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CASE REPORT

Kidney transplant early venous complications managed by re-perfusion and re-transplantation – salvage procedure

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Abstract: We report five cases of early venous complications, all successfully rescued by graft removal, re-perfusion and re-transplantation, these kidneys would have been lost otherwise. All kidneys were from deceased donors, mean donor age was 39 years (range 29–55), with serum creatitine levels on harvesting being 81 μmol/l (65–108), glomerular filtration of 1.46 ml/s (0.82–1.83). Reasons for venous complications were following: Two cases of renal vein stenosis, another two with renal vein laceration, one renal vein thrombosis for unknown reason. All the five kidney grafts have been rescued successfully. One year's results in this group comes as mean serum creatinine level of 127 μmol/l. The described approach gives a chance to the patients with early vein thrombosis and offers the kidney graft salvage *(Ref. 4)*. Text in PDF *www.elis.sk*.
Key words: kidney transplantation, vascular complications, reperfusion, rescue.

Kidney transplantation has become a method of choice in patients with end-stage renal failure.

As transplantation techniques evolved, the incidence of early surgical complications decreased. Vascular complications in a transplanted kidney are ones, these may even cause the graft loss. The rate of surgical complications is reported to be within the range of 5–25 %. The most frequent vascular complications involve the graft's renal artery and vein, with an incidence of 1–5 % (1, 2).

Patients and methods

The purpose of our report was to evaluate kidney graft reperfusion as helpful for treatment of acute renal transplant vascular complication and to determine the reasonable chance of graft salvage. From January 1, 2004 through December 31, 2008, a total of 1,071 kidney transplant procedures were performed in our center. Of this number, some 113 grafts were from living donors. The kidney transplant graft has been perfused within deceased donor retrieval using conventional approach with aorta cannulation. In live donor setting, the direct renal artery cannulation on back table has been used.

Renal vein and artery were anastomosed in the end-to-side fashion to the external or common iliac vessels in all five patients. All the five described cases had simple anatomy eg. one artery, one vein and one ureter. In these five cases the renal vein complication has been diagnosed either intraoperatively or within 6 hours after transplant, all five grafts were explanted, re-perfused with a cold storage solution (Custodiol®, 1000 ml) and re-implanted. In three out of five cases renal vein was reconstructed using graft from the same deceased donors inferior vena cava.

A lacerated renal vein was repaired using a donor internal iliac vein graft in one case. Additionally, a renal vein thrombectomy *ex vivo* was performed in one case. Vascular complications were

diagnosed immediately in the operating theatre in three out of five cases, the other two cases were diagnosed postoperatively using Doppler ultrasonography.

Our postoperative immunosuppressive protocol included antithymocyte globulin, mycophenolate mofetil, FK 506, and prednisone. In addition, antiplatelet and anticoagulation agents were also given in combination with 100 mg acetylsalicylic acid and 0.4–0,8 ml low molecular weight heparin (LMWH). The plasma levels of the LMWH were measured. The renal graft was followed up on a regular basis by ultrasound. Renal graft biopsy was indicated and performed in the case of increased serum creatinine levels. The mean follow-up period was 2.7 years (0.5–5) at the time of our report.

Results

Early surgical complications occurring in our group of patients were as follows: bleeding requiring re-operation in 50 patients (4.5 %), lymphocele requiring marsupialization in 21 patients (1.9 %), surgical wound infection in six (0.5 %), and ureteric complications in 31 patients (2.8 %). Vascular complications occurred in 15 patients (1.4 %). In our group, 18 grafts (1.7 %) were explanted because of a surgical complication including renal artery thrombosis, renal vein thrombosis, uncontrollable bleeding or urinary leak. The mean age of organ donors was 38.8 years (range, 29–55), with creatinine levels on harvesting being 81 μmol/l

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(65–108), and glomerular filtration rate 1.46 ml/s (0.82–1.83). Causes of donor death included head injury and ischemic stroke in two cases each and intracranial bleeding in one case. Some donors had also comorbidities including diabetes mellitus, coronary heart disease and hypertension.

Two recipients were treated for renal vein stenosis, another two for renal vein laceration, while renal vein thrombectomy was undertaken in one patient. The technical success rate of the above explained salvage procedures was 100%. In four patients, mean warm ischemia time was 7.25 minutes (5–12). The exact warm ischemia time of the patient with renal vein thrombosis is unknown. Mean cold ischemia time after graft explantation was 47.6 minutes (42–60), this patient's graft thrombosis was diagnosed on Doppler six hours after surgery.

Mean serum creatinine levels at 1, 7, 14, and 30 days, 6 months, 1 year, and at the last follow-up visit were 588, 293, 201, 166, 162, 127, and 156 μmol/l, respectively, with serum urea levels being 16.1, 14.1, 10.6, 10.6, 9.4, 7.8, and 13 mmol/l, respectively. Glomerular filtration rate over the study period was 0.17, 0.46, 0.71, 0.81, 1.06, 1.4, and 1.3 ml/s, respectively. Based on their biopsy specimens, all patients were diagnosed to have acute tubular necrosis.

Discussion

Early post-transplant complications are the factor which affects the fate of both grafts as well as patients future. In two out of five reported cases, where renal vein was lacerated and bleeding, the urgent intraoperative kidney graft removal was necessary and indicated as life saving step. This step allows us to both control the bleeding as well as re-perfuse the kidney graft again.

The early diagnosis of vascular complications is essential for successful salvage. Once the renal graft has been perfused again with cold preservation solution, surgeon has got enough time to assess the degree of graft damage and decide further how to manage the situation. The most common cause of renal vein thrombosis is anastomotic thickening. The case where renal vein thrombosis occurred for unknown reason, the clot must have grown over the time because the kidney on reoperation looked cyanotic on 90 % of it's surface, but with a perfused and pink segment preserved around the hilum.

Some authors have suggested *ex vivo* cellular repair (3). Likewise, the effect of cold and warm ischemia on renal function has been well characterized in clinical practice and experiment (4). Our results suggest that the repair capacity of the renal graft following ischemia-reperfusion injury and multiple insults is fairly high. It seems the transplanted organ tolerates well multiple manipulation as well as an another period of cold ischemia. A major factor with a potentially favorable effect on the success rate of procedures – in addition to early diagnosis of the complication – was that our donors were not marginal ones. Still, two of our donors were being treated for diabetes or coronary heart disease and hypertension. We are well aware that ours is a presentation of single cases. Early post-transplant complications are the factor which affects the fate of both grafts as well as patient´s future. In two out of five reported cases, where renal vein was lacerated and bleeding, the urgent intraoperative kidney graft removal was necessary and indicated as life saving step. This step allows us to both control the bleeding as well as re-perfuse the kidney graft again.

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