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## Case report of cadaveric kidney transplantation with renal-portal venous drainage: A feasible way for a venous drainage in a complex generalized thrombosed vessels setting

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## ABSTRACT

**INTRODUCTION:** One of the frequent complications suffered by patients with chronic renal failure is the lack of vascular access due to venous thrombosis. This means that the transplant surgeon must have a detailed knowledge of the intra-abdominal venous system, and other alternative surgeries, at the time of performing the renal graft implant, in order to ensure a good venous drainage.

**PRESENTATION OF THE CASE:** This article provides a case report regarding a patient with no vascular access and with surgical difficulties at the time of the kidney transplant, in whom a renal-portal venous drainage was performed with very good outcome.

**DISCUSSION:** Renal-portal venous drainage is a way to performe kidney transplant with good outcome. In Fundación Valle del Lili we have overcome the lack of vascular access in patients that need a renal transplant by new surgical technics that improve the patients quality of life and survival.

**CONCLUSION:** We can conclude that new surgical alternatives exist for those patients with chronic renal failure that have no vascular access. These patients are a priority for kidney transplants and the surgeon must take in to account the need for a new surgical assessment.

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### 1. Introduction

In order to manage their condition optimally, patients with terminal chronic renal failure require a kidney transplant, or other alternatives of renal replacement therapy as peritoneal dialysis or haemodialysis. For these options to be viable vascular access are necessary, which can be achieved through the creation of a peripheral venous arterial fistula or through central venous high-calibre catheters (permanent or temporary). Often these accesses

are achieved through prosthetic materials that in several circumstances require multiple changes due to complications such as thrombosis or infection. Which, in turn, generate structural alterations of the venous system and can lead to the development of sclerosis and therefore later difficulties in ensuring a dialysis route [1].

Patients experiencing these type of difficulties are considered a priority in the waiting list for renal transplantation; there are technical challenges involved in ensuring the venous drainage of the renal graft when secondary vascular alterations arise in the areas of common deployment. It is necessary, therefore, to consider other, less frequently used, options that could be employed in order to overcome this difficulty. Such options include the inferior vena cava, the mesenteric veins, the vessels gonadal and portal vein, amongst others [6].

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We present the case of a patient with vascular access difficulties, who received renal transplantation from a cadaveric donor, and in whom it was necessary to ensure vascular drain through a non-conventional anastomosis towards the portal vein.

## 2. Case presentation

We evaluated a 11-year old female patient from Colombia in, with diagnosis of VACTERL association. Characterized by multiple congenital malformations such as anal atresia, cardiac and spine defects, anomalies in the extremities, hypoplasia and chronic kidney failure. The patient was in haemodialysis via a Mahurkar catheter in the right femoral vein. The femoral catheter was lost due to an obstruction, which required various new vascular accesses (femoral and iliac) causing multiple venous thrombosis. The interventional radiology group evaluated the patient and performed a cavography they inserted a translumbar catheter, which caused thrombosis and stenosis along the inferior vena cava. The translumbar catheter was changed, leaving it above the thrombosis in the inferior vena cava, as it was near the right atrium.

The pre-transplant protocol was initiated, by entering the patient on the waiting list, and the patient was given priority, due to the lack of vascular access.

## 3. Surgical technique

The kidney was recovered from a cadaveric donor. A medial laparotomy was performed supra- and infra-umbilical to the receptor, during which it was found that a large part of the abdomen was blocked by multiple intestinal adhesions with oedema of the small and large intestine. Mobilization was undertaken of the right colon and the second portion of the duodenum using the Cattell Braasch and the Kocher manoeuvre. Also was performed the dissection of the abdominal infra-renal aorta and the inferior vena cava, across its whole length. Extensive thrombosis and severe fibrosis were observed in the inferior vena cava and, as such, it was necessary to locate the superior mesenteric vein in order to perform anastomosis of the renal vein, but it was impossible to do this due to the threadlike nature of the vein due to the thrombosis.

While the dissection of the hepatic portal vein it was found an extra-renal vein of good calibre and it was decided that the implant of the renal graft should be undertaken via an anastomosis at the lateral side of the renal vein to the portal vein with continuous running suture of 7-0 prolene (Fig. 1). The anastomosis of the renal artery was performed via the infra-renal abdominal aorta, forming a bridge of the graft using the donor iliac artery, resulting in an end-to-end anastomosis using continuous running suture of 7-0 prolene. Subsequently, the ureter was implanted to the intra-peritoneal bladder, with no complications during the surgical procedure. The abdomen was left open using a vacuum pack because of the bowel loops distension.

