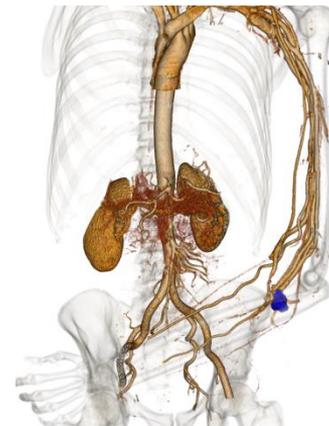




# Peripheral Vascular Injuries

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# Disclosure

- None

# Learning Objectives

- To understand the **clinical principles** guiding the imaging choice in patients with peripheral vascular trauma
- To know the spectrum of **CTA signs** of vascular injury
- Understand the role of imaging in guiding the **management**

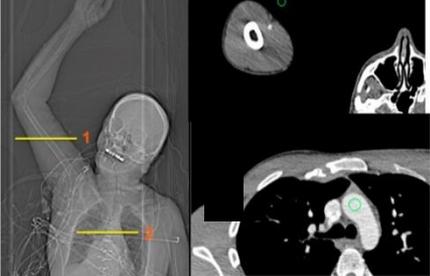
# CT Angiography for Peripheral Vascular Injuries

- CTA is 1<sup>st</sup> line investigation for vascular injury
- Rapid, non-invasive and easily available
- Detects associated injuries



Meta-analysis of 891 patients from 11 studies- sensitivity of 96% and specificity of 99%

# Imaging Technique



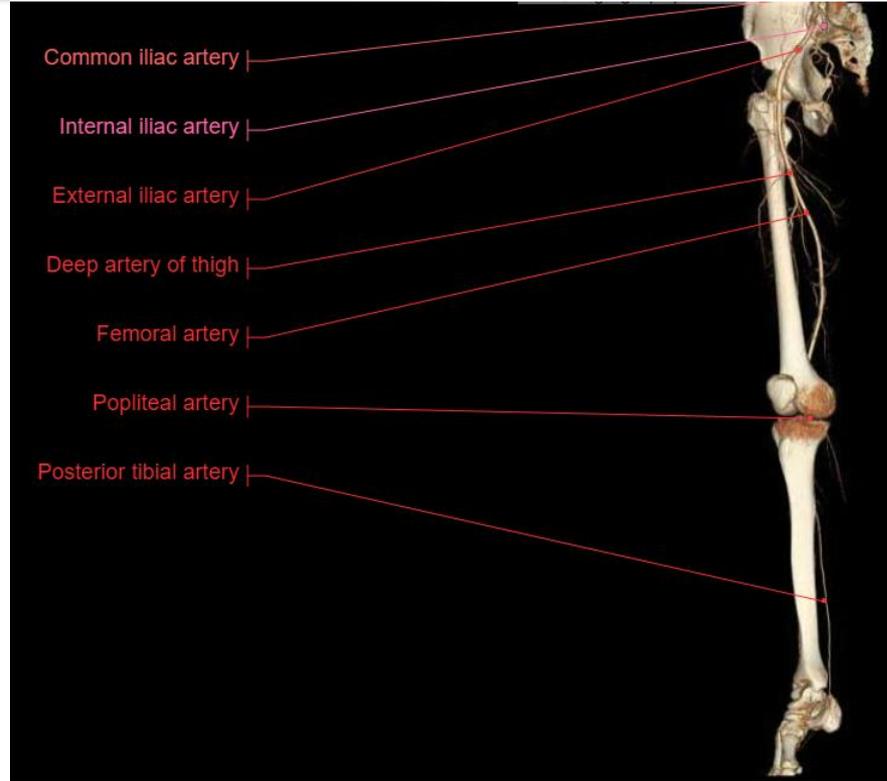
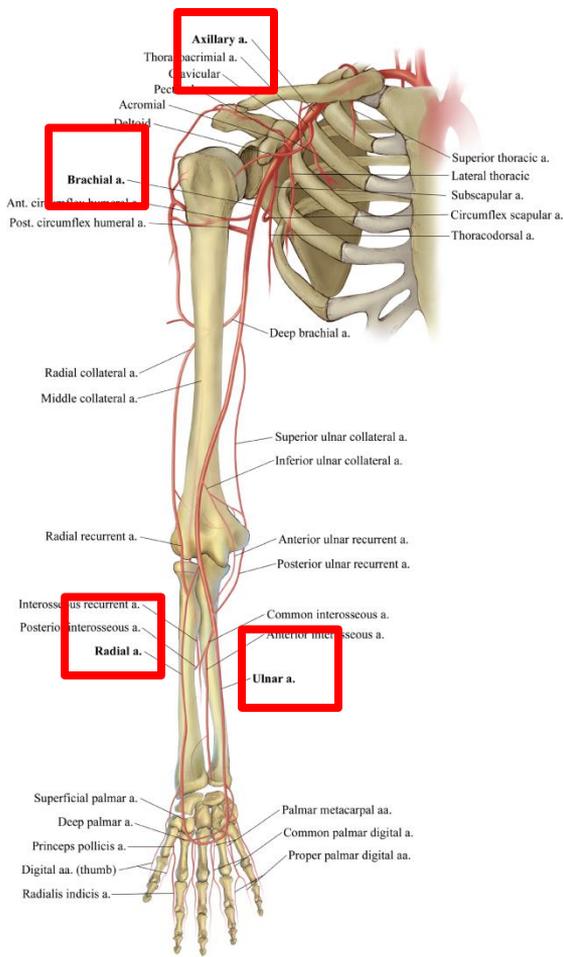
Injection: Contralateral arm if UE CTA  
-18-20 gauge

