Arterial Puncture Methodology and Closure Devices

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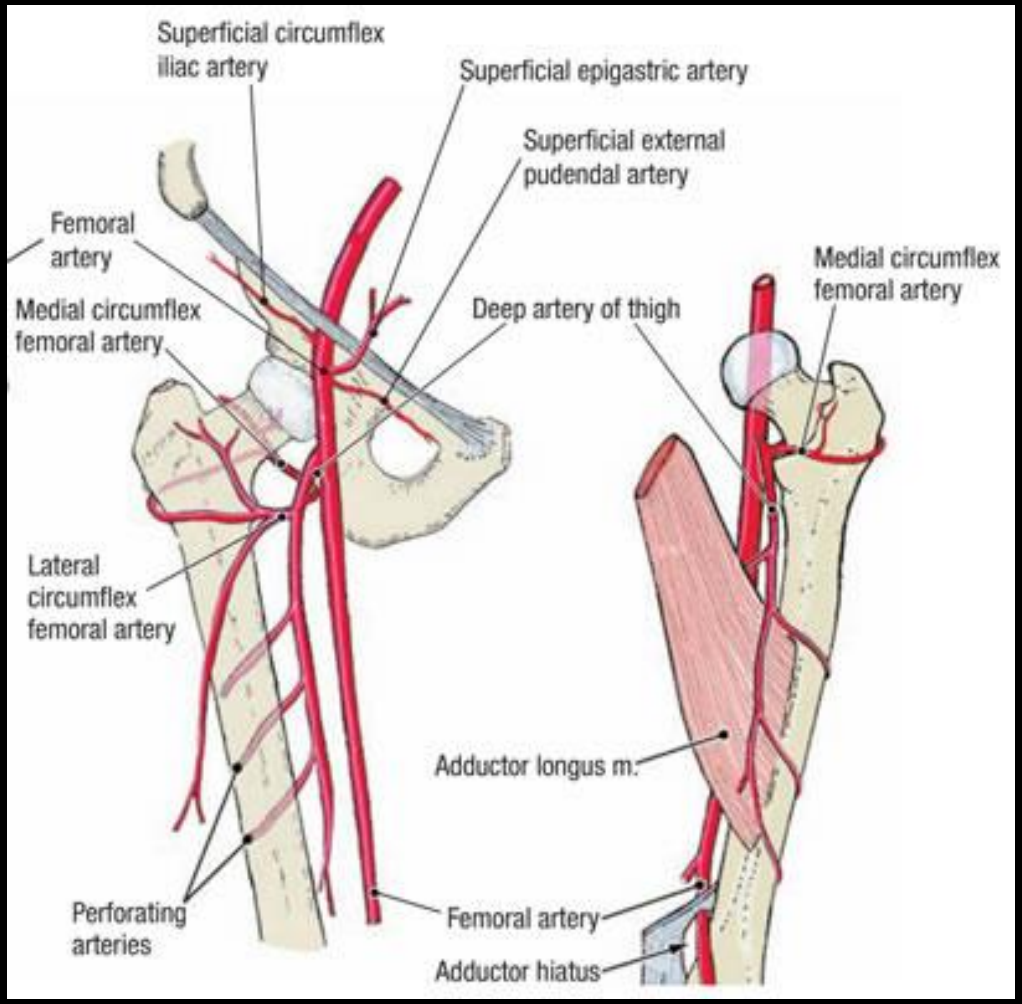
To cover

- Femoral puncture techniques
- Radial Puncture
- Closure devices

CFA anatomy


Superficial circumflex iliac artery
Superficial epigastric artery
Superficial external pudendal artery
Femoral artery
Medial circumflex femoral artery
Deep artery of thigh
Medial circumflex femoral artery
Lateral circumflex femoral artery
Adductor longus m.
Perforating arteries
Femoral artery
Adductor hiatus

Best practice or common practice?

- Femoral puncture
  - Palpation
  - Skin crease
  - Fluoroscopy
  - Ultrasound?

Best practice or common practice?

Material and methods

Questionnaires were sent to 100 consultant radiologists (52) and cardiologists (48) who perform angiography.

Details were sought of the methods and landmarks used to select level of puncture in the groin.

The positions of the superficial landmarks were

Landmark	Total number	(%)
Skin crease	27	(39.2
Maximum pulse	17	(24.7
Bone	9	(13.0
Crease/pulse	9	(13.0
Crease/bone	1	(1.4

- Landmarks used survey:
  - 39.2% inguinal skin crease
  - 24.7% maximal femoral pulse
  - 13% bony landmarks
- Ultrasound?

