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Laparoscopic renal engraftment: Points of technique

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Abstract:

Over the last 2 decades, utilisation of laparoscopy in renal transplantation has been limited to donor renal harvest. Due to technical difficulties in achieving intracorporeal vascular and ureteric anastomosis, renal engraftment is performed through incisional approach with consequent morbidity. In 2009, the first laparoscopic renal engraftment was attempted using a cadaver harvested kidney. Following a similar principle we conducted a series of cases of laparoscopic renal engraftment using live related renal donors. Live related donors with single renal vasculature was selected for this procedure. Renal harvest was performed through laparoscopic approach. Transperitoneal access was gained. A peritoneal flap was created to place the kidney in extraperitoneal location. The right external iliac artery and vein was dissected. Vascular control was achieved. Allograft was inserted through Pfannenstiel incision. Intracorporeal venovenous and arteriarterial anastomosis was conducted. Vascular continuity was established and urine efflux was confirmed. The peritoneal flap was reattached thereby placing the graft extraperitoneally. Ureteroneocystostomy was then performed using intracorporeal sutures. Between April 2011 and October 2011, 4 cases of renal engraftment was conducted successfully using the same technique. All renal units revealed satisfactory immediate and one year graft function. All patients exhibited early ambulation with limited morbidity. All patients were extremely satisfied with the cosmesis. Laparoscopic renal engraftment is an innovative concept. The initial results are exciting. The procedure is technically demanding and the operator needs to be well versed with laparoscopic anatomy and intracorporeal suturing. In coming years this technique may well be the standard of choice for renal engraftment.

Introduction:

Living donation is still needed to overcome organ shortage. All countries seem to increase and encourage such kind of donation according to medical and ethical guidelines. The results of renal transplantation from living donors are better compared to those from cadaveric kidneys. Since the first successful kidney transplantation from a living donor, some 63 years ago, surgery has shifted toward a less invasive approach offering to the donor less pain, better cosmesis, a shorter hospital stay, and a quick return to normal activities. Laparoscopic living-donor nephrectomy (LLDN) is now considered as the gold standard approach for kidney retrieval on live donors and has undoubtedly revolutionized kidney donation. It must offer to the donor safety, low morbidity, and fast recovery and must obtain a graft with adequate vessel length, short warm ischemia time, and well-preserved ureteral blood supply. We describe our technique of LLDN according to safety principles and reproducible steps. Highly qualified and well-trained surgeons are allowed to perform such techniques within a very well-equipped environment and with experienced surgical staff. A living donor program should undertake at least 30 cases per year to maintain adequate experience and offer less complication rate. Living kidney donation has successfully improved the lives of many patients worldwide for over half a century. Do we still have the same need for living donors in 2018? The answer is obviously yes and for many reasons. The first is organ shortage with a widening gap between renal supply and demand in all countries that increases every year despite the use of marginal deceased donors. Waiting lists are growing everywhere. The site of the US Government Information on Organ Donation and Transplantation, organdonor.gov, shows recently a transplant waiting list of more than 114,000 patients of whom 83% are potential kidney recipients . The second reason is the significant graft survival advantage and the reduction of the waiting time between end-stage renal disease and graft implantation. The results of renal transplantation from living donors are better compared to those from cadaveric kidneys with a graft half-life of 18 versus 12 years, respectively . Kidney transplantation from a living donor, when possible, is the best treatment for most patients with end-stage renal disease. This is related to multiple factors such as less time from dialysis to transplantation, shorter cold ischemia time, and better quality of the graft. The third reason stands for pediatric recipients where a prompt transplantation from a living donor, mostly a parent, can help for a better growth, quick return to school, and a good psychological stability; it is considered today as the gold standard therapy for children with end-stage renal disease. The fourth argument is that living donation provides a good opportunity to perform a preemptive transplantation avoiding the need of going through dialysis. A fifth reason is that we are still too far to overcome organ shortage by using xenografts from transgenic

animals, or engineered organs from stem cells. Minimally invasive surgical procedures have gained widespread acceptance in the field of living kidney donation over the last decade. Ratner et al. were the first to describe laparoscopic donor nephrectomy (LDN) . Since then, compared to open donor nephrectomy, LDN has demonstrated several improvements in terms of decreased postoperative pain, decreased length of hospital stay (LOS), rapid patient rehabilitation, reduced postoperative blood loss, and superior cosmetic results . LDN has become the gold standard procedure for living kidney donations. Several LDN modifications, hand-assisted laparoscopic (HALDN), single-port laparoscopic (LESS), and robot-assisted laparoscopic (RALDN), have improved the technique . RALDN was first reported by Horgan et al. in 2002 using a hand-assisted technique and was subsequently studied by Renoult et al. in 2006 . These studies demonstrated that RALDN offered comparable advantages to the standard LDN, with seven degrees of freedom and three-dimensional (3D) surgical vision. With these robotic benefits and safety, we believe that RALDN could serve as a potential alternative to LDN.

Conclusion:

The “two-window technique” for laparoscopic nephrectomy (simple/radical) is safe and easily reproducible, especially for a novice with a potential for minimization and/or easy salvage of vascular complications which may lead to life-threatening haemorrhage. The outcomes of our study achieved with the RALDN procedure were better than those achieved with the HALDN procedure, and the use of robotic surgery during live donor nephrectomy is safe and feasible. Although our findings need to be validated in further studies, the approach described is relatively reproducible and can be applicable to RALDN. We suggest that our findings be externally validated to reassure reproducibility of the measurement in a prospective evaluation.