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Recipient and renal allograft survival following living related-donor transplantation: a single center experience

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Abstract

Background: Despite improvements in surgical techniques of renal transplantation, still surgical complications remain a big challenge that might affect the post-transplant recipient and graft outcome. The aim of the current study was to retrospectively assess the surgical complications following living related kidney transplants in our center from 1990 to 2012 and determine their impact on long term recipient and graft survival.

Methods: We conducted a retrospective study of all live related-donor kidney transplants performed at our tertiary referral center between June 1990 and December 2012. Data regarding recipient demographics, details of surgical techniques, any reported complications and cumulative recipient and graft survival was analyzed.

Results: One hundred and four patients were included in the study whom we had access to their complete hospital records and they didn't miss follow up. There were 41 surgical complications reported in 37 recipients, prevalence of 35.5%. Vascular and urologic complications were reported in 17(16.3%) and 11 (10.5%) recipients respectively. Lymphocele was post-operatively diagnosed in nine (8.7%) recipients. Recipient survival at 1 year and 5-year were 100% and 97% respectively. Graft survival at 1 year and at 5 years were 96% and 85.5% respectively. Surgical complications mentioned, other than renal artery thrombosis, had no statistically significant impact on the graft and recipient survival.

Conclusion: Although surgical complications post-transplantation are not rare, the resulting morbidity can be minimized by prompt management of complications. In general, the existence of surgical complications did not impact recipient or graft survival.

Keywords: Living donor renal transplant, Complications, Graft survival

1 Background

Despite improvements in pre-transplant immunology workup coupled with use of new immunosuppressive medications, post-transplant surgical complications still remain a big challenge that might affect patient and graft outcome. Previous studies reported occurrence of surgical complications in 10–20% of transplant patients.

Surgical complications might affect the patient's quality of life caused by re-hospitalizations, repeated interventions and sometimes higher cost of the required procedures [1].

Pre-transplant thorough surgical evaluation, with a vision to expect these complications before they happen may result in decrease in morbidity related to these complications. Advancement in surgical techniques with extra care of both donor nephrectomy and recipient vascular and urological anastomoses ends up with marked decrease in the incidence of surgical complications [2, 3].

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The aim of the current study was to retrospectively study the surgical complications following living related kidney transplants in our center from 1990 to 2012 and to determine their effects on long term patient and graft outcomes.

2 Methods

We conducted a retrospective analysis of all live related kidney transplants performed at our tertiary referral center between June 1990 and December 2012. All hospital patient records and outpatient files were reviewed. Patients that had completed follow up for at least 5 years post transplantation were included in this study. Donor and recipient demographics, details of surgical techniques, any intra-operative, early or late postoperative complications and cumulative recipient and graft survival were analyzed.

2.1 Transplantation technique

On-table renal blood evacuation and wash with cold saline and preparation of the allograft artery and vein were usually done before starting vascular anastomosis. Donor left kidney were placed in the right iliac fossa via an extraperitoneal approach. The graft renal vein was anastomosed end to side with external iliac vein. The renal artery was anastomosed end to end with native internal iliac artery in 102 patients and two were end to side fashion with external iliac artery. Allografts were always kept cold using ice slush till completion of vascular anastomosis. On-table confirmation of allograft function is usually adopted after completion of vascular anastomosis.

Ureterovesical anastomosis, either stented or not, was established by modified Lich-Gregoir technique of extra vesical ureteroneocystostomy. A Double J stent was usually removed after 4 weeks. Redivac drain and Foley catheter were removed on 5th, 7th post-operative day respectively. On 7th post-operative day, most patients were discharged after removing the urinary catheter.

Most of patients received induction with monoclonal antibodies (Basiliximab, Non-lymphocyte depleting monoclonal antibody that target interleukin 2 receptors on activated T lymphocytes) Two doses of 20 mg intravenous at day 0 and 4 post engraftment, the first dose was given prior to reperfusion. Maintenance immunosuppressive therapies were cyclosporin, corticosteroids, and an antimetabolite. Starting from 2005 there was a gradual increase in the use of tacrolimus as the primary maintenance immunosuppressive medication instead of cyclosporin, with Mycophenolate Mofetil instead of

Azathioprine as an antimetabolite. We did not use Sirolimus for initial immunosuppression.

2.2 Statistical analysis

Statistical analysis was performed with SPSS 22.0 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp, Released 2013). Cox regression model was used to define the hazard ratio and rule out the intervening factors while Log-rank test was used for analysis of survival with different variables. Significance was accepted if $p < 0.05$.

3 Results

Out of 190 recipients operated during the period between June 1990 and December 2012, only 104 patients were included in the study, whom complete hospital records were assessed and had follow up for at least 5 years post transplantation.

