



Surgical Results and Factors on Graft Survival in Cadaveric Kidney Transplantation: Siriraj Experience.

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Abstract

Background: To evaluate the surgical results of cadaveric kidney transplantation and evaluate the factors on graft survival in our center.

Methods: From January 2001 to December 2008, 176 isolated cadaveric kidney transplantations were performed in urological division, Siriraj hospital. The data of patient's demographics, surgical outcomes, early graft function and graft survival were reviewed from 172 inpatient chart retrospectively.

Results: Mean recipient age was 40.29 ± 11.55 (range 6-65) years. There were 98 male and 74 female recipients. Mean cold ischemia time was 20.18 ± 6.22 (range 4-35) hours. There were 32% (55/172) of early surgical complications. Surgical complications included 30 of lymphatic complications, 13 of bleeding complications, 4 of vascular complication, 3 of ureteral complications, 2 of wound complications and 2 of gastrointestinal complication. There were 2.3% (4/172) perioperative mortalities. Mean follow up time was 4.4 years. The 5-year graft survival of recipient with surgical complications was 68.5% compared to 78.7% ($p=0.019$) in non surgical complication group. There were 52.6% recipients with delayed graft function. The 5-year graft survival of recipients with delayed graft function was 69.4% compared to 83.9 % ($p=0.019$) of recipients with immediate graft function.

Conclusion: Cadaveric kidney transplantation is the effective treatment in patients with end stage renal disease; however the early surgical complications may compromise the transplant outcome. Moreover there may be the risk of perioperative mortalities. Delayed graft function may affect the long-term graft survival also.

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Background

Kidney transplantation has become the treatment of choice for most patients with end-stage renal disease. Marked improvements in early graft survival and long-term graft function make the kidney transplantation being more cost-effective alternative to dialysis. Studies show that renal transplantation prolongs patient lifespan relative to dialysis.

Kidney transplantation categorizes into living-related kidney transplantation (LRKT) and cadaveric kidney transplantation (CDKT). Disadvantages of cadaveric kidney transplantation is poorer graft function because of the risk from prolong cold ischemia time, surgical technique that more difficult than living-related kidney transplantation and risk of surgical complication.

Since 1973, our center performed the cadaveric kidney transplantations[1]. From the past 10 years, there are improvements in surgical experiences, immunosuppressive regimen. We purposed to review the transplant outcome and surgical complication of cadaveric kidney transplantation in our center.

Methods

From January 2001 to December 2008, 176 renal grafts from cadaveric donors were transplanted at our centre by a total of 5 urologist in urological division, Siriraj hospital. The 172 inpatient chart were reviewed retrospectively for patient's demographics, surgical outcomes, early graft function and graft survival.

From 172 patients, we categorized into 2 groups, early surgical-related complication group and non surgical-related complication group.

Surgical complications including bleeding

complications, vascular complications, lymphatic complications, ureteral complications, wound complications and gastrointestinal complications were reviewed. We included the condition that is needed for intervention. Some patients may experience more than 1 complication.

Bleeding complications included bleeding from renal vessels, anastomosis sites or perirenal hematoma that needed for surgical explorations. Vascular complications included renal artery thrombosis, A-V fistula or renal vessel injury. Lymphatic complications defined collection that is needed for surgical drainage or prolong lymphatic leakage more than 3 weeks. Urine leaks were defined by the presence of drain content with high concentration of creatinine relative to serum. Any spontaneous separation of skin or fascia that was significant enough to require either surgical intervention or application of dressing was defined as wound complications.

Surgical technique: Renal transplants were performed according to the standardized techniques including a Gibson incision, extraperitoneal preparation and end-to-side anastomosis of the donor vessels to the iliac vessels of the recipient. Extravesical ureteral implantation was performed in the modified Lich-Gregoir technique. A double-J-catheter was placed.

The program SPSS version 16.0 was used for statistical analysis (SPSS Inc., Chicago, IL, USA). Metric variables were presented by their mean value \pm standard deviation. Nominal variables were analyzed by means of the χ^2 test, metric variables depending on their distribution by Student's t-test or the Mann-Whitney *U*-test. Organ survival was calculated according to the Kaplan-Meier method. The log-rank test was used to analyze the survival curves for

significant differences. A *P*-value of ≤ 0.05 was considered statistically significant.

Results

Table 1 shows the demographic data of donors and recipients.

Table 2 shows the data of the recipients between early surgical-related complication groups and non surgical-related complication group. No significant differences in age, sex, cold ischemia time and HLA mismatch.

