Urological complications after Kidney transplantation

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ABSTRACT

Background

Renal transplantation is a regular service at Tribhuvan University Teaching Hospital and complications have been known to occur after it. This study was conducted to assess complications after transplantation.

Objectives

To determine the incidence of urological complications after living related renal transplantation at Tribhuvan University Teaching Hospital.

Methods

A clinical study was performed (from August 2008 to July 2010) which included 50 living-related renal transplantations at Tribhuvan University Teaching Hospital. All the donors and recipients were evaluated preoperatively with necessary investigations and followed up postoperatively with standard hospital transplant protocol. The incidence of urological complications were documented and analyzed.

Results

Fifty living-related, renal transplantations were carried out during the study period. Seven doors had minor post operative complications; three had post operative fever, two had chest infections and each one had superficial surgical site infections and severe pain at incision site. Ureteroneocystostomy was performed with double J stent in all recipients. Urological complications were noted in 12 (24%) recipients. Clinical significant hematuria occurred in four cases. One patient had ureteric necrosis and urinary leak which required re-exploration post operatively. Two patients developed delayed ureteric stricture which were managed by antegrade Double J stenting and ureteric reimplantation. Peri-graft abscess occurred in two cases, which were drained percutaneously. surgical site infections was seen in one case.

Conclusions

Urological complications are inevitable in renal transplantation and our complications rate appears similar to that reported in literature.

Key words

double J stent, renal transplantation, urological complications

INTRODUCTION

The Renal Transplantation (RT) service was successfully launched at our institute in August 2008.[1] Country law only permits transplantation from living related donors,[2] and cadaveric transplantation, up to now, has never been practiced in Nepal. Urological complications after RT are not uncommon and given utmost importance because of its association with high allograft failure and even death.[3] The reported incidence of urological complications after RT ranges from 3% to 34%, but an incidence of 7% was quoted in the most recent large series.[4-6] The allograft loss rate resulting from these complications may be as high as 40%.[7] Thus, RT associated urological complication are of particular serious nature because the compromised organ is a solitary kidney and the patient is heavily immunosuppressed.[3]

The incidence of urological complications depends upon many factors, in particular, the duration of follow up and how broadly complications are defined. There is also an era effect, with a higher incidence of complications in studies during the 1970's and 1980's.[8] The last three decades have seen a dramatic reduction in complication rates as

a result of a better understanding of biological behavior; greater improvement in technique of vascular and ureteric anastomosis; and the advent of potent and effective immunosuppressant regimen. An especially important innovation has been the introduction of the double J (DJ) ureteric stent, which is being used in transplantation for splinting and draining the transplanted ureter.[3] Although there has been an increase in incidences of urinary tract infections noted in the patients where DJ stent is used, this can be overlooked because of its benefit to reduce the complication rate related to ureteric anastomosis. As a result, this present study is designed to determine the incidence and management of urological complications after living related RT cases at Tribhuvan University Teaching Hospital (TUTH).

METHODS

This clinical study was conducted in the urology and nephrology unit at TUTH from August 2008 to July 2010, over a period of two years. The first 50 consecutive end stage renal disease (ESRD) patients who underwent living related RT were included in this study. All the recipients and donors underwent a mandatory, detailed, clinical history and examination; routine and special investigations; vaccinations; economic and social assessment; and transplant education before the procedure.

Donors were evaluated preoperatively with spiral CT angiography to define renal vascular anatomy and left kidney was chosen whenever possible. All the donated kidneys were procured by open donor nephrectomy, which was carried out through a lateral flank incision along the line of 12th rib using a standard technique. The removed kidneys were perfused immediately at the back table through the renal artery using cold Euro-Collins solution and kept immersed in sterile ice solution until implantation. Recipients were taken up for surgery only after donors were extubated. Kidneys were transplanted extraperitoneally in the iliac fossa depending upon which kidney was procured. In all cases, the renal vein was anastomosed to the external iliac vein and the renal artery to the external iliac artery in an end-to-side fashion using a continuous 5/0 polypropylene suture. Ureteroneocystostomy (UNC) was performed using the Liche-Gregoir (LG) technique with double J (DJ) stent in all cases. A biopsy of the renal allograft was taken immediately after transplantation on the operation table. A single suction drain was placed in the transplant fossa before wound closure.

