

SURGICAL COMPLICATIONS OF RENAL TRANSPLANT: EXPERIENCE OF A TERTIARY CARE UROLOGY INSTITUTE IN PAKISTAN

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ABSTRACT

Objective: To evaluate the surgical complications of renal transplantation in adult end stage renal disease patients.

Study Design: Retrospective observational study.

Place and Duration of Study: Armed Forces Institute of Urology (AFIU) Rawalpindi, from Apr 2009 to Apr 2014.

Material and Methods: Frequency of the surgical complications of renal transplant was assessed in 105 adults with end stage renal disease subjected to renal transplantation at Armed Forces institute of Urology Rawalpindi, from Apr 2009 to Apr 2014.

Results: Total 105 adults were included in the study with the median age of 38 years; (ranging from 18 to 61 years). There were 88 (83.8%) male and 17 (16.2%) female patients. All were live related transplants. Vascular complications were the most common (6.66%) followed by urological complications (2.85%). Graft loss occurred in 3.8% and surgical mortality was 0.95%.

Conclusion: Vascular complications after renal transplantation need prompt detection and remedial steps to avoid graft loss. Urological complications, on the other hand, increases morbidity, often needs corrective radiological or surgical intervention, but rarely leads to graft loss.

Keywords: Kidney transplantation, Post-operative complications, Renal insufficiency.

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INTRODUCTION

Chronic kidney disease (CKD) is defined as abnormalities of kidney structure and function, present for more than 3 months, with implications for health. CKD is classified based on causes, glomerular filtration rate (GFR) category and albuminuria. A major consequence of CKD is end stage renal disease (ESRD) defined as initiation of renal replacement therapy (RRT) in patients with CKD¹. The global population dependent on dialysis was 1.1 million in 2002 and, with a 7% annual growth, is projected to exceed 2 million^{2,3}. According to Sakhuja *et al*⁴, the estimated prevalence of ESRD in the subcontinent is 100 per million population. A community based cross-sectional study done at Karachi by Jessani *et al*⁵ revealed the overall prevalence (95% CI) of CKD to be 12.5%.

Various treatment options available to

patients are haemodialysis, peritoneal dialysis and renal transplant. The annual cost of haemodialysis per patient ranges from PKR 4,86,000 to PKR 7,29,000 for twice weekly to thrice weekly sessions respectively⁶. The annual cost of 6000 IU of erythropoietin administered on weekly basis is PKR 1,62,000⁷. Renal transplantation is the optimal form of renal replacement therapy in terms of patient survival, quality of life and cost-effectiveness^{4,5}. Although the complication rate associated with the procedure is low, nonetheless, prompt detection, correct diagnosis, and timely management of surgical complications occurring after renal transplant are essential to save the graft and life of the patient. A delay in the diagnosis or management of these complications can lead to increased morbidity, risk of graft loss and mortality. Most surgical complications associated with renal transplantation are either related to the surgical wound or one of the three anastomoses (renal artery, renal vein or ureter). Despite improvements in surgical, diagnostic and

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interventional radiological techniques, surgical complications following renal transplantation remain an important clinical issue that may increase morbidity, hospital stay and procedure costs⁸.

The aim of this study was to compare the frequency of surgical complications in renal transplant in a tertiary care hospital i.e. Armed Forces institute of Urology (AFIU), Rawalpindi with national and international literature. This is the first study of its kind done in our set up.

PATIENTS AND METHODS

This retrospective study was conducted in urology department of AFIU Rawalpindi, from April 2009 to April 2014. Approval was obtained from hospital Ethics Review Committee. The work done was in accordance with the Helsinki Declaration of 1975, as revised in 2008. We retrospectively analyzed surgical complications among 105 consecutive renal transplantations. The patient records were manually explored. All kidneys came from live related donors. Grafts were flushed with heparinized cold normal saline. All transplants were performed by one of four senior surgeons sufficiently trained for renal transplantation. The four senior surgeons involved had a wide range of experience and were involved in transplant program since 1994. All of them used standard surgical techniques for transplantation. Briefly, kidneys were placed in either the right or the left iliac fossa using an extra-peritoneal approach. The renal graft vessels were anastomosed end-to-side to the recipient external iliac vessels. Multiple arteries in the graft were anastomosed individually to recipient external iliac artery or to each other before anastomosis to the recipient vessels. Fine sutures of prolene (5/0 or 6/0) were used for vascular anastomoses. Vascular bench surgery before transplantation was performed using finer sutures of prolene (7/0 or 8/0) when vascular abnormalities, multiple arteries or harvesting injury were present. A standard Lich-Gregoir ureteroneocystostomy was performed over a double-J stent in all cases. All recipients were

given prophylactic broad-spectrum parenteral antibiotic in the form of Cefoperazone and Sulbactam in the operating room at the time of induction. Critical monitoring of intake and output was done during the perioperative period to ensure fluid and electrolyte homeostasis. There was no routine use of post-operative anti-coagulation therapy.

