Surgical Complications After Deceased Donor Renal Transplant

Ramazan Kozan,[1] Hakan Sözen,[1] Ali Sapmaz,[2] Aydın Dalgıç[1]

Abstract

Objectives: **Deceased donor renal transplant is an accepted treatment for patients with end-stage renal disease. We retrospectively analyzed urological and surgical complications and outcomes in our series.**
Material and Methods: **Since 2016, we have performed 263 renal transplants at the Gazi University Transplantation Center, Ankara, and 92 of these were from deceased donors. We retrospectively analyzed outcomes of these 92 deceased donor transplants from our database records. There were 45 female and 47 male recipients, and 20 were pediatric recipients. Mean recipient and donor ages were 36 ± 14 and 38 ± 18 years old, respectively. Immunosuppression therapy consisted of steroids, mycophenolate, and calcineurin inhibitors. Induction therapy was 20 mg basiliximab (Simulect) on day 0 and day 4. Antithymocyte globulin (2 mg/kg) was used in steroid-resistant acute rejection cases.**
Results: **There were 13 surgical complications (14.1%) after 92 consecutive deceased donor renal transplants, and 4 of these were classified as miscellaneous surgical complications. Four of 9 cases were early, and the rest were classified as late complications. Postoperative early complications were bleeding (n = 2), urine leak (n = 1), and renal artery thrombosis (n = 1). Lymphoceles (n = 4) and urine leak (n = 1) occurred as late complications. Postoperative median follow-up was 78 months, during which 11 grafts (12%) were lost and 7 patients (7.6%) died from sepsis (n = 4), myocardial infarction, aortic dissection, and fungal pneumonia. No patients died from any surgical complications. The 1-year, 5-year, and 10-year survival rates of patients were 98%, 94%, and 94% and for grafts were 97%, 94%, and 88%, respectively.**
Conclusion: **Despite the limited number of deceased donor organs, improvements of surgical techniques at our center have facilitated success with deceased donor renal transplant at rates similar to other successful centers in the world.**

Key words: *Deceased donor, Kidney transplant, Outcome*

Introduction

The incidence rates of surgical complications after kidney transplant range from 4.2% to 34% and depend on the series and the types of complications reported in the studies.[1-5] These complications are likely the result of technical problems during organ procurement and transplant surgery.

Organs from deceased donors have been increasingly used to save lives and preserve health. The first successful deceased donor kidney transplant was performed in Turkey by Haberal and colleagues in 1978 with a graft supplied by Eurotransplant.[2] Since then, many improvements have been achieved through legislation, allocation, and advancements in surgical techniques and immunosuppression. However, the rates of organ donation after brain death have not improved substantially. Educational efforts by the National Health Ministry have likely contributed to the recent increase in deceased donor organs from patients after brain death, from 1.7 to 3.5 per million population; however, this remains far below the rates in Western countries (eg, 12 per million population for the European Union and 11 per million population for Germany).

Materials and Methods

Since 2006, there were 92 deceased donor renal transplants performed among a total of 263 renal transplants at the Gazi University Transplantation

From the [1]Department of General Surgery, Faculty of Medicine, Gazi University, Ankara, Turkey; and the [2]Department of General Surgery, Bilkent City Hospital, Ankara, Turkey
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Corresponding author: *Hakan Sözen, Department of General Surgery, Faculty of Medicine, Gazi University, Emniyet Mh. Mevlana Blv. No:47, Yenimahalle, 06560, Ankara, Turkey*
Phone: *+90 532 287 9770* ***E-mail:*** *mhakansozen@gmail.com*

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Center in Ankara. We retrospectively analyzed outcomes of 92 deceased donors from patient records in our database. The inclusion criteria for this study were deceased donor and either a pediatric or adult recipient. Exclusion criteria were living donor and failure to obtain a patient's medical data. The data for demographics (age and sex), cold ischemia times, follow-up times, surgical complications, urological complications, complication diagnosis times, and mortality rates were recorded. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. This study was approved by the Local Ethical Committee of Gazi University Faculty of Medicine (reference No. 02.11.2020-686).

The immunosuppression therapy consisted of steroids, mycophenolate, and calcineurin inhibitors. As induction therapy, recipients were given 20 mg basiliximab (Simulect) on day 0 and day 4. Delayed graft function (DGF) was defined as described by Halloran and colleagues[4] as (1) oliguria less than 1 L per 24 hours for more than 2 days, (2) plasma creatinine concentration greater than 5.7 mg/dL throughout the first week after transplant, or (3) more than 1 dialysis session during the first week after transplant.

