

Vascular Trauma

31st Annual David Miller Memorial Trauma Symposium

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Director Mercy Vascular Center of Excellence



Your life is our life's work.



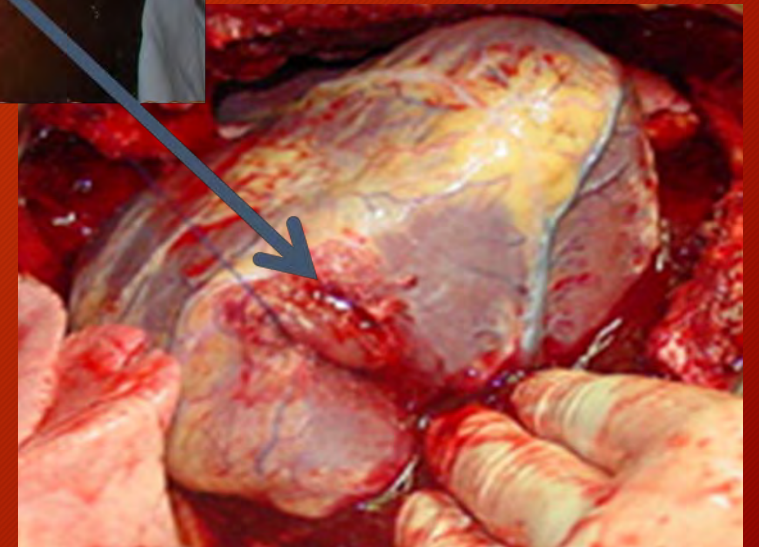
Disclosures

- Speaker and Trainer
 - Abbott, Bard, CSI, Silk Road, Endologix

Pre Test



- If you have only enough blood to obtain a single lab test, which one would you order for your Trauma patient?



Objectives

1. Basic Understanding of Vascular Injury
2. Diagnose Suspected Vascular Injury
3. Initial Critical Decisions in Vascular Injury
4. Appropriate Imaging for Vascular Injury
5. Treatment of Vascular Injury
6. Followup Requirements post Vascular injury



What is the #1 cause of vascular trauma?





HINT....

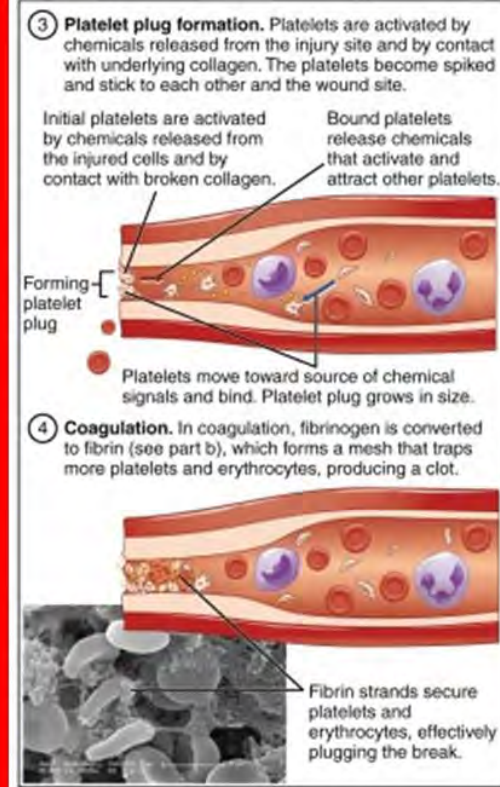
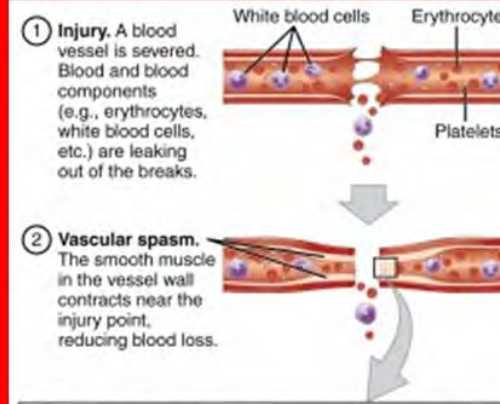
Basics of Vascular Injury

Thrombosis
Hemorrhage

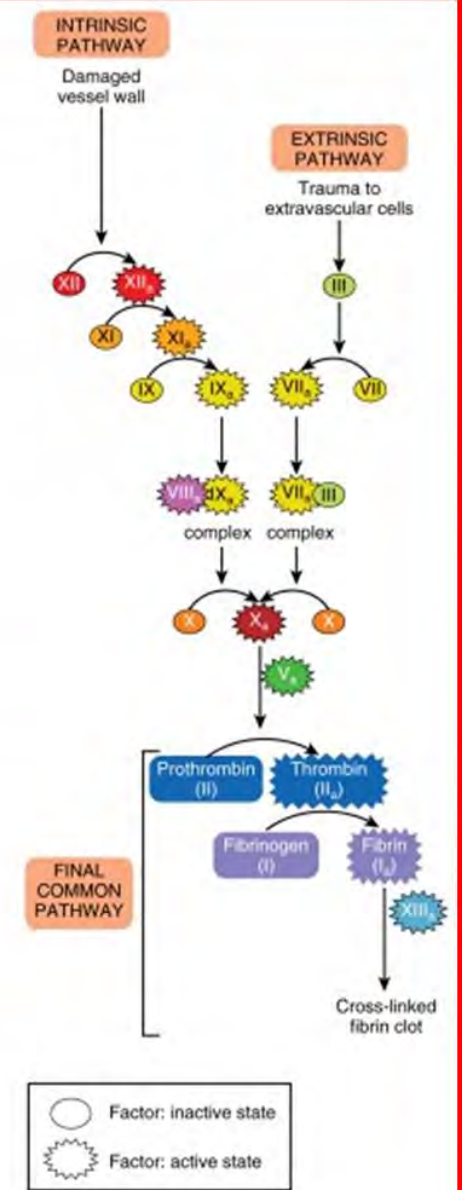
End Organ Perfusion /
Ischemia

End Organ Death

Time



(a) The general steps of clotting



(b) Fibrin synthesis cascade

Mechanism of Injury: Ozarks



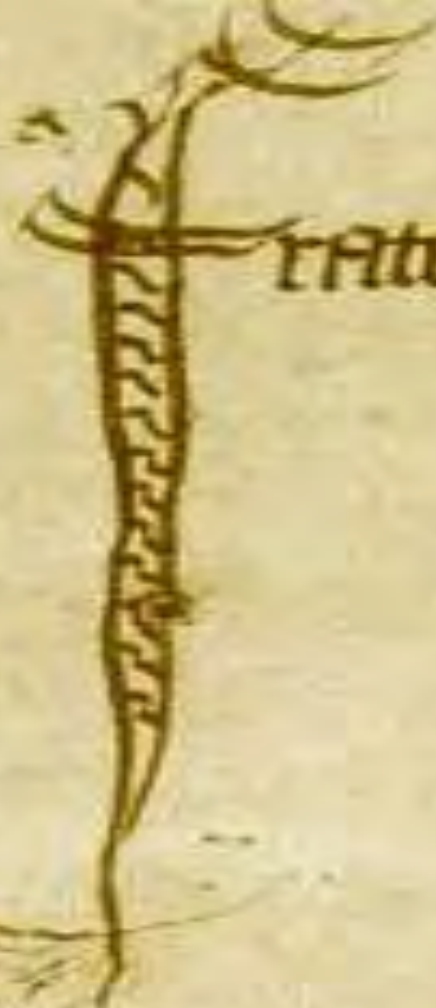
Most Important Takeaway Today

Signs of Vascular Injury

- Pulsatile bleeding
- Arterial thrill (ie, vibration) or bruit on palpation or auscultation
- Expanding hematoma.
- Distal ischemia.
 - Pain, palor, pulseless, paresthesia, poikilothermia,

