Point - Counter Point

The mini-incision donor nephrectomy is best suited for Indian patients undergoing live donor nephrectomy: Against the motion

Pranjal Modi

Department of Urology and Transplantation Surgery, Institute of Kidney Diseases and Research Centre, Institute of Transplantation Sciences, Civil Hospital Campus, Asarwa, Ahmedabad - 380 016, Gujarat, India

DOI: 10.4103/0970-1591.60465

INTRODUCTION

Donor nephrectomy is performed in a healthy human who otherwise does not require any surgery. Between 1954 and 1994, the open donor nephrectomy (ODN) through flank incision was considered as a standard procedure for kidney donation. Flank pain, incisional hernia, neuralgia, and muscle weakness were observed in large number of donors undergoing ODN. Ratner performed the first laparoscopic donor nephrectomy (LDN) in 1995;[1] since then several other institutions have started performing LDN with the incentive to the donor having less pain, early ambulation, early resumption of regular activity, and rapid recovery.[2-6] All these studies with high levels of evidence-based results, either randomized, controlled trials or prospective, nonrandomized trials find that compared to ODN, LDN provides equal graft function, rejection rate, urological complications, and patient and graft survival. These studies, however, suggest slightly increased operative time, marginally increased warm ischemia time, and increased major complications requiring reoperation (especially in the early learning phase) in the laparoscopic cases compared to the open approach. A critical analysis of delayed graft function after LDN found that female donor kidneys into male recipients and highly HLA-mismatched donors were significant factors in delayed graft function, but that no variable related to the laparoscopic procedure itself (prolonged carbon dioxide pneumoperitoneum, warm ischemia time, renal artery length, use of right kidney) affected the functional outcome of the allograrft.[7]

For correspondence: Dr. Pranjal Modi, Department of Urology and Transplantation Surgery, Institute of Kidney Diseases and Research Centre, Institute of Transplantation Sciences, Civil Hospital Campus, Asarwa, Ahmedabad - 380 016, Gujarat, India. E-mail: dr_pranjal@yahoo.com

Recognizing the disincentives of the ODN and understanding the advantages of the small retrieval incisions performed during LDN, few surgeons have stared performing "mini-incision" ODN. The intention of this article is to review the status of "mini-incision" ODN in comparison to LDN.

CURRENT STATUS FOR DONOR NEPHRECTOMY: A GLOBAL SCENARIO

LDN is technically demanding and relatively new procedure compared to ODN. The number of centers in the world, which have started learning and performing LDN, is increasing day-by-day.[8-10] Even at community hospitals, LDN is considered the procedure of choice.[11] The rising number of centers performing LDN reflects that it is more accepted by the surgical community. Many centers have shown more number of living kidney donation with introduction of the laparoscopic procedure.[12] Predonor nephrectomy survey has clearly shown the preference by potential kidney donors to the LDN.[13]

Does side matters

Initial report of laparoscopic right-sided donor nephrectomy was related with high incidence of graft loss.[14] However, with refinement of technique, many centers have performed right-sided donor nephrectomy whenever indicated. Modi *et al*., have demonstrated that how to take cuff of inferior vena cava during procurement of right renal allograft akin to ODN.[15] Further, they have shown that when multiple renal veins are present on the right side, the renal allograft could be procured laparoscopically and transplanted successfully.[16] Dols *et al*., have suggested to use right kidney routinely rather than the left kidney since right side LDN is quicker than the left side surgery and the outcome of both right side and left side donor nephrectomy are same.[17]

Arterial multiplicity and anomalous vasculature

Transplantation with multiple renal arteries is increasing. Desai *et al*., compared outcome of kidney procured

laparoscopically having multiple renal arteries and single renal artery and found no difference in the outcome.[18] Also, arterial multiplicity does not have negative impact on urological complications. Modi *et al.*, have reported procurement of right-sided kidney having pre and postcaval renal artery safely by laparoscopic procedure.[19] Anomalous renal veins are also not contraindications for left-sided donor nephrectomy.[14,20]

Obesity and laparoscopic donor nephrectomy

Obese donors require longer incision during open surgery and often the morbidity related to incision is high. Heimbach *et al.*, have shown that LDN in obese donors is feasible and safe and does not result in a high rate of major perioperative complications.[21] Operative times were longer but overall length of stay was similar among obese patients. There was a 9-10% rate of wound complications in obese donors compared to 2-4% for nonobese donors.

