



Three Times Kidney Failure Leads to Multiple Kidney Transplantation in a Middle-Aged Man and the Surgical Challenges: A Case Report

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Abstract

Background: Renal failure is a global medical problem responsible for 134 deaths/1000 person-year. Kidney transplant is the treatment of choice for ESRD (End Stage Renal Disease). There are many surgical and immunological challenges for kidney transplantation. One of these challenges is re-implanting the ureter of the transplanted kidney into the bladder. The patient has a history of two previous kidney transplantations, and is now diagnosed with kidney failure and in need for a third kidney transplantation, due to excessive adhesions from previous surgeries, reaching the bladder in order to connect the ureter was a challenge, in order to avoid such difficulty, the ureter of the nonfunctional native right kidney was implanted into the pelvis of the implanted one, which is considered an unorthodox technique for kidney transplantation.

Case presentation: A 40-year old male admitted to the organs transplantation unit at Al-Mouwassat University Hospital for renal failure. He is a 19 Pack-Year smoker, who suffers from hypertension and has a family history of hypertension. Other clinical examinations were normal and did not show anything of importance. His blood tests showed a blood Urea level of 239 mg/dl and a Creatinine level of 11.17 mg/dl. The surgery was done through Gibson surgical incision under general anesthesia and the patient in a supine position, the procedure included exposing the abdominal aorta and the right common iliac vein. End to side anastomosis was done between the implanted renal artery and the abdominal aorta, another anastomosis was made between the implanted renal vein and the right common iliac vein, but due to excessive adhesions from previous surgeries, reaching the urinary bladder was difficult, to avoid

Received: Jan 09, 2023

Accepted: Feb 06, 2023

Published Online: Feb 13, 2023

Journal: Journal of Nephrology and Hypertension

Publisher: MedDocs Publishers LLC

Online edition: <http://meddocsonline.org/>

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Keywords: Kidney transplantation; Multiple kidney transplantation; Kidney failure; Multiple kidney failure; Pyeloureteral anastomosis; Urinary reconstruction; Case report.

Abbreviations: ESRD: End Stage Renal Disease; CRF: Chronic Renal Failure; GFR: Glomerular Filtration Rate; BMI: Body Mass Index; Cr: creatinine; EGFR: Estimated Glomerular Filtration Rate; CKTR: Chronic Kidney Transplant Rejection; ATG: Antithymocyte Globulin; CNI: Calcineurin Inhibitors; MP: Methylprednisolone; CKD: Chronic Kidney Disease.

Cite this article: Raiy A, Murad MS, Hamdan H, Nakawa W. Three Times Kidney Failure Leads to Multiple Kidney Transplantation in a Middle-Aged Man and The Surgical Challenges: A Case Report. *J Nephrol Hypertens.* 2023;6(1):1018.



such difficulties we implemented the ureter of the native right kidney to the pelvis of the new transplanted kidney.

Conclusion: Three times kidney transplantation is a doable procedure, but it requires a vast experience and the ability to make decisions quickly, And Pyeloureteralanastomosis is a viable easy option for that procedure.

Background

Renal failure is a clinical syndrome defined by the kidneys inability to function properly. Globally, chronic renal failure prevalence is estimated by 13.4% and mortality rate is 134 deaths/1,000 Person-Year [1].

The definition of Chronic Renal Failure (CRF) is the impairment of renal functions for a long period of time which leads to an elevation in serum creatinine for more than three months or a calculated Glomerular Filtration Rate (GFR) less than 60ml per minute/1.73m² [1].

The term End-Stage Renal Disease (ESRD) describes the condition in which the patient needs renal replacement therapy [1].

Chronic renal failure is classified into five grades and three stages based on GFR, and kidney transplantation is the treatment of choice when GFR levels reaches 10ml per minute/1.73m² and 15ml per minute/1.73m² for diabetics [1].

There are many causes for CRF, the most common is diabetes mellitus and hypertension is the second most common [1].

Symptoms and signs of CRF include: Fatigue, poor appetite, nausea, vomiting, metallic taste, unintentional weight loss, pruritus, changes in mental status, dyspnea, or peripheral edema [3].

