Is Renal Living-Donor Transplantation Indicated in Adult Patients with Orthotopic Ileal Neobladder? Lessons Learned from a Clinical Case

Andrea Airoldia, Alessandro Volpeb, Michele Billia, GianSilvio Marchiorob, Roberta Fenoglioa, Elisa Lazzarich, GianMario Sacchettic, Cinzia Baioccoc, Eugenio Inglesedge, Alberto Menegottoa, Carlo Terroneb, Piero Strattaa,*

a Nephrology and Transplantation, Department of Clinical and Experimental Medicine, Amedeo Avogadro University, Novara, Italy
b Urology, Department of Surgical Science, Amedeo Avogadro University, Novara, Italy
c Nuclear Medicine, Maggiore della Carità Hospital, Novara, Italy

1. Case report

A 41-yr-old man underwent right nephrectomy and cystectomy with an orthotopic neobladder according to the Camey II technique due to genitourinary tuberculosis and reflux nephropathy at age 22, started haemodialysis at age 39, and underwent left nephrectomy for chronic tubercular pyelonephritis 1 yr later.

In July 2008, a classic living-donor mother-to-son renal transplantation in the right iliac fossa was performed, with a Lich-Gregoir ureteral anastomosis on a 6-Fr ureteral stent on the right horn of the neobladder. Following induction therapy with basiliximab, a routine immunosuppressive scheme with methylprednisolone, mycophenolate mofetil and tacrolimus was adopted.

In the first postoperative days, hydronephrosis of the transplanted kidney was observed at ultrasound. Plain abdominal x-ray showed ureteral stent displacement, so the stent was repositioned. Hydronephrosis occurred again after removal of the stent 1 mo after the transplant, leading to definitive stent placement. Serum creatinine decreased to 2.9 mg/dl but increased again up to 4.2 mg/dl after
removal of the urethral catheter. Hydronephrosis was again observed, and a catheter was reapplied.

Urodynamic evaluation showed safe intravesical pressure during neobladder filling, with no uninhibited contractions. Cystoscopy did not show significant morphologic urethral or neobladder anomalies.

Renal dynamic scan showed a quite normal Hilson index, with empty left horn of the neobladder in the presence of an open urethral catheter (Fig. 1a, red arrow). The index slightly worsened when the catheter was closed and the tracer accumulated in the neobladder (Fig. 1b, red arrow). After furosemide infusion, a higher amount of tracer was observed in the renal pelvis and all calyces; the dilatation partially resolved when the catheter was opened again.

The patient maintained an indwelling catheter and was discharged with clean intermittent self-catheterisation. Serum creatinine was 2.5–3 mg/dl and bicarbonate was 20 mmol/l with oral sodium bicarbonate supplementation.

The patient presented to the emergency department 4 mo later with fever, respiratory distress syndrome, and tachypnea. Results of blood work are shown in Table 1. Ultrasound did not show hydronephrosis. Blood and urine cultures were positive for Pseudomonas aeruginosa. The first diagnostic hypothesis was dyspnea due to pulmonary oedema for fluid retention due to severe acute worsening of graft function, but the condition proved to be true polypnea due to pulmonary compensation in the setting of severe metabolic acidosis (Fig. 2). Treatment with antibiotics, fluids, and sodium bicarbonate led to normalisation of the clinical and laboratory picture (Table 1).

2. Discussion

Orthotopic ileal neobladder with the Camey II technique is a urinary diversion often performed after radical cystectomy for bladder cancer, neurogenic dysfunction, detrusor overactivity, or chronic inflammatory diseases (tuberculosis, interstitial cystitis, schistosomiasis) [1].

Series of renal transplants performed in patients with urinary diversions, cystoplasty, or bladder augmentation have been published and show the feasibility and safety of the procedure [2,3], mainly in the paediatric population. Very few cases of deceased donor renal transplant have been described in adults with orthotopic ileal neobladder. To our knowledge, we describe the first case of a living donor transplant in an orthotopic neobladder.

