INTRAOPERATIVE MANAGEMENT OF KIDNEY, PANCREAS, AND SIMULTANEOUS PANCREAS-KIDNEY (*SPK*) TRANSPLANTATION

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Pre-Operative Evaluation / Considerations

Respiratory-- Pleural effusions may occur in this patient population. Increased susceptibility to infection is common in the patient with chronic uremia.
Cardiovascular-- HTN, CHF, dysrhythmias, pericardial effusion are common, especially in the undialyzed patient. Diabetes, a common cause of ESRD, is often associated with PVD, CAD, and autonomic neuropathy.
Tests: ECG (rhythm, electrolyte abnormalities, pericarditis, LVH). Other tests (ECHO, stress, etc.) as indicated
Gastrointestinal-- Gastroparesis may occur, especially in diabetic patients with autonomic neuropathy.
Renal-- Patients are usually on dialysis…*Hemo or Peritoneal?* Postdialysis goals include: K+= 4-5 mEq/l, BUN < 60 mg%, creatinine < 10 mg%. Metabolic acidosis, hypocalcemia, Hyperkalemia etc. may be present, and require preop correction. Patient may be hypovolemic following dialysis; / pre- and post-dialysis weight (> 2 kg loss is significant). **Determine whether patient is anuric….Do they still make any urine on a daily basis? Also, when was last dialysis session?**
Hematologic--These patients are typically anemic (Hct = 18-24%). Usually it is not necessary to correct this anemia (unless < 18%). A coagulation disorder may be present with abnormal Plt function and possibly thrombocytopenia.
Tests: Hct; PT; PTT; Plt count;
Neurologic-- Peripheral neuropathy may occur and specific deficits should be documented. Autonomic neuropathy can → cardiac problems (e.g., orthostatic hypotension, ↑HR, or ↓HR), silent MI, and GI problems.

Routine Monitoring

1. **Radial arterial line**
2. **CVP line may be placed but only if necessary based on the discretion of the attending anesthesiologist. (Also, Thymoglobulin requires Central access)**

Intravenous Access

- Minimum two large bore (18G or greater) peripheral IV's
- Be prepared with Ultrasound and long PIVs to gain US-guided access
- Avoid the side with AV fistula

Crystalloid/Colloid/Blood Products

- Normal Saline (No K+)
- Albumin 5% 4 bottles

- Blood and/or platelets as indicated (**make sure 2 Units PRBCs are ordered for every Kidney Tx and 4 Units PRBCs for all Pancreas and SPK transplants**
- If bleeding occurs, remember uremic platelet dysfunction, so may need to give DDAVP 0.3 mcg/kg IV over 30 minutes

Positioning / Equipment

- Upper body Bair Hugger
- Warming blanket on bed - provided by Nursing
- Check positioning. Pad extremities. Ensure protection of AV fistula, if present
- Check AV fistula regularly

Antibiotic / Steriod / Immunosuppression Coverage

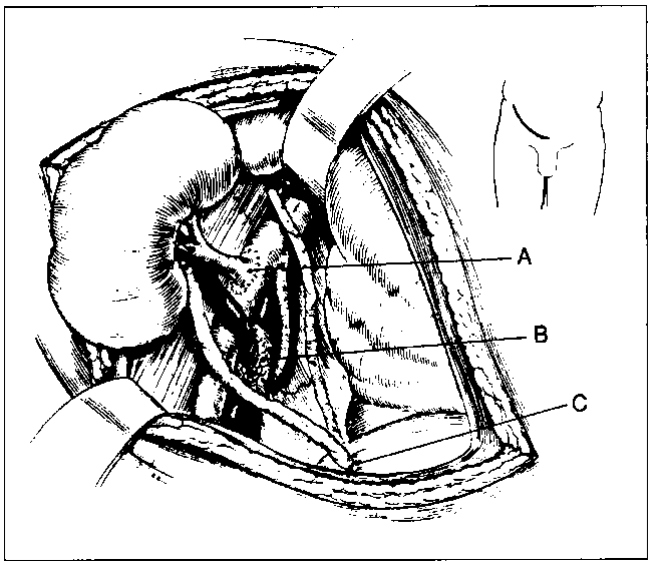
1. Solumedrol 500 mg IV push after induction of anesthesia but before surgical incision
2. Campath 30 mg IV (via peripheral IV line**) infused over 2 hours** or Thymoglobulin 1.5 mg/kg **infused over 4-6 hours** (via a central line). Campath is the drug of choice currently. As these drugs are quite expensive, check with surgeon prior to requesting from pharmacy.
    - Premed with Benadryl 25-50mg IV (give with the solumedrol and wait 30 minutes prior to starting Immunosupression drug)
3. ABx for Kidney-- Ancef (Cefazolin) 2 gm IV. If PCN allergy - Cipro 400 mg over 60 min.
4. ABx for Pancreas – **Zosyn 3.375 gm IV**. If PCN allergy - Cipro 400 mg and Flagyl 500mg over 60 min