For the first one to two weeks; depending on the rate of post operative recovery; recipients were kept in a special transplant suit where strict barrier nursing was practiced and no visitors were allowed except for the donor, after which recipients were then shifted to surgical cabins. Routine complete blood count and renal function tests were performed once or twice daily whenever indicated, and drug levels were performed weekly. A routine ultrasound of the grafted kidney was done on the same day or the following morning by specialist radiologist whenever necessary. A post transplant isotope imaging of the kidney was not practiced routinely. After the patient was discharged from hospital, out-patient follow up was undertaken daily at transplant OPD for the first four weeks and then less frequently if patient health and kidney functions remained satisfactory. DJ stent was removed after 2-4 weeks under local anesthesia in the operation theatre.

Figure 1. Plain X-Ray (A) showing percutaneous nephrostomy tube in grafted kidney in situ (White arrow) and antegrade pyelography (B) showing stricture at distal ureter (Black arrow)

All the urological complications encountered during these periods were documented and entered in performa and analyzed. Different modalities were used to diagnose a urological complication; such as ultrasonography, aspiration of peri-graft collection with determination of its creatinine content. Percutaneous nephrostomy with antegrade urography was carried out if indicated. Further diagnostic and therapeutic procedures depended on the findings and the clinical course.

RESULTS

Fifty living-related renal transplantations were carried out during the study period, of which 29 (58%) were genetically related, and the rest were either spouses or other relations. The left kidney was given preference as far as possible. The right donor nephrectomy was performed

in seven (14%) cases. The major reason to choose right kidney was either multiple or early branching of left renal artery. The mean age of the donor was 45.5 (range: 24-68) years and 68% were females. The average time taken to perform donor nephrectomy was 112 (range: 80-180) minutes with no critical events during the procedure except slippage of renal vein in one case which was controlled and ligated safely without any need for post operative blood transfusion. Seven (14%) donors had minor post operative complications in which three had post operative fever for short duration, two had chest infections, one had superficial SSI and one had severe pain at the site of incision. The mean duration of hospital stay for donors was 6.7 (range: 5-12) days.

The mean age of the recipient was 34.2 (range: 16-60) years. Five (10%) patients had pre-emptive renal transplantation (PRT); others were in maintenance hemodialysis for average duration of 9.2 months. The average time taken for recipient surgery was 134 (range; 90-230) minutes. The mean warm ischemia time was 36 (range; 24-67) minutes. The median duration of hospital stay for a recipient was 11 days. DJ stent was removed on an average of 21(range; 11-29) post operative days. The median follow up of the patient was 15 (range; 2- 24) months.

Out of 50 recipients, urological complications were noted in 12 (24%). Clinically significant hematuria was seen in four cases (Table 1). Two patients were managed with only normal saline irrigation for period of 48-72 hours after which hematuria stopped without the need for blood transfusion. Remaining two patients required cystoscopy to remove the residual bladder clot and subsequently post operative blood transfusion.

DJ stent migration was seen in one case which was diagnosed intraoperatively before wound closure, and was managed by cystotomy and retrograde DJ stenting at the same sitting under fluoroscope guidance. Postoperative wound infection was seen in one case and peri-graft abscess in two cases. Ultrasound guided aspiration of peri-graft abscess followed by pigtail drainage was conducted in one case; while another case had superficial location of pus which was drained by incising the overlying skin.