UE positioning- Ideally above head  
If not: beside

LE positioning- Supine with legs together  
and secured Include both legs in FOV

- Fast injection (4-5 ml/sec)
- Weight based, Iohexol 350mg/mL, followed by 30 cc saline chase
- Automated bolus
- Delay images through leg >50 years

# Anatomy

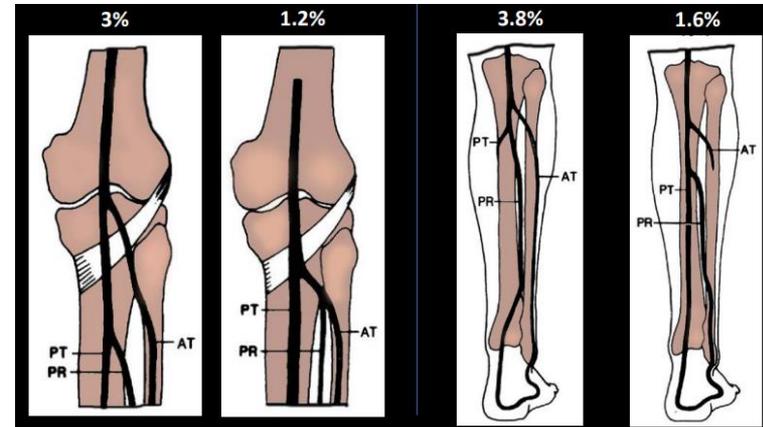


# Anatomic Variations

## Upper Extremity

- 19%: High origin of radial
- 3%: radial artery from axillary
- 3%: persistent median artery
- 2-3%: ulnar origin from brachial or axillary

## Lower Extremity



## Hard Signs

## Clinical Assessment

## Soft Sign

>90% have arterial injury

- **Pulsatile bleeding**
- **Expanding hematoma**
- **Palpable Thrill**
- **Audible Bruit**
- **Pulseless/Ischemic Limb**

