Original Article

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Urological and surgical complications of renal transplant recipients as a single-center experience

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ABSTRACT

Background: Kidney transplantation is considered the most effective therapy for end-stage renal disease (ESRD). Postoperative complications continue to occur in nearly 12–20% of patients. These complications can be sub-divided into three categories: vascular, urologic, and nephrogenic.

Objective: To determine the surgical and urological complications of renal transplant in Basra Training Center.

Patients and Methods: A prospective descriptive study was done on 71 patients who underwent renal transplant surgery between October 2015 and August 2018. After taking their informed consent, preoperative antibiotics were given, and the procedure was done under general anesthesia. In all the transplantations, the renal vein of the donor was anastomosed to the external iliac vein of the recipient with an end-to-side. While the renal artery anastomosed to the internal iliac artery of the recipient with an end-to-end for the first 50 cases, in the other 21 cases, renal artery anastomosed to the external iliac artery of the recipient with an end-to-side anastomosis. Ureters were anastomosed by the Lich–Gregoire procedure.

Results: Overall, urological and surgical complications were encountered in 12 of the renal transplants recipients from the total number (71, 17%). This study included a total of 71 patients (59 male and 12 female, 83% and 17%, respectively). The complications that occurred during the follow-ups of the patients were as follows: one patient developed urinary leak (1.4%), five patients developed lymphocele (7%), four patients complained of acute pyelo nephritis (6%), one patients (1.4%) complained of wound infection, and one complained of renal stone (1.4%).

Conclusions: In conclusion, urological complications such as lymphocele (7%) and acute graft pyelonephritis (AGPN) (6%) remain the most common type of surgical complications following kidney transplantation (in this study). Our urological and surgical complication rate was relatively low compared to others noted in the literature.

Keywords: Kidney transplantation, ESRD, urinary leak, lymphocele

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INTRODUCTION

Kidney transplantation has been considered the most effective therapy for end-stage renal disease (ESRD) since the time the first human kidney transplantation was done by Joseph Murray in 1954 [(1)] It significantly reduces mortality by over 60% compared to dialysis, increases the predictable survival time twofold, and significantly improves quality of life despite the renal transplant (RT), which is the gold standered modality of ESRD treatment.[(2)]

Postoperative complications continue to occur in nearly 12–20% of patients.[(3)] These complications can be subdivided into three categories: vascular, urologic, and nephrogenic. A delay in the finding and management of any of these complications may lead to damage of the renal graft, morbidity, or even death. RT complications may be vascular (e.g., renal artery and vein stenosis and thrombosis, arteriovenous fistula, and pseudo aneurysms), urological (e.g., urinary obstruction and leak, and peritransplantation fluid collections, including hematoma, seroma, lymphocele, and abscess formation), and nephrogenic, including acute tubular necrosis, graft rejection, chronic allograft nephropathy, and neoplasm.[(4)] These complications can occur initially in the intra-operative direct postoperative period or later and result in a surge of morbidity, hospitalization, and costs.[(5)] Urologic complications are the most common surgical complications after RT, causing significant morbidity and mortality.

Recently, the incidence of urologic complications after RT have reduced from 12.5% to 2.5% due to improvement in surgical techniques and post-transplant management.[(6)] Urologic complications are the main reason for morbidity, delay in usual graft functioning, and, in some cases, graft damage and/or death of patient.[(5)] The aim of this study is to describe the pattern of urological and surgical complications following RT that occurs in Al Basra Center of Nephrology and Renal Transplantation as a single-center experience.

Urological complications

Urologic complications have a 2.6–13% incidence rate, and they frequently affect the lower part of the ureter and cause graft loss in 10–15% of the cases.[(7,8)] They are usually secondary to the changes in ureteral blood supply during graft surgery, which causes vascular damage and, consequently, necrosis. Most are apparent in the first thirty days after transplantation.[(9)]

Urological complications are the most common ones in the late period post kidney transplantation, presenting an incidence ranging from 2.5–12.5% [6], which is less than the incidence rate when RT was introduced (approximately 25%) [10]. These complications are the main cause for morbidity and delayed graft function, and they increase hospitalization costs. Ischemia of the donor ureter and failure in surgical procedure are the leading causes of urological complications.[(8)]

