

## **Renal Transplant Anesthesia Handbook**

### **Preoperative Considerations for Renal Transplant Recipient**

Living donors and living donor recipients go through CPM: Print out 11A from pre op manager.

Most Deceased Donor recipients do not go through CPM: history and physical of the recipient will be done by the transplant team on admission. The documentation will be in the inpatient EMR as an H and P.

The patients are assessed in multiple ways and their work ups including CT scans, vascular imaging and cardiac testing are mainly in the physician portal, OTTR database, or already in PICIS (living donor mainly).

### **Standard Anesthesia Preop but focus on:**

#### **1. NPO**

- a. Patients are called in from home and may not have been NPO
- b. Patients may have significant gastroparesis
- c. Monitor glucose in preop if diabetic

#### **2. Dialysis**

- a. Type HD or PD
- b. Last dialysis date and time
- c. Dialysis Access (old and current): Fistula/graft or HD catheter. If Patient has a current dialysis catheter, this may be used for access in OR (only if cleared by surgeon). Follow appropriate protocols in accessing the Dialysis Catheter and aspirate 10 cc of blood to remove retained high dose heparin. Typically any preexisting HD catheter use is limited only to the operating room. Ideally would like to have central access to give Thymoglobulin, draw blood, measure CVP, either in ICU or on floor. There are floor policies to contend with when using the HD catheter.

### 3. Labs and workups

- a. CBC with diff: Type and Cross 2 PRBC
- b. Renal Function Panel:
  - Potassium MUST be checked and verified prior to OR
  - Serum Potassium <12hours old, if older, then needs to be rechecked. If Potassium >5.6. The patient will be dialyzed before kidney transplant.
- c. Coagulation panel: If INR is high, discuss with surgeon
- d. Check the CT scan and vascular imaging to decide the location of central access.

Concerns by the surgeon will be relayed to anesthesia before the case begins.

Anesthesia will also voice concerns to the surgeon as well.

## **Operating Room Setup Renal Transplant Recipient:**

### Standard General Anesthesia Setup

1. Monitors
  - a. A line +/-
  - b. CVP
  - c. Glucometer if Diabetic
2. Two Bair Huggers top and bottom
3. Access
  - a. Triple Lumen CVP Setup
  - b. ultrasound
  - c. a line setup +/-
4. Alaris IV pump (2 chambers)
5. Drugs (*Pharmacy*)
  - Solumedrol 500mg
  - Thymoglobulin or Basiliximab (not both)
  - Mycophenolate IV 1000mg

- Mannitol: 20% mannitol 500ml bag
  - Lasix: 400mg
  - Albumin
6. Antibiotics:
    - a. Ancef 1, 2, or 3 gm by weight
    - b. PCN allergy Vancomycin + Aztreonam
  7. NGT or OGT (check with surgeon)
  8. Ability to obtain Serum K during case
    - a. VBG/ABG

## **Intraoperative Management Renal Transplant Recipient**

### **Induction:**

- Standard induction
- Consider Rapid Sequence Induction
- Consider Cisatracurium
- Monitor blood pressure closely avoiding hypotension: if patient just had full dialysis before induction, induction should be very careful (give some fluid before induction or use phenylephrine with induction medication to avoid hypotension because patient is usually already intravascular depleted)
- Beta-Blockade (Patients are usually beta blocked)

### **Position:**

- Supine with Arms out
- Assessment of fistula/graft (monitor throughout OR course)

### **Intravenous Access (goal <30 minutes after intubation):**

- Initial peripheral line placed prior to OR.  
Patient will usually come from the floor with access if pre-admitted.
- Triple Lumen CVP is preferred and placed after induction.
- Review the vascular imaging to know the patency of central vein. Use ultrasound to scan the target vessel again to make sure it's patent. Right Internal Jugular is the preferred location. Otherwise, Left Internal Jugular

and other locations can be discussed. Check with surgeon if other locations should be attempted.

Do not spend too much time doing an impossible line (GOAL <20 minutes)  
Often, patients with a significant line history will have venous studies done to outline which vessels are open, check PORTAL prior to case.

