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A Review of Urological Abnormalities After Kidney Transplantation and their Management

Hadi Maleki[1,*], Maryam Abbasi Saeidi[2], Hamid Hosseinzadeh[3]

[1]Department of Urology, Faculty of Medicine, Alborz University of Medical Sciences, Karaj, Iran.
[2]Department of Biology, Faculty of Basic Sciences, Science & Research Branch, Islamic Azad University, Tehran, Iran.
[3]Pars Cilinic, Rasht, Iran.

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**Corresponding author: Hadi Maleki, Department of Urology, Faculty of Medicine, Alborz University of Medical Sciences, Karaj, Iran. Email: Hadi.Maleki88@gmail.com.*

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Abstract:
Urological issues in renal people with transplants include more than just posttransplant consequences. These issues contribute significantly to patient death and morbidity, resulting in long-term consequences for graft viability. Finally, transplantation is a key component of the urological network; hence, the transplant team ought to be ready for predictable and unforeseen urological difficulties in both the immediate and future. These mostly comprise surgical urological problems (urine leaks, ureteral stenosis, and vesicoureteral reflux) and bladder outlet blockage. A great deal has been achieved in the therapy of urological problems in the past few decades, owing mostly to developments in endourologic procedures. The purpose of this study is to outline the therapy of urological disorders following a renal transplant in light of present knowledge.

INTRODUCTION

End-stage kidney disease (ESKD) is a very serious illness that necessitates expensive and time-consuming treatment. Effective treatment for ESKD can considerably enhance the satisfaction of life and longevity; nevertheless, impediments, such as access to care, reactive rather than proactive therapy, and inequities in minority groups, severely influence ESKD patient treatment (1-3). Currently, kidney transplantation (KT) is unquestionably more effective for the management of ESRD in comparison to dialysis (4). The five-year survival rate alongside KT, irrespective of whether the donor is living or deceased, is over twice that of dialysis, whereas dialysis expenses three times more. Because of the longer lifespan and superior standard of life it offers, more KT are carried out every day within the globe (5). It is important to remember that KT is a medical procedure that, can lead to consequences (6). With present established criteria, better surgical methods and the introduction of suppressive medicines have resulted in record-low instances of posttransplant complication and organ loss (7). Urological disorders (UDs) account for the majority of surgically related issues, happening at rates ranging from one to fifteen percent following transplantation (8, 9). Nevertheless, criteria differ, making a reliable assessment of the frequency problematic. Also, UDs are not restricted to postoperative; these issues have been shown to have an influence on transplant viability and remain a major source of patient mortality and morbidity (9, 10). An examination of the research reveals that the primary emphasis when reporting urological diseases after surgery has been on postpartum UDs including urine leakage, ureteral stenosis, and vesicoureteral reflux (VUR) (11). As a result, while designing this study, we felt it was vital to address posttransplant UDs from a wider point of view. The purpose of this study is to outline the treatment of post-kidney transplantation urological issues in light of present knowledge (12, 13).

A review of UDs related to kidney transplantation

Problems in the early post-transplant phase can be roughly classified as vascular, urinary, fluid storage, and wound recovery issues (14, 15). Vascular problems include bleeding, thrombosis, aneurysm, dissection, and stenosis, whereas urological concerns mostly entail leaks and/or blockage of the accumulating network

(16). The majority of lengthy hospital stays are caused by initial surgical urological problems (17). Older donor age and the recipient's previous cardiac episodes are risk factors for UDs (18). Additional significant hazards are extended dialysis times and poor bladder capability (19). Yet, it is uncertain if living donor or dead donor transplants are associated with urological problems. Routine perioperative ureteral stenting has been proven to drastically minimize the risk of UDs (20).

Ultrasonography is the primary imaging technique for transplant assessment in the initial post-transplant duration, particularly when vascular issues, fluid accumulation, or blockage are suspected (21). Aside from being harmless, it can offer some further details on the function of the graft through measurement of the intra-renal conductivity index (22). Ultrasound and/or computed tomography-guided needle aspiration, accompanied by biochemical and bacterial investigation, is critical for determining the specific cause of fluid accumulation (23, 24). A fluid level of creatinine that is much higher than that in the blood implies a urine leak, compared to a lymphocele with serum-like values. Gram stain and cultures are crucial since any fluid accumulation may become contaminated (25).

