of the study were that the HALDN technique led to shorter hospital stay, more rapid return to work, equivalent early function and total cost, but significantly higher operating room time (11). A very persuasive case is made for the increased operative exposure and opportunity to control

bleeding if it occurs. Moreover, surgeons with practices that are not devoted to advanced laparoscopic surgery might be more likely to safely master HALDN because of the increased tactile feedback and exposure gained by the assisting hand. The Cincinnati approach has been a highly prudent and thoughtful introduction of a new technology in a manner that combined safety with careful data collection and analysis.

The authors' description of measures to maximize the length of the right renal vein are also innovative, and are described with highly detailed drawings and operative photographs in a monograph in the *Journal of the American College of Surgeons* (11). Their technique leads to a long staple line on the vena cava but the photographs demonstrate no compromise of vena cava luminal diameter. The very long caval staple line is a potential worry if stapler malfunction occurs; however, with the assisting hand present, should staple line bleeding develop, the chance for prompt control is significantly higher. With the introduction of laparoscopic cholecystectomy, the spectrum of complications changed, most notably with a higher rate of common bile duct complications, which initially led to a great outcry against the laparoscopic technique. Similarly, the spectrum of complications after donor nephrectomy has changed as well. Undoubtedly, the unique feature of the technique is the use of a stapler to divide two major blood vessels using only a videocamera for visualization. Staple line failure has led to serious complications and can occur from two causes. The first results from inappropriate application of the stapler too close to the aorta, leaving no stump of renal artery. This leads to splaying of the small staples, which are not designed for the high-tension aortic wall. The other cause is frank mechanical failure in staple firing. Both mechanisms of staple-line failure lead to immediate life-threatening bleeding. Surgical teams should discuss, *in advance*, how to respond to this complication, as preparation with respect to availability of vascular instruments and retractors and availability of a second experienced vascular surgeon is vital in obtaining safe control.

The most valuable asset of the Buell paper is the careful and forthright reporting of morbidity, identical at 22% in both study groups. As many potential donors ask for this infor-

mation in choosing open vs. laparoscopic donation, this paper serves as a sound basis for reply. We plan to include a reprint in our donor information packet as a scientific appraisal of the choices donors have a right to make.

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