Vascular Access, Management and Local Complications of Cardiac Catheterization

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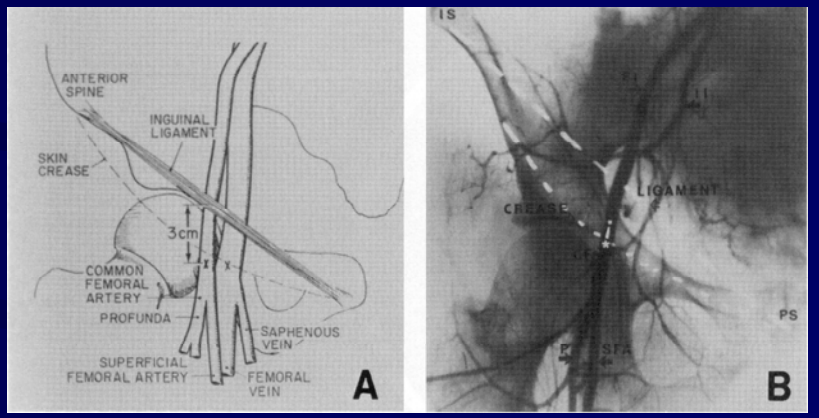
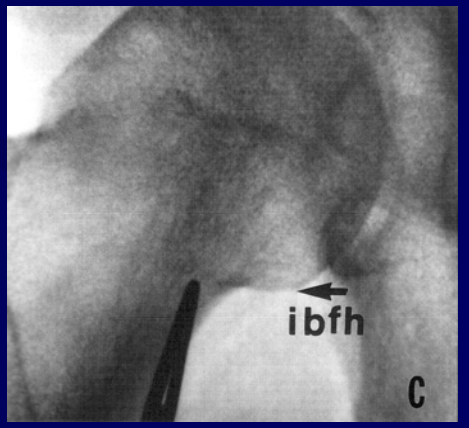
Femoral Access

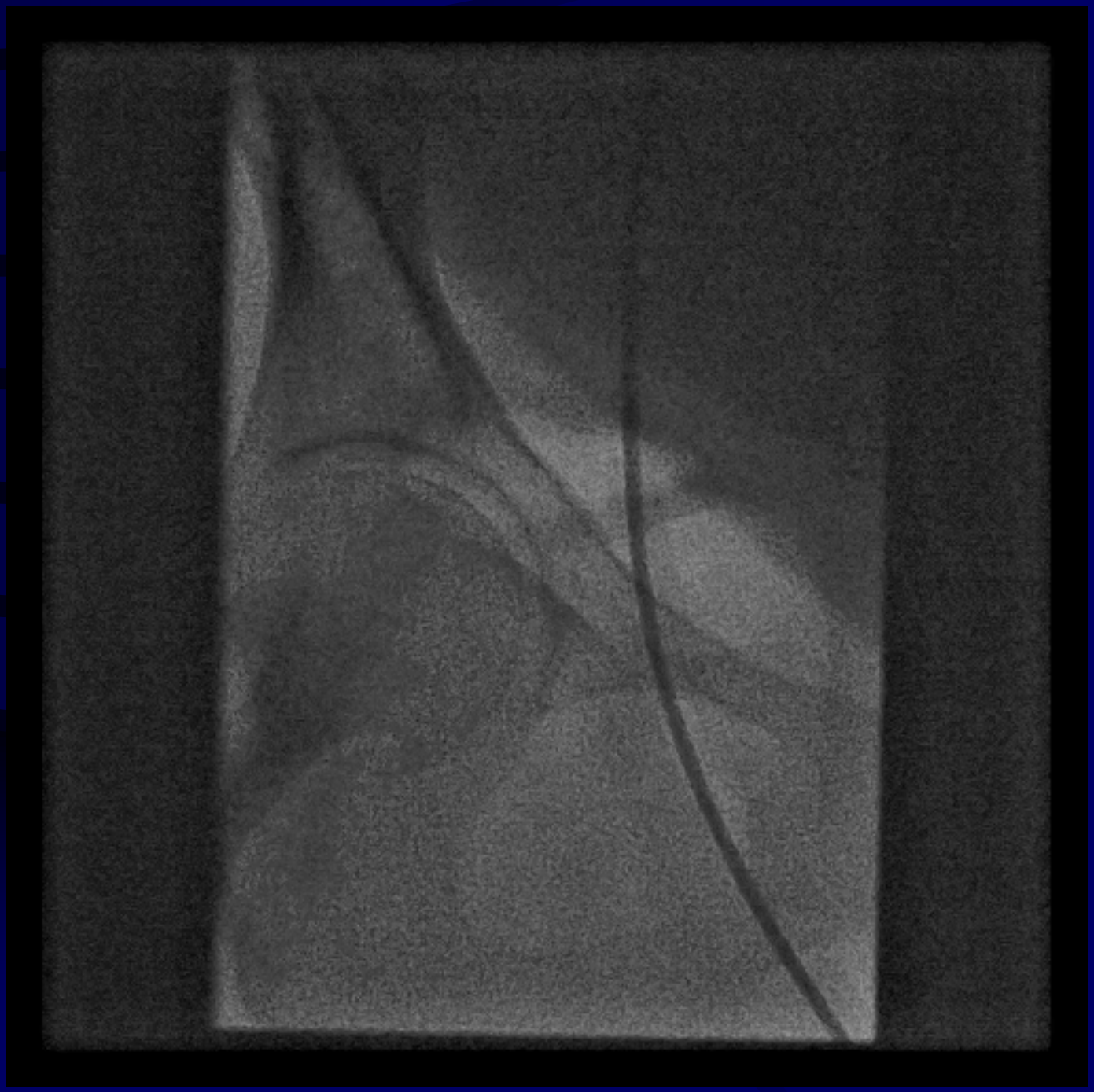
- Allows access for LHC and RHC
- Vessel caliber allows use of larger catheters for interventions
- Operator comfort, ease of catheter manipulation