Urinary Leak

Urinary leak occurs in about 6% of patients post RT and is commonly seen in the first three months, as these patients are immunocompromised.[(11)] Urinary leak can cause life-threatening infections and requires rapid intervention. Imaging typically shows a peri-graft fluid collection. Ante grade nephrostography can precisely show the site of the urinary leak. Percutaneous nephrostomy can re-direct the urinary flow, which allows

ureteral healing. In patients with a suspected urinary leak, which often happens at the site of the cystostomy or ureteroneocystostomy, the leak can be confirmed by cystography.[12] The placement of double J stent and a nephrostomy catheter for urinary diversion can treat a majority of the cases. While a noticeable bladder leak is generally treated with primary surgical repair, most bladder leaks can be treated with bladder drainage only.[12] Percutaneous drainage has been reported to be promising in healing urinary leak in 37–100% of cases.[8, 12]

Urinary Obstruction

Urinary obstruction occurs in about 2% of transplanted kidneys, and a majority of them occur within the first 6 months of the surgery.[13] There are many causes for this, such as stricture in the distal part of the ureter, edema at the anastomotic site, a blood clot within the ureter or bladder, and perinephric fluid collections. Stones, ureteral kinking, perigraft fibrosis, sloughed papillae, and fungal balls are other, more rare, causes. Since the transplanted kidney lacks innervation, patients typically do not complain of classic renal colic when obstruction takes place. Thus, a raised level of creatinine may be the only initial sign. Hydronephrosis does not reveal only an obstruction—it is also seen in cases of reduced ureteral tone, which is a result of the denervation of the transplantation procedure. Percutaneous drainage is used to relieve obstruction and helps us use other radiologic procedures such as balloon ureteroplasty and double J-stent placement. When a balloon is used for dilation of post-transplantation ureteral strictures, the overall success rate is 90% of cases, with the best outcomes obtained in recently occurred surgical strictures. Ooor prognosis results in long-lasting ischemic strictures or zones of periureteral fibrosis.[14]

Peritransplantation Fluid Collections

Postoperative collections are common after RT and include hematomas, urinomas, lymphoceles, and abscesses. The appearance of peritransplantation fluid collections is nonspecific, and the diagnosis is usually made by imaging the guided aspiration.[14] Big urinomas can rupture intraperitoneally and cause free peritoneal fluid. [15] As with other fluid collections, urinomas can be treated with CT or u/s guided aspiration, followed by ante grade nephrostogram to confirm its complete remission.[16, 17]

Hematomas

Small amounts of peritransplantation fluid collections, which occur directly after transplantation, are mainly hematomas or seromas and are often regarded as normal sequela. Size, site, and growth decide the importance of a hematoma. Early (acute) hematomas are classically hyperechogenic, whereas resolved hematomas are hypoechoic or anechoic. They appear as a fluid collection with hyperattenuating areas on native (unenhanced) CT. Older hematomas may appear as heterogeneous collections with liquefied serous contents.[4] An acute hematoma is high in signal intensity on both T1-weighted and T2-weighted pulse sequences.[9] Percutaneous aspiration can be achieved to exclude abscess formation. However, due to its thick and multiloculated components and the increased risk of infection, the percutaneous nephrostomy drainage of the fluid collection is often not effective.[9]

Urinomas

Urinomas appear as encapsulated homogenous fluid collection adjacent to the ureterovesical junction in the early postoperative time.[14] Big urinomas can rupture intraperitoneally and cause intraperitoneal fluid collection.[15] As with other fluid collections, urinomas can be treated with CT- or US-guided aspiration, followed by antegrade nephrostogram to ensure complete remission.[18]

Lymphoceles

Lymphoceles occur due to the disruption of perivascular or hilar lymphatics, often 4–8 weeks after surgery. Its incidence rate is up to 15%. [19, 20] They are anechoic on U/S and may have septations. They appear as round and hypoattenuating collections, much like seroma on CT. They can progress to a more complex picture when infected.[15] A lymphocele requires management only if the patient is symptomatic, the lymphocele is compressing the ureter, or it is infected. Frequent aspiration or drainage may be required with or without sclerosing agent injections such as tetracycline, iodine, or ethanol.[19, 20]

Abscesses

Peritransplantation abscesses occur infrequently and usually within the first weeks after transplantation.[15] They may occur as a complication of surgery, sequelae of pyelonephritis, or a secondary infection of perigraft fluid collections. Imaging can reveal the problem, but distinguishing it from other fluids may be difficult. US and CT appearances of abscesses are relatively variable and can have cystic to complex and multiloculated expressions. Their walls may be poorly differentiated, and the inner clots and debris may appear as thick areas in native CT.[21] Abscesses may be managed with either ultrasound- or computed tomography-guided percutaneous nephrostomy drainage with great success and insignificant complication rates.[4]

