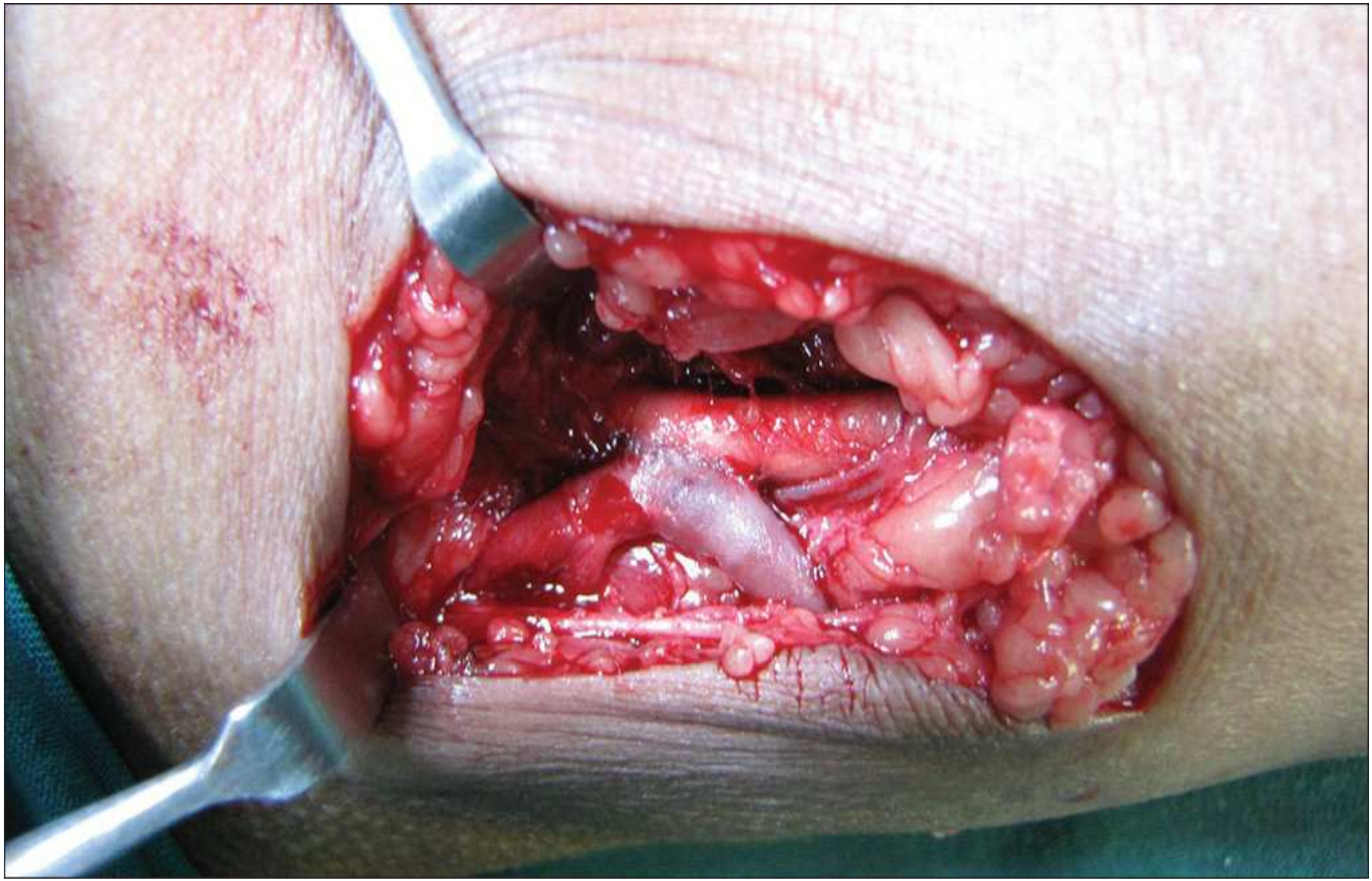
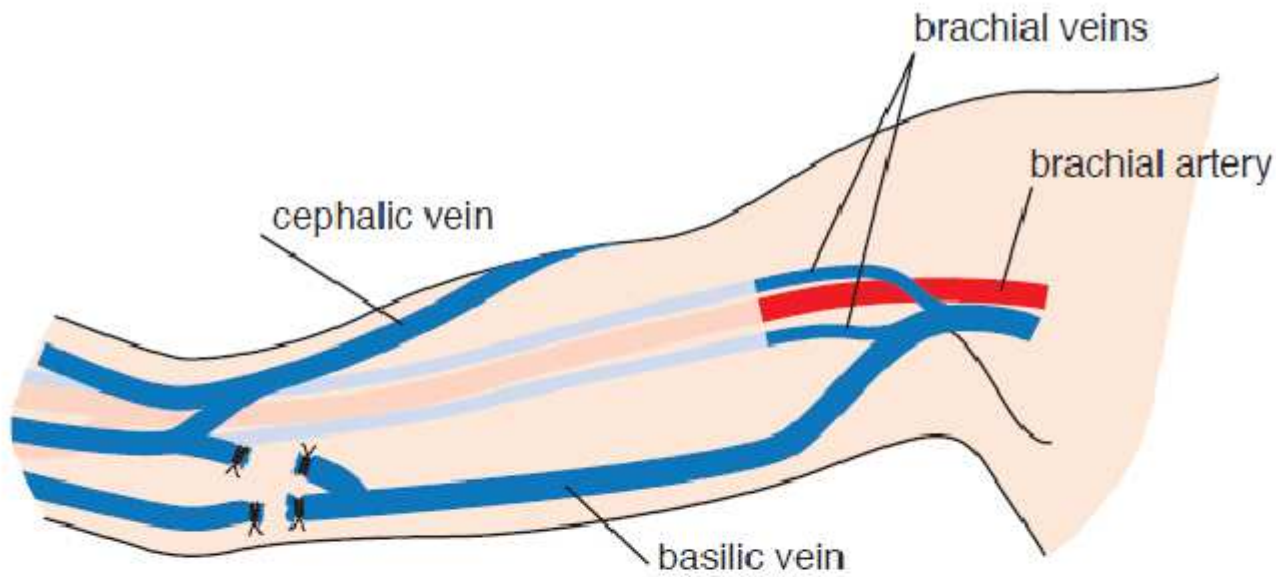
Vascular Access

