Aorto-Femoral Bypass Grafting Guidelines

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Procedure

- Procedure: Aorto-bifemoral and associated major vascular bypass procedures
- Indication: Claudication, upper or lower extremity vascular insufficiency
- Duration: 3-6 hours
- EBL: 300-1000 mL typical, some cases can be liters of blood loss
- Expected Stay: 3 to 5 days
- (A good percentage have vascular compromise/wound healing issues which prolong their post-op course)

Major Considerations

- Possibility for significant blood loss.
- Have cell-saver available.
- Associated co-morbidities of vascular insufficiency (atherosclerosis affects all blood vessels), so peri-op MI's, acute on chronic renal insufficiency, CVA's
- Hemodynamic instability (consider placing an arterial line)
- Packed red blood cell availability

Patient Co-Morbidities

- Vasculopaths often have vascular compromise with multiple organs involved.
- MI history (Pre-op Echo, EKG, & Stress Tests)
- CVA's (both pre and peri-operative)
- Carotid stenosis (consider central line placement on side where carotid stenosis is most severe so as to reduce chance of injuring the more functional carotid)
- Renal insufficiency (patients are often anemic, have poor renal reserve, and are at risk for acute on chronic renal failure)
- Pre-diabetic/Diabetic - blood sugar control, peripheral neuropathies (pad patient well for long procedures)

### Pre-op and Set-up Considerations

- Large bore IV access, consider central line access w/CVP monitoring, consider arterial line access
- Extensive abdominal incision for bypass may merit lumbar epidural placement (**Check for anticoagulants & whether timing for regional is appropriate**)
- Transversalis Abdominis Plane (TAP) Block may offer a safer regional alternative in an anti-coagulated patient who is not an epidural candidate
- Blood availability
- Cell saver available & ready in room if significant chance of major blood loss.
- Patient's hemodialysis status, if applicable, and whether hypovolemic/anemic at baseline
- Consider Cardio-Q for additional assistance with volume monitoring.

### Surgical Approach

- Aorto-bifemoral: abdominal incision (infra-umbilical) with unilateral or bilateral inguinal incisions for distal bypass access
- Axillo-bifemoral: axillary incision with tunneling to distal anastomosis sites with unilateral or bilateral inguinal incisions for distal bypass access
- Upper extremity: often from subclavian or axillary artery with access through axilla and incision extended as needed for proximal vascular anastomosis

### Communication with Surgeon

- Most communication involve intra-operative events such as major blood loss and ischemic changes (EKG changes, asymmetric pupils [evidence of intracranial event], etc).
- Regular antibiotic dosing
- Vasopressors can be used, but surgeons prefer volume & like to be notified if the patient has a large vasopressor requirement
Pre-op Evaluation

- Labs: cbc, electrolytes (especially glucose & potassium), coags
- Imaging- EKG, TTE & Stress Test (if > 3 Risk Factors: DM, CVD, HD >1 yr, >60 yo, Tobacco, HTN, Lipids)
- Cardiac reserve from a functional standpoint (climb 3 sets of stairs, angina, pulmonary edema, etc)
- Anemia - need for on-sight allocated blood units, FFP, Platelets, as labs indicate & surgical complexity dictates

Induction

- Usual induction drugs, have vasopressors & inotropes available
- Lines (a-line, CVP, large bore PIV) as indicated
- Sedate judiciously pre-operatively
- Room: Standard anesthesia machine set-up w/cables & monitors as needed for advanced line monitoring

Anesthetic Type

- Typically a GETA, although there are some cases which are done under continuous spinal anesthetic
- Induction: Propofol (typically) or Etomidate (but consider the adrenal suppression downside)
- Paralysis: Rocuronium or (If severe renal impairment) Cisatracurium
- Positioning: Supine, typically both arms are tucked, but this can be negotiated with the surgeons as needed

Intubation & Ventilation

- Standard ETT
- If concerned about blunting hemodynamic surge to intubation, utilize remifentanil bolus (50-100 mcg) or lidocaine spray to larynx (LTA) or even 10mg of Esmolol.
## Maintenance & Meds

- Volatile anesthetic gas: Sevo or Isoflurane
- Can use propofol/remifentanil (TIVA) if there is a contraindication to volatile (i.e., Malignant Hyperthermia or poor pulmonary function which would slow offloading of anesthetic gas)
- Heparin bolus (typically 100 units/kg) - usual dose is 5,000 to 10,000 units when surgeon requests
- Plan to monitor ACT with iSTAT. Typical ACT target for heparinization is around 220 - 250 seconds
- ABG's as indicated
- Re-dose antibiotics per schedule

## Fluids

- Crystalloids (Normosol or LR) with consideration given to NS if renal impairment.
- Consider albumin if volume needed when RBC's unnecessary. Albumin reduces 3rd spacing.

## Hemodynamics

- Can have sudden, large volume blood loss if poor surgical visualization and poor vascular tissue quality
- May need levophed, phenylephrine, dopamine, dobutamine if massive resuscitation required.
- Remember to check for blood availability & give platelets & FFP after first couple of units of blood given.
- May need cryoprecipitate.
- Remember that PRBC's chelate calcium & will need to give replacement Calcium chloride (through Central Line)

## Un-clamping

- During the anastomosis period of the case, the blood flow to the affected leg or legs is clamped off.
At the conclusion of the case as the anatomoses are completed, the surgeon will sequentially restore blood flow to each leg. Depending on how long the leg has had compromised or no flow, there can be washout of significant metabolic by products. These byproducts include acid, potassium, tissue & cellular debris, blood clot as well as calcium. Prepare for this by hyperventilating the patient & giving sodium bicarbonate to offset the acidemia. - Be prepared for dysrhythmias associated with the acid & potassium washout. Insulin to reduce hyperkalemia may be required. Give additional IV fluids & vasopressors, as needed, to offset the hemodynamic (often hypotension & tachycardia) changes that result.

Analgesia

- Typical medicines as indicated/limited by comorbidities (fentanyl, morphine, hydromorphone)
- Utilize adjunct medications such as Neurontin, IV or PO Tylenol, ketamine, regional blocks (especially in obstructive sleep apnea & chronic pain patients)

Post-op Nausea/Vomiting

- Typically Zofran with compazine or phenergan for rescue. Can consider decadron if not diabetic or having glucose control issues.

Emergence

- Standard
- Disp: PACU and then to ICU

Post-op Issues:

- Re-bleeding, breakdown of anastomotic site, femoral sheath leakage
(hematoma). May require pressure bags on groin if femoral access sites are leaking or considered at high risk for re-bleed.

- Patient's can "hide" several liters of blood in their anterior thigh compartment, so mark any hematoma with a boundary to facilitate hematoma progression monitoring.
- Graft/anastomosis can clot off or clamp down. RN's in PACU will monitor the pulses by palpation and/or doppler to document adequate flow.
- If renal arteries are at risk, monitor urine output more closely to assure adequate output & presumed renal function

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**Info & Hyperlinks**

Aorto-bifemoral

[http://circ.ahajournals.org/content/126/9/1127.full](http://circ.ahajournals.org/content/126/9/1127.full)


Axillo-bifemoral