Case Report

The transplant recipient with elevated creatinine, and normal ultrasonography—detection of ureteral stenosis by magnetic resonance tomography

Christian Doehn, Paolo Fornara, Hartwig Büttner and Dieter Jocham

Department of Urology, Medical University of Lübeck, Germany

Introduction

Urological complications are the most common type of post-transplant surgical problems [1]. Delay in accurate diagnosis and an inappropriate diagnosis may result in the loss of the renal transplant, and is also associated with increased morbidity and mortality [2]. Transplant ureteral stenosis occurs in 3.1–10.2% of patients after renal transplantation [1,3,4]. The diagnosis is usually made by ultrasound and radiography with contrast media. We herein present a patient with distal ureteral stenosis which could not be demonstrated by other methods, but was detected by magnetic resonance tomography (MRT).

Case

A 33-year-old man developed end-stage renal failure due to IgA nephritis in 1992. Apart from hypertension, he had no significant co-morbidity. After 10 months on haemodialysis, he underwent successful renal transplantation in December 1992. Four years later, the renal transplant had to be removed due to recurrent IgA nephritis of the transplant. In August 1997, the patient underwent a second renal transplantation which was placed in the left iliac fossa. Renal transplant function remained stable for 15 months with a serum creatinine of ~150 μmol/l. Then, his nephrologist noted an elevation of the serum creatinine up to 190 μmol/l and intermittent hydronephrosis on ultrasound. Transplant rejection, infection and drug toxicity were excluded, and the urine output per 24 h was stable.

On admission, the patient was clinically well. Serum creatinine was 185 μmol/l without any hydronephrosis on ultrasound. Duplex ultrasound showed normal indices. Immunosuppressive medication included cyclosporin, mycophenolate mofetil and prednisolone. Because hydronephrosis was not demonstrable by ultrasonography, we elected not to perform a transplant puncture for antegrade pyelography or drainage tube insertion. The patient underwent an MRT of the transplant and this clearly demonstrated a distal transplant ureteral stenosis (Figures 1–3).

Lower median laparotomy was performed. Intraoperatively, the ureter of the transplant was mobilized; the stenotic part was identified and resected. After insertion of a 7 Charriere double-pigtail stent, an

Fig. 1. Paracoronal MR subtraction images of the renal transplant, ureter and bladder demonstrating moderate hydronephrosis and prevesical ureteral stenosis.
Ureteral stenosis detection by magnetic resonance tomography showed the correct position of the ureteral stent and no evidence of hydronephrosis. Four weeks later, the patient was re-admitted to hospital. After removal of the ureteral stent, blood tests (serum creatinine, full blood count, C-reactive protein, serum cyclosporin and electrolytes) remained stable. Ultrasound showed neither fluid collection nor hydronephrosis. One day later he was discharged from hospital and at 4 months follow-up he presented a stable transplant function without complications.

**Discussion**

While immunological causes are the number one cause of renal transplant loss, urological complications are the most common surgical problems after renal transplantation. In large series, the complication rates vary from 5.3 to 19% [1]. The most frequent urological complications include ureteral stenosis, urinary fistula, renal artery stenosis and lymphocele formation [1–5]. Most often these complications occur within 3 months after transplantation [2–5]. Ureteral stenosis affects 3.1–10.2% of patients after transplantation [1,3,4].

Usual causes of ureteral stenosis are post-operative oedema, ureteral torsion or compression (e.g. from haematoma or lymphocele), non-optimal length of the ureter and different implantation techniques [1–5]. Ureteral ischaemia may also be present, and the distal ureter is particularly vulnerable, accounting for most problems in this particular part of the ureter [1,2,3,5]. The proximal half of the ureter receives arterial blood from renal, aortic and gonadal vessels while the distal half is supplied by branches from common iliac, vesical, obturator and deferential (in male) or uterine (in female) vessels [1,3]. Following harvesting of the kidney, the ureter receives its entire blood supply from the ureteral branch of the renal artery. Any damage by traction, stripping or diathermy is liable to render the ureter, in particular its distal portion, ischaemic [3]. Acute rejection involves the kidney and the ureter equally, and the resultant oedema with possible ischaemia may also lead to ureteral obstruction [1,3].

Diagnosis is usually made by ultrasound and radiography with contrast media [1,2,5]. Serum creatinine is often elevated, and ultrasound may demonstrate hydronephrosis and dilatation of the ureter. Ultrasound is easy and inexpensive but is investigator-dependent. Furthermore, a large part of the transplant ureter cannot be visualized by ultrasound. An intravenous urogram is a low cost procedure and widely available to urologists, but it does not always provide sufficient information, especially when serum creatinine is elevated. Renal scintigraphy and antegrade pyelography can be performed to localize the suspected stenosis and to analyse its relevance. However, renal scintigraphy often cannot distinguish an obstruction from other problems. Antegrade urography in combination with a Whitaker test requires a transplant puncture with a certain risk of damage; however, it has the obvious advantage of a combined diagnostic and thera-

extravesical ureterocystostomy was performed. The post-operative course was uneventful. Histological examination of the resected part of the transplant ureter demonstrated a 5 mm segment of stenosis fibrosis with accumulation of collagen fibres. Nine days later, the patient was discharged from hospital. Serum creatinine was 150 µmol/l and neither medical nor surgical complications were present. Ultrasound
apeutic approach [6, 7]. At least a nephrostomy tube can be inserted to achieve adequate drainage of the transplant.

In our patient we hesitated to measure pressure in the pelvis invasively because hydronephrosis was not demonstrable by ultrasonography so that the risk of transplant damage from puncture was high. It is noteworthy that the degree of hydronephrosis does not necessarily correlate with the intrapelvic pressure and the degree of ureteral obstruction. As an alternative procedure, an MRT was performed which clearly demonstrated the transplant ureteral stenosis. MRT provides useful information on the upper urinary tract in transplant and non-transplant patients [8–10]. In most cases, gadolinium is used as contrast medium even in patients with impaired renal function. Contraindications include metal implantations or pacemakers and pregnancy in the first trimester [10]. MRT may be used as a further diagnostic tool in cases of unclear findings on ultrasound and especially in patients with impaired renal function and renal transplant patients with transplant dysfunction [8–10].

In the case presented, the MRT demonstrated a stenosis of the distal transplant ureter and, subsequently, this part was resected and the ureter reimplanted. The fact that transplant function improved indicates that partial obstruction had been present. In selected patients with suspected transplant ureteral stenosis, MRT may provide useful information when ultrasonography is negative or equivocal.

References

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