Laparoscopic donor nephrectomy with concomitant other surgery

Johns Hopkins group has shown the effectiveness of concomitant surgery for benign pathology at the time of performing LDN.[22] Though the operative time was more, all the procedures carried out successfully. Additional ports may be needed but additional incision for extraction of specimen is avoided.

MINI-INCISION DONOR NEPHRECTOMY

Evolution of mini-incision donor nephrectomy

The disincentives of ODN by standard flank approach are important reasons for development of laparoscopic surgery. As mentioned previously, the LDN is difficult to learn, and hence, few surgeons have started mini-incision ODN. Few reports of mini-open procedures have been published with smaller incisions, shorter lengths of stay and less analgesic, reflecting the ability to reduce apparent morbidity, compared to standard ODN. It is likely that these papers would have never been written if laparoscopy had not emerged on the horizon.

Definition of mini-incision donor nephrectomy

Kok and colleague performed MIDN using an 8-15 cm (depending on body mass index) skin incision anterior to the 11th intercostals space towards the umbilicus.[23] The muscles were split, ensuring preservation of underlying branches of the thoracic nerves. A vertical pararectal incision with a length of 8-10 cm was performed beginning below the costal arch by a group of surgeons from Germany.[24] Shrivastava *et al.*, compared subcostal versus transcostal MIDN with or without rib resection.[25] All these approaches give upper abdominal incisions and there is no consensus regarding the site and length of such incisions. In contrast, the retrieval incision, in case of pure LDN, is usually in the lower abdomen.

Outcome after MIDN and comparison tolaparoscopic donor nephrectomy

There are only few studies comparing laparoscopic and mini-incision approach for living donor nephrectomy. Perry *et al.*, demonstrated that the MIDN is inferior to the laparoscopic approach in many domains.[26] The laparoscopic group had significantly less postoperative pain and required less time to return to normal functional activities than the mini-incision group. In addition, the laparoscopic group showed significantly higher quality of life scores than the mini-incision group.

In a prospective randomized trial comparing psychosocial and physical impairment after MIDN and LDN, Kok *et al.*, have shown that the mini-incision open nephrectomy is especially associated with delayed resumption of normal activities such as return to full activity and driving, and with a diminished quality of life.[23] The probable mechanism explained was the stretching of the abdominal muscles during MIDN results in bruised muscles due to contusions and it takes several weeks to recover. When self retaining retractor blades are used, it may cause nerve stretching and compression leading to neuropraxia. When performing LDN, stretching of the rectus abdominis muscles during extraction of the kidney only lasts for few minutes. This can result in muscular pain during the first few days, but will not take weeks to recover.

Neipp *et al.*, have noted a statistically significant higher incidence of ureter leak following MIDN compared to the ODN group.[27] They considered it as a price for the limited surgical access using MIDN.

There are no large series of MIDN with multiple renal arteries, anomalous renal vasculatures, and obese donors. Kok and colleagues have considered 15 cm long incision as mini-incision in their study for obese donors.[23] A mini-incision ranging up to 15 cm cannot be considered a mini-incision even in an obese donor and should be concordance with the definition of a conversion in laparoscopic surgery such as when the intended incision must be enlarged.