## **Medications**

### **Antibiotics:**

- Ancef (weight dosed) if no penicillin allergy
- Vancomycin 1 gm and Aztreonam 1 gm (if PCN allergy)

### **Immunosuppression:**

Order to be given:

- Methylprednisolone 500 mg IV (must be given prior to Thymoglobulin)
- Mycophenolate 1000 mg IV (given over 2 hours simultaneously with Thymo)
- Thymoglobulin 1.5 mg/kg (given over 6 hours via a central line using a 0.22 micron filter supplied by the pharmacy). In the rare case a central line cannot be obtained, pharmacy can mix the Thymoglobulin to be given peripherally.

Sometimes Thymoglobulin is not used; basiliximab is given instead:

- Basiliximab 20 mg IV over 30 minutes (may be ordered instead of Thymoglobulin)

All of the above drugs have been added to the PICIS drug drop down menu for accurate documentation. **Documentation of administration of Thymoglobulin is critical.**

### **Diuretics :**

- Lasix and Mannitol: Mix 400mg Lasix with 20% 500ml Mannitol bag. Administer 100 ml of the mixture (80mg Lasix and 20g mannitol) after reperfusion ( the surgeon will direct the timing). Surgeon may require extra

Lasix. Please verify the dose before given.

## **Fluids**

### Type of Fluid

- Crystalloid (usually a mix of Lactated Ringer's and Normal Saline)
- Too much Normal Saline can cause an increase in Chloride resulting in a metabolic acidosis.
- Too much LR or Plasmalyte will lead to hyperkalemia post operative if the kidney does not have primary function
- NOTE: Potassium is released by the kidney allograft, therefore Potassium must be monitored closely post reperfusion
- IF K<sup>+</sup> is elevated >5.0, then do not use Potassium containing fluids (LR/Plasmalyte)
- IF plasmalyte or LR are used, limit volume of these fluids as much as possible and rely on 0.9NS mainly

### Amount of fluid

- Communicate with surgeon regarding the desired CVP reading. A desired CVP is usually 10-12, However, depending on the patient's last dialysis they may have a low or high reading.
- The average amount of fluid given is 2 to 3 liters of crystalloid prior to reperfusion. Watch the surgical field and ask the surgeon if the kidney is perfusing well and the vessels are adequately filled. More fluid may be needed. Albumin is also an acceptable choice if needed.
- Pressor use is avoided. If considering use, this has to be discussed with surgeon only if fluid resuscitation is thought to be adequate.

### **Blood product:**

- Transfusion: there is insufficient evidence specifically on kidney transplantation regarding the cutoff of hemoglobin for transfusion. The cutoff for transfusion per surgeons is hemoglobin 8.5. But discuss transfusion with attending surgeon prior to giving

## Maintenance:

- Adequate muscle relaxation needed.
- Volume status, including CVP, should be continually monitored and discussed as these patients typically have a tenuous fluid balance.
- Maintenance of MAP >70
  - Blood pressure must be monitored closely.
  - Report hypotension to the surgical team.
  - Administer adequate fluid to avoid and treat hypotension.

AVOID vasopressors, but if patient is requiring pressor support please alert surgeon. (hypotension can occur with administration of Thymoglobulin requiring the rate of the drug to be reduced)

- Monitor Blood Glucose as many of these patients are diabetic.
- Avoid acidosis
- Monitor intraoperative K<sup>+</sup>
  - If potassium is >5.0 preop, potassium should be checked right after induction, then every 30min and treated accordingly (goal is less or around 5.0) until reperfusion. Then check it after reperfusion, treat it accordingly. Communicate with surgeons too.
  - If potassium is less than 5.0 preop, potassium can be checked right after induction. If potassium is still less than 5.0 and patient is not acidotic, potassium will be rechecked after reperfusion.
  - If post reperfusion K >5+, Treat aggressively, Repeat the VBG / ABG to monitor the K closely, Discuss with surgical team.
- During ureteral anastomosis
  - CBC
  - Renal function panel
- 3 way foley will be inserted. Monitor urine output after ureter/bladder anastomosis.
- Additional Diuretics may be requested by the surgeon if transplanted kidney urine output is low or marginal.
- The Attending Anesthesiologist MUST be in the ROOM at time of reperfusion and if there are any deviations in blood pressure or heart

rate/rhythm or oxygenation at any time of the operation.

