

Case Report

Ectopic Pelvic Kidney with Anomalous Vascular Supply during Deceased Organ Procurement – Case Report

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Abstract

Even though renal ectopia is common, there have been very few reports of these kidneys being used for transplantation. The concerns with using such kidneys are subnormal function, ureteral anomalies and complications and anomalous arterial supply which makes arterial reconstruction challenging. Majority of reports are for use in living donor transplantation where good preoperative imaging is available. There is very scant literature reporting use of ectopic pelvic kidneys from deceased donors. We report a case of an ectopic pelvic kidney found during procurement, which could unfortunately not be used for transplantation due to vascular anomalies. It is important for procuring surgeons to anticipate these anomalies and know how to modify the procurement procedure in order to procure these kidneys. Ectopic kidneys can occasionally be used for transplantation if the vasculature can be reconstructed adequately. They can thus serve as an additional source of organs for transplantation. If known before the procurement, every attempt should be made to get a formal CT angiogram to assess the vascular and pelviureteral anatomy of the ectopic kidney.



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Keywords

Ectopic kidney; pelvic kidney; kidney transplant; organ procurement

1. Introduction

Due to ongoing shortage of donor kidneys and the growing kidney transplant waitlist, marginal kidneys are being increasingly utilized for transplantation. Ectopic kidneys are also considered marginal because of higher risk of surgical complications and have traditionally not been considered for transplantation.

This anomaly is very infrequently encountered during deceased organ procurements. There has been just one case report of a pelvic deceased donor kidney which was used for transplantation [1]. We herein describe a case of ectopic right kidney found in the pelvis of an organ donor with vascular anomalies.

2. Case Report

A 33-year-old white female was found in cardiac arrest secondary to drug overdose. After initial resuscitative efforts, she regained spontaneous circulation but eventually progressed to brain death and was designated an organ donor by her family. She had a history of hypertension but no other medical or surgical history.

After initial resuscitation, her blood work revealed an initial creatinine of 2.53 mg/dl, peak of 4.44 mg/dl and terminal creatinine of 4.28 mg/dl, HbA1c of 5.8%. Her urine output averaged 150 ml/hour during resuscitation. The patient did not undergo extensive imaging during her workup, but based on her laboratory studies, our transplant center accepted the kidneys from this donor as an import.

During the organ procurement, while reflecting the right colon, right kidney was not in the usual lumbar position. Instead, a structure was found in the pelvis which on further dissection was determined to be an ectopic right kidney (Figure 1). The left kidney was in the normal left lumbar position. On further dissection of the ectopic kidney, it was found to have two arteries, one of which was originating from the bifurcation of the aorta and the second artery originated from the right iliac artery. There was a single renal vein which drained into the left common iliac vein. Based on the vascular anatomy, we cannulated the left common iliac artery for in-situ organ flush in order to save the ectopic kidney for transplantation. The distal right common iliac artery was clamped to prevent perfusion going down to the legs. The kidney flushed very well and was carefully removed along with attached distal aorta, right common iliac artery and the left common iliac vein. The ureter was dissected all the way to the bladder and removed with a bladder patch to get the maximum length possible.

On back-table, it was noted that while the kidney had an excellent perfusion, the main renal artery was originating from the bifurcation of the Aorta and was inserting into the upper pole and there was an aberrant lower polar artery which was coming off laterally instead of the usual medial hilar location (Figure 2). Due to these vascular anomalies, the kidney was deemed inappropriate for transplantation.

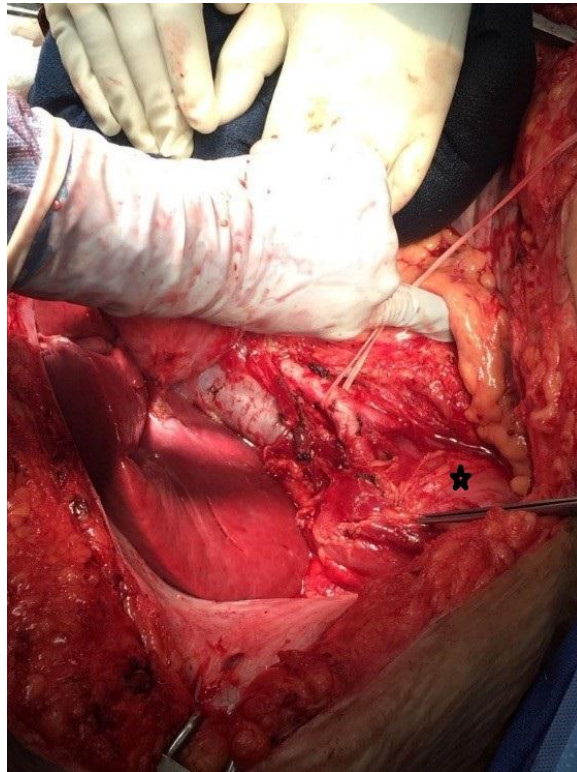


Figure 1 Exposed retroperitoneum with the pelvic kidney marked with a star. The aorta can be seen with the bifurcation. IVC and liver can be seen as well



Figure 2 Kidney on the back table showing the Renal Vein (V), main renal artery (A1), lower pole aberrant renal artery (A2) and the ureter (U).

