



erlanger

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Area Trauma Surgical
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Applicability Erlanger Health -
Baroness

Extremity Vascular Trauma

A. Who Should Read This Process/Procedure?

Trauma Services, Trauma Attending Physicians, Trauma Residents, Orthopedic Attendings, Orthopedic Residents, Vascular Attendings, Vascular Residents

B. Process/Procedure

Step:	Process Instructions/Description:
I.	Isolated Extremity Vascular Trauma (IEVT)
	A. IEVT usually occurs from penetrating injuries such as ballistic or knife stab wounds but can occur from blunt forces without associated orthopedic injury. B. Hard Signs indicate vascular injury is highly suspected or confirmed by the physical exam findings and usually call for emergent surgical intervention. 1. Pulselessness 2. Pulsatile bleeding 3. Expanding Hematoma 4. Bruit 5. Thrill C. In the case of suspected TBI or intra-abdominal injury, a CT scan(s) may be obtained on the way to the operating room so that concomitant surgical problems may be addressed. D. Soft signs indicate the possibility of EVT but confirmatory testing should be performed 1. Trajectory of injury involves physically assessing the proximity of wound(s) to the named vessels for the possibility that wound path could have resulted in vascular

	injury. Accurate assessment requires wound probing and the use of plain radiography looking for bullets or bullet fragments. 2. Pulse deficit (pulse present but unequal strength to the opposite side) 3. Nonexpanding hematoma overlying vessel 4. Temperature gradient or neuro deficit 5. Major blood loss from the wound E. Confirmatory Testing is performed for wounds with trajectory or other soft signs to rule in or out the diagnosis. 1. Ankle-Ankle, Brachial-Brachial or Radial-Radial Indices (rather than Ankle Brachial Index commonly used in peripheral vascular disease) known collectively as Extremity Vascular Pressure Difference (EVPD) are performed by the physicians on the Trauma Team with a manual blood pressure cuff and a Doppler device. Differences in SBP greater than 10 mmHg indicate the possibility of a vascular injury and more formal testing such as a CT arteriogram (CTA) is in order. 2. If there is concern for bilateral vascular injuries, ABIs should be used and differences > 0.9 should proceed to CTA. 3. Notify the Trauma attending after a positive finding on EVPD and typically proceed with a CTA of the affected extremity.
II.	Combined Orthopedic and Vascular Trauma (COVT) A. COVT requires the coordination of Trauma or Vascular Surgery (Surgery) and Orthopedics regarding the timing and prioritization of care. B. Preoperative workup for presence of vascular injury in COVT is normally dictated by the Trauma Team and Orthopedics, and relies on pulse assessment, EVPD, and CTA of the affected extremity. EVPD > 10 mmHg should prompt CTA. C. Abnormalities in the EVPD should be assessed after adequate extremity alignment occurs, since pulse differences may be due to compression or kinking of the blood vessels. D. If Surgery feels that a temporary vascular shunt (TVS) prior to any Orthopedic stabilization is indicated, Orthopedics may assist with initial reduction and lengthening of the extremity and positioning on the OR table. E. Factors affecting placement of a TVS include injuries requiring vascular control other than by tourniquet (e.g., junctional injury, REBOA), ischemia time, presence of a neuro deficit, degree of contamination and overall patient stability. F. Vascular control and Initial/preliminary debridement of open wound(s) communicating with site of vascular injury will be performed by Surgery followed by placement of a TVS. G. Once a TVS has been placed, Orthopedics can proceed with open fracture site/wound debridement and external stabilization. Someone from Surgery should be available during the orthopedic stabilization for concerns about the TVS. H. If Surgery does not opt for placement of TVS prior to orthopedic stabilization, vascular control should be obtained by tourniquet or direct visual vascular clamp/temporary ligation (blind clamping in wounds is discouraged and potentially harmful to limb salvage). If the

	vessel is thrombosed and not actively bleeding on presentation to the OR, proceed with the discretion of the "Team" regarding timing of vascular control. I. Orthopedics should perform orthopedic stabilization before definitive vascular repair is performed to prevent secondary disruption of definitive vascular repair. J. When orthopedic debridement and stabilization are complete, Surgery will proceed with definitive vascular repair unless a TVS has been placed and Surgery plans a delayed definitive reconstruction K. Fasciotomies should be considered for ischemia times > 2 hours. Vascular Surgery performs leg fasciotomies if the ischemia is related to the need for vascular intervention (stent, graft. etc.). Trauma or Orthopedic Surgery performs leg fasciotomies if the ischemia is associated with soft tissue or muscle damage or fracture. If thigh fasciotomies are necessary for any reason, that responsibility will fall on either Trauma or Orthopedic Surgery. L. Type and duration of antibiotic therapy will be discussed and agreed upon by Surgery and Orthopedics. Factors considered are degree and type of contamination and type of material (vein vs. prosthetic) used for vascular repair. At minimum, when open fracture is present, the Epic order set "Orthopedic Trauma Open Fracture Antimicrobial Prophylaxis" should be utilized to provide optimal antibiotic coverage. M. Postoperative anticoagulation will be at the discretion of Surgery and the decision should include the presence of TBI and solid organ injury. When feasible, initial anticoagulation therapy should be rapidly reversible (e.g. heparin/LMWH), since further definitive orthopedic surgical intervention is anticipated for the majority of patients. N. In the case of isolated knee dislocation with combined popliteal artery injury, timing of definitive vascular repair and spanning external fixation should be discussed between Surgery and Orthopedics. Concerns of open vascular repair and limited exposure due to knee fixation shall be addressed. If Surgery desires to proceed with vascular repair prior to external fixation, then the knee must be kept in reduction throughout the procedure and someone from Surgery should be immediately available during external fixation for concerns about the integrity of the vascular repair. Radiographic verification of reduction should be obtained prior to leaving the OR.

References:

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3. deSouza IS, Benabbas R, Mckee S. Accuracy of Physical Examination, ABI and ultrasonography in the Diagnosis of Arterial Injury in Patients with Penetrating Extremity Trauma: A Systematic Review and

Metaanalysis.

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4. Inaba K, Branco BC, Reddy S. Prospective Evaluation of Multidetector Computed Tomography for Extremity

Vascular Trauma. J Trauma 2011; 70: 808-815.

5. Inaba K, Aksoy K, Seamon M. Multicenter evaluation of temporary intravascular shunt use in vascular trauma. J Trauma Acute Care Surg 2016; 80: 359-365.

6. Tornetta P, Shahien A, Sullivan M. Combined Orthopedic and Vascular Injuries: A Multicenter Analysis. Abstract form OTA.org

Approval Signatures

Step Description	Approver	Date
COO	John Winks: Executive Vice President-COO	09/2024
Trauma Services Committee Approval	Stephanie Spain: Trauma Prgm Mgr Adult	09/2024
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