Table 3 shows postoperative surgical complications that were reported in 55 of 172 cases (32%). Of this, there are the total of 59 events of complication occur. Most common surgical complication was lymphatic complication. Half of them were perirenal collection that is needed for surgical intervention. Prolong lymphatic leakage was managed with conservative treatment. The second most common complication was bleeding complication. Ongoing transfusion requirements, hemodynamic instability, or compression of the kidney by hematoma

Table 1 donors' and recipients' demographic data

Variables	Mean \pm SD
Donor characteristics	
Age (years)	31.49 \pm 13.33
Cerebrovascular cause of death (%)	12.2%
Expanded criteria donor (%)	5.8%
Recipient characteristics	
Age (years)	40.15 \pm 11.64
Sex (Male/Female)	98/74
Perioperative characteristics	
HLA-mismatches	2.54 \pm 1.18
Mean cold ischemia time (hr)	20.18 \pm 6.22

Table 2 recipients' data between early surgical complication group and non surgical complication group

	Early surgical complication group (N=55), Mean \pm SD	Non surgical complication group (N=117), Mean \pm SD	P
Age (years)	40.4 \pm 12.6	40.2 \pm 11.0	0.918
Sex (male/female)	33/22	65/52	0.583
CIT (hours)	19.8 \pm 6.2	20.3 \pm 6.2	0.617
HLA Mismatch	2.6 \pm 1.2	2.5 \pm 1.2	0.862

are all indications for surgical explorations. There were 3 ureteral complications caused from ureteral necrosis, surgical treatment were needed for all patients. Two patients were managed with pyelo-ureterostomy. Another one was managed with cystotomy and ureterostomy tube in situ. There was 4.7% (8/172) graft nephrectomy from early surgical complication group. Causes of graft nephrectomy consisted of 3 for bleeding complication, 2 for graft rejection, 1 for graft infection, 1 for arterial thrombosis and 1 for renal vein graft injury.

There were 2.3% (4/172) perioperative mor-

talities. Two patients died from septicemia and they received graft from the same donor. One patient died from ventricular tachycardia and one patient died from gall bladder perforation with massive intra-peritoneal bleeding.

Mean follow up time was 4.4 ± 2.4 years. The 5-year graft survival of recipient with early surgical-related complications was 68.5% compared to 78.7% ($p=0.019$) in non surgical-related complication group (Fig.1).

In early postoperative period, there were 52.6% recipients with delayed graft function compared

Table 3 Categorization of surgical complications

Surgical complication (events)	N (%)	Management	N
Lymphatic complication	30(17.4)		
<i>Collection</i>	15(8.7)	Explore graft and drainage	10
		Percutaneous drainage	4
		Laparoscopic peritoneal window	1
<i>Persistent lymphatic leakage</i>	15(8.7)	Conservative treatment	15
Bleeding complication	13(7.6)		
<i>Perigraft hematoma</i>	13(7.6)	Explore graft and clot removal	10
		Graft nephrectomy	3
Vascular complication	4(2.3)		
<i>Arterial thrombosis</i>	1(0.6)	Graft nephrectomy	1
<i>Renal vein graft injury</i>	1(0.6)	Graft nephrectomy	1
<i>AVF</i>	2(1.1)	Embolization	2
Ureteral complication	3(1.7)	Surgical correction	3
Wound complication	2(1.1)	Resuture	2
Gastrointestinal complication	2(1.1)		
<i>Gall bladder perforation</i>	1(0.6)	Dead	1
<i>Ileal perforation</i>	1(0.6)	Segmental resection with anastomosis	1
Peritoneal injury	1(0.6)	Explore graft and closure peritoneal cavity	1
Other			
<i>Graft infection</i>	1(0.6)	Graft nephrectomy	1
<i>Graft rejection</i>	2(1.1)	Graft nephrectomy	2