Other complications

Infection

More than 80% of RT recipients face at least one period of infection during the first year. Quick diagnosis of infections and interventions for infectious diseases can help in preserving the graft function and improve patient life. Infections occur in the early weeks after transplantation, such as pneumonia, wound infections, and urinary tract infections (pyelo nephritis, for instance). Infections with opportunistic pathogens and cytomegalovirus often develop 1–6 months after surgery, and infections common in the general population are seen after 6 months.[22, 23]

Herniation Complications

The most common of these complications are adhesions that occur post-surgery, which may lead to bowel obstruction. Herniation of the intestine through a peritoneal tear may compromise the graft itself. Ureteral obstruction from obturator herniation of the ureter can also occur. Incisional hernia due to weakness of abdominal wall at the site of surgical incision have also been reported.[24]

PATIENTS AND METHODS

A prospective descriptive study was conducted in Al Basra Center of Nephrology and Renal Transplantation from October 2015 to August 2018.

This study included 71 patients, and the transplants were performed by the same group of surgeons in our Center for Renal Transplant

(all cases living donors, with first and second relative degree). A prospective observational descriptive study was performed to study the complications that occurred after surgery, and the effect of such complications on graft survival was assessed.

Full medical and surgical history, routine laboratory investigations, and imaging studies were done preoperatively. After taking informed consent, preoperative antibiotics were given, and the procedure was done under general anesthesia. In all the transplantations, the graft vein of the donor was anastomosed to the external iliac vein of the recipient with an end-to-side anastomosis using monofilament (5-0) non-absorbable. The renal artery was anastomosed to the internal iliac artery of the recipient with an end-to-end using monofilament (6-0) non absorbable in the first 50 cases. In the other 21 cases, renal artery anastomosed to the external iliac artery of the recipient with an end-to-side using the same non-absorbable monofilament (prolene); ureters were anastomosed by the Lich–Gregoire procedure. In the Lich–Gregoire technique, the bladder is opened by a single cystotomy and the ureter is stitched to the bladder with an absorbable (5-0) suture braided (vicryl). Then, a tunnel is created to avoid reflux, preceded by routine ureteral catheterization. A double J (DJ) stent was inserted into the ureter during surgery, and it was removed six weeks post-transplant in most of the cases. The urethral catheter was removed 5–7 days post-operatively in most cases. According to standard practice, patients received 1g of ceftriaxone preoperatively as antimicrobial prophylaxis, .and protocol standard immune-suppressant drugs were used. Drains were removed at 4–5 days post-procedure.

Follow up of the patients post-RT was done by history, physical examination, radiological assay (U/S) and laboratory assay (renal function test, and infectious scree (urine analysis and urine culture and sensitivity). We followed up with our patients every two weeks during the first three months, then every month up to the first year, and every three months over the period of the study. Descriptive statistics were done to evaluate the urological complications of renal transplants by using SPSS VERSION 21.

RESULTS

Overall, urological and surgical complications were encountered in 12 of the RT recipients from the total number. This study included a total of 71 patients (59 male and 12 female, 83% and 17%, respectively) (Fig. 1). Male to female ratio was 5:1, and the ages ranged from 15–54 years, with a mean age of 42 years.

The complications that occurred during the follow-ups of the patients are as follow: one patient developed urinary leak (1.4%), five patients developed lymphocele (7%), four patients complained of acute pyelo nephritis (6%), one patient complain of wound infection (1.4%), and one patient complained of renal stone (1.4%), as shown in Tables 1 and 2.

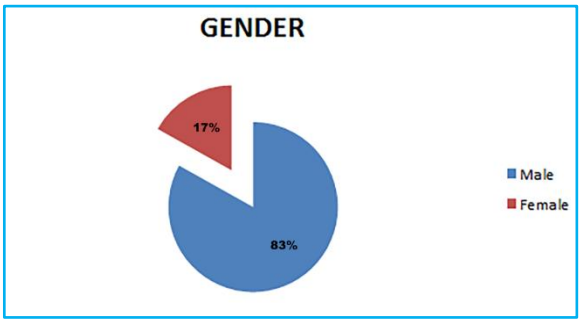

Figure 1: Pie chart depicting male to female ratio

Table 1: Frequency of complications

Complication	No.	Percentage
Acute pyelonephritis	4	6%
Lymphocele	5	7%
Wound infection	1	1.4%
Renal stone	1	1.4%
Urinary leak	1	1.4%
Total	12	17%

Table 2: Urological complications in kidney transplant patients

Complication	No. of patients (female/ male)	Mean BMI	Mean recipient age at the time of KTX
Acute pyelonephritis	4 (1/3)	23.3	46.2
Lymphocele	5(1/4)	27.2	43.6
Wound infection	1(1/-)	23	44 y
Renal stone	1(-/1)	22	56 y
Urinary leak	1(-/1)	26	50 y

DISCUSSION

The potential value of the present series is that it included many patients, all of whom received kidneys from living donors and underwent transplantation in the same center.

