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Renal transplantation from a living related donor with a retrocaval ureter – a note of caution

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Abstract In our study we describe a renal transplant from a living related donor who was found to have a retrocaval ureter. The retrocaval ureter is a rare congenital anomaly resulting from a defect in the embryological development of the ureter and the inferior vena cava (IVC). The compression of the ureter between the IVC and the vertebrae can result in progressive hydronephrosis. The non-dilated segment of the ureter was used for the uretero-neocystostomy. The patient presented with ureteric obstruction in the immedi-

ate post-transplant period, and at surgical exploration the uretero-neocystostomy was revised using the dilated portion of the ureter. We recommend that when transplanting a kidney with a retrocaval ureter, caution should be exercised in using the non-dilated portion of the ureter, since either the blood supply may be compromised or the peristalsis may be interrupted.

Key words Retrocaval ureter · Renal transplantation

Case report

A retrocaval ureter is a rare congenital anomaly, in which the ureter passes behind and is compressed by, the inferior vena cava (IVC). We describe a patient who received a kidney transplant from a living related donor with a retrocaval ureter.

A 30 year old female with chronic renal failure received a living related kidney transplant from her brother. The donor was 34 years old, asymptomatic and had normal renal function. The intravenous pyelogram demonstrated a dilated collecting system on the right, compatible with a pelvi-ureteric junction obstruction. We chose the right kidney for transplantation and left the donor with the normal left kidney.

In the course of donor nephrectomy, however, the problem of a retrocaval ureter became apparent. The non-dilated ureter behind the vena cava was mobilized and divided. There was free flow of urine from the cut end of the ureter and a catheter was easily passed up the ureter into the pelvis of the kidney. The kidney was removed in the conventional manner, perfused with Eu-

rocollins solution and stored on ice. The recipient was subjected to the standard treatment of living related donor transplantation. The renal vein was anastomosed end – to – side to the external iliac vein. The renal artery was anastomosed end – to – end to the internal iliac artery. The non-dilated portion of the ureter was anastomosed to the bladder.

On the first postoperative day the patient was noted to be anuric, with marked tenderness over the graft. The radionuclide scan and ultrasound suggested an obstructed ureter. However at re-exploration, the distal ureter was found to be ischemic. This was resected, and the dilated portion of the ureter anastomosed to the bladder. Thereafter, the patient made an uneventful postoperative recovery and was discharged on the 16th postoperative day with a serum creatinine level of 165 $\mu\text{mol/l}$.

Discussion

Hochstetter first described the retrocaval ureter in 1893 [7]. It is a rare congenital anomaly in which the ureter

passes behind the inferior vena cava. The anomaly is actually the IVC and not the ureter [1, 7, 8].

The etiology of the syndrome relates to the embryological development of the ureter and IVC [3]. The metanephros develops in the pelvis and rises through a ring of embryogenic venous channels as it moves to a lumbar position. The major venous channels are the posterior cardinal veins, connected to the subcardinal veins (the minor venous channels) by numerous prominent anastomotic vessels. The supracardinal veins, which generally develop into the IVC, become apparent in the 15 mm embryo, dorsal to the developing ureters. The posterior cardinal veins and the subcardinal veins lie ventral to the definitive ureteral position. Normally, the posterior cardinal veins undergo complete regression caudal to the renal vein, allowing the ureter to assume a normal position ventral to the developing infrarenal IVC (supracardinal vein). The subcardinal veins remain as the gonadal vein. Persistence of the posterior cardinal vein as the major portion of the infrarenal IVC causes medial displacement and compression of the ureter following lateral migration of the kidney. The ureter spirals from a dorso-lateral position upwards to a ventro-medial position below, around the developing IVC. Variants of the condition include duplication of the IVC with the ureter lying beside, behind, or between, the vascular limbs. The anomaly develops almost exclusively on the right side, except in patients with situs inversus [6, 10].

Two types of retrocaval ureter have been described [2]. Type I ("low loop") is the most common, the dilated proximal ureter assuming the shape of a reverse "J". The dilatation of the ureter persists for 1–2 cm, and turns upwards at the margin of the IVC. Possibly, a ureteral kink, an adynamic segment or pressure from the psoas muscle contributes to the obstruction [9]. The non-dilated ureter emerges medially and passes to the bladder in the normal manner. Type II ("high loop") is rare. The ureter passes behind the IVC at the level of, or just above, the pelvi-ureteric junction. This condition can be confused with pelvi-ureteric junction (PUJ) obstruction. There have been suggestions to term this phe-

nomenon a "retrocaval ureter", and to use the term "circumcaval ureter" to describe the ureter crossing behind the IVC and re-emerging medially [2]. Both types are to be distinguished from the condition in which only a loop or knuckle of ureter passes behind the IVC, but re-emerges laterally [11].

The retrocaval ureter has been reported to be associated with a horseshoe kidney [4, 5]. One case of bilateral retrocaval ureter has been documented [6].

The retrocaval ureter can become obstructed as a result of compression between the IVC and the vertebrae; an interruption of peristalsis may also arise from fixation in the area where the ureter curves around the IVC. The ureteric obstruction results in progressive hydronephrosis.

In the case of the described donor, the dilated collecting system was discovered during the routine assessment for living kidney donation. The retrocaval ureter only became evident during procurement, in the course of which we were able to mobilize the non-dilated part of the ureter from behind the IVC. Since there appeared to be no obstruction in this part of the ureter, as there was free flow of urine and a catheter could easily pass up the ureter, it was used for the uretero-neocystostomy during the transplant procedure. The recipient presented with obstruction in the immediate post-operative period, and on exploration, was found to have a necrotic lower ureter. A new uretero-neocystostomy was fashioned using the dilated portion of the ureter. Thereafter, the patient had an uncomplicated postoperative course, and was discharged well on the 16th postoperative day.

Conclusion

We conclude that a kidney with hydronephrosis due to retrocaval ureter can be used as renal transplant. However, caution should be exercised in using the non-dilated portion of the ureter for the uretero-neocystostomy, since either the blood supply may be compromised or the peristalsis may be interrupted [3].

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