Persistent Kidney Injury in a Transplant Patient: An Unusual Reaction of Xanthogranulomatous Pyelonephritis

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Introduction:
Xanthogranulomatous pyelonephritis is a rare cause of kidney injury due to chronic inflammation. It classically presents in the setting of infected kidney stones, where chronic infection and obstruction leads to chronic immune reaction. Pathology is characterized by granulomatous tissue with lipid-laden macrophages.

Case Description:
Patient: 64-year-old woman with end stage renal disease (ESRD) secondary to type 1 diabetes mellitus and hypertension underwent a deceased donor pediatric en-block renal transplant in 2010.

Chief Complaint: Nausea, fatigue, and difficulty urinating

Past Medical History:
- Renal transplant - acute rejection noted on surveillance biopsy, treated with high dose steroids
- Systemic cytomegalovirus requiring a decreased immunosuppressive regimen
- Daily immunosuppressive medications were azathioprine 100 mg, prednisone 5 mg, tacrolimus 2 mg twice daily
- Type 1 Diabetes Mellitus, poorly controlled
- Hypertension
- Recurrent urinary tract infections, on prophylactic nitrofurantoin

Labs:

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<tr>
<th></th>
<th>32% bands</th>
<th>17.0</th>
<th>143</th>
<th>122</th>
<th>6.7</th>
<th>84</th>
<th>11</th>
<th>2.4</th>
<th>534</th>
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<tbody>
<tr>
<td>ABG</td>
<td>7.14/25</td>
<td>105</td>
<td>30.5</td>
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Tacrolimus >50 ng/mL
Blood and urine cultures grew E. coli resistant to nitrofurantoin
Electrocardiogram showed peaked t-waves.

Interventions:
Piperacillin-tazobactam -> narrowed to cephalaxin with sensitivity data
Insulin drip
Stress dose steroids
Continuous renal replacement therapy (CRRT)

Reassess kidney function and viability in one month, with potential kidney explant.

Diagnostic Test | Result
--- | ---
Renal Allograft Ultrasound (OSH) | No hydroureterosis, High resistive indices, Significant renal artery stenosis
Repeat Renal Allograft Ultrasound | Abnormally high pressures, Reversed flow in the transplant vessels, Incidental bladder mass
Allergraft Duplex Ultrasound | Increased velocities with areas of elevated parenchymal resistance, Patent vessels of the renal transplant
CT abdomen/pelvis | No mass, infection or obstruction of the kidneys
Biopsy | Xanthogranulomatous pyelonephritis (XP), focal areas of necrosis
MAG3 scan (evaluation of tubular function) | Lower of the transplanted kidneys did not have demonstrable tubular function and the upper had evidence of tubular stasis

Figure 1: Histiocyte stain
Figure 2: PAS stain:

Discussion:
The pathogenesis of xanthogranulomatous pyelonephritis remains unclear.

Theories include:
- Defect in macrophage processing of bacteria (associated with E coli and P mirabilis)
- Ischemia
- Lymphatic obstruction
- Chronic immunosuppression

Case reports of XP in renal allografts with extension to other organs documented in at least one case.1

Why this patient may have been at increased risk for XP
- Frequent urinary tract infections prior to admission
- Ectopic focus of infection versus bladder mass
- High doses of immunosuppressive medications: tacrolimus >50 ng/mL on admission
- Multiple courses of stress dose steroids for presumed rejection

Diagnosis: usually radiographic. CT can show enlarged kidneys, low-density areas, hydroureterosis or extension of disease2

Treatment: Unclear. Case reports suggest that antibiotics can resolve infection while others recommend surgical management1,3

Outcome: Patient returned home on HD. Had stroke-like symptoms 2 weeks later, developed worsened renal failure requiring urgent dialysis. Withdrew care the following day.

References:
4. Photos courtesy of OHSU Department of Pathology