3. Discussion

Ectopic pelvic kidney is a rare congenital anomaly in which the kidney fails to ascend to its usual lumbar position. The incidence has been reported to be around 1:2100-3000 [2]. The ectopic kidney can be located in the pelvis, lumbar region, thorax or as a horse-shoe kidney fused to the contralateral kidney. During development, the kidney receives its blood supply in the pelvis from a branch of the aorta, and subsequently, as it ascends to the abdomen, various branches from the aorta provide the arterial supply as the vessels that had formed previously degrade. Accessory renal arteries are persistent embryonic vessels that were formed during the kidney's ascent. In the case of pelvic kidneys, it is evident that the frequency of accessory arteries would be increased. Moreover, there are frequent pelviureteral anomalies associated with these kidneys. For instance, up to 56% of ectopic kidneys are hydronephrotic secondary to pelvic, pelviureteral or ureterovesicular junction obstruction or vesicoureteral reflux [2, 3].

Ectopic kidneys have been rarely described in the transplant literature. While there are a few case reports of using ectopic kidneys for living kidney donation [4-7], there is just one report for using a deceased donor ectopic kidney [1]. This is important because the vascular and pelviureteral anatomy can be much more clearly defined preoperatively with the help of quality imaging in case of living donation. However, in case of deceased donation, ectopic kidney is usually an unexpected finding and the vascular anatomy is not defined preoperatively in most cases.

During this particular case, we identified the ectopic kidney, dissected it adequately and were able to flush it well in-situ. However, we were not able to use it for transplantation due to the abnormal vascular anatomy with a lateral anomalous lower polar renal artery which was likely originating from the right common iliac and wrapping around the lower pole of the kidney and inserting laterally into the kidney. There has been one other case report of a pelvic kidney noted during organ procurement which could also not be used for transplantation due to presence of multiple arteries, 2 of which were damaged during procurement [8]. However, in that case part of the kidney was not perfused well because the aortic cannula to flush the organs was placed in the distal aorta and not the iliac artery. In our case, we were able to perfuse the entire kidney by cannulating the left common iliac artery, but it was still not usable due to the abnormally positioned short lower polar artery.

One possible option was to anastomose the aberrant lateral polar artery to the inferior epigastric artery as described by Wolters et al [9, 10]. However, the polar artery was quite short, and it would have been difficult to do the anastomosis. Not anastomosing the lateral polar artery was not an option due to the antecedent risk of ureteral and partial parenchymal necrosis [9, 10]. Boughey et al have described using a pelvic kidney for living donor transplant, in which they ligated an accessory lower polar artery because it supplied a small portion of the parenchyma [5]. With the antecedent risk of pelviureteral complications with ectopic kidneys, we did not want to add to the risk by ligating the aberrant lower polar vessel. Due to these reasons, it was decided not to use the kidney for transplantation. The contralateral left kidney was used successfully for transplantation. Of note, no other anomalies were noted in other organs.

In conclusion, ectopic kidneys are rarely encountered during deceased donor organ procurements. Procuring surgeons should be aware of this abnormal finding and know how to modify the procurement technique in order to safely procure these kidneys. With the ongoing organ shortage, every attempt should be made to save the kidney for transplant. Both the donor

and recipient surgeons should be aware and anticipate vascular and pelviureteral anomalies and higher chances of surgical complications after transplant. As we see in this particular case, sometimes the kidneys may not be transplantable due to very aberrant vascular anatomy. If known prior to deceased donor procurement, additional imaging studies like a CT angiogram should be performed to evaluate the vessels and the collecting system more accurately before procurement.

Author Contributions

- A.R – Conception and design of the study
- D.G – Conception and design of the study
- P.Y – Critical revision
- N.L – Critical revision
- K.Y – Conception and design of study, critical revision

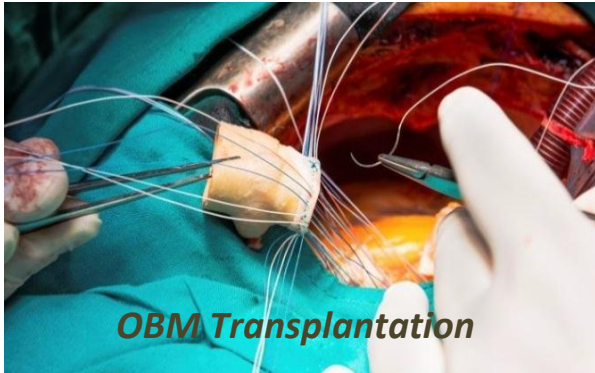
Competing Interests

The authors have declared that no competing interests exist.

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