Ureteral stenosis

Ureteral blockage happens to between two and ten kidney transplant patients after surgery, typically during the first several weeks or months. Prompt evaluation and treatment are critical to preventing graft rejection (26). A number of the patient, donor, and operational characteristics have been studied as indicators of ureteral blockage after donation (27). Allografts with over two renal arteries from donors over the age of sixty-five are at higher risk (28). The researchers hypothesized that many renal veins may be associated with "not enough inferior pole perfusion, generating relative ischemia to the ureter" (29). Extending ischemia duration and ureteroneocystostomy without ureteral stent implantation have also been linked to restriction development (30). Since the kidney transplant is denervated, the newly transplanted kidney patient seldom experiences signs of ureteral blockage until urinary tract restoration is performed by pyeloureterostomy or ureteroureterostomy to the native ureter (31). As a consequence, recipients often exhibit an undetectable reduction in kidney activity and a drop in urine production (32). Individuals can also be upset by a dull aching or fullness over the allograft as a result of peritoneal discomfort. The majority of ureteral restriction in kidney transplantation happens within three to six months following surgery, which is the primary objective of present medical care (33). Pathogenesis includes ureteral ischemic necrosis, ureteral stones, scar constitution that results in fibrosis around the ureter, chronic urinary system infection, AR, DGF, CMV, BKV infection (34). Numerous techniques, such as robotic surgery, endoscopic procedures, and stenting, are used to treat ureteric restrictions (35). Stenting involves inserting a wire mesh tube through a catheter into the ureter to keep it open and let urine flow (36). This is a short-term management choice. Robotic operation is a minimally invasive process that reconstructs the ureter and reattaches it to the renal system through small cuts (37). Balloon dilation, endoureterotomy, and laser endopyelotomy are examples of endoscopic techniques. For brief, nonischemic restrictions, balloon dilatation works well (38). A method of minimally-invasive surgery having a high rate of achievement is endoureterotomy (39).

Urine leakage

Urine leakage is most likely during the first two weeks after operation. Urine leakage is the most prevalent urologic problems following kidney transplantation, besides ureteral stricture, symptomatic vesicoureteral reflux (VUR), urolithiasis, bladder outlet blockage, and lymphocele-induced urinary tract blockage (40). A blocked urethral catheter, which causes significant intravesical tensions in the context of a freshly developed ureteroneocystostomy, must be recognized as soon as possible since it is an effectively repaired reason for urinary fistula (41). The most frequent urine leakage location is the ureteroneocystostomy (42). It is often caused by ischemia necrosis of the distal ureteral portion of the ureterovesical anastomosis (43). As a result, it is critical to avoid ureteral devascularization during transplant nephrectomy and to construct a watertight ureterovesical connection (44). Urine leaks during KT cause edema, discomfort, higher drain output, and deterioration of graft performance (45). These individuals must be closely monitored, sepsis excluded, and a Foley catheter placed. Drain fluid and Foley discharge must be checked (46). The magnitude of the urine leak following a kidney transplant determines the therapy, which may involve catheters, stenting, and radiographic draining (47). Minor leakages are frequently addressed with a long-term Foley's catheter, however, larger leakage may necessitate percutaneous nephrostomy, antegrade or retrograde stenting, and radiographic drainage (48).

Vesicoureteral reflux (VUR)

VUR is one of the most common urological consequences of KT. It is characterized as an irregular movement of urine rearward from the bladder to the kidney or, in severe situations, up to the kidney pelvis (49). In the majority of people, VUR can be inherited or acquired, after obstruction or breakdown of the bladder musculature, as well as malfunction of the

nerves that govern bladder evacuation (50). Clinical characteristics vary from asymptomatic to ESRD and seem to be closely connected to the seriousness of backflow and the frequency of urinary tract infections (UTIs) (51). The method used for ureteral insertion and bladder health at the point of donation is undoubtedly important variables in the occurrence of after-surgery VUR. The link between post-transplant VUR and a higher likelihood of UTIs is undeniable. However, the transplant society has yet to achieve a consensus on the ideal pre-emptive method, clinical significance, care, and influence on permanent allograft performance and longevity. The primary goal of VUR care is to minimize infections of the kidneys and destruction. Furthermore, doctors should strive to avoid UTIs while minimizing permanent evaluation and therapy processes. Treatment might be without surgery (e.g., urotherapy, antibiotic treatment), least-invasive (endoscopic injection), or surgery (ureteral reimplantation). Aside from VUR in the renal transplant, the existence of VUR in the native kidneys in cases of reflux nephropathy raises the risk of UTI, particularly in more severe reflux. Methods such as native nephrectomy in high-grade reflux or distal ureter closure in poor-quality reflux after surgery have been found to have a protective impact.