Diagnosing CRF can be done using many tests including: blood creatinine level, urinalysis, renal ultrasound, radionuclide renal scan, Kidney biopsy, CT scan, and/or MRI, and others [1]. Managing CRF depends on controlling the causes such as diabetes mellitus and hypertension, as well as the prevention and treatment of complications [1]. Hemodialysis is a renal replacement therapy which removes excess water, solutes, and toxins by an artificial equipment [4].

Estimated number of patients with ESRD who need renal replacement therapy is between 4.902 and 7.083 million [2].

The treatment of choice for those with end-stage renal disease is kidney transplantation, which proved that it could improve the quality of life for those patients [5].

Absolute contraindications for kidney transplantation may include the inability to tolerate surgery due to severe cardiac or pulmonary disease, active malignancy, active infection, active drug abuse and an uncontrolled psychiatric disease [5].

Relative contraindications are more variable and may differ depending on the institution and region which may include morbid obesity with a Body Mass Index (BMI) more than 40 Kg/m², history of noncompliance with dialysis schedule or medication regimen, frailty, psychiatric problems, and limited life expectancy (defined as less than the anticipated waiting time for a kidney) [5].

Every transplantation surgery requires two surgeries, one for the donor and the other for the recipient. There are two surgical approaches for a living donor, a minimally invasive fashion

(Laparoscopic and/or robotic surgery) and open surgery. The implantation in the recipient is done in an open fashion, the kidney is placed heterotopically in the pelvis, and renal vessels are anastomosed to iliac vessels and the ureter to the bladder [5].

Surgical complications may include: hemorrhage, thrombosis, infection, arterial Stenosis, lymphocele, urinoma [5].

Rejecting the transplanted kidney is not uncommon, the incidence of acute rejection within the first year is around 7.9% and the incidence of subclinical rejection at 1-year post-transplant is 25.8% [6].

Kidney allograft function is assessed by serum creatinine (Cr) and Estimated Glomerular Filtration Rate (EGFR) which requires measurement at or before each visit. Proteinuria over 500 mg/day may be an early marker of chronic kidney allograft dysfunction. Measuring hemoglobin, creatinine, and proteinuria 1-year post-transplant can be beneficial in the prognostication of kidney transplantation.

The main complication of chronic kidney transplant rejection (CKTR) is allograft loss, which leads to kidney failure and possibly death, especially in patients who are poor candidates for repeat kidney transplantation [7].

In a traditional kidney transplant surgery, the surgeon may face some challenges such as aberrant anatomy, multiple arteries, renal artery atherosclerosis, dealing with the lymphatic structures in the allograft, etc. Technical complications in kidney transplant surgery include early postoperative problems (such as tachycardia, hypotension, oligo/anuria, excessive pain, tenderness, fullness, or mass at the operative site). Vascular complications (such as allograft thrombosis, stenosis in the transplanted renal artery, Post-biopsy arteriovenous fistula, and pseudoaneurysm). Urologic complications (such as ureteral obstruction and urine leak) [8]. Technical difficulties of re-transplantation after the second graft include severe calcifications of the recipient's aortoiliac vessels, adhesions, and scars in the retroperitoneal space which make vascular dissection more challenging, increased operation times and blood loss as well as vascular and ureteric complications [9].

Case presentation

We report to you a case of a 40 year-old male, who was referred to the hospital for kidney transplantation, he is a 19 Pack-Year smoker, his medical history included hypertension as well as a family history of hypertension. The patient showed signs of fatigue and mentioned that he suffers from nausea and low urine output, other clinical examinations were normal and didn't show anything of importance.

His surgical history showed that he had had two previous kidney transplantations, and with these information reaching the diagnosis of renal failure was clear.

The first kidney was transplanted in 2011 in his right Iliac fossa, but due to logistical reasons and the patient living in Alrakka which was under ISIS control, he stopped getting his immunosuppressive therapy which led to its failure, in 2017 he had a Creatinine level of 11.6 mg/dl, and a blood Urea of 132 mg/dl, and he had a second kidney transplantation in his left Iliac fossa.

In 2021 he was referred to the organ transplantation unit in Almuwasat hospital for a third kidney transplantation, the reason for the second kidney failure was unknown but his blood tests showed a blood Urea level of 239 mg/dl and a Creatinine

level of 11.17 mg/dl.

