Pancreatectomy & Islet Cell AutoTransplant
Anesthetic Pathway
University of Nebraska Medical Center
Department of Anesthesiology

1. **PROCEDURE:** The pancreas is removed and sent to the UNMC pathology for processing (islet isolation). The islet cells are returned to the OR suspended in solution ready for infusion. The islet cells are infused into the portal venous system where the islet cells engraft in the liver. Hyperglycemia is toxic to islet cells, so normal blood glucose levels must be targeted at all times.

2. **INDICATIONS**
   a. Chronic pancreatitis requiring daily narcotics
   b. Acute relapsing pancreatitis refractory to medical management
   c. Hereditary pancreatitis (pre-malignant condition).

3. **ANESTHETIC SET UP**
   a. Basic setup for Abdominal Procedure
   b. **Do not place an epidural catheter** as the patient will be fully heparinized during the case.
   c. Most patients will have bilateral dual TAP blocks immediately prior to procedure.
   d. Monitoring
      i. Arterial line and 9fr central line.
      ii. CVP mandatory
      iii. Good IV access needed
         1. Patient may have had a bowel prep
         2. Significant blood loss can occur
   e. Have four units of blood available
   f. Ketamine and sufenta drip/bolus
      i. Avoid remifentanil and fentanyl due to hyperalgesia effects.
   g. Insulin drip
   h. Possible heparin drip

IV. **Anesthesia and Pain Management:**

A. Preoperative
   1. Consult APS for pain medicine co-management and block placement if not done remotely preop.
      a. APS to write for hydromorphone or morphine PCA
         1. Initial dosing target should be approximately 3X patient baseline morphine equivalents.
   2. Patient will have bilateral dual TAP blocks with Exparel.

B. Intraoperative
   1. If patient on daily methadone, give IV Methadone during case to replace missed oral doses (2mg oral = 1 mg IV)
   2. Ketamine 10 mg/hr gtt (0.1mg/kg/hr). -Start with 20mg bolus.
   3. Sufenta 0.004-0.008 mcg/kg/min - Start with induction

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4. Hourly blood glucose checks. Start insulin infusion when blood glucose >140 and then continue through recovery room. Goal BG 80-140. NEVER give insulin boluses, but rather titrate drip toward euglycemia.

5. Extubate on ketamine. Patient will remain on ketamine for 24 to 72hrs.

C. Post-operative

1. Patient may require aggressive titration of PCA in PACU or ICU.
   a. If the patient doesn’t not have adequate pain control after 6 bolus doses then the PCA should be adjusted. Please obtain APS assistance if inadequate pain control.

2. Ketamine infusion will be continued in ICU. Please verify that order is in place and infusion running.
   a. Alaris pump settings are mg/kg/hr so for a 70 kg patient the drip should be 0.14 mg/kg/hr which is equivalent to 10mg/hr
   b. The patient does not need concomitant benzodiazepine administration with low dose ketamine.

IV. PROCEDURE SPECIFICS

A. Phase I: Pancreatectomy

1. This includes splenectomy, and pylorus sparing duodenectomy in most cases.
   a. Takes 2-4+ hours, depending on severity of adhesions and prior pancreas surgery

2. This phase may be associated with significant blood loss

3. Anesthetic considerations:
   a. Have blood in the room
   b. Check glucose q 1 hr, start/adjust insulin gtt as necessary. Goal: blood glucose 80-140 mg/dL. Hyperglycemia can damage islet cells.
   c. Gas, electrolytes, Hgb, coags prn, correct as necessary
   d. Maintain fluid status but do not over-resuscitate.

4. Pancreas is trimmed on back table, packaged and sent to the lab.

5. Note blood loss at this point in the procedure

B. Phase II: Reconstruction

1. As applicable: cholecystectomy, appendectomy, creation of choledochojejunostomy, feeding limb and Roux limb, insertion of feeding J tube, draining G tube, and surgical drain.

2. Pancreas processing is concomitant with this time period. Islet cells usually return to OR about 4 hours after the pancreas leaves the room.

3. Anesthetic considerations
   a. If not begun already, start Insulin drip at 1 unit/hr, increase to 2 units/hr when head of pancreas is out
   b. Check glucose q 30 minutes due to potential rapid changes in requirements after pancreas is explanted. Do not bolus, try to avoid overcorrection of hypoglycemia. Discuss with surgeon if hypoglycemia or if BS>200 at any time.
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C. Phase III: Islet infusion
   1. Islet cells return from lab suspended in bag(s) containing 200 ml suspension. Bags will contain some heparin.
   2. Patient is heparinized before injection
      a. calculate total heparin dose = 70 u / kg.
      b. subtract heparin in islet bags
      c. plan to give the difference in heparin as a bolus at least 3 minutes prior to islet infusion.
      d. Check heparin dose with surgeon
   3. Islet cells infused into the portal venous system (splenic vein stump or mesenteric vein)
      a. Infusion may take 15-60 minutes, depending on tissue mass
      b. Portal pressure is measured intermittently
      c. Portal hypertension may develop.
   4. Anesthetic considerations
      a. Hypotension may occur during islet infusion (?endotoxin if prep is infected).
      b. Have NaHCO₃, CaCl₂, Phenylepherine, and Epinephrine available
      c. Bleeding may occur (severe) due to elevated portal pressures from islet cell injection.
      d. Disseminated intravascular coagulation may occur.
      e. Vasopressin or norepinephrine drip may be necessary if hypotension persists after injection.
      f. If the portal pressure increases sufficiently, the patient is at extremely high risk for portal vein thrombosis. A heparin infusion may be ordered by the surgeon based on clinical circumstances, surgeon preference. Because the need for heparin cannot be excluded, **do not place epidurals in these patients.**


Protocol based and derived from University of Minnesota Medical Center 2015

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