

# Robotic-assisted dual kidney transplantation

Sharma Himanshu, M. K. Ramaprasad, R. Vishnu, T. A. Kishore

Department of Urology, Aster Medcity, Kochi, Kerala, India

## Abstract

**Aim:** The aim of this study was to report the feasibility of robotic-assisted dual kidney transplantation (DKT) in a marginal donor.

**Materials and Methods:** The case was a 53-year-old male, who with IgA nephropathy underwent a robotic-assisted robotic DKT.

**Results:** The total operating time was 265 min, total console time was 215 min, and anastomotic time was 39 min for both the kidneys, and blood loss was 220 ml. The total drain output was 150 ml on the 1<sup>st</sup> day. The drain was removed after 48 h and Foley catheter was removed after 5 days. Nadir creatinine was 1.1 mg/dl and time to nadir creatinine was 7 days. The patient received one unit of blood transfusion. Total postoperative hospital stay was 7 days and bilateral ureteric stents were removed after 14 days. At the end of 3 months, creatinine was 1.0 mg% and epidermal growth factor receptor was 82 ml/min/1.73 m<sup>2</sup>.

**Conclusion:** Robotic DKT offers solutions to the challenges faced in open DKT.

**Keywords:** Dual transplantation, kidney transplantation, minimally invasive kidney transplantation, robotic kidney transplantation, robotic surgery

**Address for correspondence:** Dr. Sharma Himanshu, Department of Urology, Aster Medcity, Kochi, Kerala, India.

E-mail: drsharmahs.himanshu@gmail.com

**Received:** 02.02.2018, **Accepted:** 09.05.2018

## INTRODUCTION

Expanded criteria donors (ECDs) are defined as older than 60 or over 50 years with complicating comorbidities including hypertension, diabetes, cerebrovascular accident as a cause of death, or a terminal serum creatinine of 2.0 mg/dl or higher.<sup>[1,2]</sup> In order to increase the utilization of deceased donor organs, the United Network of Organ Sharing has implemented new policies to use organs from ECDs.<sup>[1,2]</sup> The first adult dual kidney transplantation (DKT) was performed in 1996 by Johnson *et al.*<sup>[3]</sup> The premise of transplanting both donor kidneys into a recipient is to increase the functional nephron mass.<sup>[3]</sup> The DKT involves longer surgical time and is prone to surgical complications due to the complexity of procedure. The original technique

included bilateral Gibson incision and transplanting one kidney to each side.<sup>[3]</sup> Later on, surgical modifications such as unilateral placement of the kidney and *en bloc* transplantation had been described.<sup>[4-7]</sup> In the past few years, robotic kidney transplantation is gaining popularity across the world.<sup>[8,9]</sup> The first case of robotic-assisted DKT was reported by Frongia *et al.*<sup>[10]</sup> We report our initial case of robotic DKT and, to our knowledge, this is the second case reported so far.

## MATERIALS AND METHODS

A 53-year-old patient with IgA nephropathy was on hemodialysis with a history of recent laparotomy for splenic trauma. The deceased donor was a 63-year-old

Access this article online	
Quick Response Code:	Website: www.urologyannals.com
	DOI: 10.4103/UA.UA_14_18

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** reprints@medknow.com

**How to cite this article:** Himanshu S, Ramaprasad MK, Vishnu R, Kishore TA. Robotic-assisted dual kidney transplantation. *Urol Ann* 2018;10:330-2.

diabetic patient who had a cerebrovascular accident and subsequent brainstem death. He was a known diabetic for 5 years with a creatinine of 1.5 mg% at the time of retrieval. The ports are placed in a similar fashion to robotic radical prostatectomy with cephalad displacement of the ports by 4 cm. The procedure started with incision of peritoneum at the level of umbilicus to iliac fossa on both sides. This enables to fashion a flap of peritoneum along with bladder [Figures 1a and b]. Subsequently, iliac vessels were dissected and prepared for anastomosis. A Pfannenstiel incision was made and a GelPOINT® (Applied Medical Resources Corp, Rancho Santa Margarita, CA, USA) was inserted through it [Figure 1c]. The graft was wrapped in a gauze jacket and placed through this incision [Figure 1d]. A marking stitch was placed on the upper pole on the gauze jacket to orient the kidney while performing anastomosis. Initially, the left donor kidney was placed in the right iliac fossa [Figure 2a]. Arterial and venous anastomoses were performed using 6.0 Gortex suture (Gore-Tex CV-6; W.L. Gore and Associates Inc., Flagstaff, AZ, USA). A custom-made punch was utilized for arteriotomy. Once the clamps were released, the right donor kidney was placed inside and anastomosis was performed to the left external iliac vessels [Figure 2b]. The peritoneum was approximated to the anterior abdominal wall [Figure 2c] and an extraperitoneal drain was placed [Figure 2d]. The vascularity of both kidneys was confirmed by a Doppler scan using a robotic drop-down probe (Hitachi Aloka Medical America Inc., CT, USA). After the release of pneumoperitoneum, the position of the graft was verified by inserting the camera through the GelPOINT®. Vesicoureteric anastomosis was completed through the Pfannenstiel incision using a 4.0 Polygalactin