Femoral Approach

- Technique
  - Puncture site 1-2 cm below inguinal ligament
  - Locate inguinal ligament running from anterior superior iliac spine to pubic tubercle
  - Use of skin crease to mark skin entry
  - Fluoroscopy of inferior border of femoral head





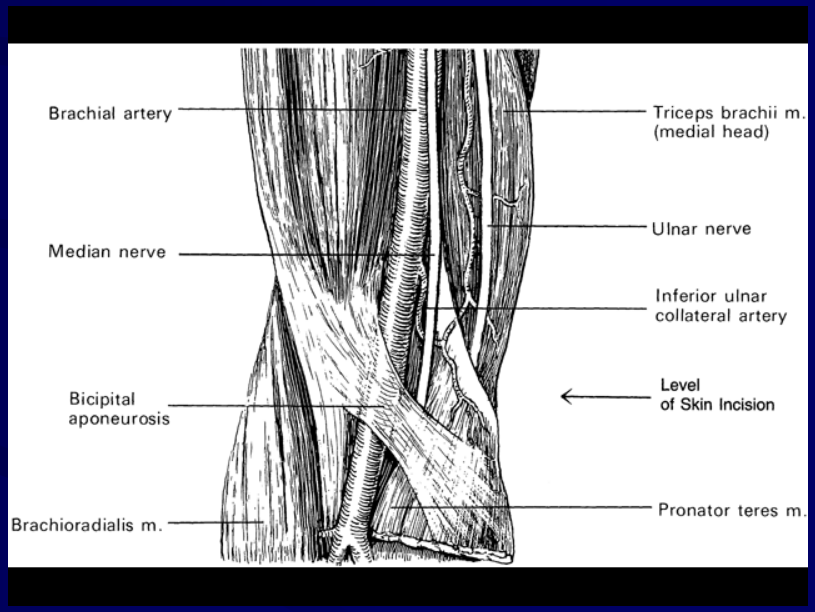


Contraindications to Femoral Arterial Access

- Relative contraindications
  - PVD
    - Femoral Bruits
    - Diminished pulses
    - AAA
    - Prior femoral revascularization
  - Obesity
  - Local Infection