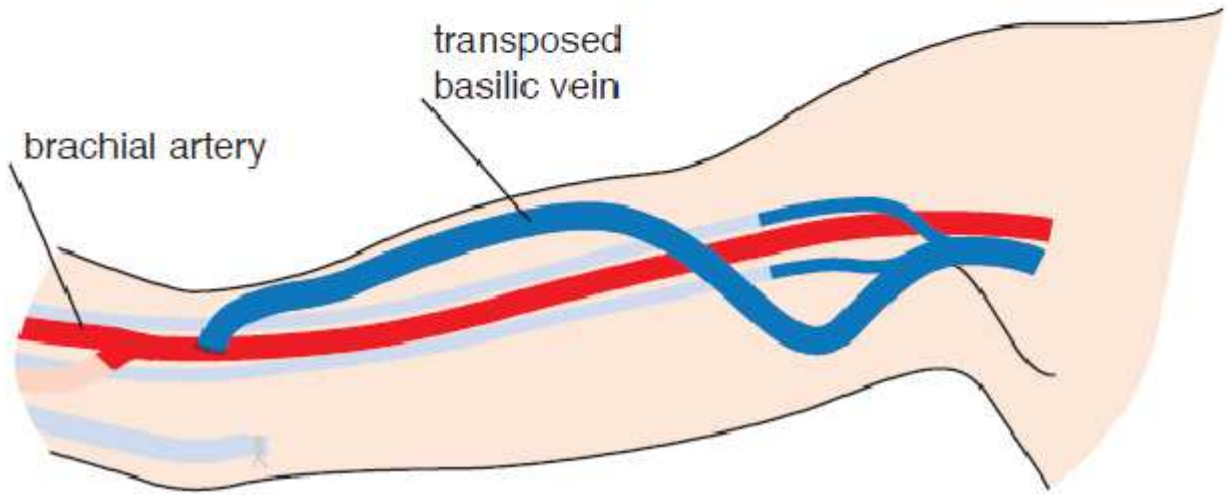
Definition of Terms

- Maturation: The process by which the vein dilates and the wall thickens after creation of AVF
- Simple Direct Fistula: The vein and artery are connected and used in their normal position. The distal end of the vein is sutured to an adjacent artery