Tests for Vascular Injury

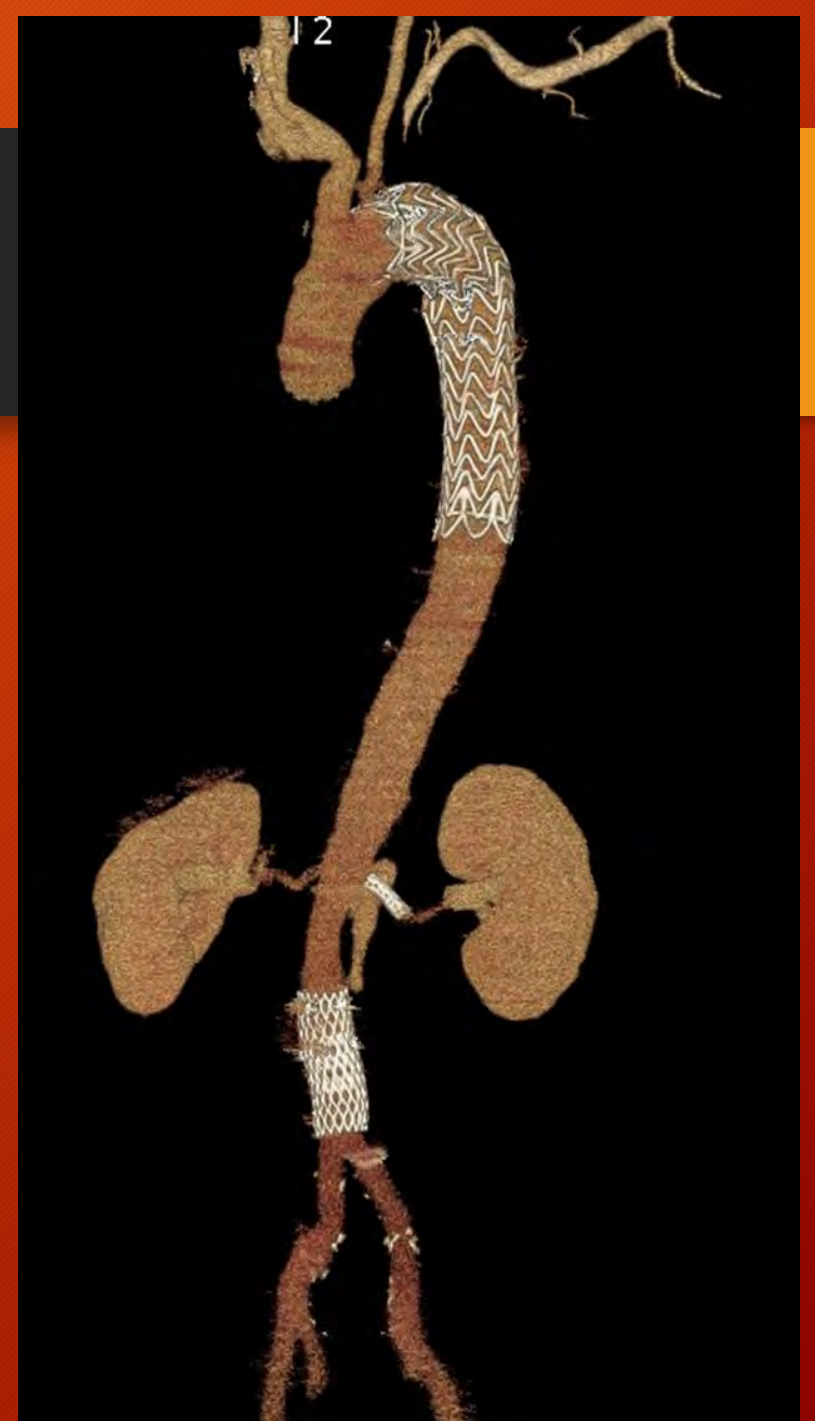
- Physical Exam!!!
- ABI
- Arterial Duplex
- CT Angiogram
- Angiogram



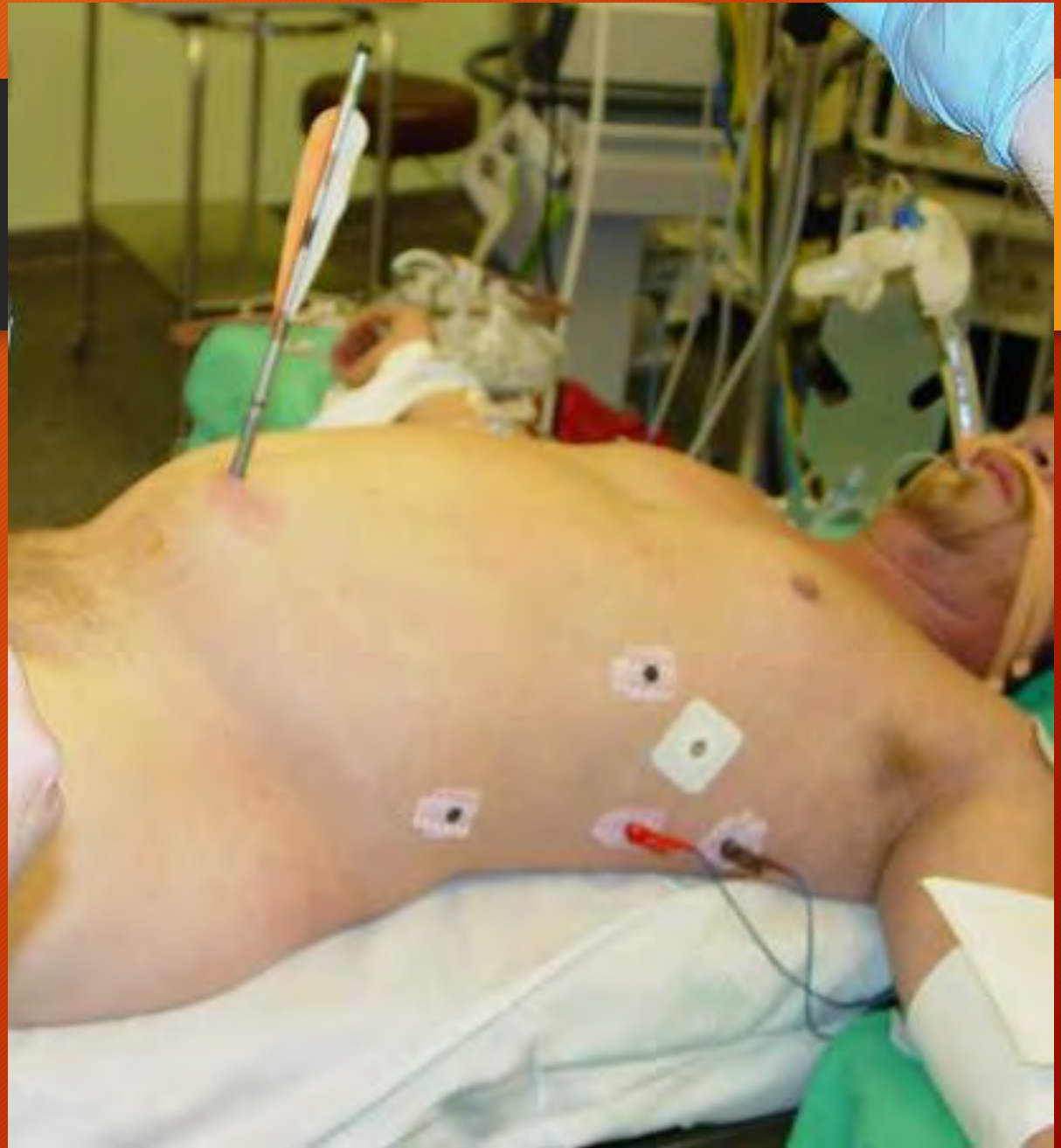
frater **S**achin^{us} iste

Many Times Endovascular First

- Can be temporizing
 - Can be permanent
 - Can be quicker
 - Can cut down blood loss
 - Can lead to long term complications.
-
- Nothing will ever beat a good contralateral saphenous vein around or below knee / elbow