Surgical and urological complications occurring after RT still remain a major concern and a cause for morbidity, occasionally resulting in graft loss. The reported incidence of urological complications varies between 2.6–15% in some large series.[10–26]

Shoskes et al. [8] reported a rate of 7.1% in a series of 1000 renal transplantations. Similarly, El-Mekresh et al. [10] detected urological complications in 8% of 1,200 LRDTs. (living-related donor kidney transplants) Our urological complication rate for 71 LRDTs is 17%, which is slightly higher than the range of the literature.

Urinary leak

Urinary leak usually occurred as a result of ischemia of ureter.[27] Special technical care is needed to protect hilar fat and periureteral tissue during dissection. The type of ureterovesical anastomosis is another important factor for the progression of urological complications. In our patients, ureterovesical anastomosis was performed by using ureteroneocystostomy technique (Lich–Gregoir). The extravesical technique has recognized benefits such as decreased bladder bleeding, leak of urine, and obstruction, which are some of the main urological complications faced after kidney transplantation. The reported incidence of urinary leakage is 1.2–13%.[28, 29] Leakage at the level of ureterovesical anastomosis mainly occurs due to poor blood supply to the distal ureter.[30] In our series, urinary leakage developed in one case (1.4 %). It was managed by conservative management as a large-sized urethral catheter and kept in the ureteric catheter for longer, which is less than

that reported in El-Mekresh et al. (3.1%, 30), and less than that in Streter et al. (2,9%).[31]

Lymphocele

Lymphatic collection in the peri graft region is reported to have an incidence of 0.6–18%,[32] and most of these were small and resolved spontaneously. Although the main reason of a lymphocele is the lymphatic vessels originating from the donor kidney, the lymphatic vessels of the recipients also contribute to the lymphocele formation. Active management of the collection is indicated only if they are large enough to cause obstruction. We detected lymphocele in five patients (7%), four of them conservatively managed and one managed by ultrasound-guided aspiration. This incidence is higher than that reported in Khauli et al. (4.9%) [33] and Dinckan et al. (1.86%) and lower than that in El-Mekresh et al. (31) (24.3%).[34]

Renal stone

Urinary stones after RT is an uncommon complication. This complication was first documented by Hume et al. in 1966. [35] Many of the clinical features of urinary stones after transplantation differ from those in non-transplant patients. Typical renal colic or pain is usually absent because of the denervation of the transplant kidney and ureter. Rarely, the presentation [36] is similar to acute rejection or acute tubular necrosis. [36] In our study, one case of renal stone was reported (1.4%). It was treated by extra corporeal lithotripsy. This is higher than the incidence shown by Shoskes et al. (0.2 %, 8) and lower than that in Lancina et al. (2%) and Motayne et al. (1.8%).[37, 38]

Wound infection

Wound infections are a central cause for postoperative morbidity in patients following kidney transplantation. These patients can be at risk for graft damage and mortality as well beyond the routine risk of surgical site infections for typical procedures.

Kidney transplantation carries added risk caused by its necessary medication as strict immunosuppression agents prevent the inflammatory cytokines, which are responsible for transplant rejection. These cytokines are also responsible for the initial inflammatory phase of wound healing.[38, 39] The risk of infection is greater in the first year after surgery.[40] Wound infection in our center was 1.4%, which is less than that reported in Sousa et al. (UNIFESP) (10.3%), Menezes et al. (UFSPB) (13%), and Røine et al. (OUHR) (27%).[40, 41, 42]

Pyelonephritis

Although urinary tract infection (UTI) creates the most commonly occurring infection in RT patients, the effect of such a complication on graft and patient outcomes remains controversial.[43, 44] UTIs have been typically considered to be relatively easy to manage after RT, but recent data suggests the opposite.[45,46] Abbott et al. [45] and Kamath et al.[47] reported that late UTI increases the risk for both kidney loss and death of the patient. In our center, the incidence of acute graft pyelonephritis (AGPN) was 6% (four patients), which is less than that reported in Pellé et al. [46] (18.7%), Kamath et al.(16.5%) and Valera B et al. (26%).[48,49]
Lastly one of important limitation of the current study is the small sample size, further evaluation and studies is needed.

CONCLUSIONS

In conclusion, urological and surgical complications, especially lymphocele and acute graft pyelonephritis (AGPN), remain the most common types of surgical complication following kidney transplantation. Our urologic and surgical complication rate is relatively lower than others noted in the literature. We also noted that lymphocele occurs more often in males.

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