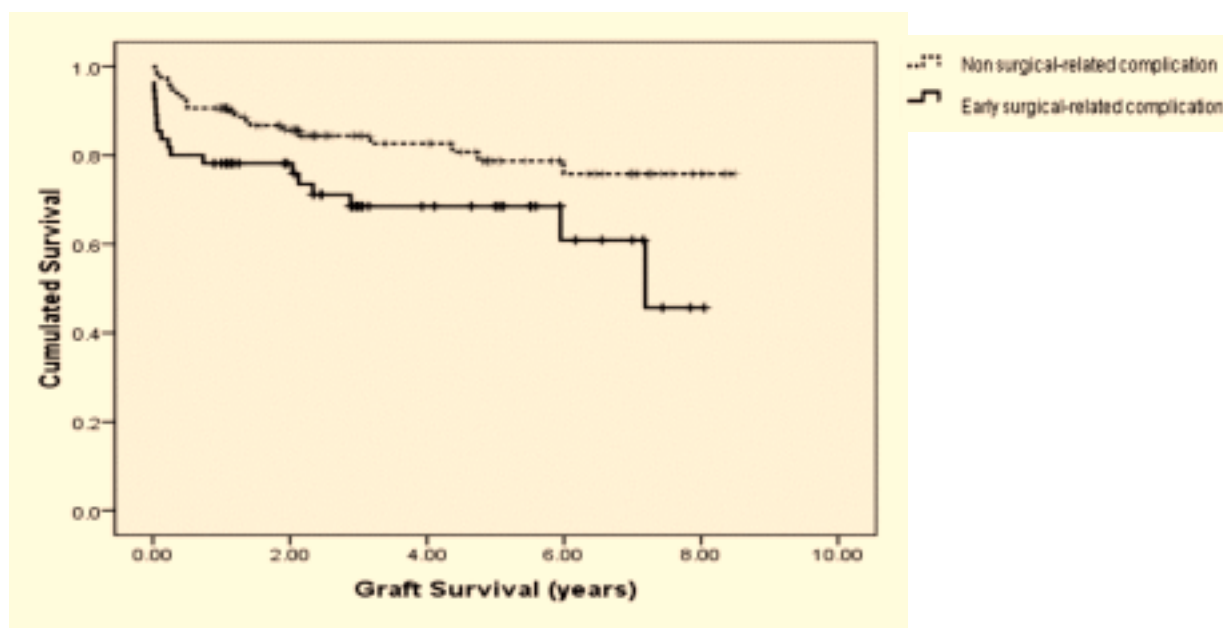


Fig.1 Kaplan-Meier analysis of cumulated patient survival in non surgical complication group compared to early surgical complication group

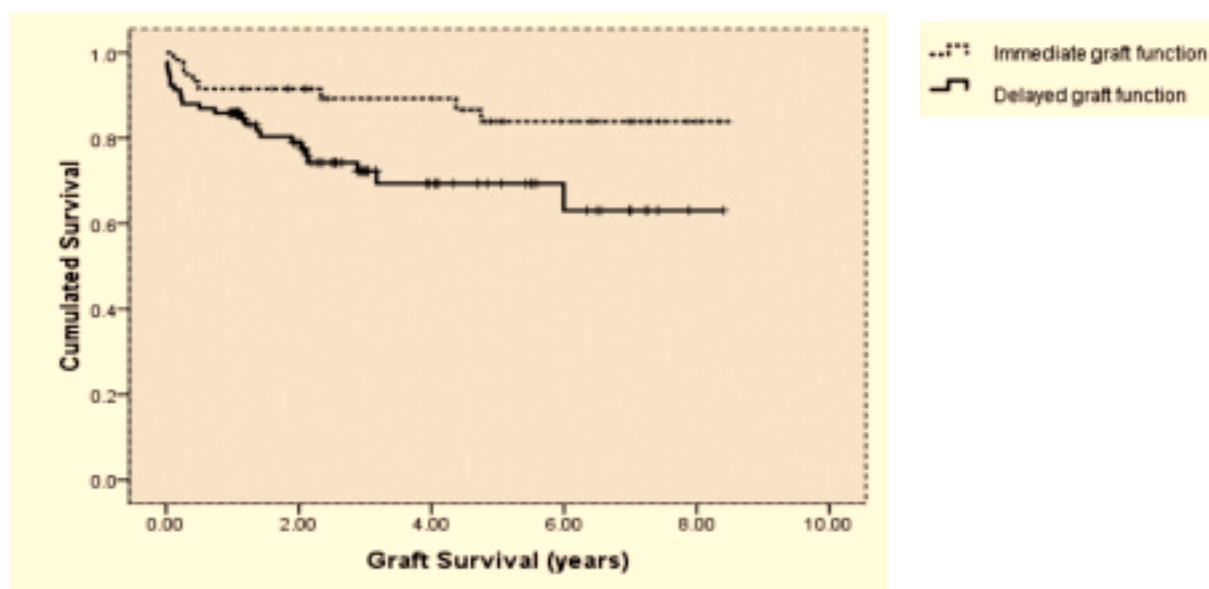


Fig.2 Kaplan-Meier analysis of cumulated patient survival in immediate graft function compared to delayed graft function

to 33.7% recipients with immediate graft function. The 5-year graft survival of recipients with delayed graft function was 69.4% compared to 83.9% ($p=0.019$) of recipients with immediate graft function (Fig.2).