Not an endovascular
candidate



Technology has changed how we treat

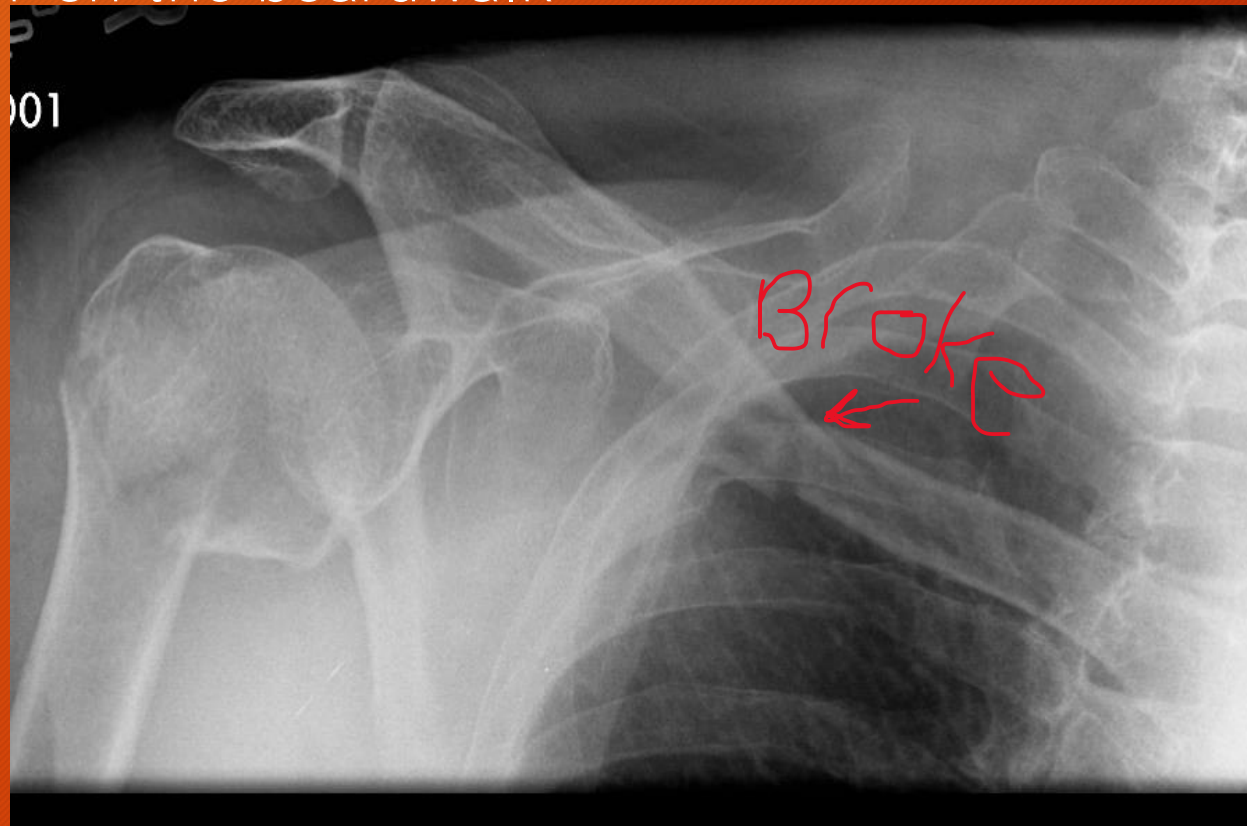


There are endovascular limitations
Stent larger blood vessels only

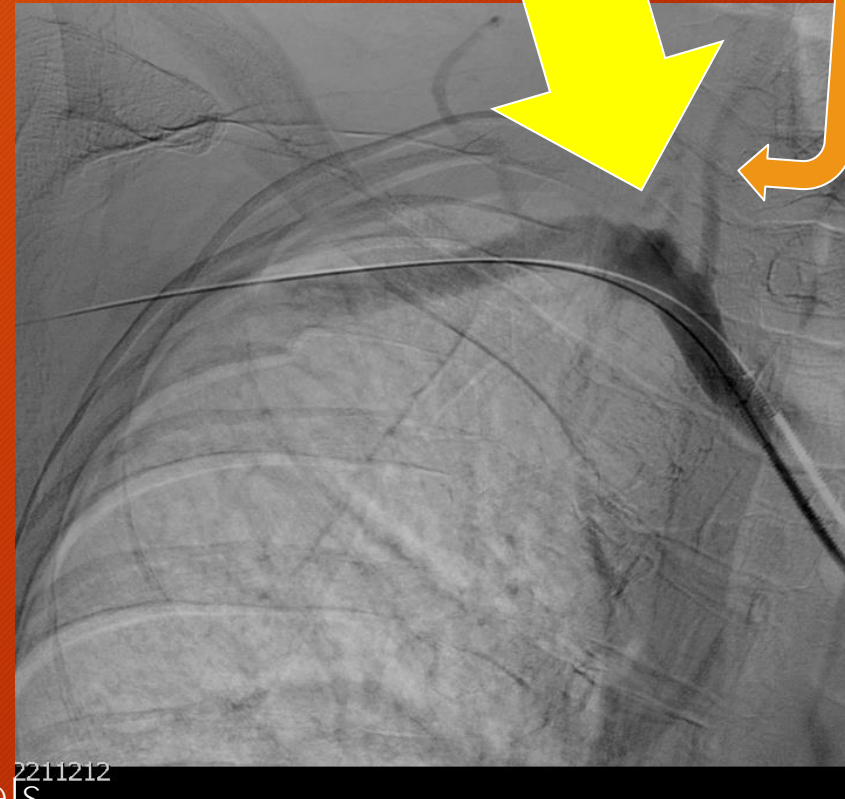


Casual Bicyclist

- 73 yo relatively healthy WM presents with growing hematoma in supraclavicular fossa on right s/p wrecking his beach cruiser on the boardwalk



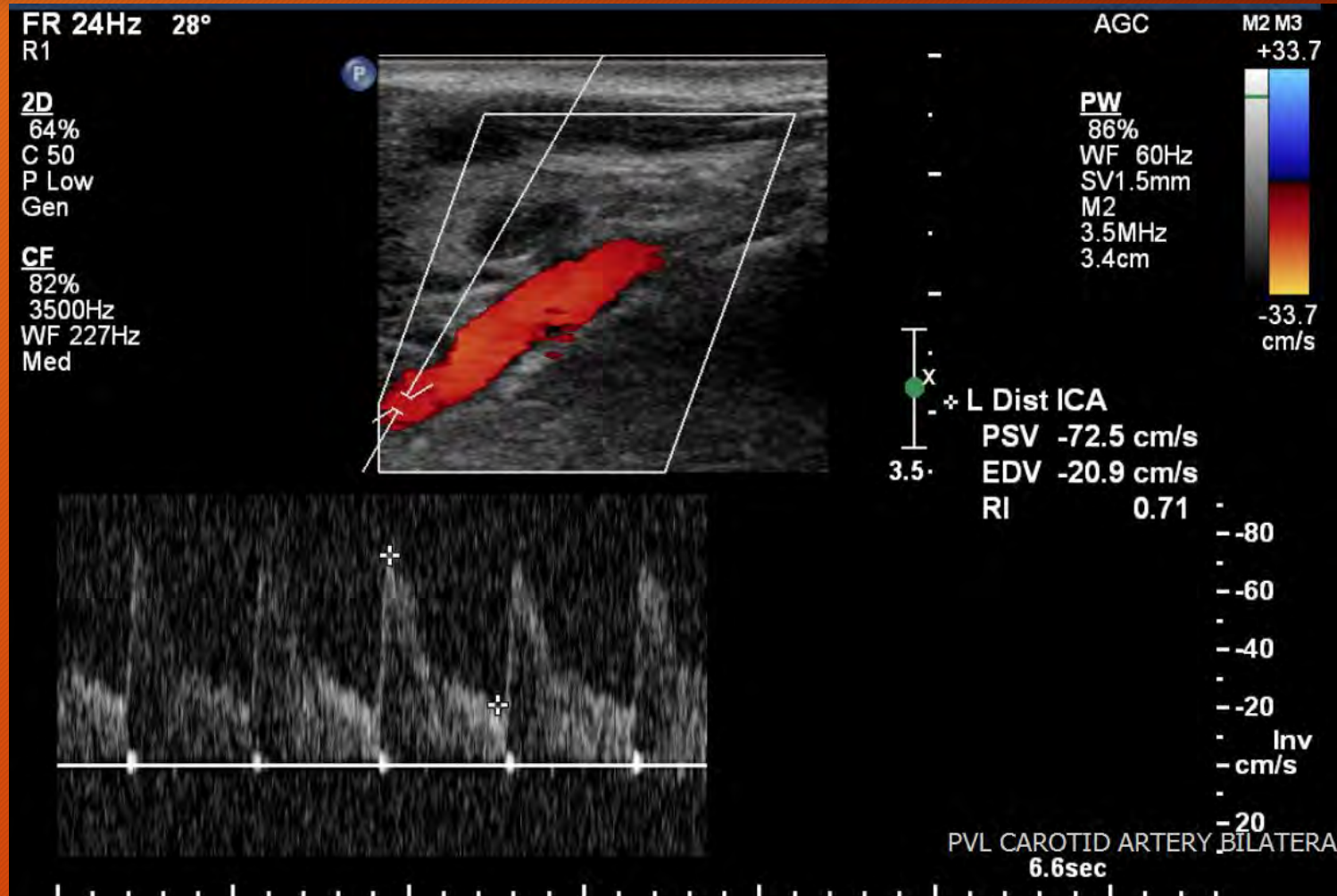
Subclavian Artery Injury at right IMA Median Sternotomy? Balloon Occlusion? Endo Fix?



Will endovascular sacrifice other vessels

Will endovascular be durable or is this “temporary” until definitive repair

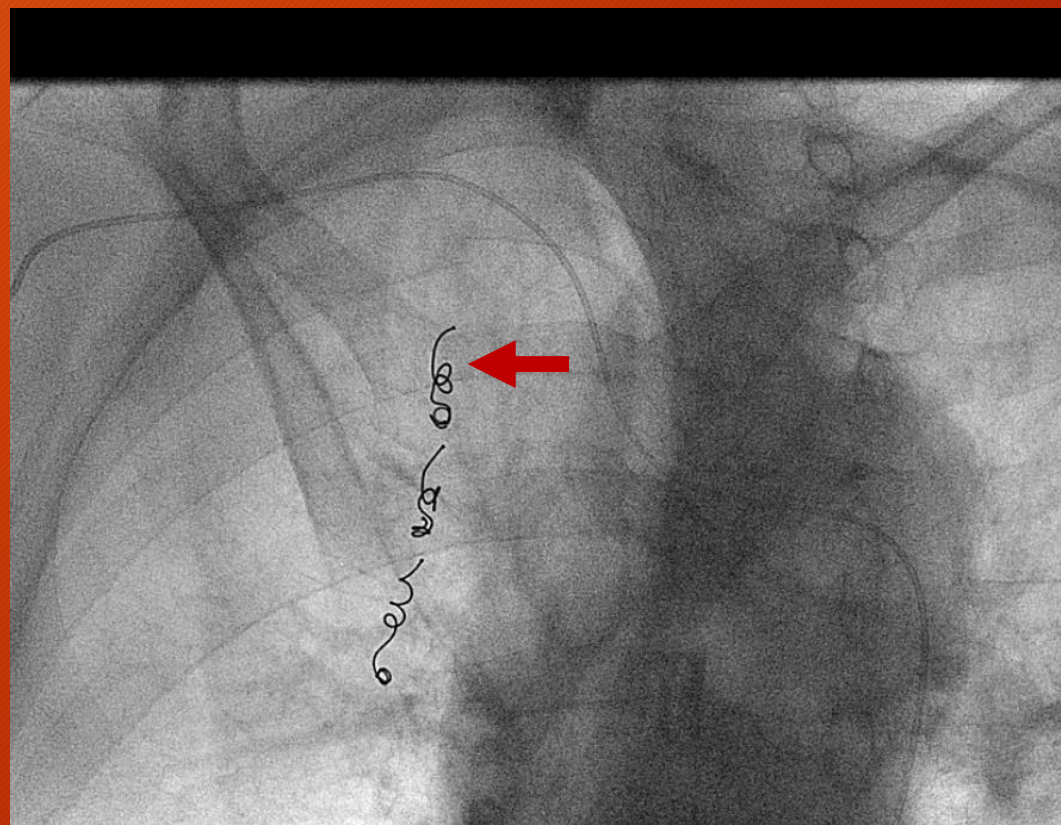
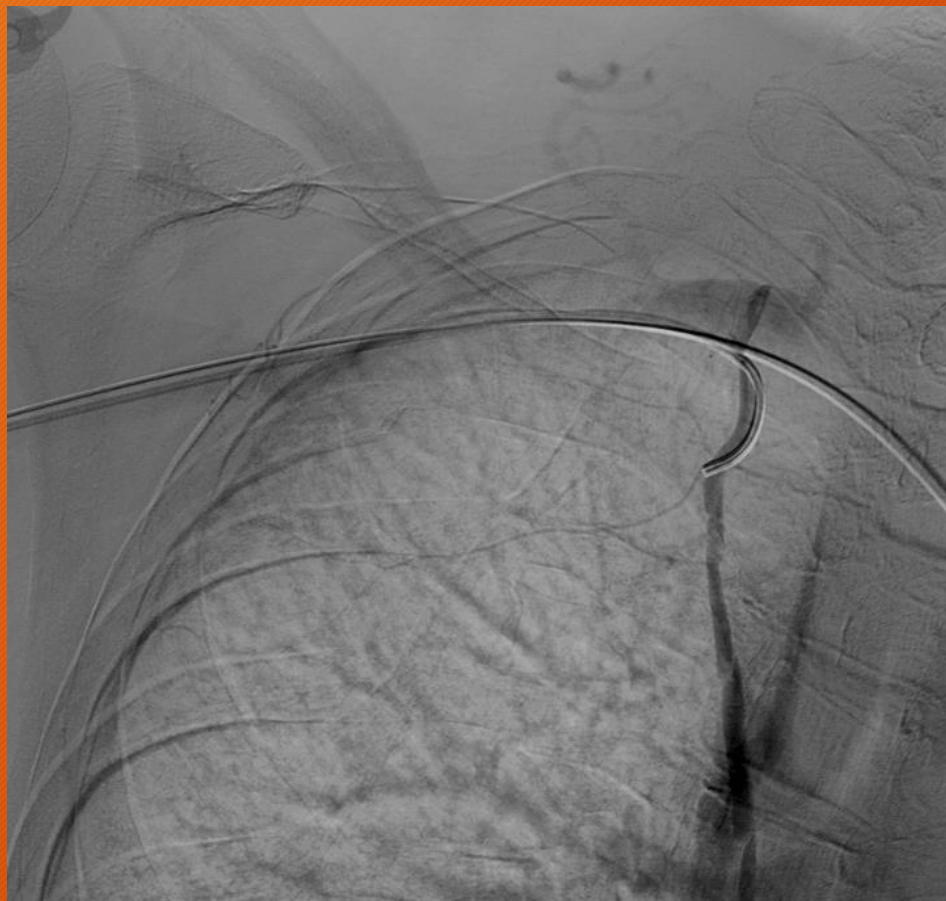
Why do quick duplex? ----Vertebral artery sacrifice...