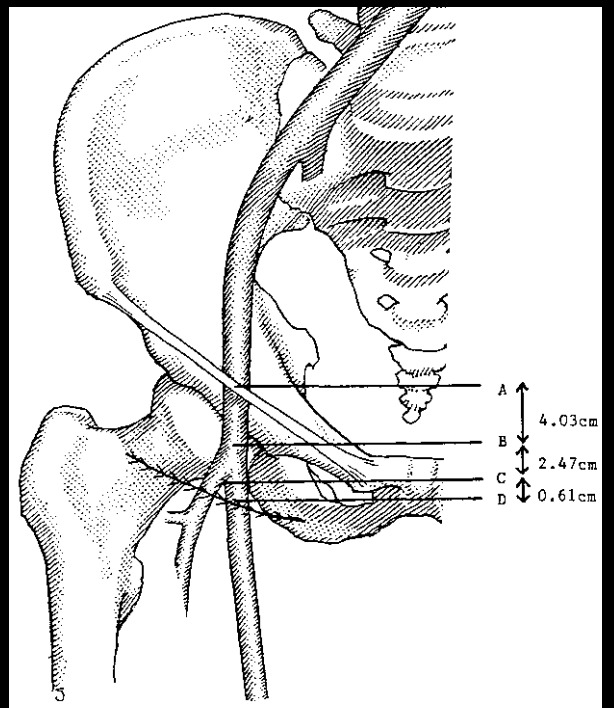


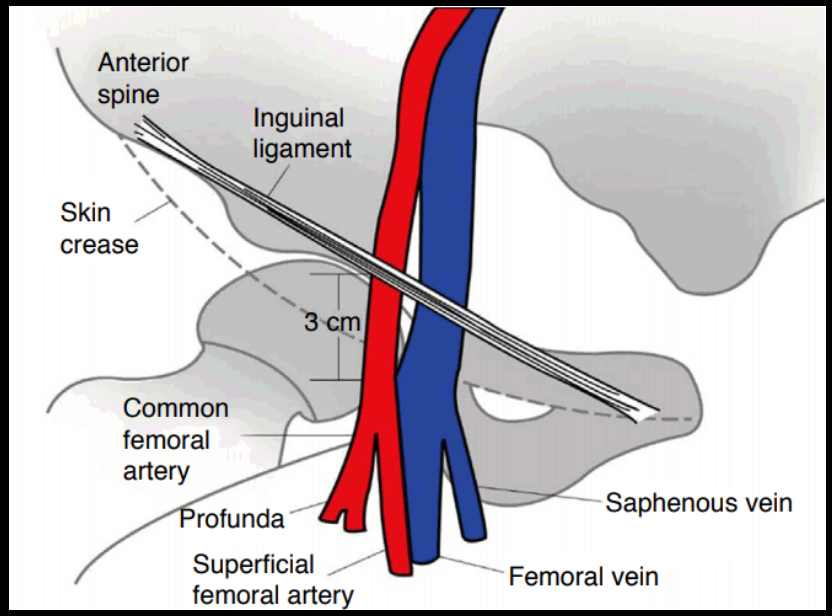
Figure 1. The relationship of the femoral artery to the superficial landmarks used at angiography. (A: inguinal ligament; B: maximal femoral pulse; C: bifurcation of common femoral

Inguinal skin crease

- CFA bifurcation is above the skin crease in 70 % of people
  - Greater than 70% in the obese