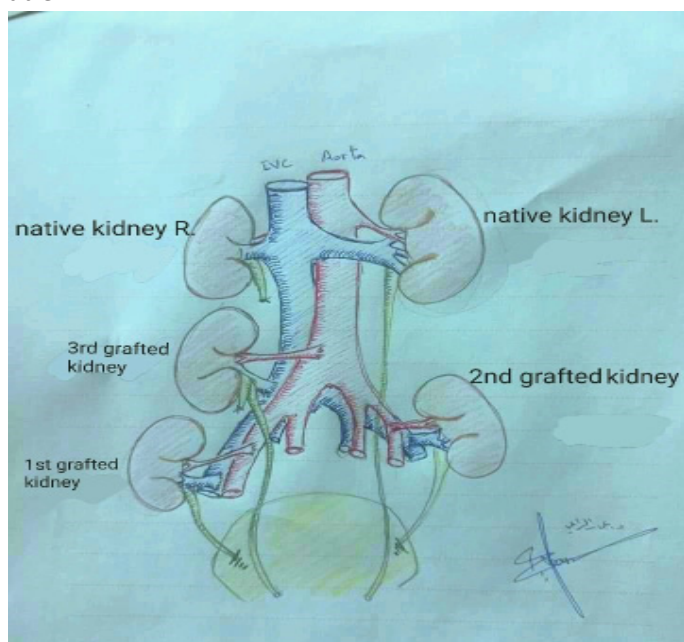
The surgery was done through Gibson surgical incision under general anesthesia and the patient was put in a supine position, the procedure included exposing the abdominal aorta and the right common iliac vein, an end to side anatomical anastomosis was made between the implanted renal artery and the abdominal aorta, and another end to side anastomosis between the implanted renal vein and the right common iliac vein. Due to excessive adhesions from previous surgeries, reaching the urinary bladder was difficult, to avoid such difficulty a pyeloureteralanastomosis was made between the ureter of the unfunctional native right kidney and the pelvis of the new transplanted kidney.

Used immunosuppressive agents included: Anti-Thymocyte Globulin (ATG) which was used as an induction immunosuppressant, and for maintenance: Calcineurin Inhibitors (CNI) were prescribed for life, Myfortic (mycophenolic acid) and Methylprednisolone (MP) were also prescribed for life.

The follow up included: getting a Doppler ultrasound for the implanted kidney after a week and another after a month from surgery. Urinalysis, blood urea and Creatinine levels were measured twice a week and measuring the levels of Calcineurin Inhibitors (CNI) was done once a week for a month. The follow up also included using a Foley catheter for 5 days and a double J catheter for 45 days. Surgical drains were removed after 6 days and the patient left the hospital after their removal. Stitches were undone 15 days after the surgery. Getting a renal ultrasound was done once a week, it showed in the first two weeks an accumulation of fluid under the skin, the Creatinine level of which was 12 mg/dl, this was managed conservatively with a Foley catheter drainage to the bladder for 15 days, the patient also had three months of house quarantine.

The surgery was successful and the patient was discharged from the hospital 6 days after the surgery.

During his last check-up we asked the patient if he committed to the instructions given to him by the surgical team and if the aftermath of the surgery was tolerable, he mentioned that he followed the instructions and the recovery period was tolerable.



An illustration of the surgical anastomosis.

Discussion

Chronic kidney disease is a global challenge that has a global prevalence rate of 13.4% [2]. Kidney transplant is usually the treatment of choice for end-stage kidney disease [5], it has a mean graft survival rate of 35.6 months.

Reviewing PubMed library in the past 10 years shows that Chronic Kidney Disease (CKD) has a mortality rate of 134 deaths/1000 person-years based on a population-based study [7]. First year incidence of acute rejection was 7.9% and first year subclinical chronic rejection was 25.8% [6,7].

It is diagnosed using: blood creatinine level, urinalysis, renal ultrasound, radionuclide renal scan, Kidney biopsy, CT scan, and/or MRI and others [1]. Our patient's blood creatinine level was 11.17 mg/dl which lead to the diagnosis of kidney graft failure.