Plan of Attack: Right SCA, VERT, IMA, & Carotid



Coil embolize IMA to keep from back bleeding since transection at its take off



Deploy Covered Stent Graft Maintaining Carotid



6 Month followup: Duplex yearly for life and aspirin for life.



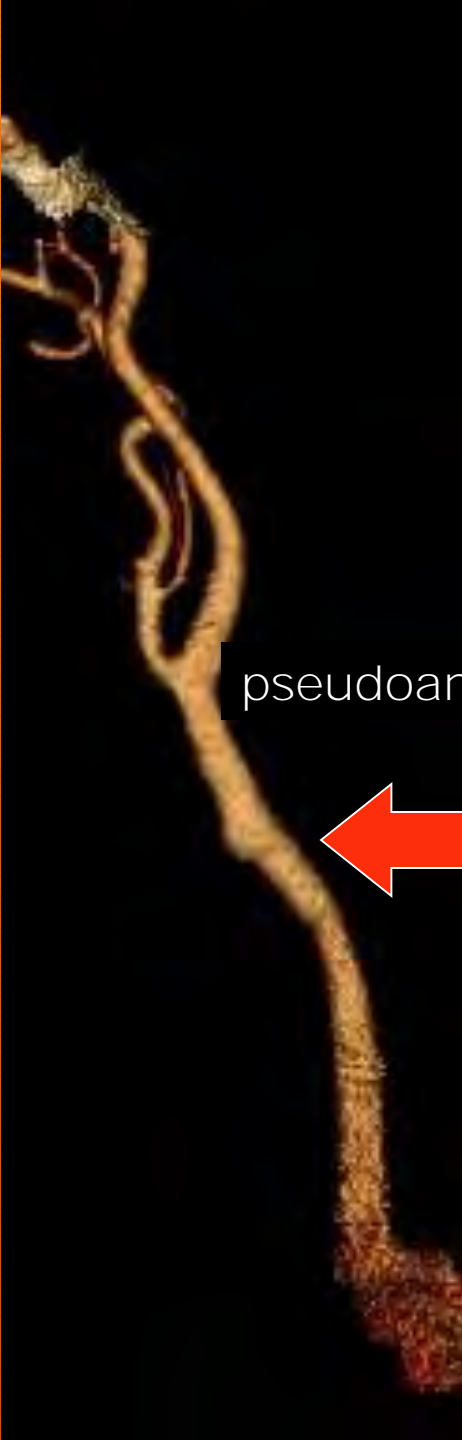
What can go wrong? Postop mgt?



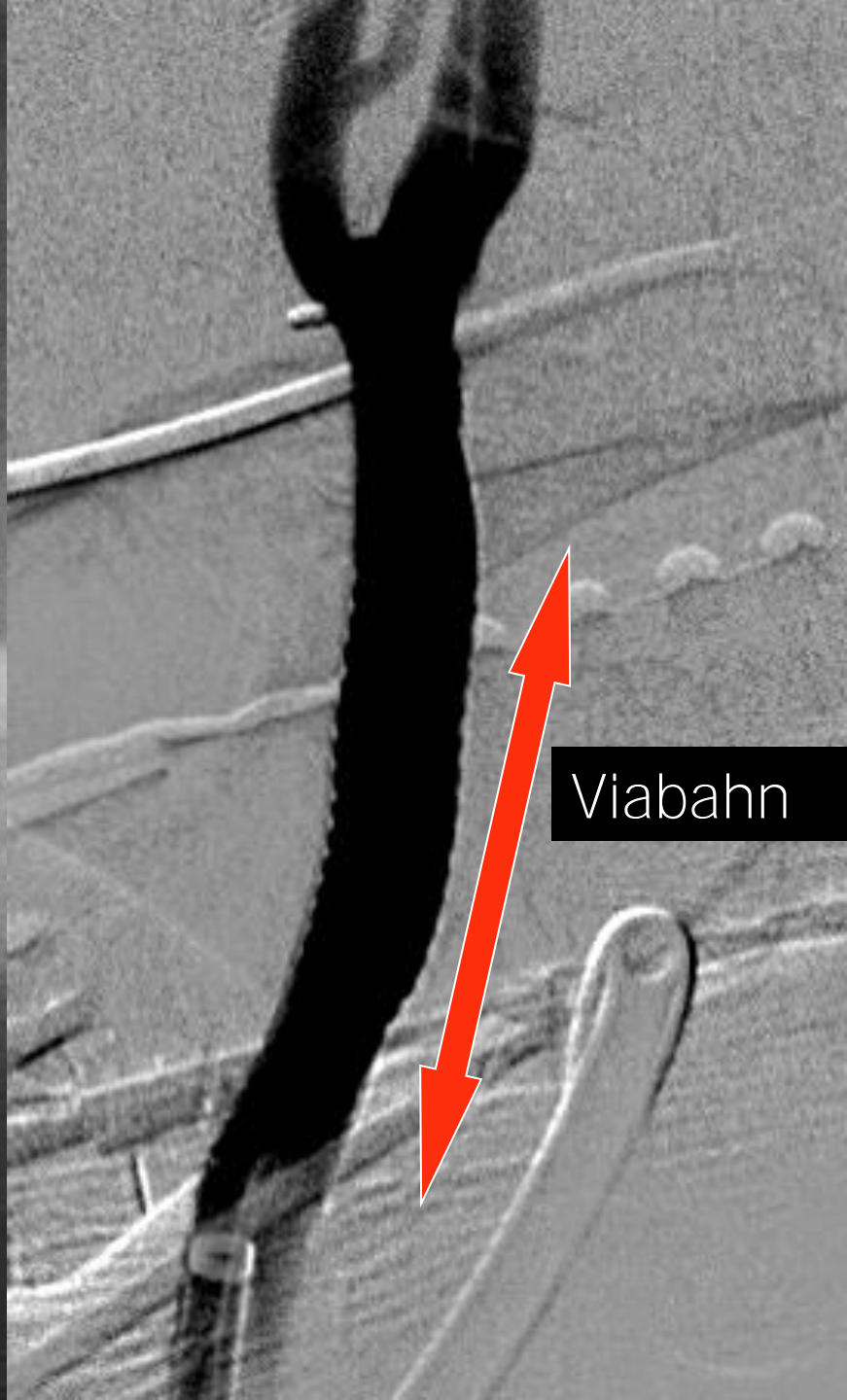
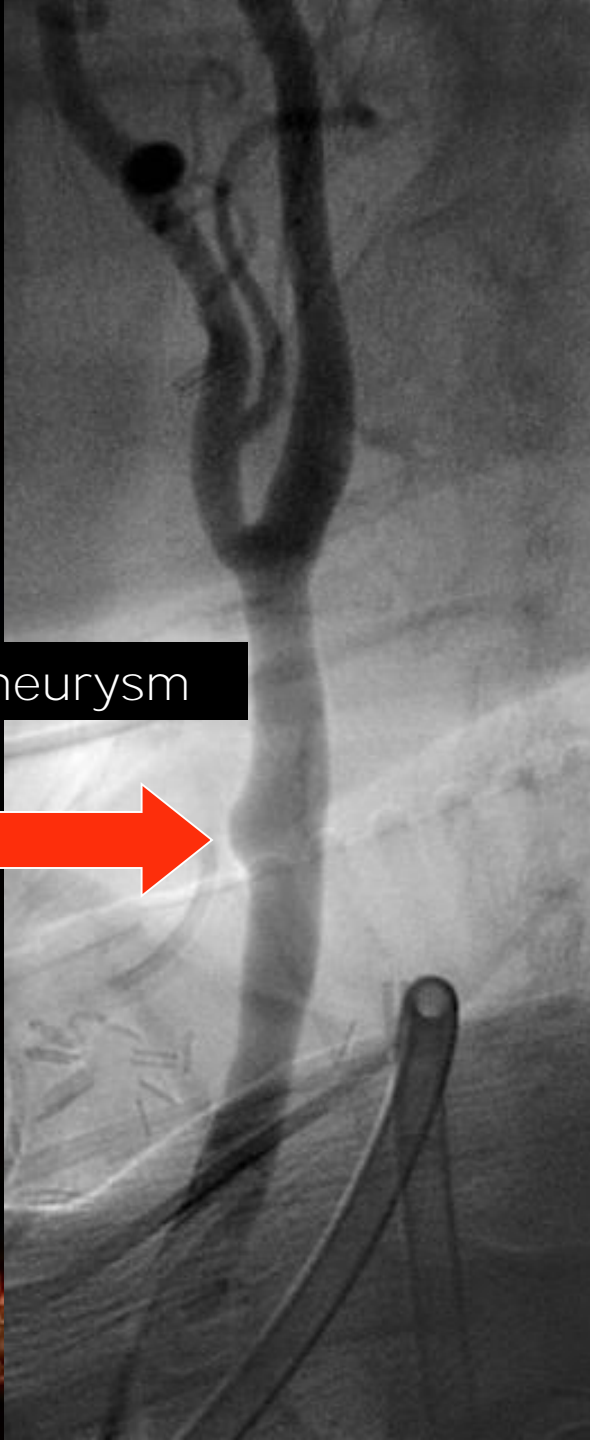
Traumatic Carotid Artery or Vertebral Artery Injury