One patient had ureteric necrosis and urinary leak which required re-exploration on the 7th post-operative day; the patient was managed with percutaneous nephrostomy and later found to have distal ureteric stricture (Figure 1). Antegrade DJ stenting was successful and patient is on regular follow up with normal creatinine level. One female patient, who received a kidney from her father, developed distal ureteric stricture after 3 months of transplantation which was confirmed by antegrade pyelography (Figure 2). Percutaneous nephrostomy followed by antegrade DJ stenting was done, which was subsequently changed two times at an interval of 6 weeks. She didn't respond to endourological management, so finally ureteric re-implantation was done with good outcome. All the details of urological complications and surgical procedures in recipients following renal transplantation are presented in Table 1 and Table 2.

DISCUSSION

Renal transplantation is now a well-established surgical procedure and the preferred form of renal replacement for patients with end stage renal failure.[9] In earlier days, incidences of urological complications was as high as 34%, partly due to the technique of kidney harvestment, ureteric reimplantation and immunosuppressive regimen (high dose of steroids). Over the last three decades, however, the incidence has steadily decreased so that most series are now reporting an incidence of about 7%.[4-6, 9] In this series we reported a complication rate of 24 percent, which seems higher than normal when compared to those in the literature. The higher than average complication rate can be put down to our liberal definition of urological complications, in which minor complications like insignificant hematuria and superficial SSI were also included, as proven by our complications related to ureteric reimplantation, which was only 6% in our series.

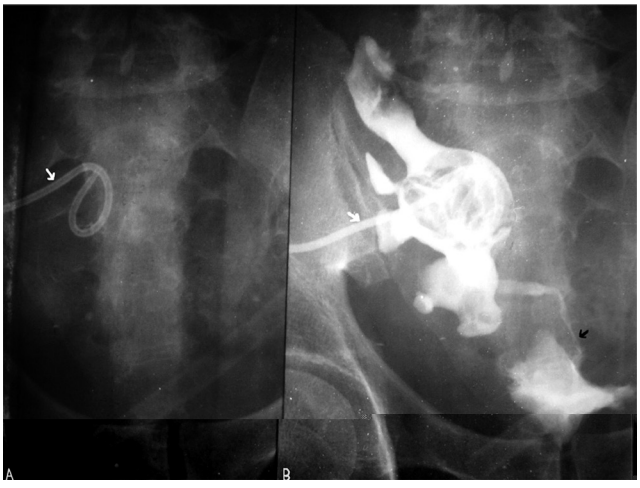

Figure 2. Antegrade pyelography of grafted kidney showing distal ureteric stricture (White arrow)

Table 1. Urological complications following renal transplantation (n=12)

Complications	Number(N=50)	%
Hematuria	4	8
Clot retention	1	2
Ureteric stricture/stenosis	2	4
Ureteric necrosis and urinary leak	1	2
Stent migration	1	2
Peri-graft abscess	2	4
Wound infection	1	2
Total	12	24

Urological complications can have a significant effect on the outcome of transplantation and may lead to loss of the graft. Due to this, avoidance is better than cure, and many complications can be avoided by paying meticulous attention to each and every step of the transplant operation; starting with the donor operation, where great care must be taken to avoid damaging lower polar arteries and avoid stripping the ureter of its adventitia. Bench dissection of the donor kidney before transplantation avoids similar problems in the vessels that are not pulsatile at this stage. The ureteric reimplantation at the end of the transplant operation itself must be done carefully using the shortest length of ureter possible but without placing it under tension.[8,9]

We employed DJ stent in all the cases and extravesical LG technique was the preferred method for UNC by the authors. This extravesical LG technique already gained popularity among transplant surgeons because of its low complication rate, as it is simple, requires less time and is technically easy.[10] Furthermore, prophylactically placed ureteral stent significantly reduced the rate of complications,[11] therefore, urinary leak or ureteric strictures were seen only in three cases (6%) in our study. Streeter et al[12] studied consecutive 1,535 renal transplants and reported that overall incidence of urological complications to be 9.2%, in that urinary leak or primary ureteric obstruction being 6.5%. Hussein et al[13] reported the incidence of urinary leak and ureteral stenosis to be 2% and 0.6% respectively, which is one of the lowest among published literatures.