Brachial Artery

- Accessed percutaneously or via surgical cut down
- Allows access for LHC and RHC if surgical cut down approach used
- Permits use of 7 Fr catheters for intervention
- Punctured 1-2 cm proximal to flexor crease percutaneously



Brachial Artery

- Contraindications
  - Presence of AV fistula
  - Overlying soft tissue infection
  - Absence of brachial pulse
  - Inability to extend the arm at the elbow or supinate the hand
  - Severe axillary or subclavian disease

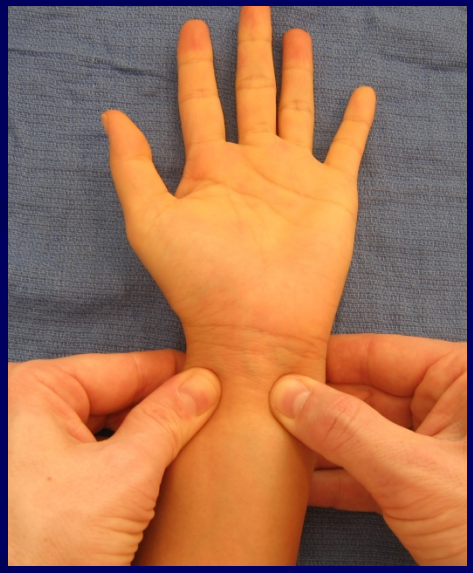
Radial Artery

- Puncture site over wrist
- Requires use of “special cocktail”
  - Lidocaine, nitroglycerin or Ca Ch Blocker to prevent spasm
  - Heparin added to reduce thrombotic complications
- Limited to smaller sized catheters (5 or 6 Fr)
- Right arm preferred, but left arm necessary if imaging LIMA
- Must confirm adequate circulation to hand with Allen test

Allen Test

Allen Test Grading Using Pulse Oximetry

- **Grade A:** No change in waveform or saturation
- **Grade B:** Reduction in waveform but saturation is maintained
- **Grade C:** Severe dampening or loss of waveform that reappears within 2 minutes
- **Grade D:** Loss of waveform that does not reappear in two minutes



Transradial Percutaneous Coronary Intervention

- Bleeding is associated with increased morbidity and mortality
- Transradial intervention is associated with lower rates of bleeding complications
- Success rates are “similar” to that achieved with transfemoral percutaneous intervention
- Ready for Prime Time in the USA?

Other Arterial Sites

- Axillary puncture
  - Patient's hand placed behind head to expose axillary fossa
  - Puncture site is over head of humerus
  - Left axillary artery preferred
- Lumbar Aorta puncture
  - Patient must be prone
  - Cannot apply direct pressure

Brachial/Radial Complications

- Tend to be thrombotic (compared to femoral which are hemorrhagic)
- 0.5-0.6% incidence of complication
  - Thrombosis
  - Nerve Injury
  - Arteritis/Cellulitis

Femoral Venous Complications

- Femoral Venous Thrombosis/pulmonary embolus
- Risks
  - venous compression from large arterial hematoma
  - multiple venous catheters
- Increased risk of PE with endomyocardial biopsy with bioptome reinsertion, can be prevented with continuous flush.

Femoral Arterial Complications

- Most common procedure related morbidity
  - Vessel thrombosis
  - Distal embolization
  - Dissection
  - Bleeding
    - Free hemorrhage
    - Retroperitoneal hematoma
    - Pseudoaneurysm
    - AV fistula

Femoral Arterial Complications

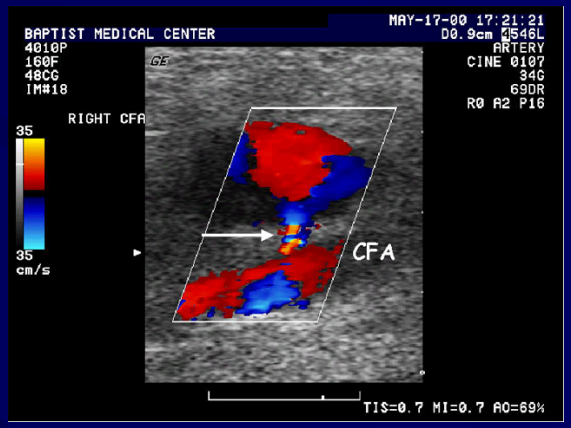
- Arterial Thrombosis is rare
  - Risks include small common femoral artery, large sheaths, prolonged dwell time
- Local dissection
- Plaque avulsion
- Bleeding around catheter
  - Due to laceration of artery
    - decrease trauma by twisting motion as catheter inserted
    - Can be treated with upsizing to larger catheter
- Hematoma
  - Over 1-2 weeks to resolve
  - Can compress femoral nerve leading to quadricep weakness for up to months