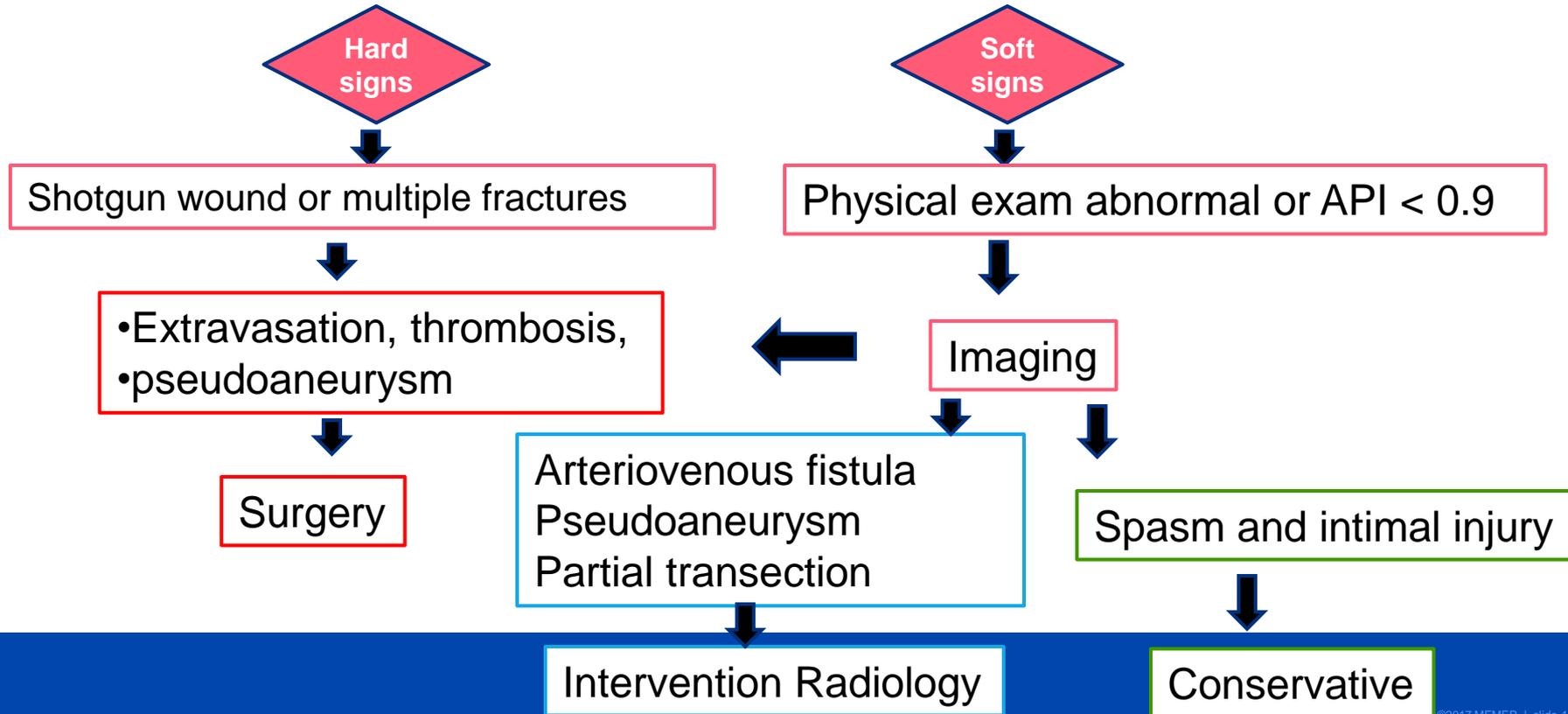
3-25% have arterial injury

- ❖ **Hypotension or shock**
- ❖ **Injury in proximity to major artery**
- ❖ **Diminished but palpable pulse**
- ❖ **Peripheral nerve deficit**

# Algorithm for evaluation of patient with possible peripheral vascular injury.

Initial assessment of injured extremity

- Primary survey of ATLS – bleeding present?
- Manual compression, compression dressing, or tourniquet
- Secondary survey of ATLS –neurovascular status?



# Types of Vascular Injuries

- **Intimal injuries**
- **Laceration or partial transection**
- **Complete transection**
- **Pseudoaneurysm**
- **Arteriovenous fistula**
- **Spasm**



# CT signs of vascular injury

## Direct signs

- ❖ Active extravasation of contrast
- ❖ Occlusion or segmental non-opacification - thrombosis/transection
- ❖ Abrupt vessel narrowing-spasm, compression, dissection
- ❖ Intimal defect / tear
- ❖ Pseudoaneurysm
- ❖ Early filling veins- Arteriovenous fistula
- ❖ Abnormal course, caliber and contour of vessel

# CT signs of vascular injury

## Indirect signs

- ❖ Perivascular hematoma
- ❖ Ballistic track through/near artery
- ❖ Shrapnel less than 5 mm from vessel