## **Emergence**

- Most patients are extubated.
- Assure patient is adequately reversed with adequate pain control.
- Avoid vigorous coughing

## **End of Case considerations Renal Transplant Recipient**

### Hand off to PACU/ICU

- Deceased Donor kidney transplant patients are transported to the SICU or the PACU.
  - We will “Fast Track” appropriate cases
    - extended PACU
    - Tower 9, ICU bypass
- Living donor recipients
  - Patients go to the PACU then FAST TRACK to T9.
  - (discuss with surgeon the preference so that arrangements can be made early in the case and bed availability is established)
- Patient should be transferred with monitors (EKG, Arterial Line, and oxygen saturation).
- Give a full report to the PACU/ICU nurse including:
  - Patient History, including last dialysis date
  - Line placement and Fistula location and status
  - Fluids
  - Administration times of antibiotics, immunosuppressive, and diuretics
  - Urine output
  - Check postop CBC and renal function panel results which should be sent in OR during ureter anastomosis.





## Living Donor Nephrectomy Anesthesia Operating Room Protocol

### Introduction:

Living donor nephrectomies for transplant are performed approximately 20 to 30 times a year at University Hospitals Case Medical Center. These cases must be performed with experienced staff (not students) to ensure the safety of the donor. Every effort should be made to minimize the possibility of any complication. It is important to remember that this patient does not need an operation and that the donor does not gain any benefit from this procedure. They only incur risk. A living donor nephrectomy operating room protocol will ensure we can provide a reproducible, streamlined procedure for each donor with the lowest possible complication rate.

### Preparation:

Living donors undergo a rigorous work up to ensure the safety of the procedure for the patient. They are approved for donation by our selection committee. They are assessed from all aspect of health and the work up can be found in Physician Portal, OTTR database, AEMR, PACS, and PICIS. The living donor is seen within 1-2 weeks of donation and a complete history and physical can be found in AEMR from this visit.

The surgeon will touch base with the anesthesia provider prior to the start of the case to discuss any concerns

Standard work up for a living donor includes:

Labs:

- CBC
- BMP
- LFT's
- urinalysis and culture

Serologies:

- hepatitis B,
- hepatitis C,
- HIV,
- syphilis,
- TB,
- CMV,
- EBV,
- west nile GFR

measure

CT angiogram of the abdomen and pelvis

Dermatology clearance, PAP (female), mammogram (female $\geq$ 40yrs), colonoscopy ( $\geq$ 50yrs), PSA (male $\geq$ 50yrs)

Any other consults that may be required (i.e. cardiology, ID, genetics, etc)

Preoperative management LIVING DONOR

Preoperative studies:

Preoperative labs are done 1-2 weeks prior to OR date during the last preoperative visit. Serologies, NAT's, type and screen, and final crossmatch is also done at this time.

Positioning:

- left lateral decubitus position for a right nephrectomy

- right lateral decubitus position for a left nephrectomy.
- They are positioned on a bean bag and axillary roll. They are secured to the table with tape and safety belts. Upper and lower body warming blankets may be used. The surgeon will be present and involved in all positioning. All pressure points will be padded.

#### Intravenous Access:

- A peripheral line will be placed initially in the pre-operative area.
- A second large bore peripheral line will be placed after induction of anesthesia.
- More access may be placed at the discretion of the anesthesia team if they deem it necessary.

#### Intraoperative Management Living DONOR

#### Intraoperative Medications:

##### The surgeon will direct timing of administration of these medications

- Antibiotics: Ancef (weight dosed) if no allergy.
- Mannitol 12.5g IV and Lasix 40mg IV when the kidney is being released from the retroperitoneum (the surgeon will direct the timing).
- Heparin 5000 units IV will be given right before the vessels are ready to be cross clamped (the surgeon will direct the timing)
- Protamine 50mg IV (slow push) will be given very slowly after clamping of the renal vein (the surgeon will direct the timing)

#### Fluids:

A goal of 2 to 3 liters of crystalloid for the case should be achieved. The surgeon will communicate the fullness of the renal vein to give a sense of the volume status of the patient and may ask for more fluid.

### Intraoperative Management

- Induction: Standard induction. Surgeon will notify anesthesia prior to insufflation.
- Anesthesia will monitor closely for bradycardia and pre-treat if they deem appropriate.
- Maintenance: Adequate muscle relaxation needed for visualization.
- Monitor urine output particularly after mannitol and Lasix administration

### End of Case Considerations:

The primary team will write for a hydromorphone PCA to be started in PACU for pain control once the donor has met criteria per PACU nursing