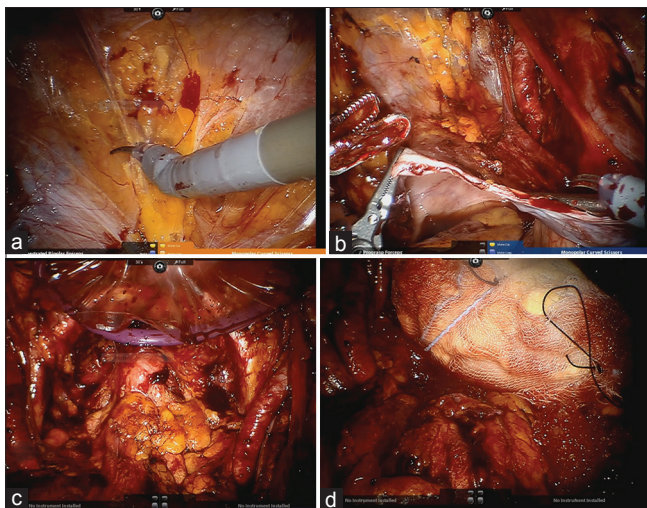
suture (Ethicon Inc., Cincinnati, OH, USA) and a 5-Fr 15-cm double J stent was placed. The detrusor layer was closed using 6" V-Loc™ 3-0 CV23 (Covidien Inc., New Haven, CT, USA). The Pfannenstiel incision and port sites were closed subsequently [Figure 2d].

## RESULTS

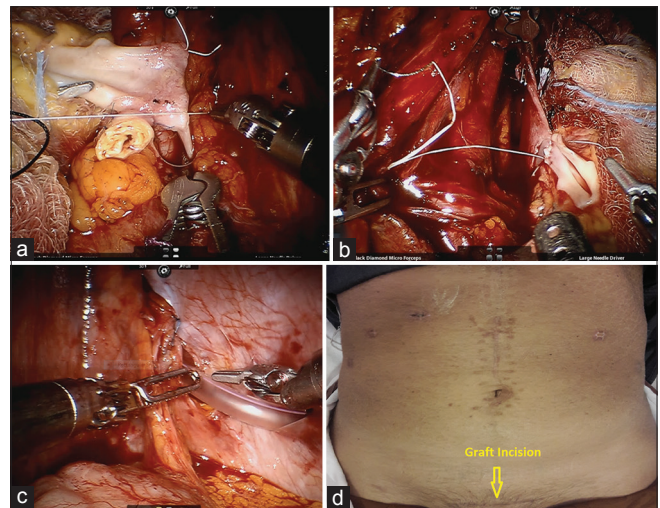
The total operating time was 265 min, total console time was 215 min, and anastomotic time was 39 min for both the kidneys, and blood loss was 220 ml. The total drain output was 150 ml on the first day. The drain was removed after 48 h and Foley catheter was removed after 5 days. Nadir creatinine was 1.1 mg/dl and time to nadir creatinine was 7 days. The patient received one unit of blood transfusion. Total postoperative hospital stay was 7 days and bilateral ureteric stents were removed after 14 days. At the end of 3 months, creatinine was 1.0 mg% and epidermal growth factor receptor was 82 ml/min/1.73 m<sup>2</sup>.

## DISCUSSION

DKT recipients have comparable outcomes in terms of function, graft loss, and survival versus those in elderly patients with younger grafts.<sup>[11,12]</sup> DKT carries a potentially higher risk of surgical complications because of the longer surgical procedure and multiple anastomosis involved.<sup>[11-13]</sup> Conventional technique described is that of bilateral Gibson incision and transplanting one kidney to each side. The drawbacks of this method are higher tissue dissection, a longer operative time, and increased chance of wound complications.<sup>[3]</sup> A midline extraperitoneal approach was described to minimize dissection, operative time, and wound



**Figure 1:** (a) Development of extraperitoneal space, (b) the extraperitoneal flap, (c) the GelPOINT® *in situ*, (d) graft in position with ice slush