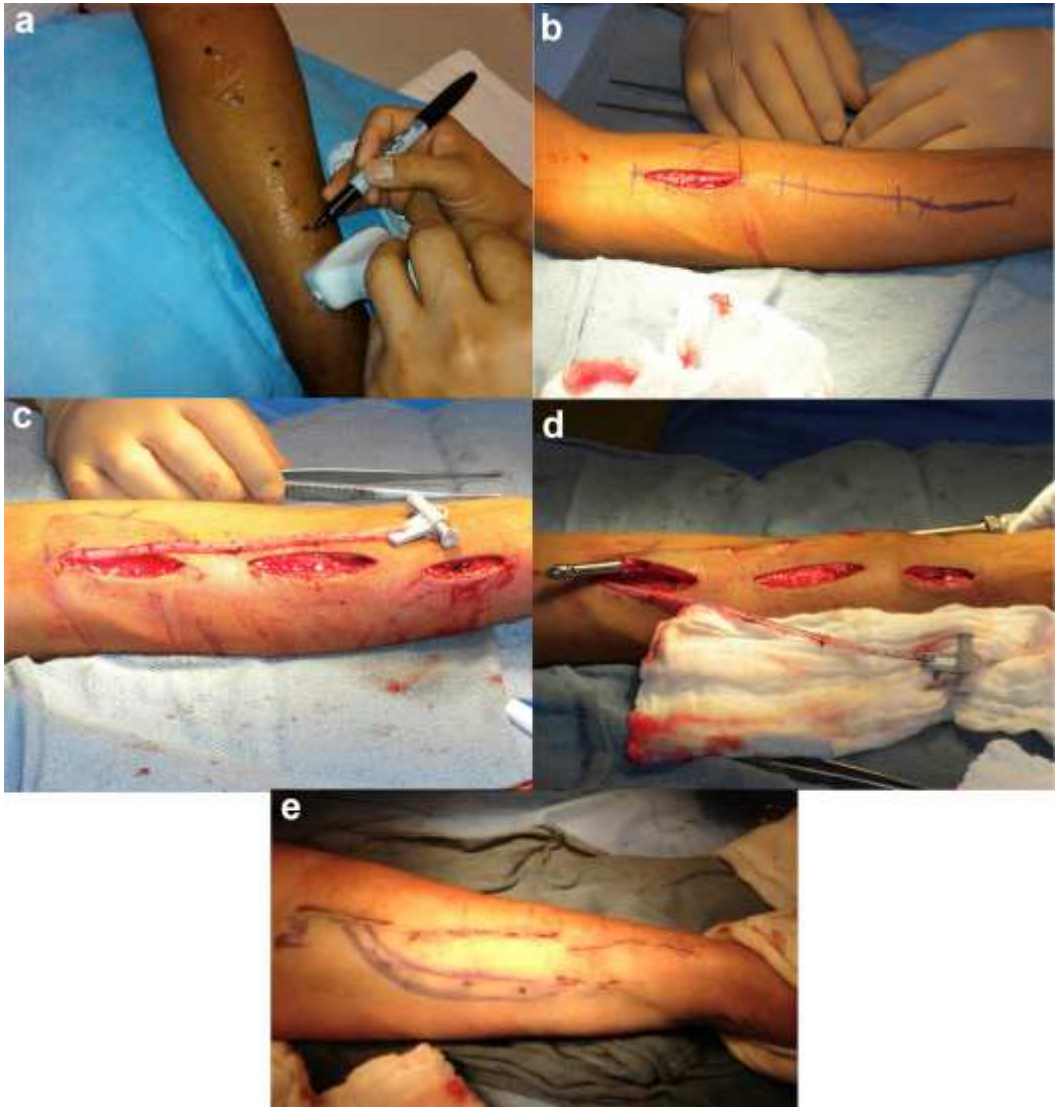
- Vein Transposition Fistula: The vein is moved to a position that is better for connection. The distal portion is brought to a position that will make it easier to cannulate. A tunnel or pocket has to be created to serve as a “bed” for the moved vein. This may be a 2 step procedure where the fistula is first created and then later moved to the new position.