Induction

- Standard induction sequence. If concern over possible full stomach, modified rapid sequence with rocuronium.
- Ensure placement of Foley catheter and Flowtron boots / SCDs on the legs. Foley will be unclamped during initial portion of case
- OG tube for kidneys, NG tube (stays in at end) for Pancreas and SPK

Maintenance

- Baseline ABG, electrolytes, Hgb/Hct. Repeat q 1-2h as indicated.
- Standard maintenance-Balanced, fentanyl, muscle relaxation with cisatracurium or rocuronium **(Have Sugammadex in the room)**



(A) renal artery to external iliac artery
(B) renal vein to iliac vein
(C) ureter to bladder

- **Maintain moderate hydration (2-3 Liters of NS) during early portion of case**. The dissection is in the extraperitoneal space by retracting the peritoneum medial and cephalad. The external iliac artery and vein are identified,
- **During vascular anastomoses, hydrate patient using either crystalloids or colloid bolus as necessary.** The external iliac vein is clamped first and the renal vein-to-iliac-vein anastomosis is performed. Then the external iliac-artery-to-renal-artery anastomosis is performed, and the clamps are released
- **When the Surgeon requests it during arterial anastomosis of kidney (5-10 minutes) before reperfusion give →**
  1. **Lasix 100 mg IV**
  2. **Mannitol 12.5 gm (1 bottle) IV {possible 25 gm (2 bottles) IV}→ discuss with attending and surgeon**

- During unclamping and reperfusion of the kidney, be prepared to administer fluids or lighten anesthetic as needed due to reperfusion syndrome or bleeding. Be prepared in case of reperfusion hyperkalemia and/or hypotension occur.

- Prepare for blood pressure changes secondary to the use of verapamil, sometimes injected in the renal artery by surgeon. If blood pressure becomes a problem, supplement with $CaC1_2$ 1gm IV.

- The surgeon will tell us (or the circulating nurse) when to clamp the foley tubing and when to start running the blue dyed antibiotic irrigation solution – this will fill the bladder to allow reimplantation of the ureter
- Maintain hydration. Unclamp Foley when surgeon requests and ensure adequate urine output once ureter anastomosed to bladder.
- PRBC as indicated by hemodynamics and Hbg; Platelets, FFP if indicated and

discussed with surgeon

- If urine output is not > 1 ml/kg/hr after unclamping, consider fluid bolus and/or Dopamine 2.5 mcg/kg/min. Ensure adequate hydration. Consider additional Lasix/mannitol.