Discussion

Cadaveric kidney transplantation remains the effective treatment in end stage renal disease-patients. However surgical complications can occur and prolongs hospital stay. Moreover surgical complication can affect the initial graft function and may compromise the transplant outcome[2].

Many studies have reported surgical complication rate in range 5-35%[3,4]. In our study, the rate of surgical complication was 32%. However we collected prolong lymphatic leakage as the complication also. There was 4.7% of graft nephrectomy from ours comparable to 4-7% from others[3,5]. The most common cause of graft nephrectomy was bleeding complication.

From our study, the most common complication was lymphatic complication. Lymphocele formation after kidney transplantation has been resulted from dissection around the recipient iliac blood vessels. Incidence of our report was comparable to previous reports[5,6]. In case of prolonged lymphatic leakage, that is minor complication, surgical intervention can be avoided by conservative treatment. Tube drain can be left in place for a period but the disadvantage is that it may take risk for infection.

In our study, there were 7.6% incidences of bleeding complication. Perigraft hematoma was the leading cause for graft re-exploration and if it occurred, the graft nephrectomy was needed for 23% (3/13).

From study of Hernández[3], the retrospective review from 870 cadaveric kidney transplants, they reported 14.7% incidences of bleeding complication but they included the hematoma that is needed for blood transfusion.

Also there may be the risk from perioperative mortalities. In our center, the major causes of perioperative mortality were systemic infection. Two patients who receive renal graft from the same donor died from severe infection. This may be the transmitted infection from a donor. There is no mortality that is direct related to surgical complication.

We found that graft survival in recipients with early surgical-related complications was significant lower than recipients with non surgical-related complication group. However more sample size is needed for subgroup analysis.

To overcome the organ shortage, the pool of donors can be increased by the use of expanded criteria donors. However, from the study of Port[7], they reported suboptimal outcome of expanded criteria donors. In our center, from 2001, there were only 10 renal grafts from expanded criteria donors were used because of uncertain long-term graft survival. Further studies of ECD renal graft are needed to evaluate the graft function and long-term graft survival.

Conclusion

Cadaveric kidney transplantation is the effective treatment in patients with end stage renal disease; however the early surgical complications may compromise the transplant outcome. Moreover there may be the risk of perioperative mortalities. Delayed graft function may affect the long-term graft survival also.

References

1. Vareesangthip K, Jitpraphai P, Vongwiwatana A, Permpikul P, Pornpong C, Larpkitkachorn R, et al. Results of Renal Transplantation of the Siriraj Hospital - Thailand. **Transplantation Proceedings** 2003; 35: 159-62.
2. Weiss-Salz I, Mandel M, Galai N, Nave I, Boner G, Mor E, et al. Factors associated with primary and secondary graft failure following cadaveric kidney transplant. **Clinical Transplantation** 2004; 18: 571-5.
3. Hernández D, Rufino M, Armas S, González A, Gutiérrez P, Barbero P, et al. Retrospective analysis of surgical complications following cadaveric kidney transplantation in the modern transplant era. **Nephrol Dial Transplant** 2006; 21: 2908-15.
4. Wahlberg J, Tufveson G, Larsson A, Backman U, Frödin L, et al. Influence of the age of cadaveric kidney donors on transplantation outcome and rate of surgical complications. **Scand J Urol Nephrol Suppl** 1990; 131: 39-42.
5. Bentas W, Jones J, Karaoguz A, Tilp U, Probst M, Scheuermann E, et al. Renal transplantation in the elderly: surgical complications and outcome with special emphasis on the Eurotransplant Senior Programme. **Nephrol Dial Transplant** 2008; 23: 2043-51.
6. Humar A, Matas AJ. Surgical Complications after Kidney Transplantation. **Seminars in Dialysis** 2005; 18: 505-10.
7. Port FK, Bragg-Gresham JL, Metzger RA, Dykstra DM, Gillespie BW, Young EW, et al. Donor characteristics associated with reduced graft survival: an approach to expanding the pool of kidney donors. **Transplantation** 2002; 749: 1281-6.