## Case

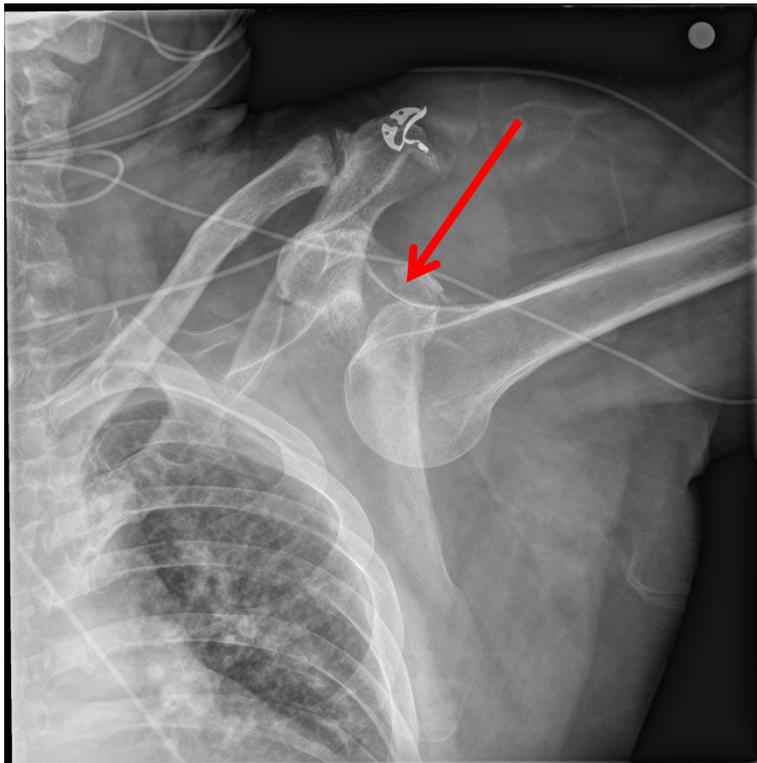
45 year male with stab injury to forearm



# Radial artery active extravasation

## Case

70/m poor pulses after shoulder reduction

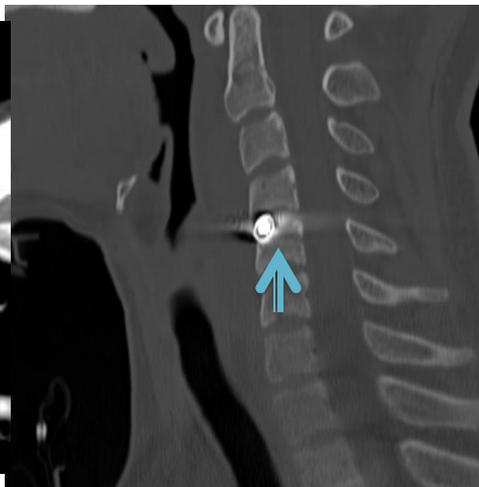
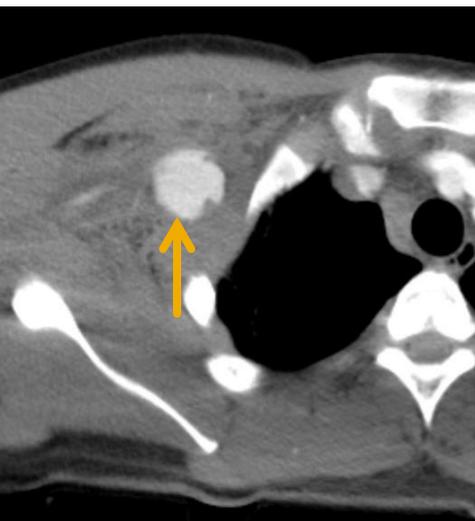




