Kidney Transplantation Guidelines (Recipient)

Recipient

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Kidney Transplantation (Recipient) CPT Code : 00868

Please note that these guidelines may need modification according to the patient’s condition, surgical protocol, and clinical studies in progress. Please check with the attending anesthesiologist assigned to the case.

General information

Patients presenting as recipients for kidney transplantation have end-stage kidney disease often requiring dialysis. Because of this the patient should have had dialysis shortly before surgery. Post-dialysis potassium levels are often low, and can cause digoxin toxicity. Hemoglobin levels in patients with end stage kidney disease are also low, but require blood transfusion only if Hb < 8.0 g/dl. Check CMV (cytomegalovirus) status of packed cells, and use PAL filter for all transfusions, if available.

Don’t use limb with AV-fistula for vascular access, non-invasive blood pressure monitoring, or patient ID wristbands! Document location and viability of AV-fistula on anesthesia record!
**OR set-up**
Standard intraoperative monitoring. Arterial line is rarely indicated.
- General OR anesthesia cart
- EKG
- ETCO₂
- NIBP (not on limb with AV-fistula !)
- Pulse oximeter
- 5% Albumin, 500 ml
- Cisatracurium, 2-3 vials
- Fentanyl, 2 x 250 μg
- Hydromorphone, 2 x 2 mg
- Mannitol, 12.5 g, i.v.-solution (from nurses cart)
- NACL, 2000-3000 ml
- Furosemide, 100 mg, i.v. solution (from nurses cart)

**Preoperative patient management in the holding area**

As soon as the patient has arrived in the holding area give:

- **20 G peripheral venous access line** in limb without AV-fistula !
- **Midazolam, 2 mg, i.v.** to lower anxiety

The patient may arrive in the holding area with ONE of the following protocols, check the protocol and verify with the attending surgeon:

**Low Intensity Induction:**
- **Basiliximab (Simulect®) induction protocol:** 20mg IV x 1. Start in OR via central or peripheral line, infuse over 30 minutes. Ask surgeon for timing of dose. Can be given immediately after IV steroid.
- **Methylprednisolone, 500mg IV** (if not already given on the floor)

**Standard Intensity Induction:**
- **Thymoglobulin (ATG):** 1mg/kg (dose rounded to nearest 25mg)
  - Start in OR via CVP line 1hr **after premeds given**, infuse slowly over 12hrs.

  **Pre-medication for ATG:**
  - Acetaminophen, 650 mg, po/pr/ng (if not already given on the floor)
  - Diphenhydramine, 50 mg, iv (if not already given on the floor)
  - Methylprednisolone, 500mg, iv (if not already given on the floor)

**High Intensity Induction:**
- **Thymoglobulin (ATG) induction protocol:** 1.5mg/kg (dose rounded to nearest 25mg)
  - Start in OR via CVP line 1hr **after premeds given**, infuse slowly over 12hrs.

  **Pre-medication for ATG:**
  - Acetaminophen, 650 mg, po/pr/ng (if not already given on the floor)
  - Diphenhydramine, 50 mg, iv (if not already given on the floor)
  - Methylprednisolone, 500mg, iv (if not already given on the floor)
Preoperative patient management in OR

General anesthesia is the anesthetic technique of choice. Whatever anesthetic technique is chosen, hypotension – even transient – should be avoided to prevent decrease in perfusion of AV-fistula and transplanted kidney. Protect limb with AV-fistula!

TED stockings and thromboguards on lower legs

After standard general induction of anesthesia:
- Foley catheter
- Triple lumen CVP line insertion in (right) internal jugular vein. Use SonoSite!
- Cefazolin 2g IV. If >120kg, give 3g IV
- For penicillin allergy, give Levofoxacin 750mg IV
- For history of MRSA colonization or infection, ADD weight-based vancomycin dose:
  - 50-70kg = 1g
  - 71-100kg = 1.5g
  - >100kg = 2g
- It takes antibiotics only 1-2 minutes to be distributed throughout the blood circulation but 30-60 minutes to diffuse to the skin!