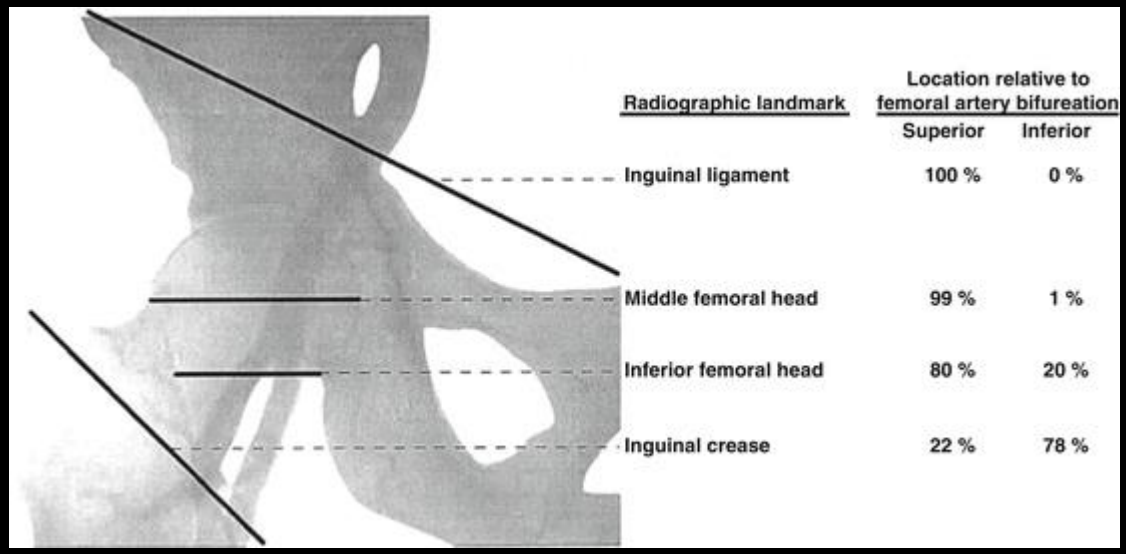
Palapation

- Maximum impulse may be over SFA in 5%
- Difficulty of palpation in the obese

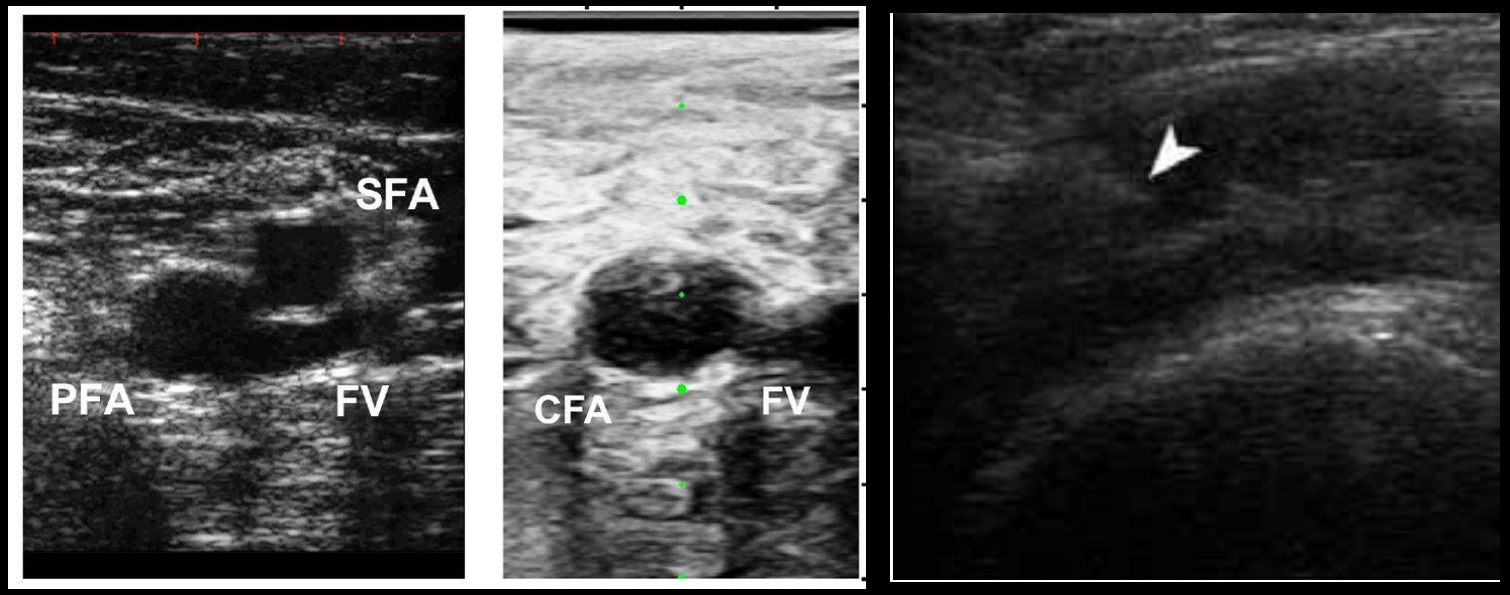


Fluoroscopy

- Skin nick at level of inferior femoral head
- Arterial puncture at mid femoral head
- Still issue of high bifurcation