All of the studied recipients had living related renal transplants. The study included 72 (69.2%) male and 32 (30.8%) females. Commonest recipient age group was between 20 and 30 years (49%) with median recipient age of 29 (IQR=23) years. There was no relation between age or sex and onset of surgical complications ($p=0.2$, $p=0.23$ respectively) (Table 1).

On post-operative day 7, mean (\pm SD) serum creatinine was 1.2 ± 0.28 mg/dl. Serum creatinine level of 1.2 mg/dl was achieved in 66 (63.4%) and 85 (81.7%) recipients on postoperative day 7 and day 30 respectively.

As shown in Table 2, there were 41 surgical complications in 37 recipients, a prevalence of 35.5%. Nineteen vascular complications developed in 17 (16.3%) recipients while 13 urologic complications developed in 11(10.5%) recipients. Lymphocele was post-operatively diagnosed in 9 (8.7%) recipients. Postoperative complications were carefully reported using Calvien-Dindo grading system [4] as shown in Table 2.

Nineteen vascular complications were reported. Seven (6.7%) patients developed renal artery thrombosis, eight (7.7%) patients had postoperative hemorrhage, of which five needed surgical intervention, and four (3.8%)

Table 1 Age distribution of the recipient patients

Age (years)	Number of recipients n (%)
<20	7 (6.73)
20–29	51 (49.03)
30–39	27 (25.96)
40–49	13 (12.50)
≥ 50	6 (5.76)

Table 2 Surgical complications reporting by Calvien–Dindo grading system

Surgical complication	Incidence n (%)	I	II	IIIa	IIIb	IVa	IVb	V
Renal artery thrombosis	7 (6.7)	0	0	0	0	6 (5.77%)	0	1 (0.96%)
Renal artery stenosis	4 (3.8)	0	0	1 (0.96%)	1 (0.96%)	0	0	2 (1.92%)
Hemorrhage	8 (7.7)	0	3(2.88%)	0	5 (4.8%)	0	0	0
Urinary fistulae	10 (9.6)	1 (0.96%)	0	2 (1.92%)	6 (5.77%)	1(0.96%)	0	0
Obstructive uropathy	3 (2.9)	0	0	2 (1.92%)	1 (0.96%)	0	0	0
Lymphocele	9 (8.7)	4(3.85%)	0	2 (1.92%)	3 (2.88%)	0	0	0

patients developed renal artery stenosis. All cases with renal artery thrombosis required exploration and graft nephrectomy while balloon dilatation and stenting was sufficient for management of renal artery stenosis and preservation of graft function.

Thirteen urological complications were reported in 11 patients. Ten (9.6%) patients had urinary leakage and three (2.9%) patients had obstructive uropathy. The leakage of urine started within 24 h post-surgery in the first four (3.8%) patients who had non-stented anastomosis. Re-exploration and redo reimplantation of the ureter over a double J stent was needed. After year 2000, all patients had stented ureterovesical anastomosis. Six (5.8%) patients had urine leakage on the 4th post-operative day. Percutaneous nephrostomy (PCN) was sufficient for management of leakage. Four weeks later, double J stent removal and contrast study revealed neither extravasation nor stricture while one patient developed ureterovesical stricture after 6 months and was managed by balloon dilatation and double J stent. Two more patients were complicated with obstructive uropathy. One patient developed ureterovesical stricture post stent removal and was managed by PCN and antegrade Double J stent insertion for 6 weeks. Another patient presented with upper ureteric stricture and was managed by PCN and antegrade laser endouretotomy.

Lymphocele developed in nine patients (8.7%); all of them were treated with ultrasound-guided percutaneous drainage.

Recipient survival at 1 year and 5-year were 100% and 97% respectively. Three patients died within the first 5 years after transplant due to cardiovascular events in two and road traffic accident in one patient. None of surgical complications led to recipient deaths. Graft survival at 1 year and 5 years were 96% and 85.5% respectively. None of surgical complications, other than renal artery thrombosis, had statistically significant impact on the graft survival. (Table 3)

Table 3 Impact of surgical complications on graft survival

Surgical complications	Graft survival n: survived/ total complicated (%)		p
	1 year	5 years	
Renal artery thrombosis	0/7 (0)	0/7 (0)	<0.005
Renal artery stenosis	2/4 (50.0)	1/3 (33.3)	0.420
Urinary fistulae	8/10 (80.0)	8/10 (80.0)	1.000
Post-transplant hemorrhage	6/8 (75.0)	6/8 (75.0)	1.000
Obstructive uropathy	2/3 (66.7)	1/2 (50.0)	0.782
Lymphocele	9/9 (100.0)	8/8 (100.0)	1.000

n survived grafts/total complicated (% percentage of survived of total complicated)

4 Discussion

Generally, renal transplantation is considered a relatively safe surgery but sometimes it carries certain risks. Studying the impact of surgical complications on the short-term and long-term outcomes of patients with renal transplantation is an area of interest. In this single-center study we described surgical procedures, complications, their management and impact on patient and graft outcome. The overall incidence of surgical complications in our series was 35.5%.