**Figure 2:** (a) Right allograft being anastomosed with left external iliac vessels, (b) left-sided graft being placed and anastomosed, (c) peritoneal flap after closure, (d) postoperative appearance

dissection by Haider *et al.* in 2007.<sup>[4]</sup> Unilateral placement of both kidneys was described by Mason and Hefty in 1998.<sup>[5]</sup> The right kidney was placed superiorly, with renal artery anastomosed into the common iliac artery and renal vein into the inferior vena cava. With this method, both ureters were spatulated and joined to each other. This technique reduced trauma from the surgical procedure and operative time. Moreover, the contralateral side remained untouched for possible future transplant.<sup>[6,7]</sup> The drawbacks of this technique include higher incidence of lymphoceles, high risk of hemorrhage, and increased risk of single graft loss.<sup>[14,15]</sup>

The first ever robotic DKT was performed by Frongia *et al.* in 2014 which resulted in favorable outcome at 24 months.<sup>[10]</sup> They have utilized an epigastric incision to introduce the graft and reported 400 min operating time. In our case, we have employed a Pfannenstiel incision and a GelPOINT<sup>®</sup> to introduce the graft. The GelPOINT<sup>®</sup> allows in maintaining the pneumoperitoneum while introducing the graft. The Pfannenstiel incision enabled us to perform open technique to perform ureterovesical anastomosis. The ureterovesical anastomosis can be performed comfortably through the graft insertion incision as it is directly placed over the bladder. This reduces the operating time, duration of pneumoperitoneum, and Trendelenburg position.

## CONCLUSION

Robotic DKT offers solutions to the challenges faced in open DKT.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. Harada KM, Mandia-Sampaio EL, de Sandes-Freitas TV, Felipe CR, Park SI, Pinheiro-Machado PG, *et al.* Risk factors associated with graft loss and patient survival after kidney transplantation. *Transplant Proc* 2009;41:3667-70.
2. Pascual J, Zamora J, Pirsch JD. A systematic review of kidney transplantation from expanded criteria donors. *Am J Kidney Dis* 2008;52:553-86.
3. Johnson LB, Kno PC, Dafoe DC, Schweitzer EJ, Alfrey EJ, Klassen DK, *et al.* Double adult renal allografts: A technique for expansion of the cadaveric kidney donor pool. *Surgery* 1996;120:580-3.
4. Haider HH, Illanes HG, Ciancio G, Miller J, Burke GW. Dual kidney transplantation using midline extraperitoneal approach: Description of a technique. *Transplant Proc* 2007;39:1118-9.
5. Masson D, Hefty T. A technique for the transplantation of 2 adult cadaver kidney grafts into 1 recipient. *J Urol* 1998;160:1779-80.
6. Ekser B, Baldan N, Margani G, Furian L, Frison L, Valente M, *et al.* Monolateral placement of both kidneys in dual kidney transplantation: Low surgical complication rate and short operating time. *Transpl Int* 2006;19:485-91.
7. Salehipour M, Bahador A, Nikeghbalian S, Kazemi K, Shamsaeifar AR, Ghaffaripour S, *et al.* En-bloc transplantation: An eligible technique for unilateral dual kidney transplantation. *Int J Organ Transplant Med* 2012;3:111-4.
8. Oberholzer J, Giulianotti P, Danielson KK, Spaggiari M, Bejarano-Pineda L, Bianco F, *et al.* Minimally invasive robotic kidney transplantation for obese patients previously denied access to transplantation. *Am J Transplant* 2013;13:721-8.
9. Abaza R, Ghani KR, Sood A, Ahlawat R, Kumar RK, Jeong W, *et al.* Robotic kidney transplantation with intraoperative regional hypothermia. *BJU Int* 2014;113:679-81.
10. Frongia M, Cadoni R, Solinas A. First robotic-assisted dual kidney transplant: Surgical technique and report of a case with 24-month follow-up. *Transplant Direct* 2015;1:e34.
11. Lee RS, Marsh CL, Miller EA, Kuhr CS. Intermediate outcomes of dual renal allografts. *Transplant Proc* 2003;35:854-5.
12. Bunnapradist S, Gritsch HA, Peng A, Jordan SC, Cho YW. Dual kidneys from marginal adult donors as a source for cadaveric renal transplantation in the United States. *J Am Soc Nephrol* 2003;14:1031-6.
13. Hassan A, Halawa A. Dual kidney transplant. *Exp Clin Transplant* 2015;13:500-9.
14. Boggi U, Barsotti M, Collini A, Bernini M, Vistoli F, Paleologo G, *et al.* Kidney transplantation from donors aged 65 years or more as single or dual grafts. *Transplant Proc* 2005;37:577-80.
15. Timsit MO, Rabant M, Snanoudj R, Cohen D, Salin A, Malek S, *et al.* Single graft loss in dual renal transplant recipients: Impact of graft placement on recipient outcomes. *Transpl Int* 2011;24:51-7.