Ultrasound guided puncture

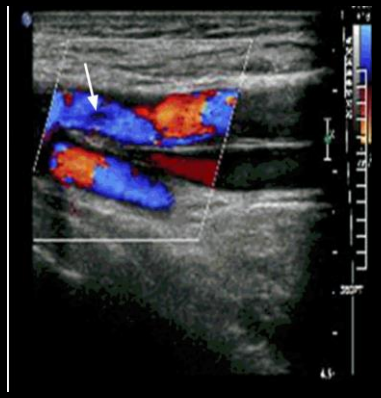


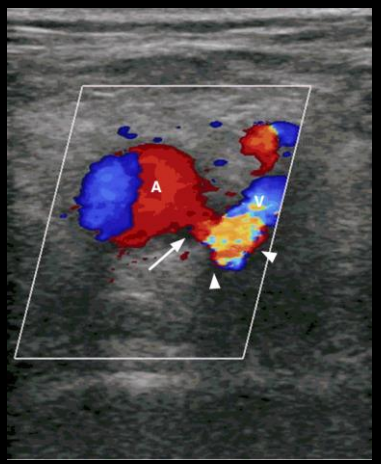
Ultrasound guided puncture

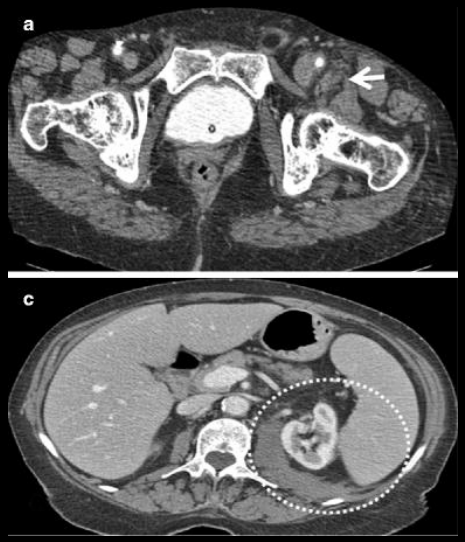
- Incidence of pseudoaneurysm formation reduced with U/S guidance
  - Principally due to inadvertent EIA or superficial/deep femoral artery puncture
- Numerous studies demonstrating lower complication rate and higher success rate with first attempt with US guidance
- Most recent large prospective study:
  - Comparison of US guidance and conventional method for common femoral artery cannulation: A prospective study of 939 patients, Katircibasi et al, Acta Cardio Sin 2018
    - Less attempts, less haematomas and AV fistulas

Complications of femoral puncture

- Haematoma
  - Subcutaneous (common)
  - Subintimal
  - Retroperitoneal (0.15 – 0.5%)
- Dissection (0.1 – 0.4%)
- Pseudoaneurysm (0.05 – 0.5%)
- AV Fistula (v. rare!)



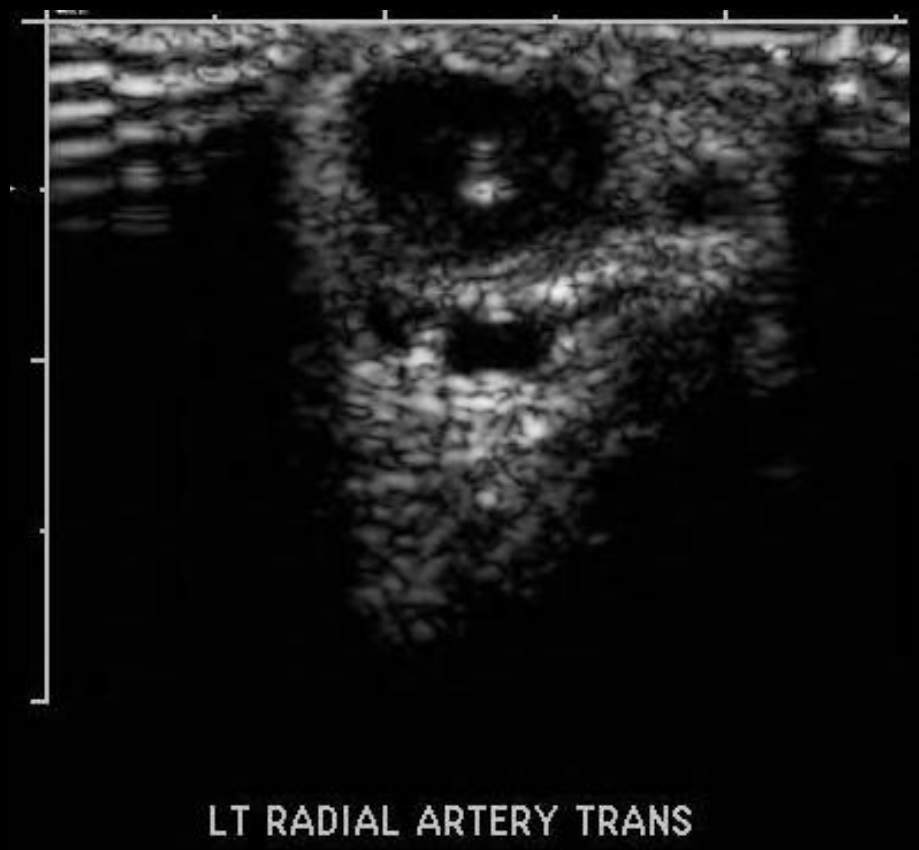




Radial Access

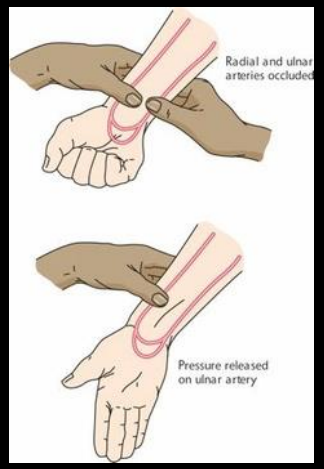
- Radial styloid puncture point
- Ultrasound guided
- 21 G needle
- 0.018 wire