The surgical technique for kidney transplants has changed very little from the original pelvic operation described in 1951 by Kuss and colleagues.[6] We usually choose the right iliac fossa because of the more superficial location of the iliac vein on this side. However, the left iliac fossa may be selected if the recipient is a candidate for a future pancreas transplant or if there has been a previous transplant or significant arterial disease on the right side. Another option is to place the kidney in an intra-abdominal position through a midline incision, especially for a pediatric recipient or for a recipient who has previously undergone operations on both the left and the right iliac veins. End-to-side Carrel patch technique was used for vascular anastomosis with continuous 6-0 (vein) and 7-0 (artery) propylene sutures to external iliac artery/vein, abdominal aorta, and inferior vena cava (in small children) in deceased donors.

The bladder was always filled with isotonic normal saline solution (with gentamycin, 40 mg) via a Foley catheter before surgery, and the clamp was retained until ureterovesical anastomosis. Haberal and colleagues[7] previously described their modified version of the Lich-Gregoir method with the corner-saving technique, and we used this procedure during anastomosis of ureterovesical reimplant,[7] which is briefly described as follows. Double-armed 6-0 monofilament polydioxanone running suture is used for ureterovesical reimplant. The first stitch for the corner-saving suture technique begins from 3 mm ahead of the corner of posterior wall of the graft ureter and corner of the bladder. After the last stitch (3 mm after the corner of the ureter), both ends of the suture material are pulled to decrease the excess, and the posterior walls of the ureter and bladder are tightly drawn together. Then, the anterior wall is sewn either with the same suture or with another running suture. For our patients, double J stent (4.8F, 14 cm) placement was performed in all cases. Foley catheter and pelvic drains were removed by postoperative day 5. Double J stent was removed by 5 weeks after the operation, with the patient under sedation on an outpatient basis by either the pediatric surgery department (for pediatric recipients) or the urology department.

Statistical analyses were performed with SPSS software (version 20). The results are expressed as mean values ± SD or as the median values with ranges. Relevant variables were analyzed with descriptive statistics. The nonparametric Kaplan-Meier survival estimator was used for survey analysis.

Results

There were 45 female recipients (49%) and 47 male recipients (51%), and 20 of 92 were pediatric recipients (21.7%). Mean ages for recipients and donors were 36 ± 14 and 38 ± 18 years, respectively. Mean cold ischemia time was 16.5 ± 5.1 hours (median, 16 hours; range, 6-26 hours), and mean human leukocyte antigen mismatch was 3.9 ± 0.7.

A total of 13 surgical complications (14.1%) occurred after deceased donor renal transplant among 92 consecutive procedures. Although 4 of these 13 cases were classified as miscellaneous surgical complications, 9 were specific, with 4 of 9 classified as early complications and 5 of 9 classified as late complications. The 4 postoperative early complications were bleeding (n = 2), urine leak (n = 1), and renal artery thrombosis (n = 1). The 5

postoperative late complications were lymphocele (n = 4) and urine leak (n = 1). Postoperative mean follow-up was 82 ± 60 months (median, 78 months; range, 1-128 months). Among 92 deceased donor transplants, DGF occurred in 76 recipients in this study (83%). Postoperative bleeding was observed in 2 cases, 1 of which included hemodynamic effects. Both of these patients with postoperative bleeding were diagnosed on the first day after the transplant; one of these patients required surgical revision, but the other patient's bleeding stopped spontaneously.

One patient with urine leak had been diagnosed at postoperative day 4 from the results of the drain output biochemical examination. Another patient's urine leak was diagnosed with collection on postoperative day 33 at routine outpatient follow-up by ultrasonography. Both patients have been treated successfully with percutaneous nephrostomy by interventional radiology.

All lymphocele cases (4.3%) were diagnosed by ultrasonography (postoperative days 11, 14, 32, and 42) and confirmed by needle aspiration of the lymphocele content and estimation of the creatinine concentration of the aspirate. Three of 4 patients with lymphocele required drain placement, which was performed by the interventional radiology team; no fluid collection reoccurred, and no further intervention was needed. Only 1 patient with lymphocele required open surgical marsupialization, which was performed in response to a failed radiological treatment. Since then, follow-up with this patient has revealed no problems.

Four of 13 of these cases with complications were classified as miscellaneous surgical complications, which were incisional hernia (n = 2) and wound infection (n = 2). Only 1 graft was lost as a result of surgical complications. A total of 11 grafts (12%) were lost during follow-up (median follow-up of 78 months) as follows: 6 with chronic allograft nephropathy, 2 with viral infections (BK nephropathy), 1 with renal artery thrombosis, and 1 with hemolytic uremic syndrome, and 1 graft was a pediatric dual kidney transplant to an adult recipient. A total of 7 patients (7.6%) died from sepsis (n = 4), myocardial infarction, aortic dissection, and fungal pneumonia during follow-up. None of the patients died from any type of surgical complication. The 1-year, 5-year, and 10-year survival rates of patients were 98%, 94%, and 94%, respectively; the corresponding rates for grafts were 97%, 94%, and 88%, respectively.