The patient was moved to the paediatric ICU for post-surgery handling, where she received initial immunosuppression with methylprednisolone and Mycophenolat-Mofetil and induction with thymoglobuline. The patient had a satisfactory clinical evolution with decreased creatinine levels and 48 h after the initial surgery, she was taken to surgery for the review of the cavity and the closure of the abdominal wall.

Later, the patient was moved to the ward, with medical management, during which time her renal function was normal with a creatinine level of 0.33 mg/dL. She was discharged with instructions to attend control appointment with the paediatric nephrologist.

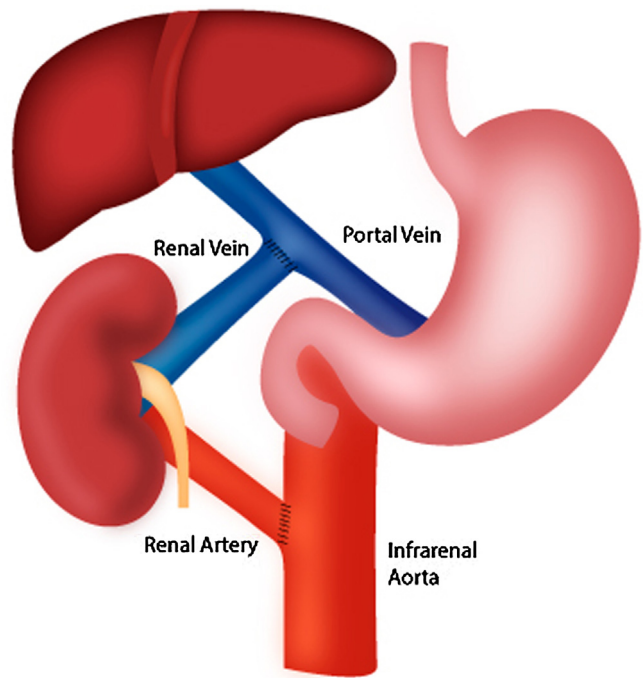


Fig. 1. XXX.

## 4. Discussion

Traditionally, renal allografts are placed in the right lower quadrant of the abdomen via a crescent-shaped incision called Gibson. During the procedure, the external iliac vessels are dissected after ligation of the lymph vessels with the aim of avoiding postsurgical complications, such as lymphocele. Then the anastomosis is performed laterally to the blood vessels of the kidney graft to the blood vessels of the right external iliac vessels, achieving these anastomoses with a continuous running suture of 6–0 prolene. The graft's venous drainage is connected to the external iliac vein or to the common iliac vein on the right side. Once the vascular anastomosis is completed, the kidney to be implanted is perfused with withdrawal of the vascular clamps. Subsequently, the ureteral implant is connected to the bladder after placement of a catheter in double J in the ureter [2].

When patients need a second transplant, the surgical procedure is done in the left iliac fossa of the abdomen using the same surgical technique. In the event that the patient loses the second transplant and need to have a third transplant, a median laparotomy is used, during which the right colon is mobilised using the Cattell-Braasch manoeuvre and vascular dissection of both the inferior vena cava and the abdominal infra-renal aorta in order to place the renal graft.

This leads to a risk of thrombosis in the common iliac vessels and the inferior vena cava after the surgical intervention in patients who have received their dialysis through a translumbar catheter. At this point, the transplant surgeon must review other surgical alternatives through evaluation of the portal and mesenteric venous system in order to define the ideal anatomic site to enable venous anastomosis and to ensure an optimal venous drainage for the renal graft. Doing this type of reconstructions implies the risk of complications as thrombosis of the spleen-portal system, which finally could lead to portal hypertension with a pre-sinusoidal origin. In this case this complication wasn't presented.

In the paediatric population weighing under 15 kg, the initial approach is intra-abdominal because this allows an ideal space for the renal implantation, a decreases the risk of possible vascular complications. The abdominal aorta and the inferior vena cava

are ideal sites to perform the infra-renal vascular anastomosis [3]. Renal–portal venous drainage is an alternative as we describe in our case report, but surgeons must take into account that after doing a partial occlusion with vascular clamps it exists the risk of portal thrombosis that could lead to renal and hepatic venous drainage occlusion, loss of the graft and death.

A literature search was undertaken to determine which other types of surgical approaches have been used, via a focus on retrospective studies and case reports in the paediatric population.

The first study found was a retrospective series published in 2001 in the *European Journal of Urology*, undertaken by Dr. J. Adams and collaborators from the Children's Hospital of the University in Heidelberg, Germany. The study reported the experience of 61 paediatric patients who received a kidney transplant. The patients were divided into two groups: the first group consisted of 31 patients with the renal graft placed in the iliac fossa, and the second group consisted of 30 patients in whom the renal graft was placed in the retroperitoneal space in the infra-renal abdominal aorta and in the inferior vena cava. It was reported that the transplanted patients in group 1 developed 25.8% more vascular complications in comparison to the group 2 patients with 5-year survival of the graft being 86% in group 2 and 5-year survival of 51.6% in group 1. The overall recommendation of the study was that paediatric patients weighing less than 15 kg should be treated using the retroperitoneal approach with vascular anastomosis of the renal graft to the large vessels [3].