- Sheath inserted 4F - 6F



Radial Puncture - Allen's Test

- To confirm dual circulation to the hand through the palmar arch
- Occlusion of both radial and ulnar arteries at the wrist
- Release over ulnar and observe had reperfusion
- Positive (normal) if <7 seconds
- Negative if > 15 seconds
- If borderline 7 – 15 seconds only a relative contraindication

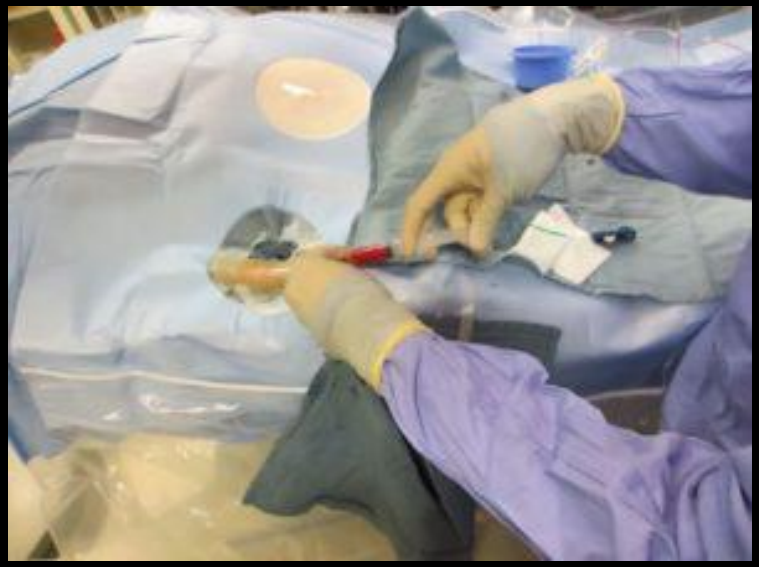


Radial cocktail

- 5mg verapamil
- 3000 – 5000 U heparin
- 200 mcg GTN

- Intermittent aspiration of patients blood to minimize pain

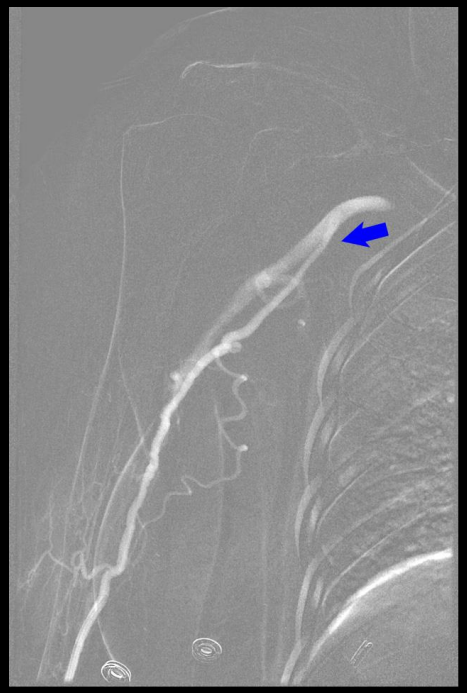
- Repeated for sheath changes



Satti SR, *Vance A., Sivapatham T. "Radial access for cerebrovascular procedures: Case report and Technical note"* ***Interv Neuroradiol.*** *2015*

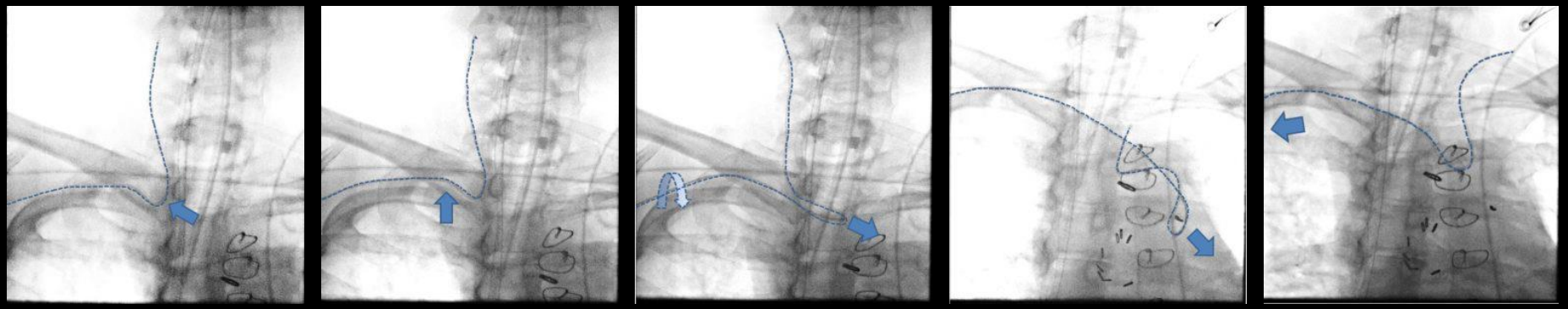
Anatomical situations to abandon /avoid

- High origin of radial artery (persistent superficial brachial a)