Femoral Complications

- Retroperitoneal Hematoma
- Risk increased with puncture above or at inguinal ligament
- Signs include:
  - Hypotension
  - Decreased hematocrit
  - Ipsilateral flank pain

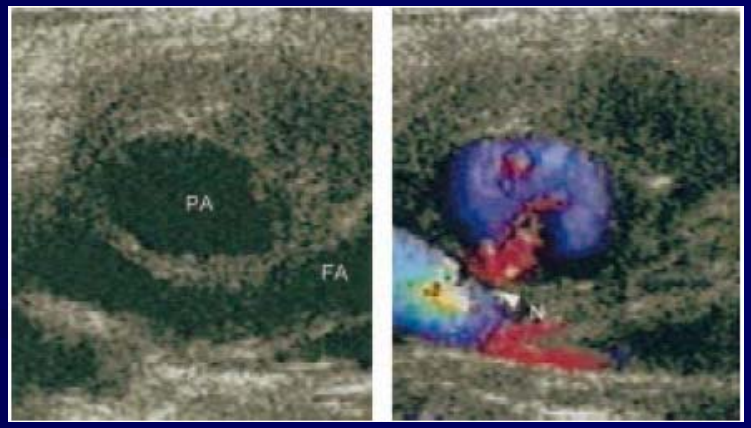
Femoral Complications

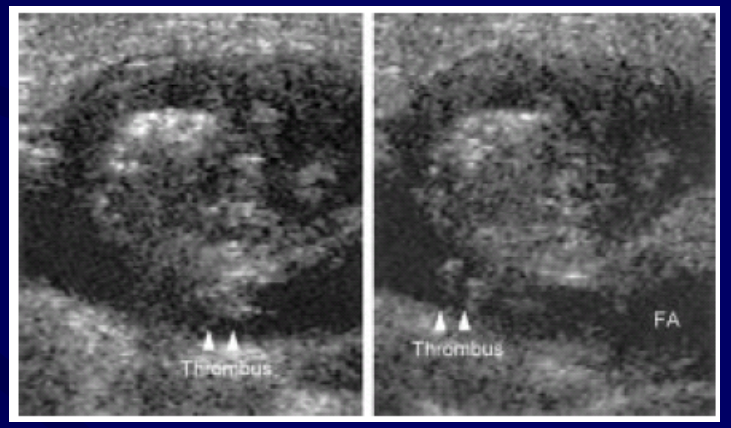
- Pseudoaneurysm – Usually a hematoma cavity with active blood flow during systole and diastole
- Risk – arterial puncture below the bifurcation because smaller caliber vessel and difficult to obtain hemostasis.
- Detected as pulsatile mass, bruit
- Size matters