brachial veins
brachial artery
cephalic vein
basilic vein


transposed
basilic vein
brachial artery

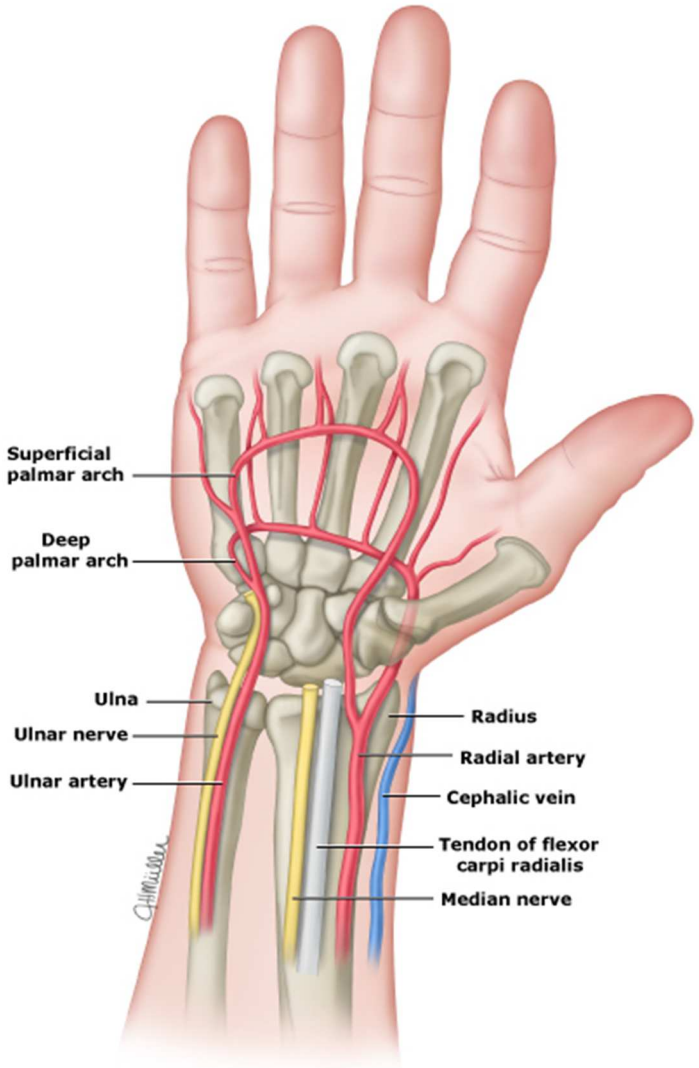
Anatomic Location/Names

- Radial-cephalic: generally has lower blood flows
- Brachial-cephalic: Upper arm cephalic vein to the brachial artery just above the elbow
- Brachial-basilic: Trickier as the basilic vein must be elevated and moved. It is shorter than the cephalic vein and has less room to stick.

