Acute Kidney Injury
Post Kidney Transplant: Beyond the Perioperative Period

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Disclosures

• None
Objectives

• Review the differential diagnosis of acute kidney injury (AKI) in the kidney transplant recipient (beyond the peri-operative period)

• Outline an approach to the evaluation of AKI following kidney transplantation

• Distinguish AKI in the transplant and non-transplant populations
Case 1

- A 49 year-old man with a history of ESKD in the setting of longstanding DM2 underwent a successful deceased donor kidney transplant 4 months ago.
- Immediate graft function, nadir SCr 1.3 mg/dL
- He has been generally feeling well other than some diarrhea over the last 1-2 weeks. He is taking all of his medications, which include tacrolimus, mycophenolate mofetil, prednisone, and calcitriol, which he was taking pre-transplantation for secondary hyperparathyroidism.
- Routine clinic labs reveal a SCr 2.0 mg/dL

Which of the following are potential etiologies for his AKI?
- a) Allograft underperfusion secondary to GI fluid losses
- b) Allograft underperfusion secondary to high tacrolimus level
- c) Allograft underperfusion secondary to hypercalcemia
- d) All of the above
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Hypercalcemia is common following KTX

Secondary Hyperparathyroidism in ESKD

- Kidney can excrete PO4 and make 1,25(OH) D -> PTH production should decrease
- Some patients have ongoing autonomous secretion of PTH

After transplant...

- Tertiary hyperparathyroidism
  - Hypercalcemia
  - Hypophosphatemia

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“Prerenal” until proven otherwise...
AKI Beyond the First Week

- Underperfusion of the allograft
  - True or effective volume depletion
    - Acute CNI toxicity
- Urinary tract infection
- Urinary tract obstruction
- Acute rejection
- BK nephropathy
- Recurrent disease
- Thrombotic microangiopathy

- Other
  - Transplant renal artery stenosis, de novo glomerular disease, PTLD of the allograft
Case 2

- 56 year old man with a history of ESKD in the setting of ADPKD underwent a successful deceased donor kidney transplant 9 months ago.
- Immediate graft function, nadir SCr 1.2 mg/dL
- Early acute cellular rejection at month 3, treated with thymoglobulin and subsequently maintained on higher dose of tacrolimus and mycophenolate mofetil
- New “baseline” SCr 1.6-1.7 mg/dL
- Routine clinic labs reveal a SCr of 2.2 mg/dL, UA with 4-6 WBC/hpf, urine culture negative, tacrolimus level 9.5 ng/mL, no DSA

Which of the following is the most likely cause of his AKI?

- a) Acute cellular rejection
- b) Urinary tract infection
- c) Acute humoral rejection
- d) BK nephropathy
Rationale for Individualizing Immunosuppression

Too Much
- Cardiovascular Disease
- Infection
- Neoplasia
- Nephrotoxicity

Too Little
- Allograft Rejection
Individualizing Immunosuppression Based on Immunologic Risk

**HIGH RISK**
- Highly sensitized, +XM/ABOI
- African American/Hispanic ethnicity
- Pediatric patients
- Deceased donor source
- HLA mismatch, +DSA*
- Prolonged cold ischemia

**LOW RISK**
- Non-sensitized
- Asian/Caucasian ethnicity
- The elderly, infirmity
- Living donor source
- HLA identical, no DSA

*DSA = donor specific antibody
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Which of the following is the most common cause of his AKI?

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c) Acute humoral rejection
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c) Acute humoral rejection
d) **BK nephropathy**
Figure 1. Type and prevalence of BK virus (BKV) infections in kidney transplant recipients.

Bohl DL and Brennan DC, CJASN 2007
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✓ Underperfusion of the allograft
  • True or effective volume depletion
    • Acute CNI toxicity

• Urinary tract infection
• Urinary tract obstruction
✓ Acute rejection
✓ BK nephropathy
• Recurrent disease
• Thrombotic microangiopathy

• Other
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UTI in Transplant Recipients

- Often present as an asymptomatic rise in serum creatinine
- Not always associated with pyuria
- A urine culture is always part of the evaluation of AKI in the kidney transplant recipient
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Evaluation of AKI in the Kidney Transplant Recipient

- Empiric IVF
- Calcineurin inhibitor trough level
- Urinalysis and culture
- Serum BK PCR
- Ultrasound of the allograft
- Urine protein to creatinine ratio
- CBC
- Serum calcium level
- Allograft biopsy
Take Home Points

• AKI has a unique differential diagnosis in kidney transplant recipients

• Transplant patients are “prerenal” until proven otherwise and (almost) all deserve a trial of isotonic fluid

• Every patient requires careful consideration of individual risk of rejection v consequences of overimmunosuppression

• When in doubt, biopsy
Thank you!