DONOR NEPHRECTOMY IN INDIAN SCENARIO

In India, majority of large transplant centers perform LDN. Till June 2009, at Institute of Kidney Diseases and Research Centre, Ahmedabad, we have performed over 500 retroperitoneoscopic donor nephrectomy and over 100 LDN. At Muljibhai Patel Urological Hospital, Nadiad, 537 LDN were performed. Other centers such as Sanjay Gandhi Post Graduate Institute, Lakhnow; Christian Medical College, Vellore; All India Institute of Medical Sciences, New Delhi; and many more teaching institutions have adopted LDN as the principle mode of surgery for kidney donation. Most of these are premier teaching institutions and training the students for various laparoscopic surgeries including

donor nephrectomy. This gives a background for future generation for offering LDN, both in teaching and non-teaching institutions and other centers for transplantation. ODN, though standard of care at most of these teaching institutions, is used only at rare occasions. Majority of the time ODN is performed by classical flank approach with or without rib resection. Training in MIDN is lacking even at majority of teaching institution. Only one center in India has published data of mini-incision donor nephrectomy. [25] This underscores limited acceptance of MIDN. Further, cost-effective LDN has removed the incentives for opting ODN in the developing country such as India.[28]

CONCLUSION

LDN has evolved over a period of ten years and there are adequate data to accept it as a new standard of care for the donor. Evolution of mini-incision ODN is associated with upper abdominal incision and, randomized controlled trials with high level of evidence have suggested that LDN is having better outcome than the mini-incision ODN.