The incidence of hematuria in our series was 8% (Table 1), which is significantly high as compared to other series'. We are taking renal allograft biopsies from the upper pole of the kidney before wound closure and that could be a possible explanation for such a high incidence of hematuria in heparinized recipients. Many centers have now stopped practicing routine baseline renal allograft biopsies in live related transplantations because they considered it irrelevant for future reference, although renal biopsies are very crucial for cadaveric donors and in selected cases. Two patients of hematuria in our series did not require any form of urological intervention except normal saline irrigation for about 48-72 hours. The remaining two needed repeated cystoscopies and clot evacuations under general anesthesia, while one was re-explored on the same day after having massive hematuria.

The wound infection rate after renal transplant was variable; in literature it ranges between 2% to 43% and is usually associated with diabetes, urinary fistulas, hematomas and post graft nephrectomies.[14] In our series, wound infection rate was 2% which is among the lowest in literature; while two of our patients developed peri-graft abscesses due to infections in peri-renal hematoma. Both of the patients were treated with drainage of pus without compromising the graft outcome. Similarly, Mazzucchi et al[15] reported their wound infection rate to be 3.1% (2 out of 64 transplant) in their study.

Table 2. Surgical procedures in recipients with urological complications following renal transplantation (n=12; N=50)

Procedure	Number	%
Cystoscopy and clot evacuation	2	4
Immediate re-exploration	2	4
Antegrade DJ stenting	2	4
Nephrostomy placement	2	4
Cystotomy and retrograde DJ stenting	1	2
USG guided aspiration of peri-graft abscess followed by pigtail drain placement	1	2
Incision and drainage	1	2
Ureteric re-implantation	1	2
Total	12	24

Higher risks of surgical complications to the transplant recipients were associated to the renal graft with multiple arteries and complete ureteric duplication.[16] At the beginning of the renal transplantation era, this fact was considered as a contraindication to the procedure. Nowadays, multiple vessels are not considered as a problem anymore, neither to open, or to laparoscopic nephrectomies.[15] The patient who developed ureteric ischemia and urinary leak in our series had received a kidney with multiple renal arteries from his wife. A preoperative spiral CT angiography had revealed bilateral accessory renal artery and the left kidney was harvested, but in fact, the left kidney had one smaller (1-2mm) accessory renal artery which was scarified during the procedure. The remaining two arteries were reconstructed at bench and anastomosed as a single ostium to external iliac artery, which obviously was a risk factor for the complication encountered.

Many authors tried to identify other causal factors that is associated with the development of urological complications.[12,17] Reek et al1[8] identified three major etiological factors responsible for urological complications to be poor technique of organ retrieval, technique of ureteric re-implantation and ureteric ischemia. Injury during organ retrieval was reported in 1726 of 9014 (19% - 7% vascular, 12% non-vascular) retrieved kidney in the UK.[19] Both the vascular and non vascular injuries contribute to the risk of urological complications. Streeter et al[12] analyzed the donor factors which could have association with urological complications and concluded that donor's age, cold ischemia time and origin of kidney (locally retrieved vs imported via organ-matching scheme) as a significant risk factors to predict the complications in recipients.

Although other possible complications after renal transplantation like lymphocele, renal calculi in transplanted kidney, urethral stricture, impotence were mention in literatures,[6-8,13] we did not come across with those complications. In fact transplanted renal calculi and malignancies are late complications and we have not crossed that time frame, so all the patients need to be in close watch to detect such complications in the future.

CONCLUSIONS

Urological complications are inevitable in renal transplantation and incidences of such complications in our small series appears similar to that reported in other literature studied.

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