Bladder Outlet Obstruction (BOO)

A BOO is a condition that occurs where the passage of urine is either partially or fully obstructed. This causes signs such as decreased urine flow, pain in the pelvis, and bladder irritation (52). Persistent BOO can cause consequences including infections, bladder stones, diminished urinary tract function, and kidney disease. Urinary retention caused by BOO is a serious urological issue that can arise in the early as well as late stages following KT, especially in middle age and elderly men (53). Early evaluation and management of BOO are critical for maintaining allograft performance (54). Proper long-term transplant performance is contingent on low-pressure urine preservation and efficient bladder evacuation (55). In urinary retention, higher intravenous pressure caused by detrusor muscle tension has a negative impact on graft activity (56). This might result in leaking from the ureterovesical anastomosis or serious infections via the ureteral pathway, particularly in the initial days following KT (57). In over time, intravesical pressure rises owing to extended detrusor rigidity caused by BOO, and this elevated tension affects graft operation by inducing hydronephrosis (58). Luckily, investigations such as KT recipients have indicated that individuals who have permanent renal insufficiency owing to BPH demonstrate better renal function in both early and late operative examination (59).

Persistent UTI following KT

urinary tract infections (UTIs) are the most prevalent kind of infection after KT (as much as 47 percent). Furthermore, many individuals develop asymptomatic bacteriuria (ASB) soon after KT (60). Although most facilities treat asymptomatic bacteriuria within 1-3 months after KT, there is emerging evidence that this could be unneeded. The incidence of UTI appears to be higher with ureteral stents, especially during the initial month following the transplantation (61). Early catheter extraction lowered the incidence of urinary tract infections with no increasing risk of urine leakage and ought to be conducted within three weeks of following KT (62). Nevertheless, even after catheter extraction for UTI, the chance of recurring UTIs persists greater in individuals who previously suffered from catheterization-associated UTI (63). Any person with chronic or persistent urinary tract infections following KT ought to be thoroughly evaluated for anatomic or functional urinary tract deficiencies as previously described (64). Female sex, immunosuppression, previous severe rejection, CMV infection, re-transplantation, polycystic kidney disorder, Type 2 diabetes, and VUR in the native kidneys all increase the probability of urinary tract infections following KT (65). Prophylactic antibiotics ought to be supplied in the emergency condition and for initial recurrence, with special attention paid to screening for functional or anatomical allograft diseases (66).

DISCUSSION AND CONCLUSION

Drs. Joseph Murray, a plastic surgeon, and Hartwell Harrison, a professor of urology, performed the first effective kidney transplant. For many years, physicians were the main surgeons who performed kidney transplants (67). Currently, the surgical function of the urological in kidney transplantation is becoming less crucial due to, among other reasons, lower training in vascular procedures for speciality urologists (68). Yet, because of special difficulties connected to the genitourinary tract, urological involvement in KT remains crucial, and the urologist's knowledge of surgeries on the urinary tract is usually indispensable (69). UDs are prevalent following a KT, although they can be decreased by the application of ureteral stents, early identification, and quick management. According to the criteria, problems including urine leakage, ureteral stenosis, lymphocoele, lithiasis, urethral stricture, and vesicoureteral reflux happen in two percent to thirty percent of all patients (70). The bulk of them are ureteral problems caused by anastomosis errors. A large number of urological problems (82.5%) were treated using an endourological technique rather than surgical intervention (71). From 2002, regular placement of a ureteral stent has resulted in a substantial decrease in leakage of urine or fistula. Ureteral stenting,

while reducing the amount of urine leakage and initial blockage owing to anastomotic edema, might result in UTIs or urethral damage with hemorrhage (72). Consequences following KT might be difficult to control because of the increased risk from prior procedures and the necessity for continued immunosuppression in frequently comorbid individuals (73). Considering recent advancements in endoscopic urology, a minimally invasive treatment for urological problems may be a suitable choice. Furthermore, a thorough postoperative urologic evaluation before KT is required to establish risk factors before the operation. Finally, UDs following KT might have serious repercussions, including persistent graft malfunction and, ultimately, allograft removal (74). Effective transplantation is thus heavily contingent on both a complete urologic work-up before transplantation and the early identification of problems following operation (75). Notwithstanding a dearth of large-scale prospective studies, endoscopic therapy options provide minimally invasive choices for individuals with a range of UDs following KT (76).

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Authors' contributions

Conceptualization and reviewing: Hadi Maleki, Writing draft: Maryam Abbasi Saiedi and Hamid Hosseinzadeh The authors reviewed the manuscript.

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Availability of data and materials

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