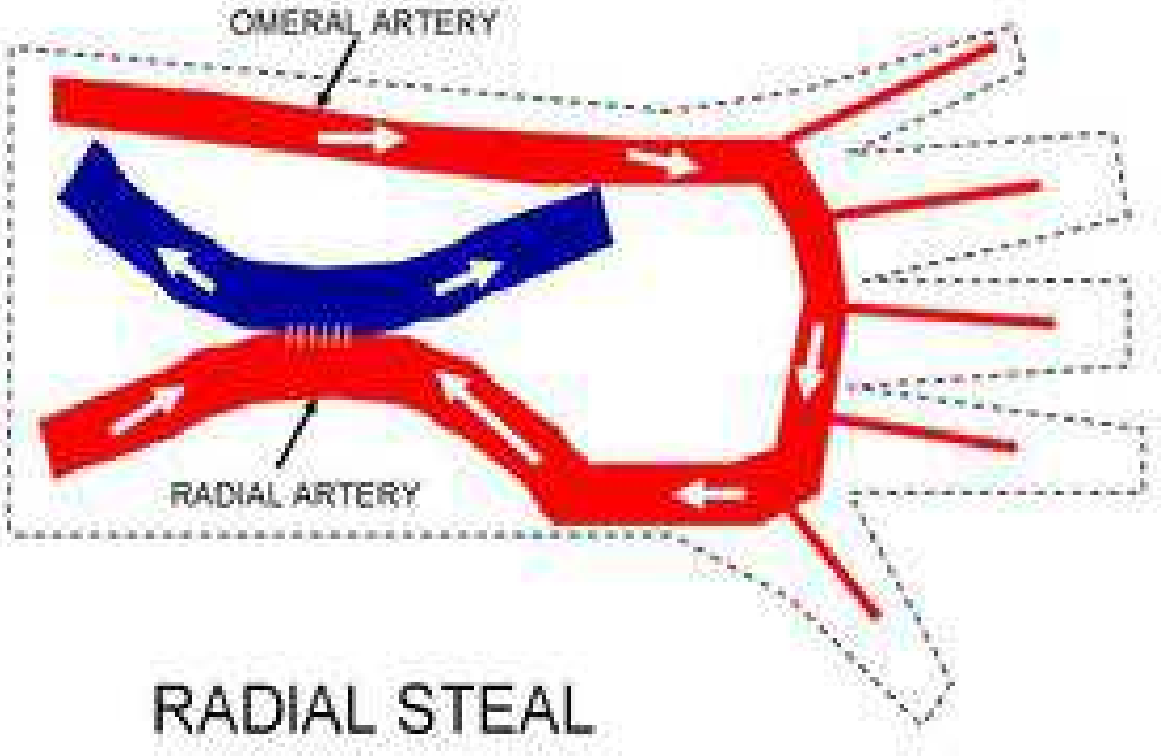

a
b
c
d
e

- **Steal Syndrome: Vascular steal** — shunting ("steal") of arterial blood flow from the distal part of the limb into the fistula . Symptomatic steal occurs in up to 20 percent of patients receiving an upper extremity access. Factors that contribute to steal include lack of adequate collateral flow and/or excessive fistula blood flow (large fistula). It is more common with a brachio-cephalic/basilic fistula than a more distal fistula.

Anatomy of the radial artery



Schematic representation of the arterial supply to the ventral surface of the hand. Collateral circulation to the radial artery is provided by the ulnar artery through the deep and superficial volar arterial arches.

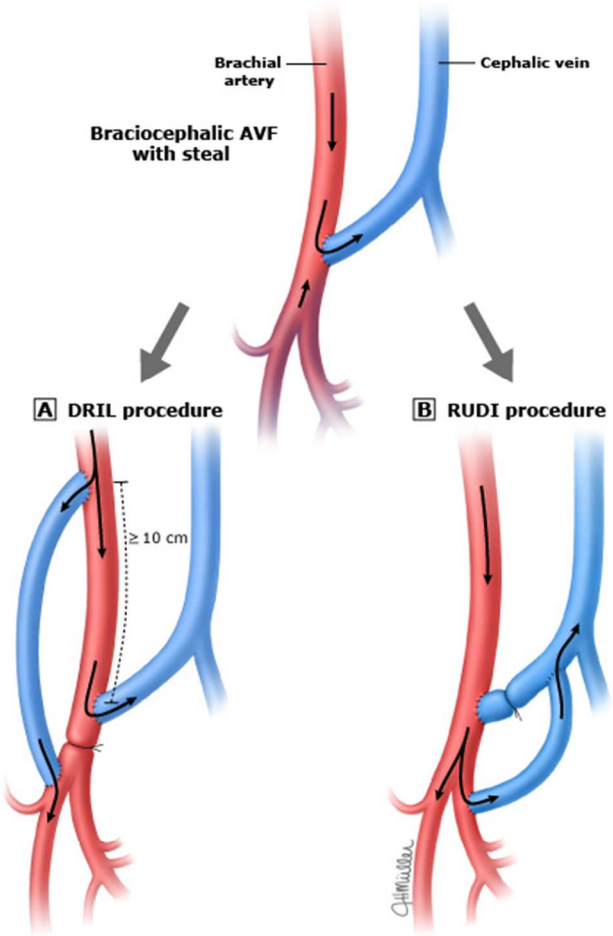


RADIAL STEAL

- Vascular steal typically manifests a median of two days after the placement of a prosthetic AV graft but with an AV fistula is delayed as the blood flow through the access progressively increases as the fistula matures. Severe ischemic symptoms (loss of sensation or weakness) may be more common among patients with diabetes sessions.

- Less severe symptoms such as paresthesias and coolness with retained pulses, are more common and usually improve over weeks with the development of collateral blood flow. Careful, frequent clinical evaluation and an alert nursing staff are required in this setting. Symptoms often worsen during dialysis.