After surgery, the patients were monitored clinically and biochemically. Pulse, blood pressure and urine output were continuously monitored and blood samples were sent for haemoglobin, blood gases, urea, creatinine and electrolytes. All patients received standard three drug immunosuppressive therapy including Tacrolimus, Mycophenolate mofetil and steroid. Immediate haemorrhagic complications were clinically detected preoperatively or in the immediate post-operative period and treated as an emergency. Drains were removed when they were dry i.e. after 5 to 7 days. Ureteric stents were removed four weeks post-operatively. We classified all surgical complications into vascular, urologic, lymphatic, wound related or other types. Data was analyzed using statistical software SPSS version 20.0. Mean and standard deviation (SD) were utilized to describe quantitative variables like age. Percentage was calculated for gender and different complications.

RESULTS

One Hundred and five adults were included in the study with the median age of 38 years; (range, 18-61). There were 88 (83.8%) male and 17 (16.2%) female patients. All were live related transplants. Surgical complications occurred in 13 patients (12.38%). Vascular complications were most commonly reported, followed by urological complications, wound-related problems, hematoma, lymphoceles, and other complications. Multiple renal arteries were found in 13 patients (12.38%).

Overall, we discovered vascular complications in 7 (6.66%) patients. Four patients had arterial thrombosis and three patients presented with haemorrhage. Out of the four patients

having arterial thrombosis, three patients had anuria in the immediate post-operative period. Doppler sonography of the graft revealed minimal blood flow in the renal vasculature. The patients were explored, which revealed intra-renal thrombosis in two patients with normal flow at the site of vascular anastomosis while one patient had thrombosis at the site of vascular anastomosis. All three patients had graft nephrectomy. One of the patients had hyperacute rejection. The transplant kidney immediately turned blue when the clamps were removed. Two patients were immediately reopened on the operation theatre table when grossly haemorrhagic drainage was observed in the drainage. One of the patients had bleeding from the renal arterial anastomosis while the other one had an arterial bleeder in the abdominal wall. Both the grafts were saved. One of the patients from the haemorrhage group had a very unusual presentation. His graft was perfectly working fine when he had marked bleeding in the drain on the 3rd postoperative day associated with anuria and hypotension. He was immediately taken to operation theatre and explored. Upon exploration he was found to have bleeding from the external iliac artery which was repaired. The very next day he again bled in the drain with signs of acute limb ischaemia. Exploration revealed a necrosed graft along with sloughing of the external iliac artery. Graft nephrectomy was done and iliac artery repair was done using a saphenous vein graft by vascular surgeon. The patient had a third episode of bleeding which again necessitated exploration. The arterial graft and adjacent external iliac wall were found necrosed on exploration. His external iliac artery was ligated to arrest the bleeding. Unfortunately we lost the patient in the immediate post-operative period after third exploration.

The urologic complications in 3 patients (2.85%) included two urinary fistulae and a case of ureteric obstruction. Both of the urinary fistulae resulted from leakage of the ureteric re-implantation site. One of the fistulae was diagnosed in the first week after surgery while

the second one was diagnosed in third post-operative week. The creatinine levels were raised in the drain fluid and CT Cystogram revealed a leak from ureterovesical anastomosis. Both the patients were managed by surgical intervention and ureteroneocystostomy was revised over a ureteric stent. The ureteric obstruction was recognized on the table when a patient with well-functioning graft suddenly developed anuria when the wound was closed. The patient was reopened and the ureter was found stitched in the medial most abdominal wall stitch. The urinary flow restored after releasing the stitch.

One of the patients had superficial wound infection which was managed with antibiotics, debridement and excision. Two patients had hematoma formations which were recognized peroperatively. One had a psoas hematoma and other had a subcapsular hematoma in the transplanted kidney. In both the cases, the hematoma was drained. Both the patients had prolonged drainage postoperatively. Overall, 4 patients (3.8%) lost their grafts due to surgical problems. In our study the mean duration of drain was 6 days.