Immunosuppression Induction Protocol (choose ONLY ONE and verify with the attending surgeon):

**Low Intensity Induction:**
- Basiliximab (Simulect®) induction protocol: 20mg IV x 1. Start in OR via central or peripheral line, infuse over 30 minutes. Ask surgeon for timing of dose. Can be given immediately after IV steroid.
- *Methylprednisolone, 500mg IV* (if not already given on the floor)

**Standard Intensity Induction:**
- Thymoglobulin (ATG): 1mg/kg (dose rounded to nearest 25mg)
  - Start in OR via CVP line 1hr *after premeds given*, infuse slowly over 12hrs.
  - *Pre-medication for ATG:*
    - Acetaminophen, 650 mg, po/pr/ng (if not already given on the floor)
    - Diphenhydramine, 50 mg, iv (if not already given on the floor)
    - *Methylprednisolone, 500mg, iv* (if not already given on the floor)

**High Intensity Induction:**
- Thymoglobulin (ATG) induction protocol: 1.5mg/kg (dose rounded to nearest 25mg)
  - Start in OR via CVP line 1hr *after premeds given*, infuse slowly over 12hrs.
  - *Pre-medication for ATG:*
    - Acetaminophen, 650 mg, po/pr/ng (if not already given on the floor)
    - Diphenhydramine, 50 mg, iv (if not already given on the floor)
    - *Methylprednisolone, 500mg, iv* (if not already given on the floor)

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<thead>
<tr>
<th>Class</th>
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**Intraoperative patient management**

Cisatracurium  
Fentanyl  
Hydromorphone

General anesthesia can be provided as inhalation anesthesia (O₂/Air/volatile agent or O₂/volatile agent). No N₂O to prevent inflation of intestines!

The total fluid requirement of the patient may be in the range of 2-3 liters depending on the patient’s volume status at the time of transplant, 250-500 ml of which should be albumin 5%, for the rest use only NACL and avoid Lactate Ringer’s and Plasmalyte because of their potassium content. Check potassium levels by taking venous blood gas samples!

**If hyperkalemia (K+ > 6 mmol/l) should occur, the treatment options are:**

If not currently on insulin drip; check blood sugar  
If BG > 150 give 5 units IV push  
If BG < 150 give 25-100ml D5W and regular insulin 5 units IVP  
Re-check BG in 5-10 min to re-evaluate need for additional dextrose.

CaCl₂, 500-1000 mg, slowly i.v. (if K+ is very high; unless patient is on digoxin)  
NaHCO₃ (dosage depends on severity)

**Shortly before recirculation of transplant kidney, give:**

Mannitol, 12.5 g, i.v. (ask surgeon for right timing)  
Frusemide, 100 mg, i.v. (ask surgeon for right timing)

**Postoperative patient management**

After surgery has finished, the patient will be extubated and transferred to PACU.

Postoperative pain management is provided by PCA loaded with hydromorphone.
### OR set-up
- General OR anesthesia cart in OR
- EKG
- ETCO2
- NIBP (not on limb with AV-fistula!)
- Pulse oximeter
- 5% Albumin, 500ml in OR
- Cisatracurium, 2-3 vials
- Fentanyl, 2 x 250mcg
- Hydromorphone, 2 x 2 mg
- Mannitol, 12.5g, i.v.-solution in OR (from nurses cart)
- NaCl, 2000-3000ml in OR
- Furosemide, 100mg, i.v.-solution in OR (from nurses cart)

### Preoperative patient management in the holding area
- 20 G peripheral venous access line established
- Midazolam, 2 mg, i.v. given
- Acetaminophen, 650 mg, po/pr/ng (if not given on the floor already)
- Diphenhydramine, 50 mg, iv (if not given on the floor already)

### Preoperative patient management in OR
Before induction of general anesthesia:
- TED stockings and thromboguards put on lower legs

After standard induction of general anesthesia:
- Foley catheter inserted and secured
- Triple lumen CVP line inserted in (right) internal jugular vein. Use SonoSite!
- Cefazolin 2g, i.v. If >120kg, give 3g IV (For pcn allergic  Levofloxacinc 750mg i.v.)
- For history of MRSA colonization or infection, ADD weight-based vancomycin dose:
  - 50-70kg = 1g
  - 71-100kg = 1.5g
  - >100kg = 2g
- Methylprednisolone, 500 mg, i.v.

- Thymoglobulin (ATG) 1 OR 1.5 mg/kg IV Infused over 12 hours (start 1 hour after methylpred
  OR
- Basiliximab (Simulect®) 20mg i.v. infused over 30 minutes, can be started immediately after
  steroids. **store in refrigerator**

### Intraoperative patient management
Shortly before recirculation of transplant kidney:
- Mannitol, 12.5 g, i.v., given (ask surgeon for right timing !)
- Frusemide, 100 mg, i.v., given (ask surgeon for right timing !)