In 2002, Serafin Novas, F. Veiga and other Spanish collaborators published two reports of cases from adult patients aged 24–68 years with chronic renal failure and thrombosis of the inferior vena cava. All patients received their kidney transplant with venous drainage to the superior mesenteric vein and arterial anastomosis to the common iliac artery right in the retroperitoneal position. All patients had satisfactory clinical developments and normal renal function and the authors recommended this surgical option in patients who have thrombosis of the inferior vena cava [4].

In 2007, Martinez Urrutia and collaborators at the University Hospital of La Paz in Madrid, published a retrospective series of 208 paediatric patients, 4 of which had thrombosis of the infra-hepatic cava which was diagnosed during the pre-transplant assessment. Three of them were implanted in the form orthotopic on the left side, after a nephrectomy, and one was implanted in the left iliac fossa. The venous anastomosis was performed in the infra-hepatic vena cava and the renal vein, with the arterial anastomosis to the abdominal aorta. The survival of the grafts at 3 years was 100%; the patient that received the implant to the left iliac fossa experienced organ dysfunction due to arterial hypertension. This research recommends this surgical technique for this type of paediatric patients [5].

In 2008, V.K.H Wong, R. Vaker and their collaborators reported a case in the *American Journal of Transplantation*. The case concerned a kidney transplant with venous drainage to the ovarian left vein in a 39-year old female patient with chronic renal failure due to diabetic nephropathy, which was associated with thrombosis of the iliac vessels, and the inferior vena cava, due to coagulopathy and factor V deficiency.

Management was initiated with warfarin and a renal transplantation was taken from a cadaveric donor, the venous anastomosis was performed in the left ovarian vein. There were no complications during the surgical procedure. This patient had a satisfactory clinical evolution, with follow-up, and nine months after the transplantation they had normal renal function [6].

In regard to the kidney transplant with hepatic portal anastomosis as reported, in 2002, by Dr. Velásquez, Ospina and collaborators from the San Vicente de Paul Hospital in Medellín, Colombia, they reported the case of a female patient who developed oedema and

ascites twelve days after birth (in 1995). After a month, the patient experienced deterioration in their renal function, similarly to her brother who had died of nephrotic syndrome after three years of initially experiencing deterioration in their renal function following a kidney transplant using his father's kidney. During her surgery, no inferior vena cava or iliac vessels were found, which meant that the venous drainage of the renal graft was undertaken via the portal vein with no complications. The patient had a satisfactory clinical evolution with normal renal function tests [7].

In 2013, in *Paediatric Transplantation*, a case report was presented detailing a renal transplantation with portal-renal anastomosis in a 19-month-old male patient who suffered from chronic kidney failure induced by hypovolemic shock secondary to the rupture of a right accessory renal vein, the management of which was surgical. The patient developed thrombosis of the inferior infra-renal vena cava due to the surgical trauma. The patient received dialysis for six months. They received a kidney transplant, which was unsuccessful due to the development of a venous thrombosis in the renal vessels. Subsequently, the patient received a second transplant, using a portal-renal anastomosis for venous drainage. After the second transplant, the patient had a satisfactory clinical evolution with a normal renal function [8].

## 5. Conclusion

We can conclude that new surgical alternatives exist for those patients with chronic renal failure that have no vascular access. These patients should be a priority for kidney transplants and the surgeon must take in to account the need for an assessment of their spleen portal venous system during the pre-transplant evaluation, with a view to ensuring venous drainage of the graft even when there is a thrombosis in the inferior vena cava or in the two iliac vessels.

## Conflicts of interest

The authors have no conflicts of interest to declare.

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## Ethical approval

Fundacion Valle del Lili, IRB approval.

## Consent

Written informed consent was obtained from the patient for publication of this case report.

## Author contribution

Mauricio Millan; Luis A. Caicedo; Gabriel J. Echeverri: Study concept and design. Mauricio Millan, Liliana Caicedo, Mauricio Duque: Acquisition of data, Drafting of the manuscript and edition: Laura S. Thomas Gabriel J. Echeverri, Mauricio Millan. Oscar Serrano, Jorge I. Villegas, Gabriel J. Echeverri, Luis A. Caicedo: Critical Revision of the manuscript for important intellectual content.

## Guarantor

Gabriel J. Echeverri, MD.

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