Objectives - At the end of this activity, participants should be able to:

- Diagnose and treat patients with common post renal transplant surgical problems
- Select patient for common post renal transplant surgery; improving patient outcomes
Patient counts, by modality

Deceased donor transplants

Living donor transplants
The most common cause of death following kidney transplant is:

A. cardiovascular  
B. malignancy  
C. infection  
D. suicide  
E. trauma

Causes of Death in Kidney Transplant Recipients

- CV Disease: 40%  
- Malignancy: 25%  
- Infection: 25%  
- Other: 10%

Primary diagnoses of cardiac & infectious hospitalizations in the first & second years post-transplant

Cardiovascular hospitalization:

- Hypertension  
- Left Ventricular Systolic Dysfunction  
- Coronary Artery Disease  
- Aortic Stenosis  
- Other

Infectious hospitalization:

- Cellulitis  
- Kidney Infection  
- Vascular access  
- Other infections

First-time, kidney-only transplant recipients, age 18 & older, with Medicare primary coverage, transplanted in 2006–2008.
Factors that affect urologic care following kidney transplant

- Modified genitourinary anatomy
- Marginal renal function
- Immunosuppression

The most effective way to access the transplant ureter is with:

A. rigid cystoscopy
B. flexible cystoscopy
C. flexible ureteroscopy
D. percutaneous nephrostomy
E. open surgery

Impact on management

- Transplant ureter is usually on the anterior or lateral portion of the bladder
- Difficult to access cystoscopically
- Can be injured during urologic, abdominal or vaginal operations
- More likely to have reflux
Differential Diagnosis of Rising Serum Creatinine

- Problems before the kidney
  - Reduced cardiac output
  - Renal artery stenosis
- Problems in the kidney
  - Ischemic injury
  - Nephrotoxicity
  - Rejection
- Problems after the kidney
  - Urinary retention
  - Ureteral obstruction

Impact on management

- Avoid nephrotoxic medications
  - Aminoglycoside antibiotics
  - Iodinated contrast
- Monitor fluid status
- Dose medications per renal function
- Beware of drug interactions
- Allograft biopsy may be necessary

The most common post-transplant urinary tract infections are:

A. bacterial
B. fungal
C. viral
D. protozoan
E. opportunistic

Answer: A, B, C, D, E.
Relative frequency of organisms isolated in urine culture post transplant

- E. coli: 29%
- Enterococcus: 12%
- Staphylococcus: 10%
- Streptococcus: 12%
- Klebsiella: 4%
- Pseudomonas: 4%
- Fungal: 5%
- Other: 10%

Infection in Solid-Organ Transplant Recipients

JA Fishman. NEJM 357:2601, 2007

Relative Risk for Infectious Death

- Relative Risk
  - 4.04
  - 2.4
  - 1.59
  - 1.42
  - 1.19
  - 1.04
  - 1

Scrub Creatinine (mg/dL):
- 2.5-2.9
- 2.0-2.4
- 1.5-1.9
- 1.0-1.4
- <1.0
Impact on Management

- Risk of infection is dependent on time from transplant and graft function
- Infections may not present with typical signs and symptoms
- Treatment should be based on culture results
- Minimize prolonged use of catheters and foreign bodies
- Minimize urinary stasis

Impact on Management

- Work up recurrent urinary tract infections
- Consider antimicrobial prophylaxis
- Consider non-antibiotic prophylaxis
  – Cranberry, Methenamine, Vitamin C
- Continue maintenance immunosuppression
- Discuss case with transplant physicians
- Consider infectious disease consultation
- Be aware of drug interactions

Immunosuppression use

Figure 7.27 (Volume 2)

Patients age 18 & older receiving a first-time, kidney-only transplant in 2012. CsA: cyclosporine A; CsM: cyclosporine microemulsion.
Impact on Management

- Drugs that reduce calcineurin inhibitor levels
  - Rifampin
  - Anticonvulsants (barbiturates, phenytoin, carbamazepine)
  - Quinolones (ciprofloxin, levaquin)
  - St. John’s wort
  - Antibiotic induced diarrhea
- These drugs can be used with monitoring of drug levels

