

## Endourology

# First live donor nephrectomy with abdominal tortuous aorta and two renal arteries: A renal transplantation case report

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## ABSTRACT

46-year-old wife (donor) and 52-year-old husband (recipient) admitted to our clinic for kidney transplantation. CT angiography of the donor showed us there were bilateral renal double artery and a tortuous aorta that is deviated to the left side. The main artery cannot be reached by laparoscopy because of the upper level of renal artery and deviation of the aorta and an open conversion was performed. Presence of tortuous aorta with multiple renal arteries makes laparoscopic donor nephrectomy a challenging procedure even preformed by an experienced surgeon. The possibility of open conversion should always be kept in mind in these cases.

## Introduction

Renal transplantation is the ideal treatment for end-stage renal disease. Unlike nephrectomies performed due to the other urological diseases, the length of the renal artery and vein should be sufficient in live donor nephrectomies to achieve an appropriate and effective vascular anastomosis.

Vascular anomalies are the most common problems in donor nephrectomy operations. Multiple renal arteries (MRA) are the most common among them and incidence rates are reported between 15 and 30%. The presence of MRA makes live donor nephrectomy technically more challenging and can also lead to vascular and urological complications during the follow-up period of the recipients.<sup>1</sup>

Tortuosity is a condition associated with coarctation, kinking and elongation in vessels and causes obstructing of the vessel lumen and related symptoms. Aortic tortuosity is usually reported in the thoracic aorta and may be confused with an aortic aneurysm, mass, and pseudo-coarctation in imagings.<sup>2</sup> Abdominal tortuous aorta (ATA) is very rare and was reported in a limited number of publications.<sup>3</sup> In patients with this condition, no data are available in the literature regarding the safety of abdominal surgery and possible complications. We report in here a donor nephrectomy case in a patient with severe ATA and two renal arteries and the transplantation of the graft kidney.

## Case report

A 46-year-old woman and 52-year-old man, wife and husband, were referred to our clinic for kidney transplantation. The male patient was undergoing hemodialysis treatment for three years due to chronic kidney disease caused by urolithiasis. He had a surgical history of multiple open and endoscopic stone surgeries. The donor had no history of any surgery or medical diseases. Preoperative serum creatinine level of the donor was 0.67 mg/dL, and separated renal functions of the left and right kidney were 43% and 57% respectively in the 99mTc-DMSA renal scintigraphy. CT angiography showed a double artery malformation in both kidneys. Also, it was observed that a tortuous aorta deviated to the left at the level of renal hilus. One of the left renal arteries (the main renal artery) originated from the upper level of aortic kinking, at the same level of the truncus coeliacus, and the other one is from the lower level (Fig. 1). Since the patient was a refugee and had no other donor, all the complications and risks related to the operation were explained to the patients, and kidney transplantation was decided. Left donor nephrectomy was decided since the left kidney had a lower function than the right and the right renal vein was too short. The operation was started laparoscopically. The inferior pole accessory renal artery and renal vein were dissected. However, due to the proximal origin of the main renal artery that could not be reached, full control of renal pedicle

**Abbreviations:** Multiple renal arteries, MRA; Abdominal tortuous aorta, ATA; Computed Tomography, CT.

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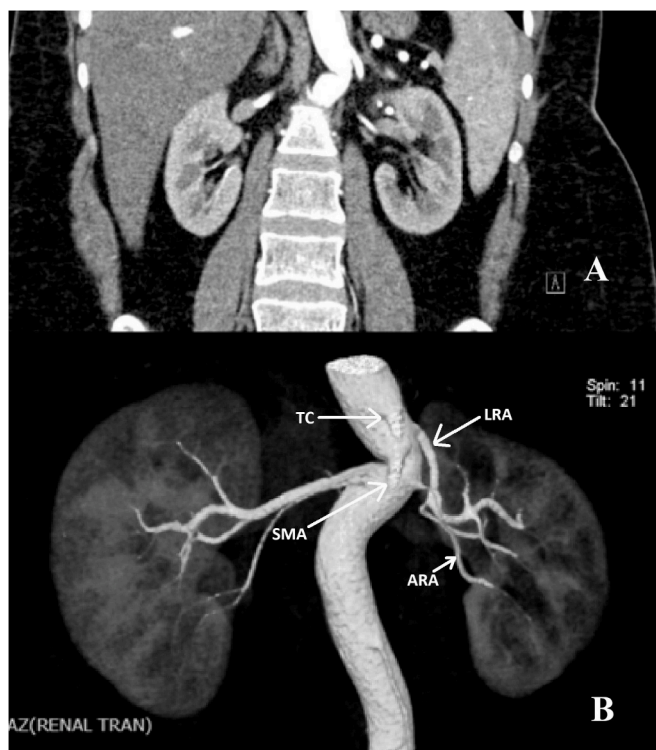
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**Fig. 1.** A. Coronal image of CT angiography; visualisation of tortuous aorta and renal arteries, B. Visualisation of tortuous aorta, renal arteries and the other major vascular structures with the three dimensional reconstruction of CT angiography images. (TC: truncus coeliacus, SMA: superior mesenteric artery, LRA: left renal artery, ARA: accessory renal artery).