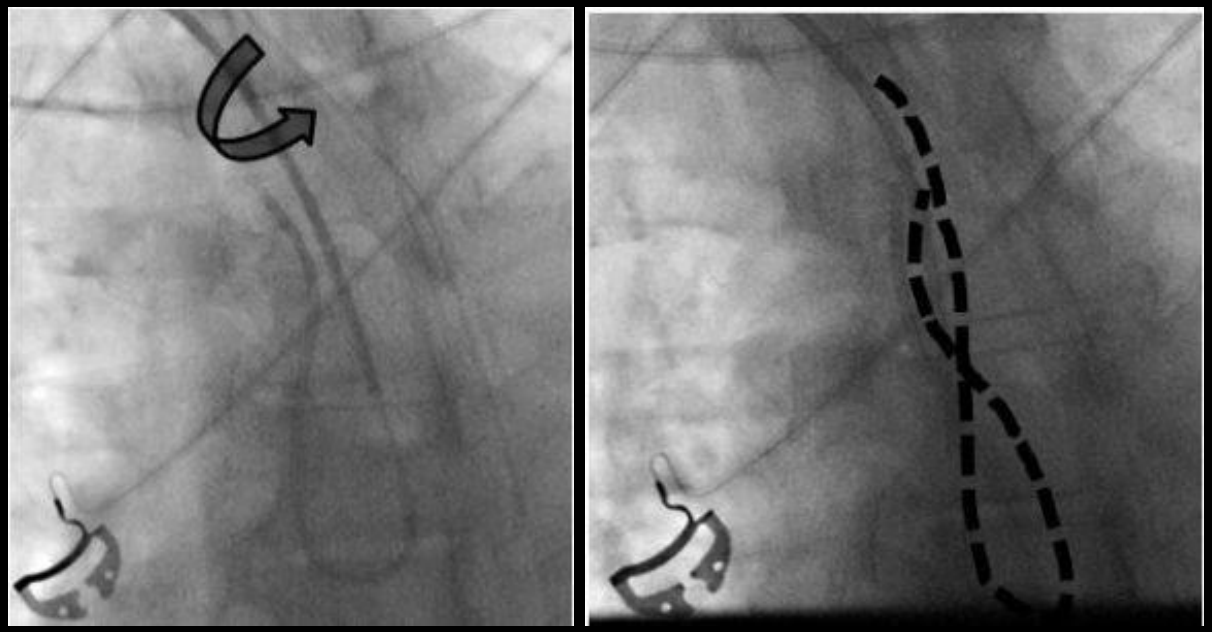


- Radial loop
  - More common on right

Left CCA and vertebral catheterisation



Reforming in the arch



Patent haemostasis

- Just enough inflation to maintain haemostasis

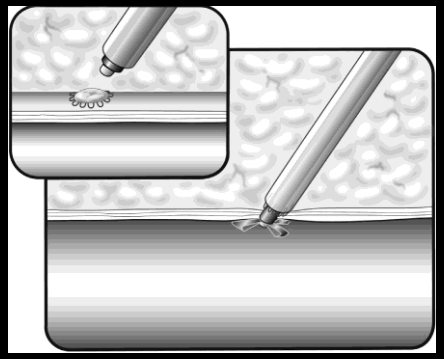
- PROPHET study randomised 436 patients to conventional versus patent haemostasis

- 75% reduction in radial artery occlusion at 30 days with patent haemostasis technique