- Medical mgt
- Anticoagulate vs Antiplatelet

- Operating on a dissection is like walking on hot coals **without getting burned...**



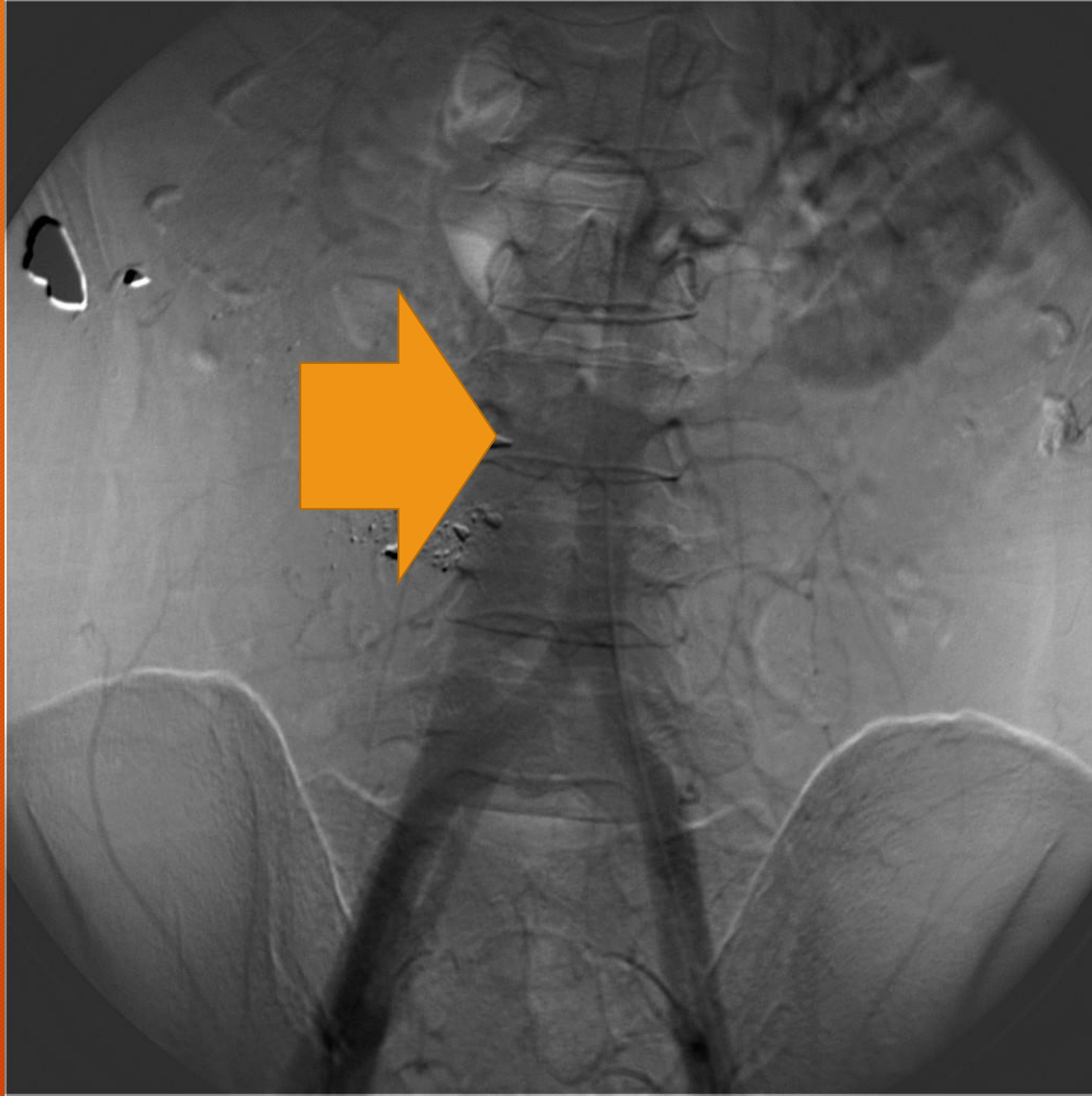
pseudoaneurysm



Viabahn

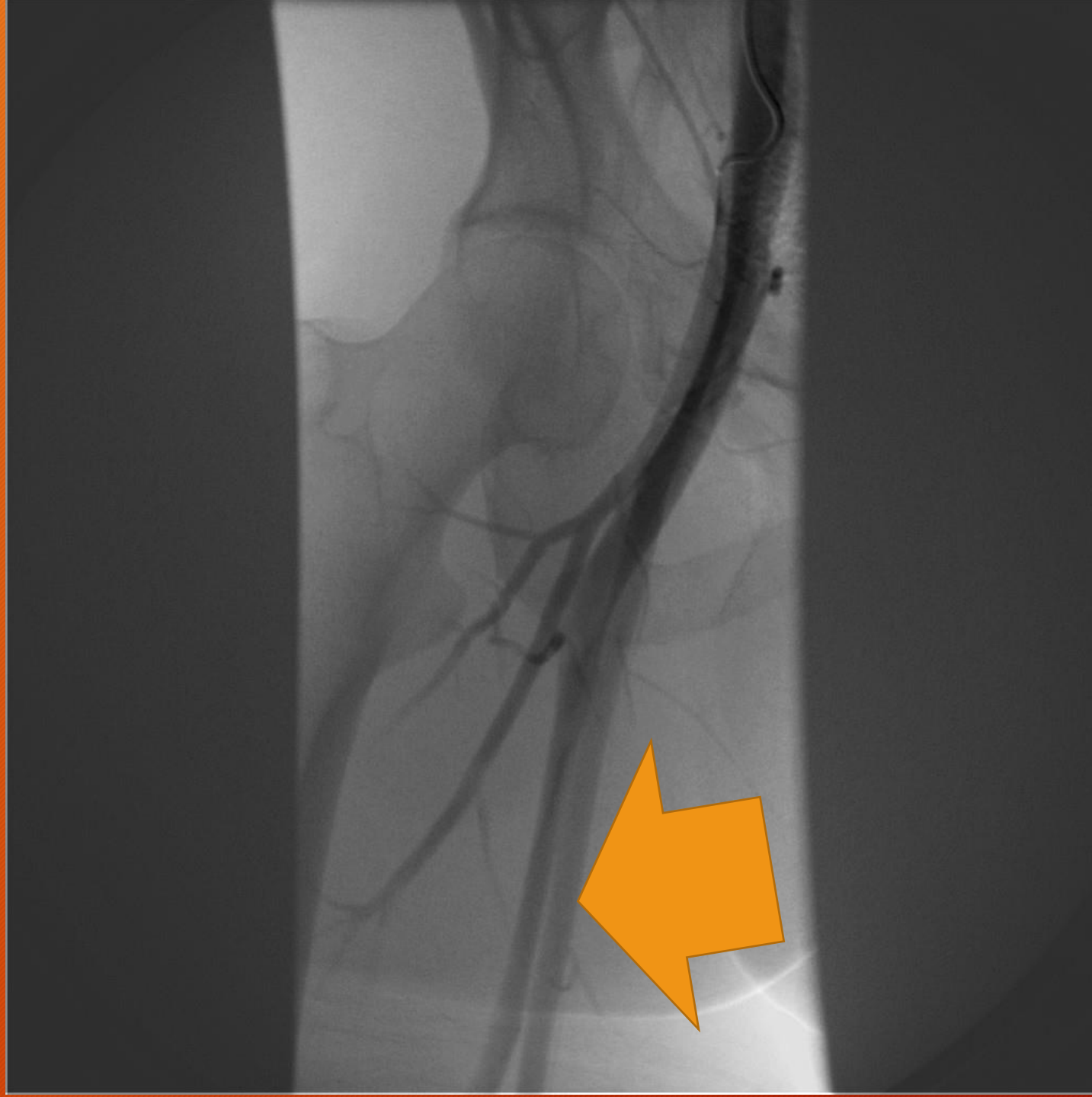
GSW Leg

Can see
AV-
Fistula