Impact on Management

- Drugs that increase calcineurin inhibitor levels
  - Ketoconazole, fluconazole, itraconazole
  - Erythromycin
  - Calcium channel blockers
- Drugs that increase nephrotoxicity
  - Aminoglycosides
  - NSAIDS
  - ACE inhibitors or blockers
  - Lipid lowering agents

Impact on Management

- Drugs that inhibit wound healing
  - mTOR inhibitors (sirolimus, everolimus)
  - Steroids
Post transplant malignancy


Prostate Cancer

- Most common GU cancer post transplant (~3%)
- PSA levels are not significantly altered by kidney or liver failure
- Prostate biopsy in immunosuppressed has equal risks
- Treatment should be based on tumor grade, stage, and patient prognosis
- Avoid transurethral surgery, brachytherapy, or cryotherapy post bladder drained pancreas transplant (consider enteric conversion)

Kidney Cancer

- Approximately 2% of tumors post transplant
- More common in the native kidneys
- Possible relationship to time with ESRD
- Radical nephrectomy is usually indicated
- Consider partial nephrectomy for tumors <4 cm in the transplant kidney
- mTOR inhibitor immunosuppression
- If immunotherapy for metastatic disease is considered, immunosuppression must be discontinued
Bladder Cancer

• Increased risk may be related to factors causing renal failure such as smoking, possible viral exposure, and cyclophosphamide
• Urine cytology is reliable in transplant patients
• Identify transplant ureteral orifice prior to bladder resections
• BCG use can be successful, but risk of sepsis must be considered
• Patients with significant renal dysfunction are best managed with ileal diversion to decrease absorption of urine

Testes Cancer

• Less than 0.1% of post transplant tumors
• Management of nodal disease can be difficult
• Immunosuppression is usually reduced during the administration of chemotherapy

Summary

• Urologic complications are not uncommon in transplant recipients
• Most of these issues can be evaluated and treated by the local urologist
• Communication with the transplant team is important to optimize results and avoid injury to the graft

NA Muruve and DA Shoskes. Genitourinary malignancies in solid organ transplant recipients. Transplantation 80:709, 2005
Vascular Complications

- Renal artery thrombosis
- Renal vein thrombosis
- Hematoma
- Renal artery stenosis
- Arteriovenous fistula

Renal artery stenosis

Incidence depends on diagnostic criteria
- Presentation - bruit, hypertension, edema, rising creatinine
- Diagnosis - color flow Doppler, angiography
- Treatment
  - medical
  - PTA vs Surgical

Arterio-venous fistula

- post biopsy
- trauma
- infection
- ruptured aneurysm
- Presentation - bruit, hypertension, pain
- Diagnosis - color flow Doppler, angiography
- Treatment - embolization
Urologic Complications

• Obstruction
• Extravasation
• Reflux

Obstruction

• Intrinsic
  – ischemic stricture
  – edema
  – blood clot
  – stone
  – ureteral redundancy
  – tumor
  – infection (fungal, viral)

Obstruction

• Extrinsic
  – lymphocele
  – hematoma
  – urinoma
  – tumor
  – abscess
Obstruction

- Presentation - rising creatinine, mass, possibly pain
- Diagnosis - ultrasound, renal scan, CT, nephrostogram

Treatment of Obstruction

- Nephrostomy is both diagnostic and therapeutic
- Once renal function is stable get nephrostogram
- Endoscopic treatment effective for very short strictures
- Ureteroneocystostomy

Treatment of Obstruction

- Use of the recipient ureter
  - ureteroureterostomy
  - ureteropyelostomy
  - Pyelopyelostomy
- Psoas hitch
- Boari flap
- Vesicopyelostomy
Extravasation

- Calyceal
- Renal pelvic
- Ureteral
- Ureteroneocystostomy
- Vesical

Extravasation

- Presentation - decreasing urine output, wound drainage
- Diagnosis
  - ultrasound
  - cystogram
  - nephrostogram
  - cystoscopy
- Treatment

Pyelovesicostomy
## Summary

- The treatment of surgical complications requires evaluation of the anatomy with appropriate imaging
- Use anatomical landmarks to avoid injury to adjacent organs
- Stents and drains have reduced complication rates
- Tension free anastomoses