DISCUSSION

Surgical complications were a major cause of graft loss in the early period of renal transplant. The estimated incidence was around 20% in 1960 to 1980. The incidence of these complications has significantly dropped due to improvement in surgical techniques^{9,10}. Currently, the estimated incidence of complications in major transplant centers is less than 5%¹⁰. As surgical experience increases, easier and safer techniques are adopted to avoid complications. In our study the overall rate of surgical complications was 12.38%. Hussain *et al*¹¹ reported an incidence of 26% in their study done at Sindh Institute of urology and transplant which had a larger sample size including 647 transplant procedures.

Main surgical complications seen after renal transplant can be classified into vascular and urological, though other complications like wound infection, haematoma or lymphocoele

formation are less frequent. Post-transplant urological complications are the most common of the surgical complications seen after renal transplantation, which causes significant morbidity. The most frequent of these urological complications involve the ureterovesical anastomosis. These include urinary fistula formation, ureteric stenosis and vesico-ureteric reflux. Though rarely these urological complications lead to graft loss or patient death, but are an important cause of morbidity, delayed graft function, hospitalization, and poor cost-effectiveness. The incidence of urological complications seen in our study was 2.85% and is comparable to that observed in the literature i.e. 4-11%^{12,13}. We used stented extravesical ureteroneocystostomy by Lich-Gregoir technique which has been associated with significantly fewer urinary tract infections as compared to intravesical ureteroneocystostomy and is preferable because of its surgical simplicity¹². Careful preservation of ureteric blood supply during donor nephrectomy is an important factor in avoiding ureteric complications. In a local study, Hussain *et al*¹¹ reported 5.8% incidence for urological complications.

In our study, among urological complications, 1.9% had urinary fistula secondary to the ureteric implantation failure, while 0.95% had ureteric obstruction. Risaliti *et al*¹⁴ has reported the incidence of 7.4% and 2.7% for urinary fistula and urinary obstruction respectively in their study. In our study all the patients with such complications were re-operated due to lack of interventional radiology services. A well-equipped and skilled interventional radiology unit can greatly reduce the need for surgical treatment¹³.

Vascular complications are less frequent with a reported incidence of 1% to 23% but have a more devastating course¹⁵⁻¹⁷. Arterial stenosis is documented to be the most common vascular complication and can result from an inadequate suture technique, trauma and kinking of the artery, rejection, and atherosclerosis of the donor or the recipient arteries¹⁸. Arterial thrombosis is the most dreaded of vascular complications,

which can result in graft failure. It occurs in about 1% of all transplanted kidneys¹⁹⁻²¹. This can result from technical difficulties in removing the implant, endothelial injury to the vessel during nephrectomy or at perfusion, kinking at the site of anastomosis and atherosclerosis of the recipient artery. Venous thrombosis is another rare surgical complication after renal transplant surgery. Generally it presents early in the postoperative period, and is one of the most common causes of early graft loss. The etiology is often multifactorial, but technical problems are usually present. Other vascular complications occurring in the postoperative period are hematomas and anastomotic aneurysmal formation. In our series, the most common complications observed were vascular with an incidence of 6.66% comparable to the literature^{16,17}. Arterial thrombosis was the most common, seen in 3.8% which is comparable to a study done by Zilinska *et al*¹⁷ who reported an incidence of 3.9% in their study. We also reported haemorrhage in 2.85% cases. Early recognition and corrective intervention avoided graft loss in two of these cases. In our study the frequency of multiple arteries was 12.38% which is comparable to the reported incidence in other international studies²². We also saw 2 cases of haematoma formation in our study.

Wound-related problems, such as infection is higher for renal transplant surgery than in other surgeries owing to the effect of immunosuppressive drugs on healing. Most cases of surgical site infection have been managed medically. Our rate of infection was 0.95% whereas in another study by Olakkengil *et al*²³ the reported incidence of wound infection was 5%. We have witnessed a reduction in the wound related complications by use of disposable drapes, opsite transparent adhesive film and restricting the operating room human traffic.

The limitations of the current study were small sample size and minor differences in the surgical techniques of the operating surgeons. Large sample size and analyzing data of individual surgeon would further uncover more

knowledge to improve the surgical complications of kidney transplant and avoid graft loss.

CONCLUSION

Vascular complications after renal transplantation need prompt detection and remedial steps to avoid graft loss. Urological complications, on the other hand, increases morbidity, often needs corrective radiological or surgical intervention, but rarely leads to graft loss.

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CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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