Pseudoaneurysm

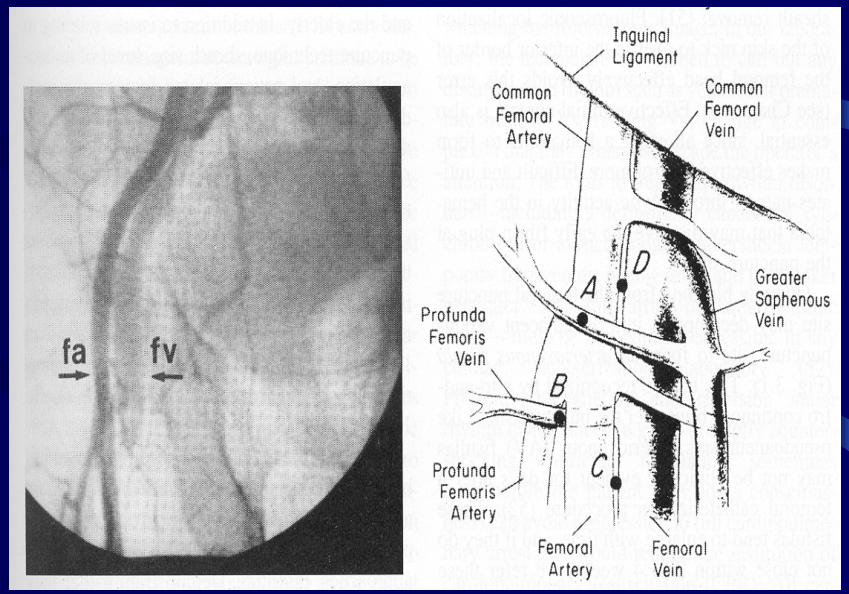
- Treatment
  - Ultrasound guided compression of the neck
    - Successful in 90% of cases not on anticoagulation
    - Requires compression times of 30-60 minutes
    - Recurrence rates of 20%
  - Surgical repair
  - Thrombin injection
    - Success rates of 93-100% reported



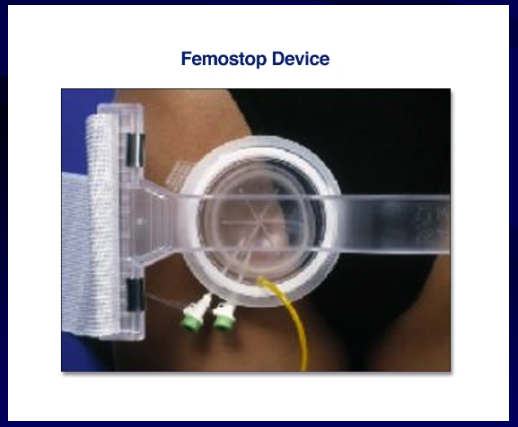


Femoral Complications

- AV Fistula
  - To and fro bruit
  - Low puncture site or where a small vein overlies the femoral artery puncture site.
- Can be followed for 2-4 weeks
  - Surgery is definitive treatment if not resolved



Which method of Sheath removal is best?



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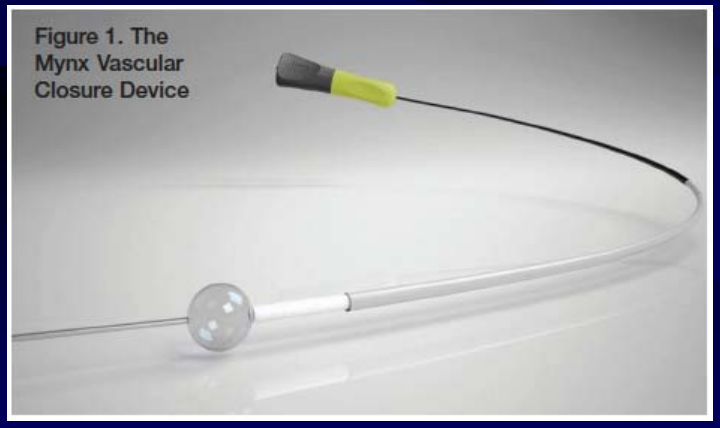

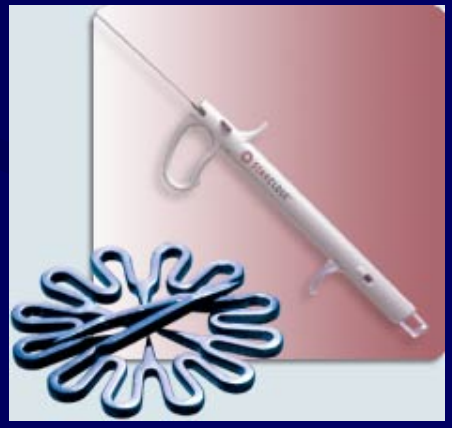

Which method of Sheath removal is best?

- Vascular closure devices
  - Rapid hemostasis with shorter times to ambulation and discharge
  - Increased cost
  - Complications
- Manual compression remains the “Gold Standard.”