Discussion

The overall incidence of surgical complications after kidney transplant is low, especially compared with liver or pancreas transplants. Monitoring for surgical complications is essential for graft outcome. Better results in kidney transplant in short-term and long-term renal allograft and patient survival improvement have been documented in recent years.[1-3] These improved outcomes are the result of a coalesced effect of enhanced organ preservation and surgical techniques, effective antimicrobial prophylaxis, availability of potent immunosuppressive regimens, and good patient care.[1-3]

In our study DGF is the major obstacle against better outcomes. Patients with DGF are at increased risk for rejection and inferior graft survival with acute rejection rates of up to 44% during the first year after transplant and lower rates of graft survival at 1, 3, and 5 years compared with patients without DGF.[4] Poor donor management, older donor or recipient age, and extended cold ischemia time are known risk factors.[5] The low rate of deceased donor donation in Turkey is the major obstacle against better outcomes. Although we have short supply of deceased donors but have above average donor care, having more marginal donors and older donors available could help to influence outcomes (in our study group, 24 of 92 deceased donors were >55 years old).

Vascular thrombosis is a major concern in pediatric renal transplants, and it is the third most common cause of graft failure in adult renal transplants. The incidence rates of vascular thrombosis vary from center to center and range from 0.7% to 5%.[8,9,11] Previous reports have noted the thrombosis rate in young recipients (age less than 2 years) to be as high as 30%, which generally results from surgical technique (kinking or torsion of the vessels and intimal dissection, etc.).[8,9,11] Other potential causes for thrombosis are hypotension,[10] perfusion and preimplant damage,[12] and immune mechanisms.[13] Immediate surgical thrombectomy with revision of the anastomosis is the accepted solution for such cases of vascular thrombosis.

In our series, arterial thrombosis was the most common vascular complication, with a prevalence of 1%. One patient with a vascular problem was reoperated with thrombectomy, but the graft was lost as consequence of arterial thrombosis.

Incidence rates of postoperative bleeding are reported to range between 6% and 12%.[14] Postoperative bleeding is a life-threatening complication, and when this develops, it is usually soon after the transplant and originates from unligated vessels in the graft pedicle, from small severed retroperitoneal vessels of the recipient, or directly from the anastomosis. Risk factors for postoperative bleeding include recipient high urea levels, obesity, antiplatelet agents, and postoperative antiaggregate or anticoagulation therapies. In our patient series, we found an incidence rate for postoperative bleeding of 2.2%, and 1 patient required a second examination but no source of bleeding was found. We routinely use anticoagulation for the first 3 days postoperatively (subcutaneous low-molecular-weight heparin), followed by antiaggregate (aspirin, 80 mg) therapy for 3 months. We believe this has a protective effect on vascular complications, and in some cases may be the cause of bleeding. Both patients recovered without any further problems.

Lymphocele incidence rates range between 0.6% and 20% after kidney transplant[15,16] and are considered to be a surgical complication. The etiology of lymphocele after kidney transplant is controversial, but it appears to develop from the recipient's lymphatic vessels close to the iliac vessels and/or from the renal allograft pedicle. In our series, the incidence of lymphocele development was 4.3%. Meticulous preparation of the graft and minimal dissection of the recipient's iliac vessels during the anastomosis are the main reasons for low numbers in this cohort study and a previous study.[17]

The most common urological complications after renal transplant involve the ureter, and urine leak and distal ureter stenosis account for 90% of these.[18-20] Urine leak may occur at the ureteroneocystostomy site because of ischemia. Other less common causes for urological complications are surgical trauma to the ureter during procurement, donor nephrectomy, or increased urinary pressures caused by obstruction.[19] In recent years, there has been a debate regarding the use of stents for the ureteroneocystostomy to reduce the incidence rates of leaks and strictures postoperatively; some studies have advocated a routine use of stents,[21] and some have not.[22] The leakage rates in this present study were similar to rates reported in previous studies. We believe the low incidence rate of low urine leak (2.2%) in our study may be the result of our use of the suture technique of Haberal and colleagues, for which the use of stents for the ureterovesical anastomosis significantly reduces the need for surgical revision after renal transplant. Also, this technique facilitates clear observation of the edges of both sides of the ureter mucosa and allows for a safer anastomosis procedure.

Conclusions

Renal transplant is the best treatment choice for children and adults with end-stage renal failure without any obstacle for the transplant. Despite the limited number of deceased donor organs, improvements of surgical techniques at our center have facilitated success with deceased donor renal transplant at rates similar to other successful centers in the world.

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