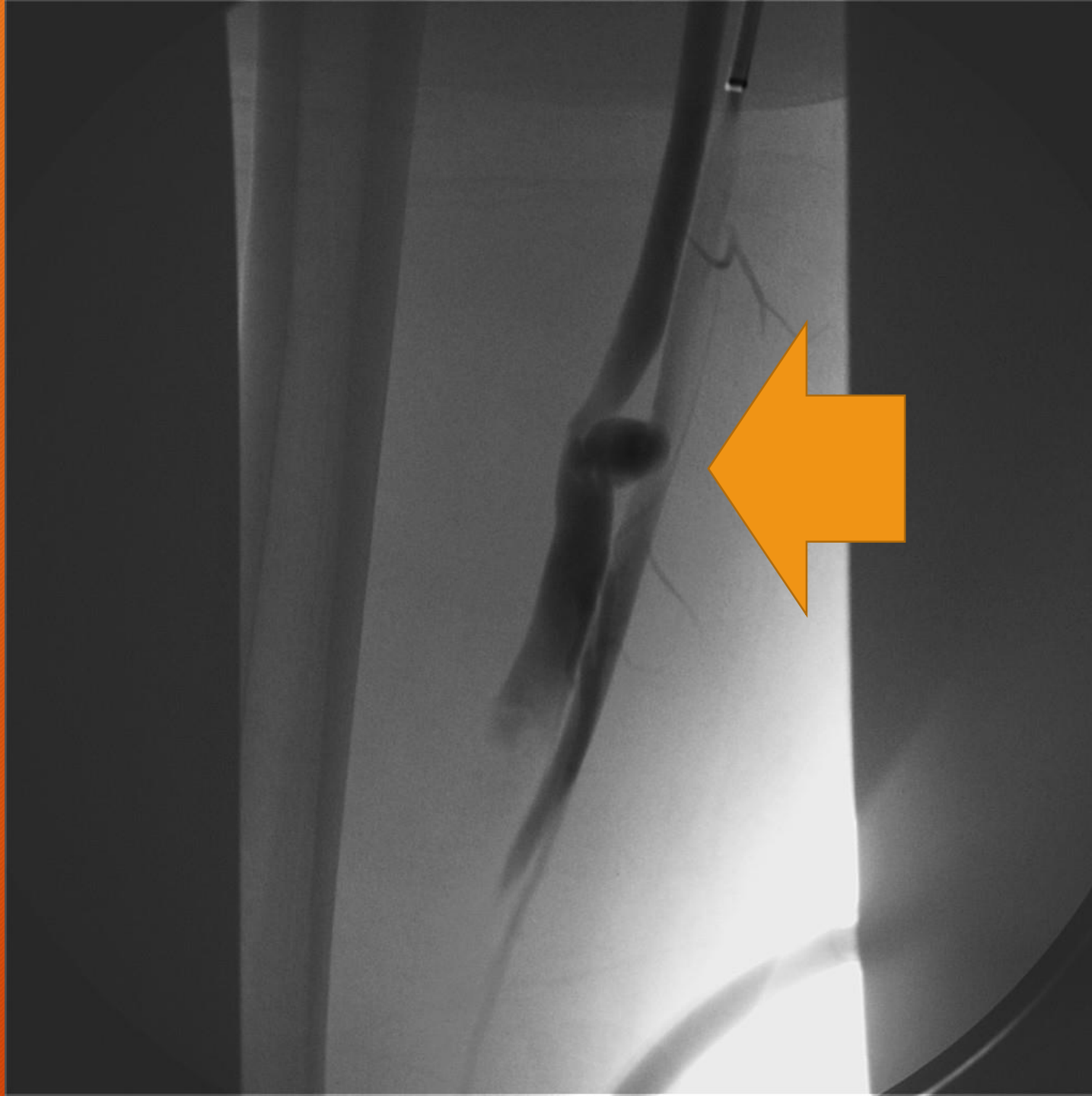
GSW Leg

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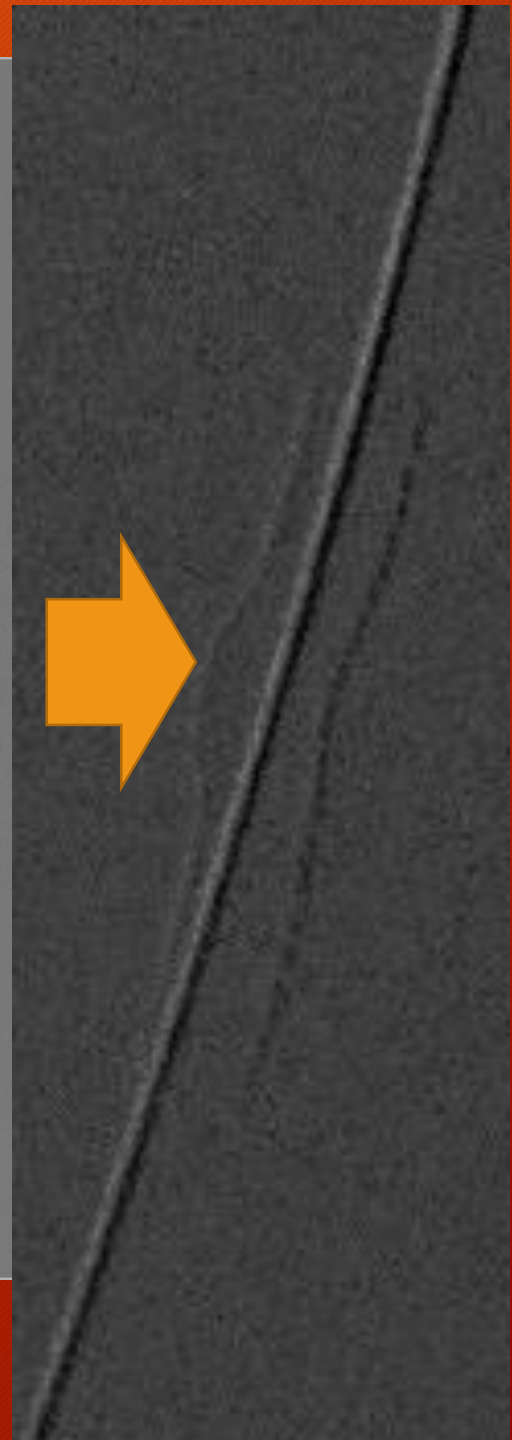
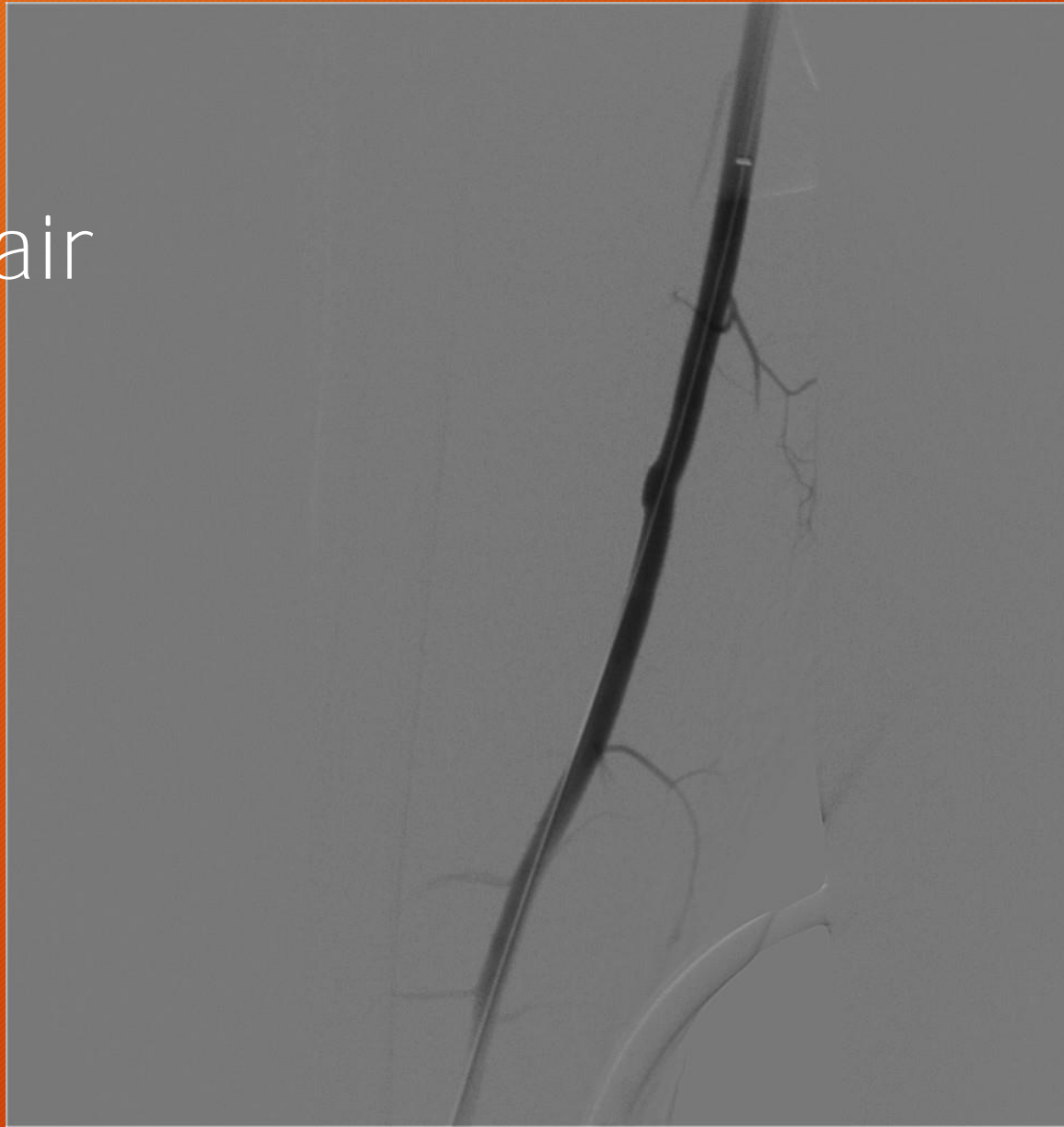


GSW Leg

Can see
AV-
Fistula



Viabahn Repair
GSW Leg



What to watch for postop peripheral stent?