# Laceration or partial transection

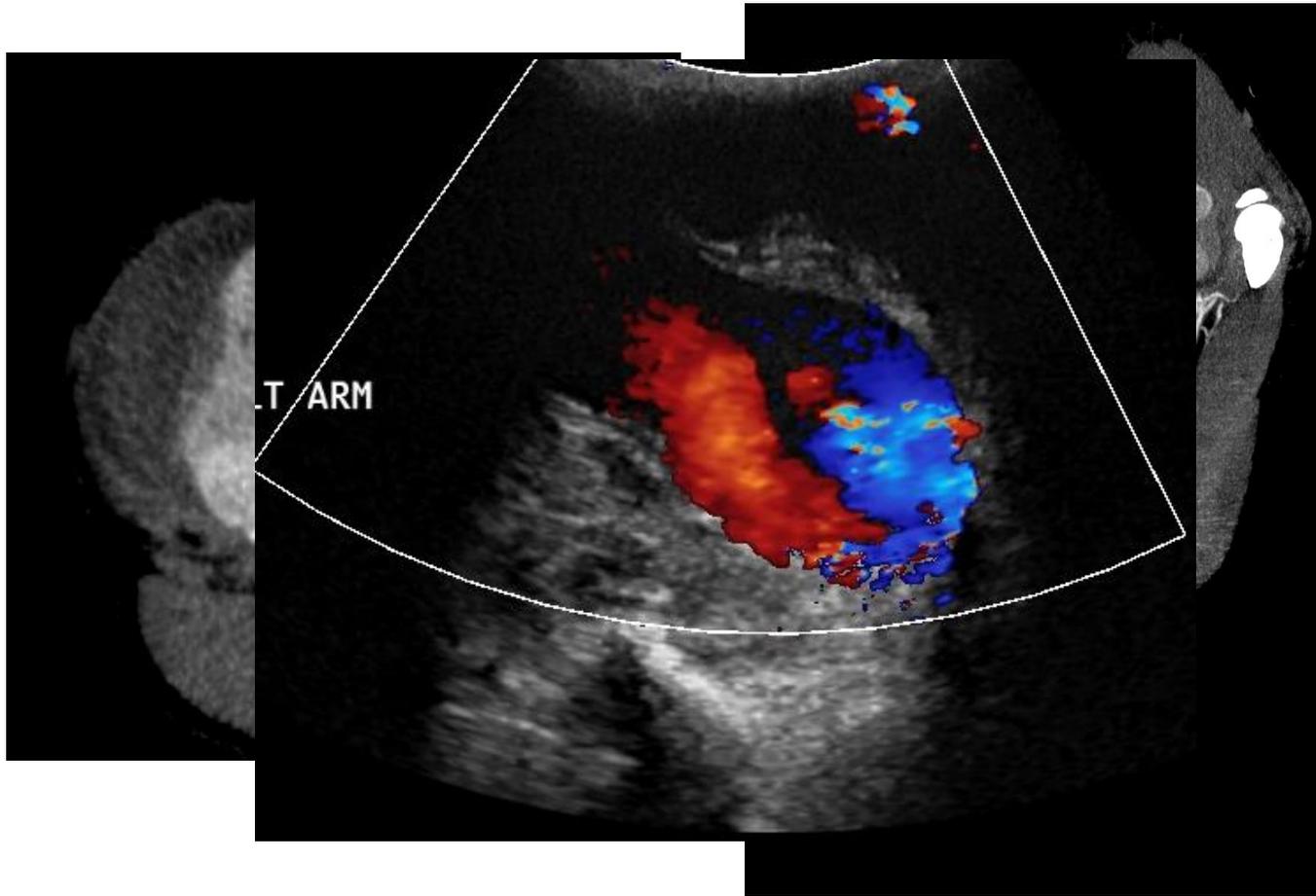
## Case

22 year male with gunshot wound to the chest. + bruit and a thrill in the right infraclavicular area



**Pseudoaneurysm of right axillary artery with distal thrombosis**

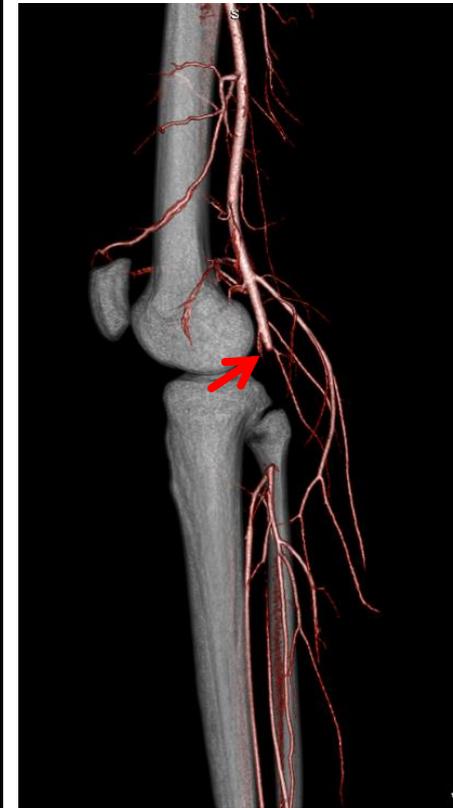
Case: H/o Blunt metal injury 1 year ago with slowly progressively increasing pulsatile mass