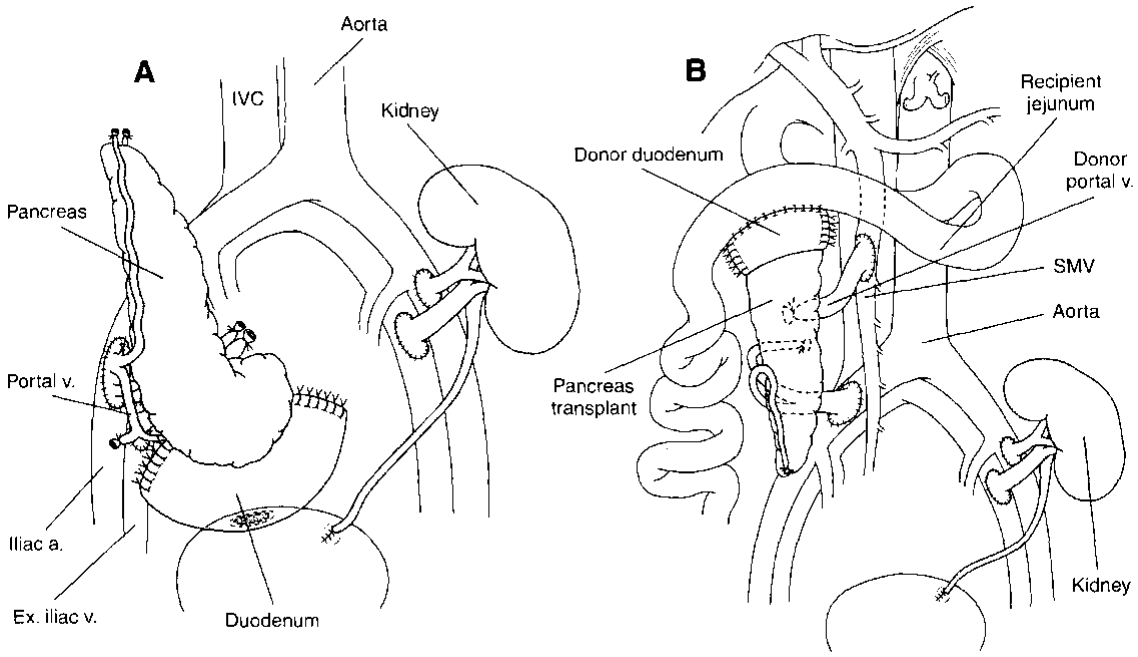
Post – Op

Extubate- if criteria met

Patients all go to PACU initially. Now they move from PACU to Bles 6, unless they meet specific ICU admission criteria.

May have delayed graft function- Pts. still may need dialysis

Pancreas Transplant Portion*



Simultaneous Pancreas Kidney (SPK) transplantation not only provides kidney replacement for the Type I diabetes patient with end-stage renal disease (ESRD), but also controls diabetes. Most pancreas transplants are performed in combination with kidney transplantation from the same donor [SPK]. However, Pancreas transplantation also can be performed for patients who have received a previous kidney transplant (pancreas after kidney [PAK]). Additionally, isolated pancreas transplantation is done for patients with brittle diabetes or with impending complications with near-normal kidney function. Immunosuppression regimen (postop) for pancreas transplantation is generally more aggressive than that used for kidney transplantation. Typically, the pancreas transplant is placed in the right iliac fossa and the kidney transplant in the left iliac fossa. This can be

done through a transperitoneal lower midline incision or with two separate extraperitoneal lower-quadrant incisions in the same manner as kidney transplantation. The graft is prepared first on the back table. For arterial in-flow, a Y-graft is fashioned, using the donor iliac artery bifurcation. The graft duodenal segment is shortened on the back table. The iliac extension vascular graft is anastomosed to the recipient external or common iliac artery. The portal vein is anastomosed to the external iliac vein. The donor duodenum is anastomosed to a loop of small bowel to drain the exocrine excretions .With pancreas transplantation, there may be significant blood loss if the graft mesenteric vessels are not occluded properly.

- Glucose should be checked every 30 minutes prior to reperfusion and then every 10-15 minutes for the first hour after reperfusion –keep glucose between 150-300
- Maintain hydration during vascular anastomoses.
- During unclamping and reperfusion of pancreas, be prepared for brisk / major bleeding; therefore administer fluids and PRBCs and lighten anesthetic as needed

*NOTE: Generally the kidney will be transplanted before the pancreas, however, this order is occasionally reversed.