Bypass revision for brachiocephalic fistula steal



Surgical options for bypass revision for brachiocephalic fistula steal are illustrated in the figure.
(A) Distal revascularization-interval ligation (DRIL): The brachial artery just distal to the anastomosis is ligated, and a bypass is created from the more proximal brachial artery to the proximal radial artery. The distal circulation is dependant upon the new bypass.
(B) Revision Using Distal Inflow (RUDI): The origin of the fistula is ligated on the venous side followed by a revsion from a more distal arterial source to the venous limb. In contrast to the DRIL procedure, the RUDI procedure maintains the native arterial circulation.

ANEURYSM/PSEUDOANEURYSM —
Aneurysms/pseudoaneurysms of AV access are at risk of rupture, infection, bleeding, erosion of the overlying skin, and difficulty with cannulation.

True aneurysms are abnormally dilated (>150 percent the normal diameter) parts of the blood vessel that contain **all** the layers of the vessel wall. Cause is unclear. ?? Increased venous pressure due to a central venous stenosis, repeated punctures at the same site, and immunosuppression are possibilities

A **pseudoaneurysm** is a break in the vessel wall with a collection of blood outside the vessel wall with scar tissue.

Usually results from repeated cannulation in the same area of the access especially with AV grafts as the material deteriorates.

Cannulation should not be done

Can be prevented by rotating the sites of needle insertion.

Angioplasty and Stents


"I'm recommending an animal balloon angioplasty."
Reynolds
CARTOONSTOCK .com
Search ID: dren1511

- Angioplasty uses an intravascular balloon positioned inside of the narrowing to expand the area.
- Elastic recoil can occur after a successful procedure – it can happen within minutes or can be delayed
- Some type of anatomic disruption (break or tear) is required for a successful procedure.
- There is an expected 6 month patency rate

- Out-patient procedure
- Access can be used immediately
- Minimal blood loss
- No hospitalization
- Minimal discomfort
- Can be used on multiple areas