REFERENCES

1. Ratner LE, Ciseck LJ, Moore RG, Cigarroa FG, Kaufman HS, Kavoussi LR. Laparoscopic live donor nephrectomy. Transplantation 1995;60:1047-9.
2. Wolf JS Jr, Merion RM, Leichtman AB, Campbell DA Jr, Magee JC, Punch JD, *et al*. Randomized controlled trial of hand-assisted laproscopic versus open surgical, live donor nephrectomy. Transplantation 2001;72:284-90.
3. Brook NR, Harper SJ, Bagul A, Elwell R, Nicholson ML. Laparoscopic donor nephrectomy yields kidney with structure and function equivalent to those retrieved by open surgery. Transplant Proc 2005;37:625-6.
4. Øyen O, Andersen M, Mathisen L, Kvarstein G, Edwin B, Line PD, *et al*. Laparoscopic versus open living-donor nephrectomy: Experiences from a prospective, randomized, single-center study focusing on donor safety. Transplantation 2005;79:1236-40.
5. Simforoosh N, Basiri A, Tabibi A, Shakhssalim N, Hosseini Moghaddam SM. Comparison of laparoscopic and open donor nephrectomy: A randomized controlled trial. BJU Int 2005;95:851-5.
6. Andersen MH, Mathisen L, Oyen O, Edwin B, Digernes R, Kvarstein G, *et al*. Postoperative pain and convalescence in living kidney donors-laparoscopic versus open donor nephrectomy: A randomized study. Am J Transplant 2006;6:1438-43.
7. Abreu SC, Goldfarb DA, Derweesh I, Thornton J, Urbain JL, Mascha E, *et al*. Factors related to delayed graft function after laparoscopic live donor nephrectomy. J Urol 2004;171:52-7.
8. Yuzawa K, Shinoda M, Fukao K. Outcome of laparoscopic living donor nephrectomy in 2007: National survey of transplantation centers in Japan. Transplant Proc 2009;41:85-7.
9. Duchene DA, Winfield HN. Laparoscopic donor nephrectomy. Urol Clin N Am 2008;35:415-24.
10. Kok NF, Weimar W, Alwayn IP, Ijzermans JN. The current practice of live donor nephrectomy in Europe. Transplantation 2006;82:892-7.
11. Hawasli A, Boutt A, Cousins G, Schervish E, Oh H. Laparoscopic versus conventional live donor nephrectomy: Experience in a community transplant program. Am Surg 2001;67:342-5.
12. Barry JM, Conlin M, Golconda M, Norman D. Strategies to increase living donor kidney transplants. Urology 2005;66:43-6.
13. Chung E, Grant AB, Hibberd AD, Sprott P. Why potential live renal donors prefer laparoscopic nephrectomy: A survey of live donor attitudes. BJU Int 2007;100:1344-6.
14. Mandal AK, Cohen C, Montgomery RA, Kavoussi LR, Ratner LE. Should the indications for laparoscopic donor nephrectomy of the right kidney be the same as for the open procedure? Anomalous left renal vasculature is not a contraindication to laparoscopic left donor nephrectomy. Transplantation 2001;71-660-4.
15. Modi P, Kadam G, Devra A. Obtaining cuff of inferior vena cava by use of the Endo- TA stapler in retroperitoneoscopic right-side donor nephrectomy. Urology 2007:69:832-4.
16. Modi P, Rizvi SJ. Two renal veins are not a contraindication for retroperitoneoscopic-right side donor nephrectomy. J Endourol 2008;22:1491-6.
17. Dols LF, Kok NF, Alwayn IP, Tran TC, Weimar W, Ijzermans JN. Laparoscopic donor nephrectomy: A plea for the right-sided approach. Transplantation 2009;87:745-50.
18. Desai MR, Ganpule AP, Gupta R, Thimmegowda M. Outcome of renal transplantation with multiple versus single renal arteries after laparoscopic live donor nephrectomy: A comparative study. Urology 2007;69:824-7.
19. Modi PR, Rizvi SJ, Gupta R, Patel S, Trivedi A. Retroperitoneoscopic right-sided donor nephrectomy with pre- and postcaval renal arteries. Urology 2008;72:672-4.
20. Modi P. Retroperitoneoscopic donor nephrectomy for retroaortic renal vein draining into left common iliac vein. Urology 2008;71:964-6.
21. Heimbach JK, Taler SJ, Prieto M, Cosio FG, Textor SC, Kudva YC, *et al*. Obesity in living kidney donors. Clinical characteristics and outcomes in the era of laparoscopic donor nephrectomy. Am J Transplant 2005;5:1057-64.
22. Molmenti EP, Pinto PA, Montgomery RA, Su LM, Kraus E, Cooper M, *et al*. Concomitant surgery with laparoscopic live donor nephrectomy. Am J Transplant 2003:219-23.
23. Kok NF, Alwayn IP, Tran KT, Hop WC, Weimar W, Ijzermans JN. Psychosocial and physical impairment after mini-incision open and laparoscopic donor nephrectomy: A prospective study. Transplantation 2006;82:1291-7.
24. Schnitzbauer AA, Loss M, Hornung M, Glockzin G, Mantouvalou L, Krüger B, *et al*. Mini-incision for strictly retroperitoneal nephrectomy in living kidney donation vs flank incision. Nephrol Dial Transplant 2006;21:2948-52.
25. Srivastava A, Tripathi DM, Zaman W, Kumar A. Subcostal versus transcostal mini donor nephrectomy: Is rib resection responsible for pain related donor morbidity. J Urol 2003;170:738-40.
26. Perry KT, Freedland SJ, Hu JC, Phelan MW, Kristo B, Gritsch AH, *et al*. Quality of life, pain and return to normal activities following laparoscopic donor nephrectomy versus open mini-incision donor nephrectomy. J Urol 2003;169:2018-21.
27. Neipp M, Jackobs S, Becker T, zu Vilsendorf AM, Winny M, Lueck R, *et al*. Living donor nephrectomy: Flank incision versus anterior vertical mini-incision. Transplantation 2004;78:1356-61.
28. Kumar A, Dubey D, Gogoi S, Arvind NK. Laparoscopic assisted live donor nephrectomy: A modified cost-effective approach for developing countries. J Endourol 2002;16:155-9.

How to cite this article: Modi P. The mini-incision donor nephrectomy is best suited for Indian patients undergoing live donor nephrectomy: Against the motion. Indian J Urol 2010;26:142-4.

Source of Support: Nil, **Conflict of Interest:** None declared.