In most literature, the incidence of urologic complications was estimated to be 2.6–14.1% with the most frequent complications being urinary leakage and obstruction [4, 5]. Although it is very unusual that these complications lead to mortality or graft loss; morbidity, graft dysfunction, re-hospitalization, and increased costs are common reported problems [6–9]. In our series the incidence of urological complications was 10.5%, the most frequently observed were urinary leakage and obstruction, reported to occur in 9.6% and 2.9% of cases respectively. All of which occurred in the first month post-transplant. Patients with urinary fistulas had lower serum creatinine at one-month post-transplant which was statistically significant ($p = 0.021$). It was also observed that patients with obstructive uropathy had rapid recovery of graft function after management and had lower serum creatinine at one month

($p=0.043$). Importantly, regardless of the fact that 40% of patients with urine leakage was treated with surgical re-exploration, it did not affect graft survival at one and 5 years. The same had been observed for patients who developed obstructive uropathy managed by PCN and antegrade JJ stent insertion, graft survival was not affected ($p=0.78$). For both groups renal function was stabilized at 6 months post-transplant. This indicates that 6 months post transplantation, complicated renal grafts mostly behave like other non-complicated grafts.

The major finding in our study is that long-term patient and graft survival was not statistically different between patients who had post-transplant surgical complications and those without. This is in the same line to what Coupel et al. described at 5- and 10-years long-term survival for patient with first or second grafts. [10] Our findings are in concordance with those of van Roijen et al., who documented that surgical intervention of urological complications during the early post-operative period did not affect patient or graft survival. [11]

It has been previously documented by Brintjes et al. [12] and Faenza et al. [13] that there is no relationship between the type of urinary anastomosis and the risk for surgical urological complications. The success of ureterovesical anastomosis depends on the vascularity of the donor ureter, which may be compromised during the donor nephrectomy and by handling during transplantation. Vascular compromise produces ischemia that may affect both proximal and distal parts of ureter. [14–17]

It has been our policy to avoid dissection in the triangle between renal hilum, ureter and lower pole of the kidney to avoid damage to ureteral vasculature. As the ureter receives most of the blood from renal vessels, we use the minimum required length of the ureter.

Other factor which favored a lower incidence of Urinary complications was the routine use of extravesical Lich-Gregoir technique with a ureteric catheter. Interestingly a meta-analysis [18] of 2 RCTs and 24 observational studies recommended the extravesical Lich-Gregoir technique for decreasing the overall incidence of urological complications. The donor periureteral fat should be preserved to ensure adequate ureteric blood supply. Wilson et al. [19] stated that stents are favored to reduce major urological complications, especially urinary leaks. Sirvastava et al. [20], reported 7.7% complication rate with non-stented and 2.0% with stented ureteral anastomosis, this is lower than what had been observed in our series.

In most studies, the incidence of vascular complications varies from 1 to 23%. [21, 22] In our series 7 patients had arterial thrombosis and 4 patients developed arterial stenosis. Renal artery trauma and arterial kinking were risk factors for vascular complications. Management included

percutaneous transluminal angioplasty with placement of an endovascular stent or surgical revision.

It was previously reported that Lymphatic complications has incidence rates of 0.6% to 22%. [23, 24] Our results showed an incidence of 8.6% which is parallel to what has been previously published. Lymphoceles occur mainly due to the vascular and graft hilum dissections.

In the current study, no mortality was related to surgical complications. Despite the fact that re-intervention was required for some recipients, there was no effect on recipient or graft survival.

5 Conclusion

Although surgical complications post-transplantation are not rare, the resulting morbidity can be minimized by prompt management of complications. In our study, other than renal artery thrombosis, the existence of surgical complications did not impact recipient or graft survival.

Abbreviations

ESRD: end stage renal disease; PCN: percutaneous nephrostomy.

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None.

Authors' contributions

MS: (role: Principle investigator, writing, statistics, assisting surgeon). OE: (role: shared in investigation, writing and assisting surgeon). TAY: (role: idea of research and surgeon). AF: (role: surgeon, revision). ME: (role: shared in data collection, assisting surgeon). MSA: (role: nephrologist, follow up of cases, data collection and revision). All authors have read and approve the manuscript.