The preferred surgical technique for a kidney transplant includes ureterovesical anastomosis using either Lich-Gregoir or Politano-leadbetter techniques [10]. However, the surgical team was not able to apply these techniques on the patient due to excessive adhesions. The surgical technique used was pyeloureteral anastomosis on the original ureter, which is a well documented treatment for ureteral complications after kidney transplant [11].

Pyeloureteralanastomosis is briefly mentioned as a viable option for urinary reconstruction during kidney transplantation in "Textbook of Organ Transplantation" by Kirk et al., where they stated that the most likely complication of this technique is urinary leakage [8]. Lieter et al. found no chance for reflux to occur using this technique in his paper in "The Journal of Urology" and deemed it satisfactory [12]. While Skatin et al. found a 4.28% chance for complications after implementing pyeloureteralanastomosis in a study involved 70 patients [13].

All these aforementioned papers described pyeloureteralanastomosis as an easy technique with low chance of complications, which shows the need for reevaluating the conventional methods used in similar cases.

The standard surgical procedure entails a 5-3% chance for urinary leaks, where the most common location is the newly created ureteroneocystostomy, it also entails ureter stricture caused by ischemia in the lower part of the grafted ureter [8].

Urinary leakage has nearly the same prevalence in the standard procedure compared to pyeloureteralanastomosis, however, ischemia and stricture in lower ureter have not yet been reported when using pyeloureteralanastomosis and are expected to have lower prevalence than the standard procedure due to the usage of the native ureter, which has adequate blood supply [8,12,13].

The preferred surgical technique for a kidney transplant also includes arterial anastomosis in end-to-side fashion to the external iliac artery, however, previous anastomoses that were done during past transplantations and the resulting excessive adhesions prevented us from accessing the external or internal iliac arteries, arterial anastomosis was done into the abdominal aorta in end-to-side fashion. Anastomosis into the abdominal aorta is shown to be a viable option when the iliac arteries are not suitable for anastomosis, or cannot be reached [8,14].

The standard procedure also includes venous anastomosis into the external iliac vein, however, anastomosing the grafted renal vein into the common iliac vein was shown to be suitable in cases where the grafted vein is too short, or when reaching the external or internal iliac veins is not available, this correlates with our case, where the excessive adhesions prevented us from reaching the aforementioned veins [8,14].

There is no medical consensus whether to remove the dysfunctional kidneys or not, however, it is considered common practice for failed grafts that have not been removed for 1-2 years to be left in situ, and removing them has not been found to have better prognosis for the graft or the patient. Papers advocating for removing previous grafts consider them a source for inflammation, and it allows for immunosuppressant cessation in patients who are not expecting a new graft [15].

Considering these results, and in light of the excessive adhesions the patient has, previously grafted kidneys were left in their place in our patient.

Immunosuppressive therapy using ATG as induction and combining calcineurin inhibitors and myfortic as maintenance is recommended by the national institute for health and care excellence in the UK [16], while low dose methylprednisolone in maintenance is considered safe and beneficial, especially in patients with cardiovascular risk factors [17].

Considering that our patient has hypertension, which originally caused his renal failure, his immunosuppressive therapy included ATG as induction, and calcineurin inhibitors, myfortic, and methylprednisolone as maintenance.

Third and fourth kidney transplant is familiar in medical literature [18,19], and the most recorded kidney transplants done on one patient is 7 on a patient from the Netherlands [20]. However, this is the first documented case of a third kidney transplant in Syria.

Two strengths of this study is the usage of an unconventional surgical technique, besides being a regional breakthrough.

This case was published on local medicine-related pages on social media.

Conclusion

Transplanting a third kidney is a challenging surgical procedure while pyeloureteralanastomosis is an effective and easily applicable technique which entails low risk for complications.

Declaration

Ethics Approval and consent to participate

Not applicable.

Consent for Publication

Verbal informed consent was obtained from the patient for the publication of this case report and any accompanying images, the consent was verbal because the patient moved to another governorate at the time of writing this paper.

Availability of data and material: Not applicable.

Competing interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

Funding

No funding was received for the writing of this case report.

Acknowledgment

The authors would like to thank the surgical team for their hard work during and after the surgery.

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