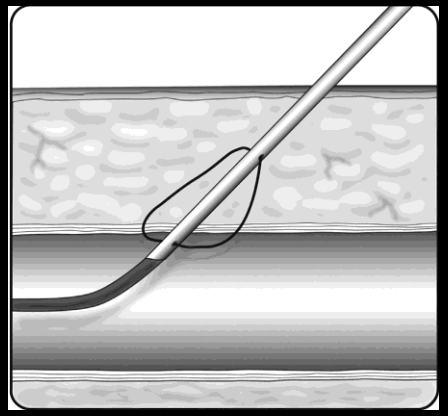
Closure devices

Active approximators

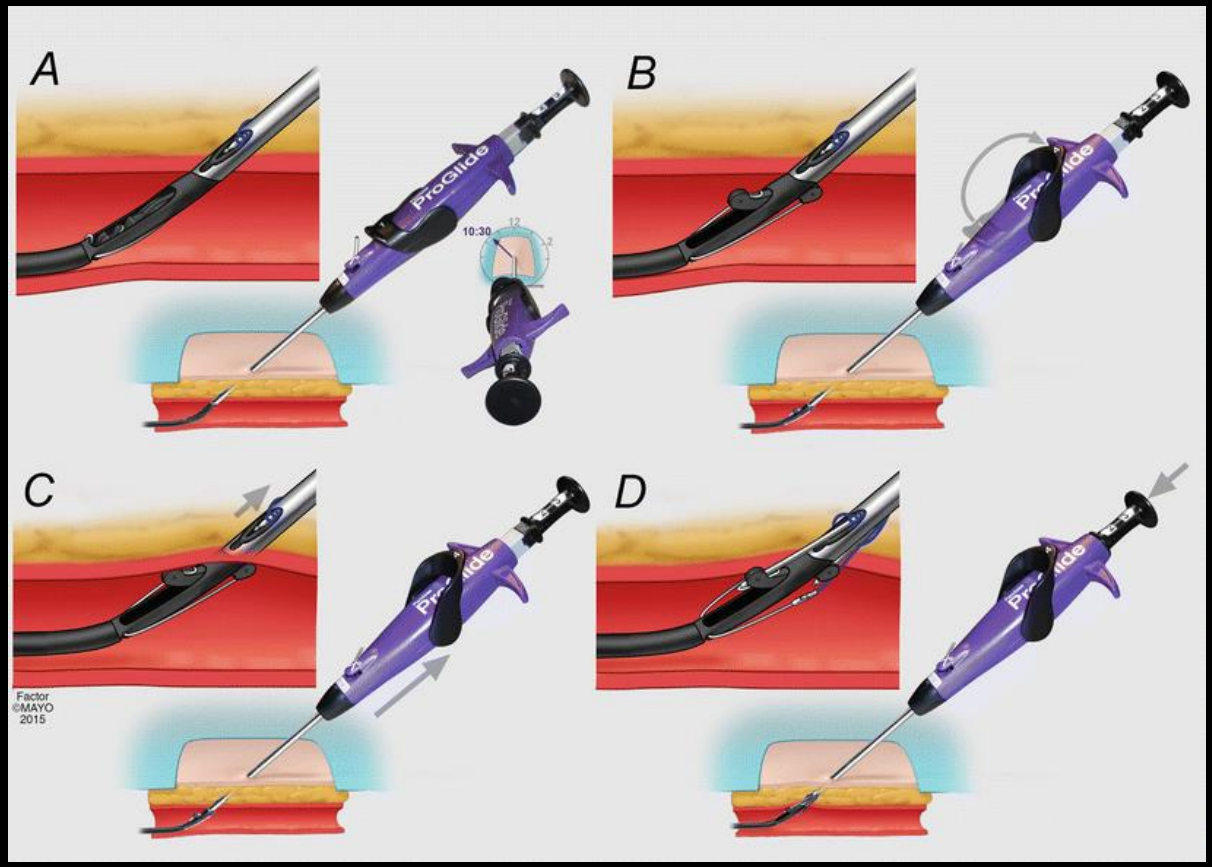
- Clip
  - Starclose
    - Extravascular nitinol clip