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Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

DONE and The study was submitted to and approved by our ethics committee of Faculty of Medicine, Alexandria University. Ethics committee's reference number: not available

Consent for Publication

Not applicable.

Competing interests

None.

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References

1. Barba AJ, Rincón MA, Tolosa EE et al (2010) Surgical complications in kidney transplantation and their influence on graft survival. *Actas Urol Esp* 34(3):266–273
2. Marcelo FC, Murilo FA, Silvio TJ. (2011) Surgical complications of renal transplantation. In: Jorge O, Jason A, editors. *Understanding the Complexities of Kidney Transplantation*. InTech; p. 527–546
3. Dinckan A, Tekin A, Turkyilmaz S et al (2007) Early and late urological complications corrected surgically following renal transplantation. *Transpl Int* 20(8):702–707
4. Zavos G, Pappas P, Karatzas T et al (2008) Urological complications: analysis and management of 1525 consecutive renal transplantations. *Transpl Proc* 40(5):1386–1390
5. Nie ZL, Zhang KQ, Li QS et al (2009) Urological complications in 1,223 kidney transplantations. *Urol Int* 83(3):337–341
6. Clavien PA, Barkun J, De Oliveira ML et al (2009) The Clavien-Dindo classification of surgical complications: five-year experience. *Ann Surg* 250:187
7. Buresley S, Samhan M, Moniri S et al (2008) Postrenal transplantation urologic complications. *Transpl Proc* 40(7):2345–2346
8. Terrier N, Long JA, Bacqueraz F et al (2005) Surgical complications of renal transplantations: incidence and prognostic factors (article in French). *Prog Urol* 15(6 suppl 1):1271–1285
9. El-Mekresh M, Osman Y, Ali-El-Dein B et al (2001) Urological complications after living-donor renal transplantation. *BJU Int* 87:295–306
10. Coupel S, Giral-Classe M, Karam G et al (2003) Ten-year survival of second kidney transplants: impact of immunologic factors and renal function at 12 months. *Kidney Int* 64:674–680
11. Tisserand B, Doré B, Touchard G et al (2013) Long-term outcome of renal transplantation: impact of surgical complications on graft survival (article in French). *Prog Urol* 23(2):113–120
12. Bruintjes MHD, d'Ancona FCH, Zhu X et al (2019) An update on early urological complications in kidney transplantation: a national cohort study. *Ann Transpl* 24:617–624
13. Faenza A, Nardo B, Fuga G et al (2005) Urological complications in kidney transplantation: ureterocystostomy versus uretero-ureterostomy. *Transpl Proc* 37(6):2518–2520
14. Gonzalo Rodríguez V, Rivero Martínez MD, Trueba Arguiñarena J et al (2006) Diagnosis and treatment of urological complications in kidney transplants. *Actas Urol Esp* 30:619–625
15. Pisani F, Iaria G, D'Angelo M et al (2005) Urologic complications in kidney transplantation. *Transpl Proc* 37:2521–2522
16. Kirnap M, Boyvat F, Torgay A et al (2019) Incidence of urinary complications with double J stents in kidney transplantation. *Exp Clin Transpl* 17(1):148–152
17. Osman Y, Ali-El-Dein B, Shokeir AA et al (2005) Routine insertion of ureteral stent in live donor renal transplantation: is it worthwhile? *Adult Urol* 65:867–871
18. Alberts VP, Idu MM, Legemate DA et al (2014) Ureterovesical anastomotic techniques for kidney transplantation: a systematic review and meta-analysis. *Transpl Int* 27:593–605
19. Bzoma B, Kostro J, Hellmann A et al (2018) Ureteric stenting in kidney transplant recipients, gdansk centre experience, Poland. *Transpl Proc* 50(6):1858–1862
20. Srivastava A, Chudhary H, Sehgal A et al (2004) Ureteric complication in live related donor renal transplant- impact on graft and patient survival. *IJU*. 20:11–14
21. Sambuis C, Dugardin F, Barbier S et al (2010) Retrospective analysis of vascular complications in renal allograft after five years: single center study (article in French). *Prog Urol* 20:40–48
22. Osman Y, Shokeir A, Ali-el-Dein B et al (2003) Vascular complications after live donor renal transplantation: study of risk factors and effects on graft and patient survival. *J Urol* 169:859–862
23. Smyth GP, Beitz G, Eng MP et al (2006) Long-term outcome of cadaveric renal transplant after treatment of symptomatic lymphocele. *J Urol* 176:1069–1072
24. Joosten M, d'Ancona FC, van der Meijden WA et al (2019) Predictors of symptomatic lymphocele after kidney transplantation. *Int Urol Nephrol* 51(12):2161–2167

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