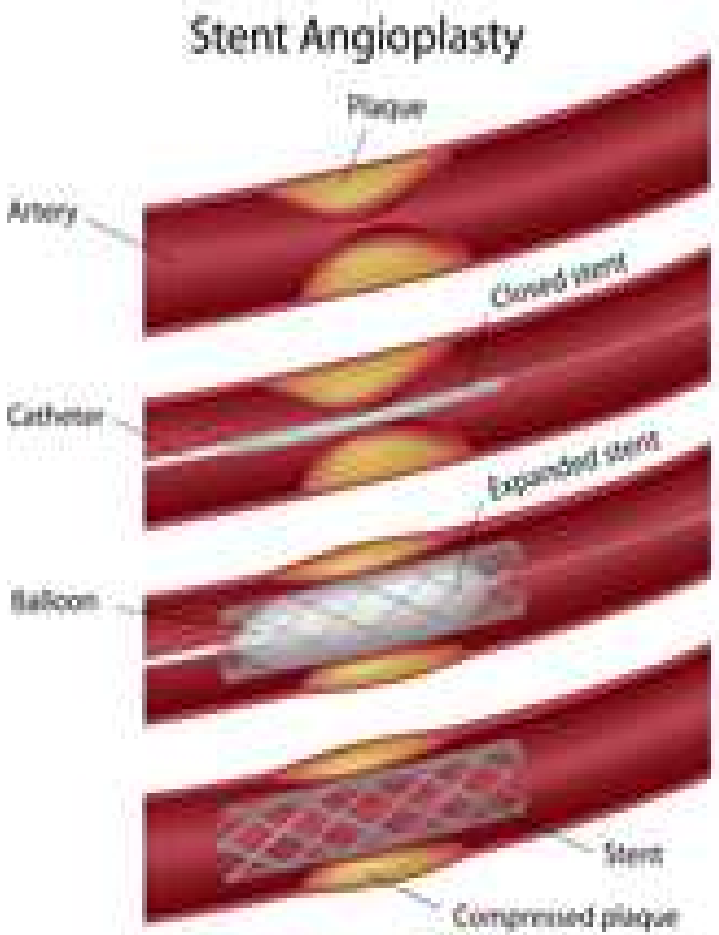

A
B

Angioplasty Complications

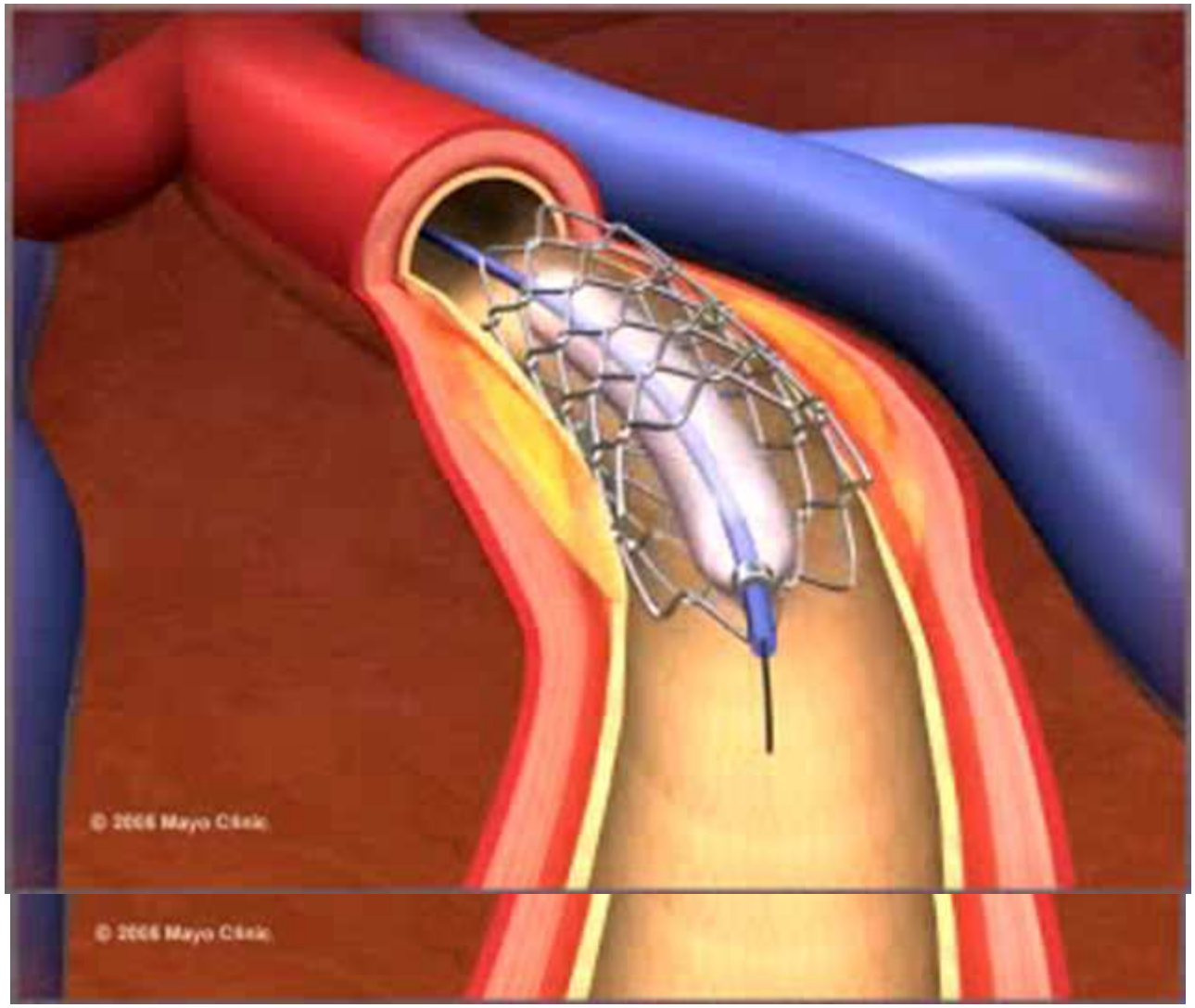
- Vein spasm
- Vein rupture
- Endothelial tear
- Extravasation
- Balloon rupture

Stents

- Common Sites of narrowing:
- Venous anastomosis – 60%
- Peripheral draining vein 37 %
- Central Vein 3.2 %
- Artery 5 %
- Multiple locations 31%
- “Stenosis” is defined as a greater than 50% reduction in size.