- Suture
  - Perclose
    - Polypropylene suture



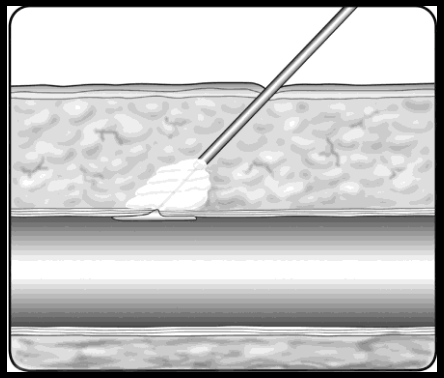
Perclose Proglide Abbott Vascular

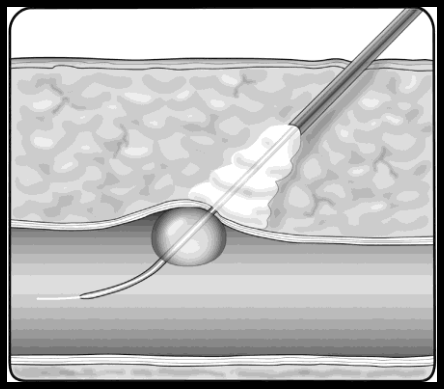


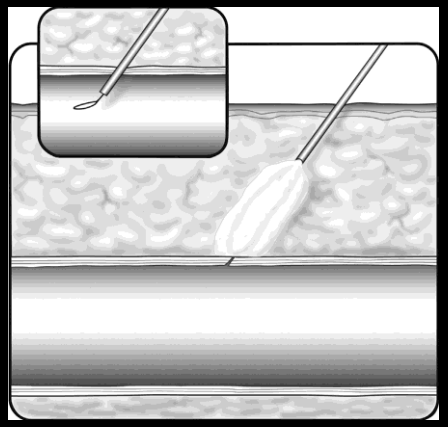
Closure Devices

Passive approximators

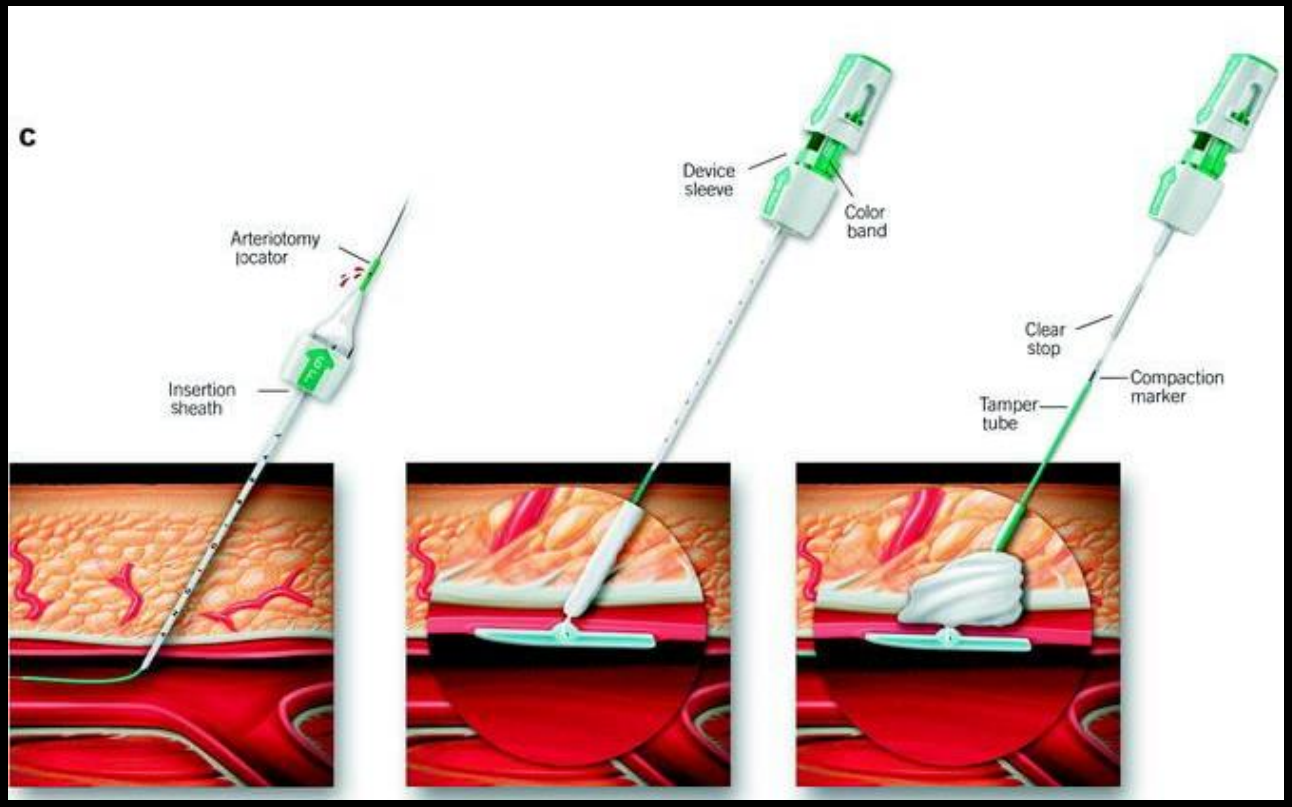
- Angioseal
  - Intraluminal anchor, collagen plug
- Mynxgrip
  - Sealant combined with temp balloon
- Exoseal
  - Polyglycolic acid plug







St Jude Angioseal



Closure Devices

External compression

- Femostop

- Safeguard

A systematic review of vascular closure devices for femoral artery puncture sites

Vincent J. Noori, MD, *and* Jens Eldrup-Jørgensen, MD, *Portland, Me*

Journal of Vascular Surgery
September 2018

- Mostly cardiac literature
- 34 studies within the last 10 years included
- Mostly single device with MC as comparison
- Better patient comfort and satisfaction
- Similar rate of all complications (haematoma etc)
- Less major complications (bleeding)
- Greater infections and thrombotic complics

Vascular closure devices for femoral arterial puncture site haemostasis (Review)

Robertson L, Andras A, Colgan F, Jackson R

Cochrane Library

Cochrane Database of Systematic Reviews

Meta-analysis indicated that collagen-based or plug-based, metal clip-based and suture-based vascular closure devices (VCDs) were all associated with reduced time to haemostasis when compared with manual or mechanical compression. However, consider-

Evidence on the effectiveness of one VCD compared with another VCD is lacking. No study compared time to haemostasis between

Collagen VCDs were associated with a lower incidence of groin haematoma when compared with manual compression, but no differences were noted between metal clip-based and suture-based devices and manual compression. The clinical significance of the

no cases of death were described

But…. Poor quality of evidence and significant bias

Also data over 20 yrs included!

In Summary

- Use ultrasound for puncture
- Consider radial approaches
- Seal with device of your choice