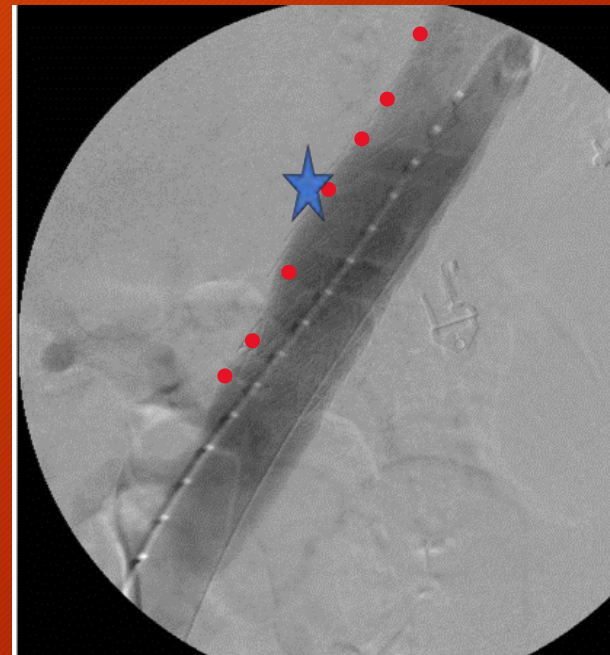
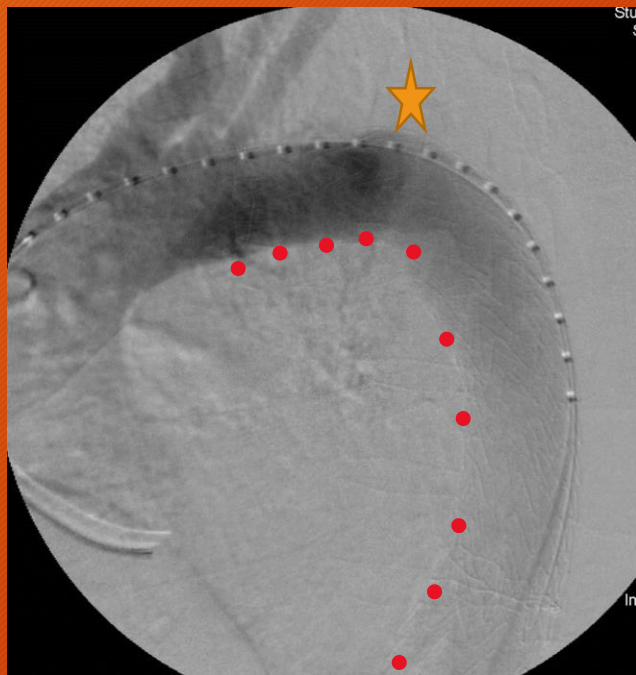
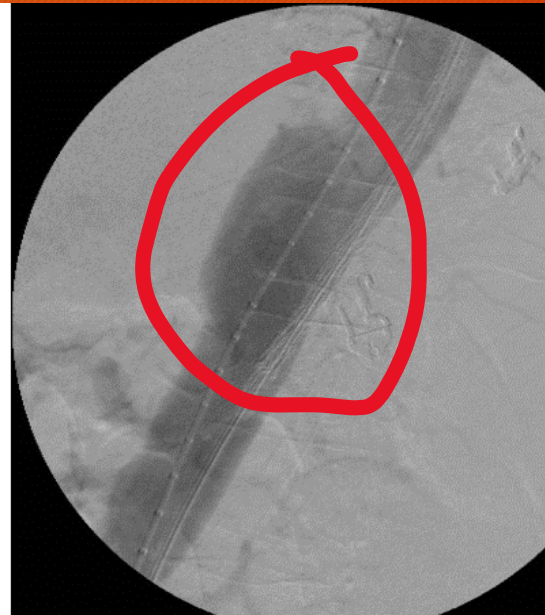
- If no perfusion - do fasciotomy
- Thrombosis of stent
 - Distal organ ischemic
 - **“cold leg”**
 - Trauma - less dual antiplatelet use
- Migration / Mismatch size
 - Recurrent symptoms or bleeding
 - **Can “pull” apart**
 - Held in place by outward pressure







MVC



Endovascular repair of traumatic thoracic aortic injury: Clinical practice guidelines of the Society for Vascular Surgery

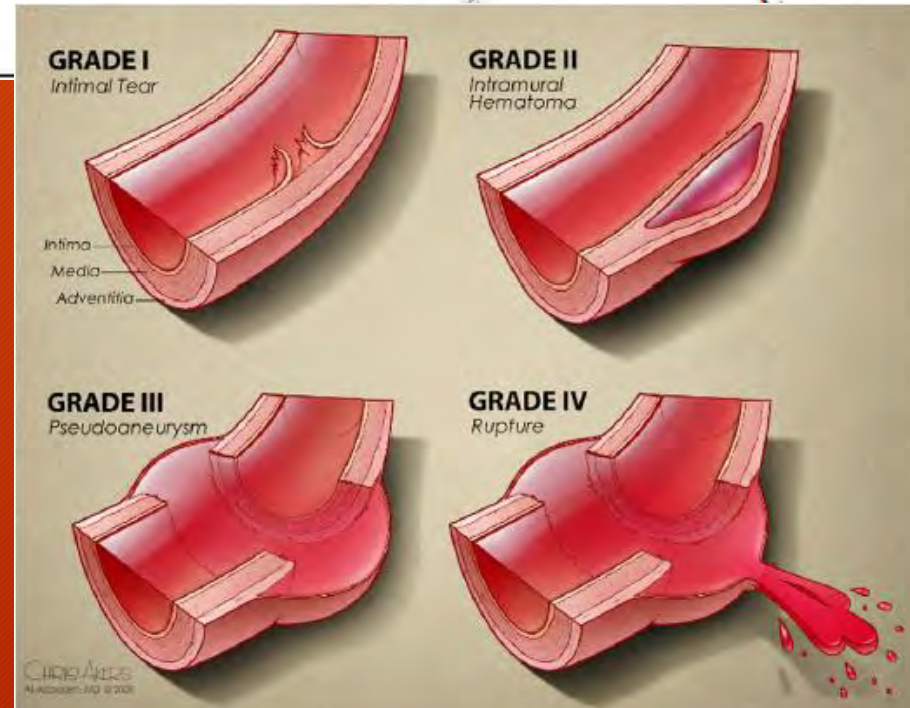
W. Anthony Lee, MD,^a Jon S. Matsumura, MD,^b R. Scott Mitchell, MD,^c Mark A. Farber, MD,^d Roy K. Greenberg, MD,^e Ali Azizzadeh, MD,^f Mohammad Hassan Murad, MD, MPH,^g and Ronald M. Fairman, MD,^h *Boca Raton, Fla; Madison, Wisc; Palo Alto, Calif; Chapel Hill, NC; Cleveland, Ohio; Houston, Tex; Rochester, Minn; and Philadelphia, Pa*

(*J Vasc Surg* 2011;53:187-92.)

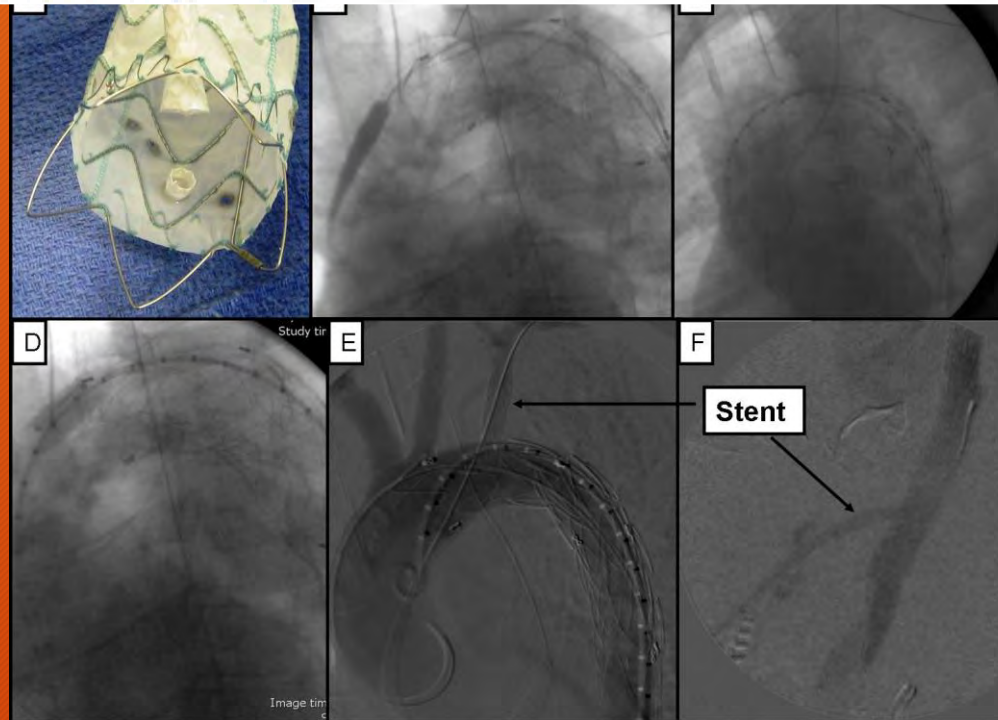


Guideline	Consensus	Grade of recommendation		Quality of evidence	
		1—strong	2—weak	A—high	B—moderate
Choice of treatment	We suggest that endovascular repair be performed preferentially over open surgical repair or nonoperative management.		2		C
Timing of repair	We suggest urgent (<24 hours) repair, and at the latest prior to hospital discharge.		2		C
Management of minimal aortic injury	We suggest expectant management with serial imaging for type I injuries.		2		C
Type of repair in the young patient	We suggest endovascular repair regardless of age if anatomically suitable.		2		C
Management of left subclavian artery	We suggest selective revascularization of the left subclavian artery.		2		C
Systemic heparinization	We suggest routine heparinization but at a lower dose than in elective TEVAR.		2		C
Spinal drainage	We do not suggest routine spinal drainage.		2		C
Choice of anesthesia	We suggest general anesthesia.		2		C
Femoral access technique	We suggest open femoral exposure.		2		C

1. TEVAR regardless of age
2. Repair Grade 2 and Higher
3. Repair Urgently <24 hours
4. Selective LSCA Revasc



- **Recommendation 3:** In patients who need very urgent TEVAR for life-threatening acute aortic syndromes where achievement of a proximal seal necessitates coverage of the LSA, we suggest that revascularization should be individualized and addressed expectantly on the basis of anatomy, urgency, and availability of surgical expertise (GRADE 2, level C).