<table>
<thead>
<tr>
<th>Date</th>
<th>Parameters</th>
<th>pH</th>
<th>pCO₂ (mmHg)</th>
<th>pO₂ (mmHg)</th>
<th>HCO₃⁻ (mmol/l)</th>
<th>Cl⁻ (mmol/l)</th>
<th>AG (mmol/l)</th>
<th>Lactic acid (mmol/l)</th>
<th>Serum creatinine (mmol/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Nov</td>
<td>7.33</td>
<td>42</td>
<td>99</td>
<td>20</td>
<td>112</td>
<td>12</td>
<td>1.5</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td>26 Feb</td>
<td>7.30</td>
<td>19</td>
<td>116</td>
<td>9</td>
<td>102</td>
<td>19</td>
<td>0.1</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>27 Feb</td>
<td>7.31</td>
<td>26</td>
<td>72</td>
<td>13</td>
<td>106</td>
<td>19</td>
<td>1.1</td>
<td>5.6</td>
<td></td>
</tr>
<tr>
<td>1 Mar</td>
<td>7.44</td>
<td>28</td>
<td>99</td>
<td>19</td>
<td>109</td>
<td>15</td>
<td>0.9</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>2 Mar</td>
<td>7.39</td>
<td>33</td>
<td>128</td>
<td>20</td>
<td>111</td>
<td>14</td>
<td>1.5</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>3 Mar</td>
<td>7.33</td>
<td>39</td>
<td>99</td>
<td>21</td>
<td>109</td>
<td>13</td>
<td>1.9</td>
<td>2.7</td>
<td></td>
</tr>
</tbody>
</table>

pCO₂ = partial pressure of carbon dioxide; pO₂ = partial pressure of oxygen; HCO₃⁻ = bicarbonate; Cl⁻ = chloride ions; AG = anion gap.

* At discharge following renal transplant.
One of the major risks of transplanting a kidney in a neobladder is the higher rate of metabolic acidosis. Two different causes of metabolic acidosis occur in this setting, with two independent pathogenic mechanisms: transplanted kidney and neobladder (Fig. 3).

As a result of renal tubular acidosis (mainly classic distal type 1 and less often types 2 and 4), non-anion gap metabolic acidosis occurs in >30% of patients with grafted kidney as well as in the absence of neobladder. This generally mild metabolic alteration can be exacerbated by...
tacrolimus-related nephrotoxicity, urinary infection, and suboptimal graft function and eventually leads to acute and chronic complications such as respiratory distress syndrome [4], osteoporosis, inflammation, negative protein balance, and malnutrition [5–7].

Metabolic acidosis can also occur in the presence of normal native kidneys in patients with neobladders, with clinical implications in >50% of cases. Significant risk factors for acidosis are higher absorption of urine over a prolonged contact time with the intestinal mucosa, wider surface of the intestinal neobladder, neobladder outlet obstruction, or pathologic postvoid residual volume [8–10].

In the present case, the patient did not present significant anatomic obstruction of the lower urinary tract or of the uretero-ileal anastomosis, but adequate urinary drainage of the transplanted kidney could be obtained only with an indwelling urethral catheter that allowed very low pressures in the reservoir, as confirmed by renal-scan images.

Renal transplantation is feasible in patients with orthotopic neobladder, but anatomic and functional neobladder features can lead to unsatisfactory drainage of the transplanted kidney, which can ultimately lead to impairment of renal graft function and multifactorial metabolic complications.

Living-donor transplants are characterised by the very high expectations of the family of the donor and receiver as well as the physicians involved in their care. Based on our experience, the choice to perform a living-donor transplant in an adult patient with a neobladder should be discussed thoroughly with patients and donors and among physicians. Patients may need to maintain an indwelling urethral catheter or to perform clean intermittent catheterisation to preserve adequate renal function and are at increased risk of severe metabolic complications.

Conflicts of interest: The authors have nothing to disclose.

EU-ACME question

Please visit www.eu-acme.org/europeanurology to answer the following EU-ACME question online (the EU-ACME credits will be attributed automatically).

Question:

In patients with neobladders, metabolic acidosis occurs in presence of normal native kidneys, with clinical implications in >50% of cases. When a patient with neobladder underwent renal transplantation, the risk for metabolic acidosis:

A. Substantially decreased.
B. Substantially increased.
C. Did not change.
D. Depended on the age of the recipient.

References