# Pseudoaneurysm of Brachial artery- Delayed manifestation

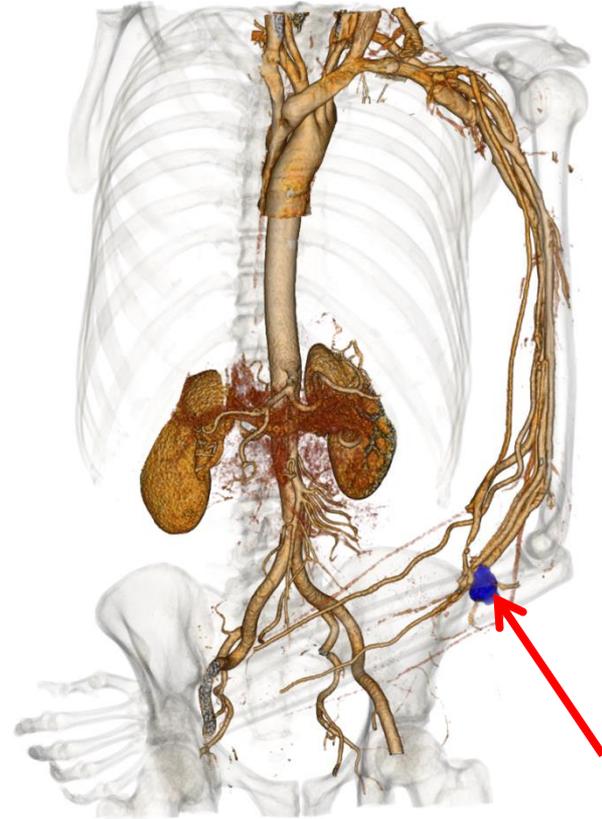
## Case

24 year male pursued by police force and jumped off a 3-foot ledge presented with right knee pain and swelling



## Case

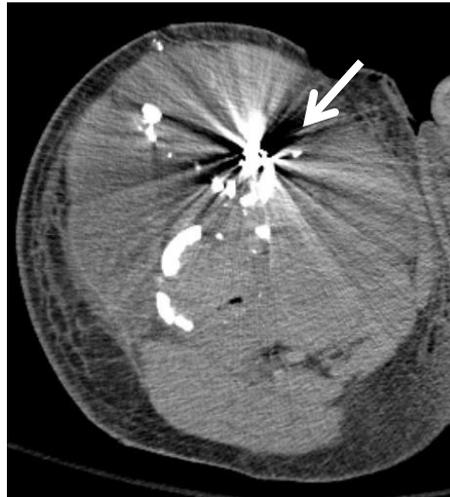
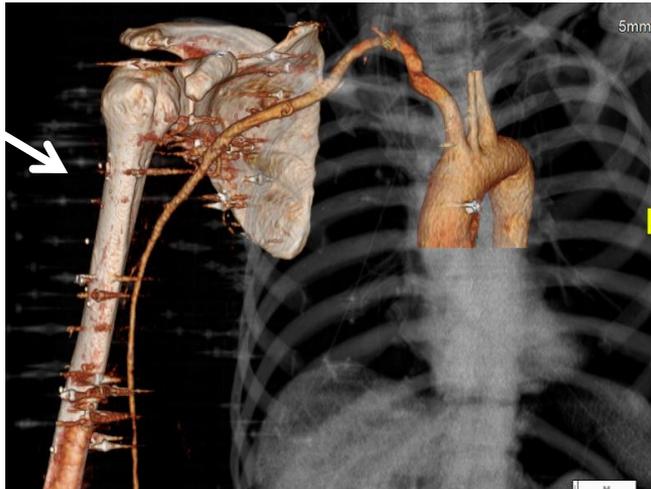
44 year old with MVA.  
Penetrating injury due to glass  
from windshield



# Ulnar pseudoaneurysm with AV fistula

# Pitfalls of CTA

- ❖ Poor opacification of lumen- mismatch between contrast transit and image acquisition
- ❖ Motion artefact
- ❖ Streak artefact





## Take home points

- CTA is 1<sup>st</sup> line imaging modality for fast and accurate assessment of vascular injury
- Know the direct and indirect signs of vascular injuries on CTA
- Accurate description is essential for management decisions

# Thank you



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