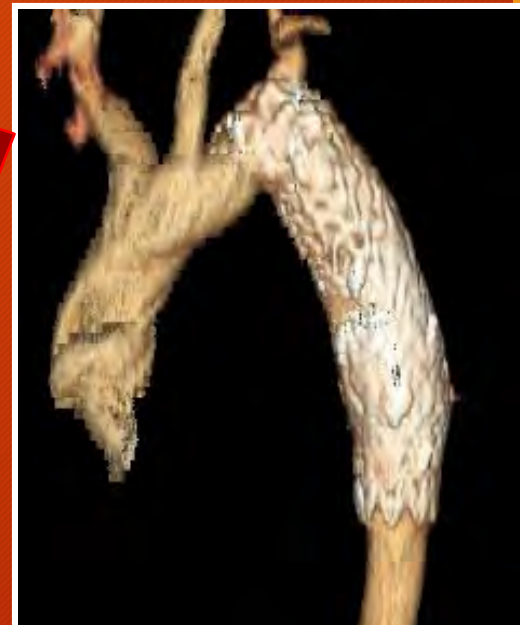


What to look for postop Aortic Endograft: EVAR/TEVAR

- Dissection going into heart
- Dissection going distally
- Continued Leak from Collateral vessel
- Organ ischemia
- Leg ischemia from catheterization
- Groin bleeding



Young Patients Have to be followed for life:
Infolding of endo graft over time... I did open repair later



Motorcycle Crash with massive leg fractures above knee to below knee bypass...



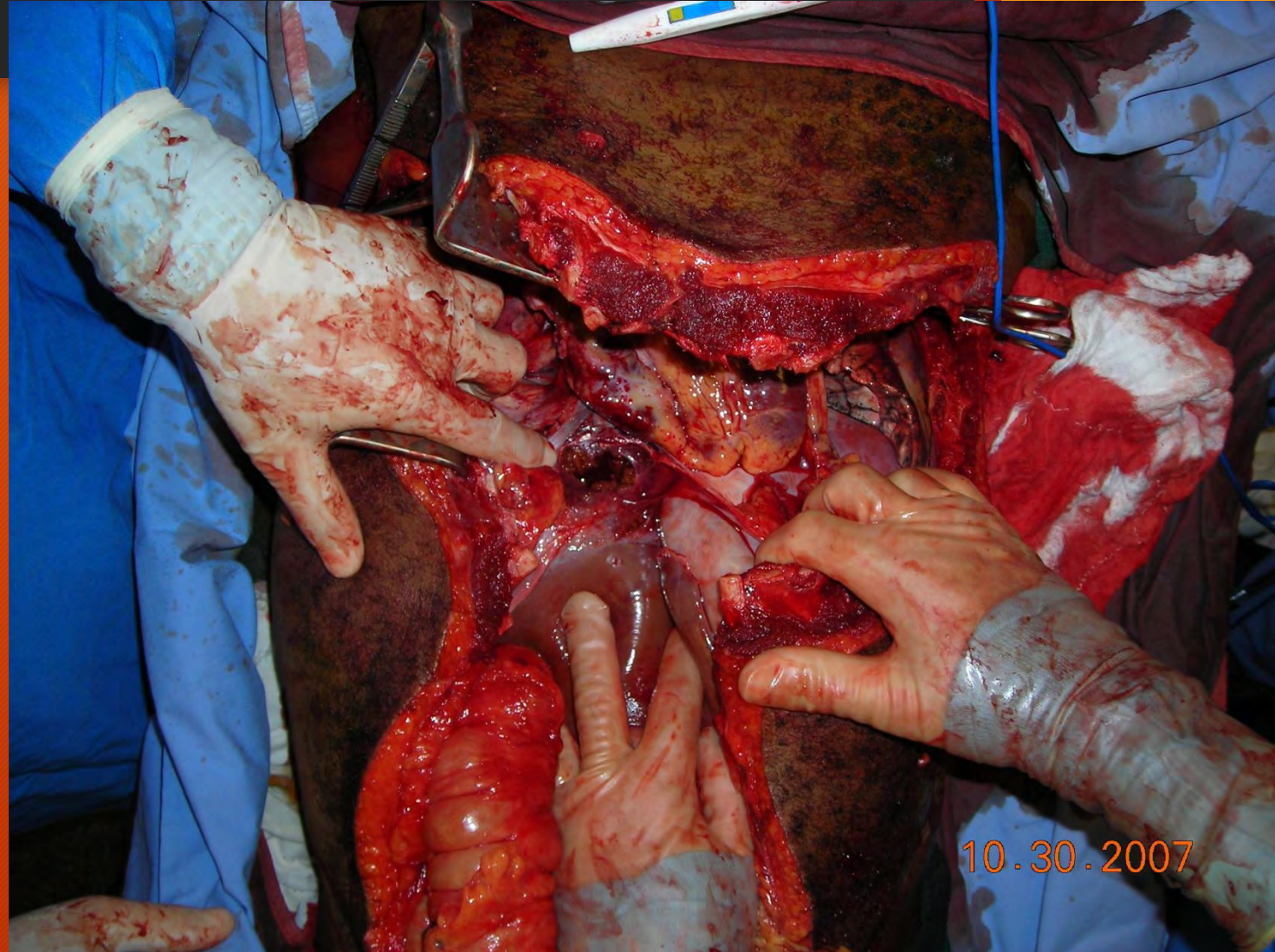
Shark Bite! *for real*

- Primary Amputation
 - Blood/Nerve/Muscle



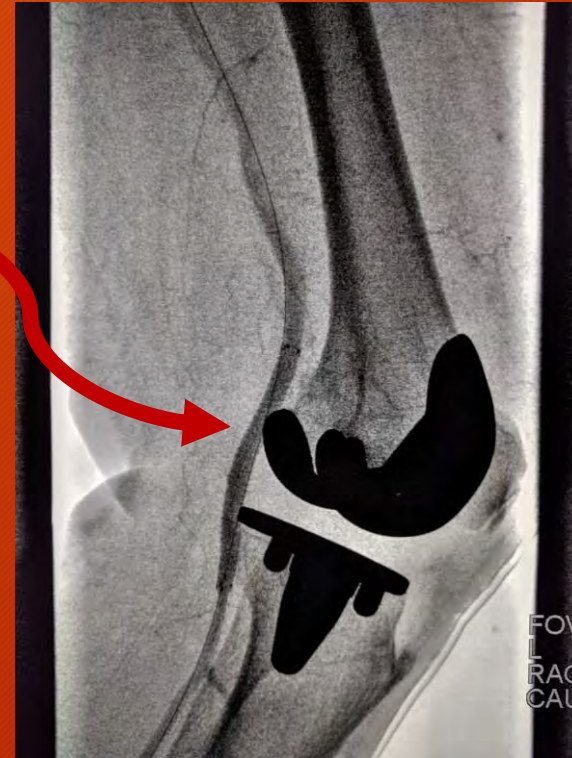
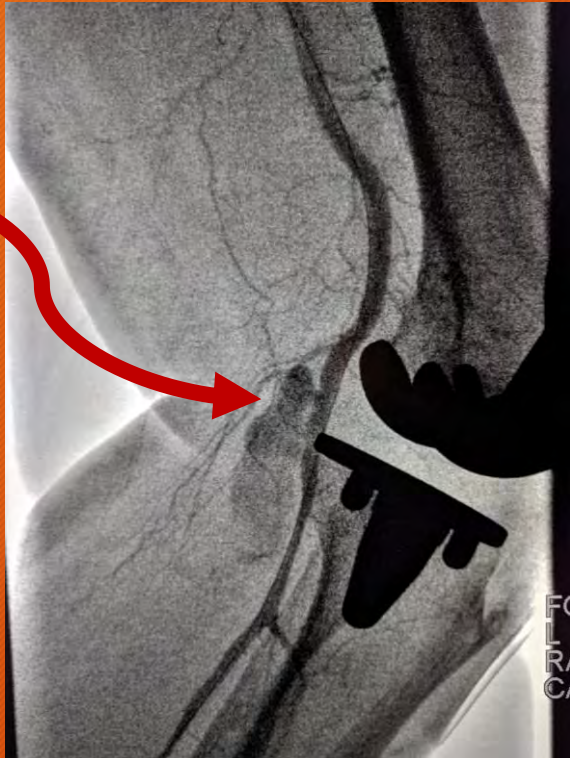
GSW Suprahepatic Vena Cava

Mercedes incision...



TKR - Iatrogenic Popliteal Artery Injury

Test: What did I do? Pitfalls? Followup? Alternatives?



Thank you

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