control could not be achieved laparoscopically. Then the surgery was converted to an open method to avoid possible vascular complications. The patient underwent open donor nephrectomy in lombotomy position. The operation was 146 minutes, and perioperative blood loss was approximately 220 cc. No other complications were observed in the operation. The graft kidney's vein and arteries were anastomosed to the common iliac vein and artery. Two renal arteries were anastomosed separately (Fig. 2). The total operation time was 120 minutes, warm ischemia time was 1.5 minutes, total arterial anastomosis time was 18 minutes, vein anastomosis time was 7 minutes and uretero-vesical anastomosis time was 8 minutes. Early graft function and urine output were seen in the recipient. The donor was discharged with a serum creatinine level of 0.87 mg/dL on the second postoperative day. The recipient was discharged on day 7 postoperatively with a serum creatinine level of 1.02 mg/dL. The serum creatinine levels of the donor and the recipient at the 9th-month follow-up are 0.81 and 1.12 mg/dL, respectively. No complication was observed in the follow-up of both cases.

## Discussion

There are plenty of studies in the literature about kidney transplantation with graft kidneys with MRA. In some of these studies, it has been reported that vascular and urinary complications are more common after transplantation due to MRA in the graft kidney. In a study including 288 live donor nephrectomy, the MRA rate was reported as 21%. In this study, it was reported that the presence of MRA did not affect clinical outcomes in open donor nephrectomies, but in laparoscopic donor nephrectomies, it has been reported to have more blood loss and longer duration of operation than those without MRA.<sup>4</sup>

In our clinic, donor nephrectomy is routinely performed laparoscopically by a single surgeon. Our surgeon performed more than 500



**Fig. 2.** Image of the graft kidney after vascular anastomosis. 1 renal vein and 2 renal arteries were anastomosed to the common iliac artery and vein, respectively.

urological laparoscopic surgeries and more than 50 laparoscopic donor nephrectomy until the time of this case. This experience is clearly beyond the learning curve. Despite this, we have a surgical necessity to open conversion in this case. The reason for this is that the patient has an ATA and a high origin of main renal artery. The origin of the main renal artery from the truncus coeliacus level and the presence of deviated aortic tortuosity prevented us from reaching this artery laparoscopically. In a study comparing 279 laparoscopic donor nephrectomies with 211 open donor nephrectomy, 18 patients (6.45%) underwent open conversion. These cases converted to open because of anatomical variations such as MRA (n = 5, 27.8%), bleeding (n = 8, 44.4%) and adhesion (n = 5, 27.8%).<sup>5</sup>

As far as we know, our case is the first reported case of donor nephrectomy due to the coexistence of ATA and MRA. Depending on level of the tortuosity and the degree of aortic lumen obstruction, tortuous aorta may lead to hypertension, aortic insufficiency and pain. In our case, any symptom related to ATA was not seen before or after the operation in the follow-up period and therefore no attempt was made to date.

## Conclusion

In the presence of abdominal tortuous aorta and MRA, donor nephrectomy is an effective and feasible method. Abdominal tortuous aorta and MRA coexistence transform laparoscopic donor nephrectomy into a compelling procedure. It should therefore be kept in mind possibility of open conversion that even performed by experienced surgeon.

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### Declaration of competing interest

Authors have no conflicts of interest to declare.

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