Stent Angioplasty
Plaque
Artery
Closed stent
Catheter
Expanded stent
Balloon
Stent
Compressed plaque

- The term “stent” is used to describe something that is left in place in the vein after an angioplasty to keep the access open
- There are different types:
- *Bare metal
- Drug-eluting
- *Covered (bare stents with a fabric covering)
- *most common



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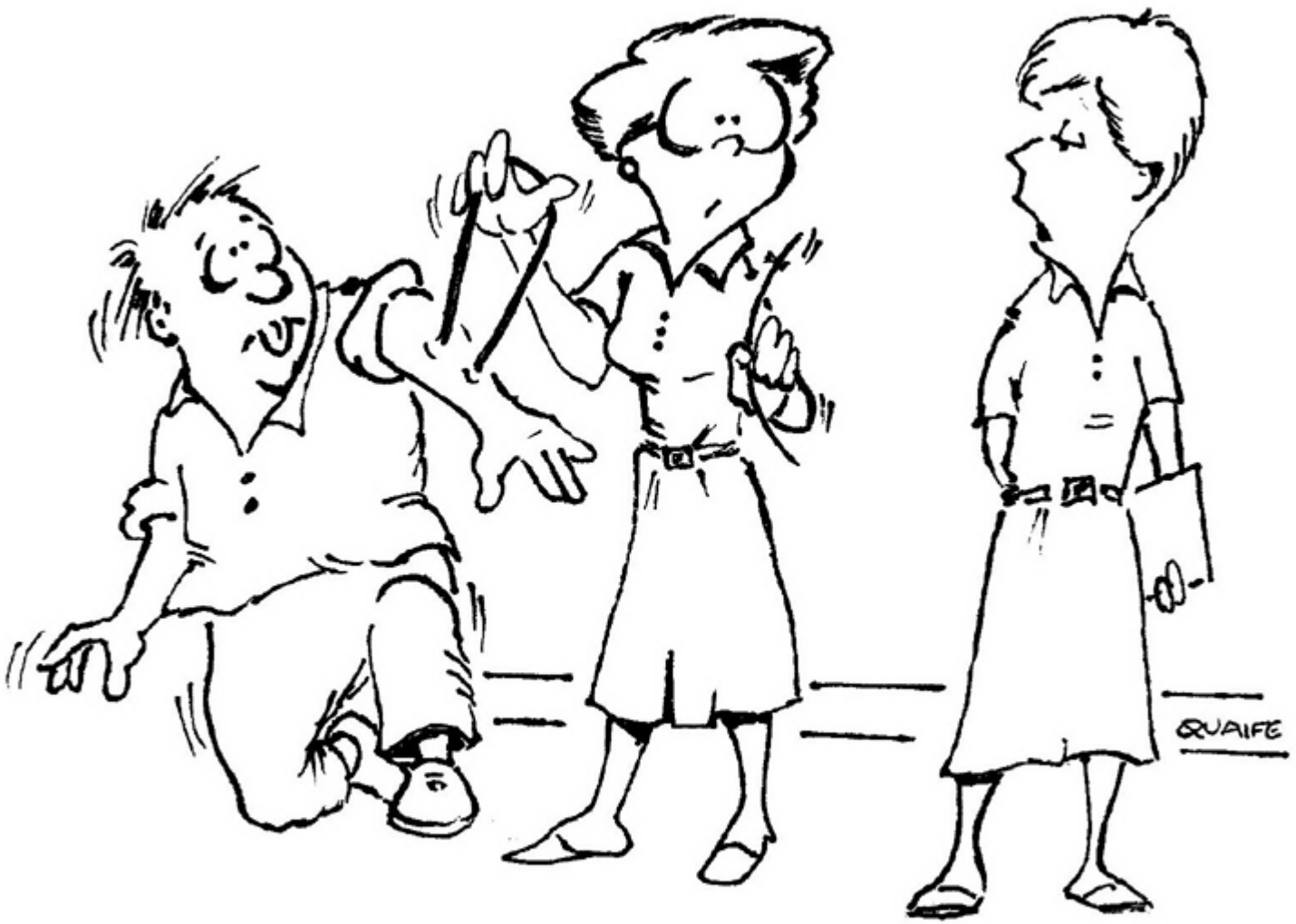
- Although stents can help manage a failed angioplasty the risks include:
- -significant cost and higher rate of complications
- They should be used when there is acute angioplasty failure, rapid recurrence of stenosis or vein rupture



No, Kelly. You're supposed
to leave the vein inside!