# Vascular Access: Problems that can Ruin Your Day

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# Objectives

- Explain how a stenosis forms.
- Discuss one technique that staff could implement to prevent aneurysm formation.
- Describe two techniques to implement to prevent access infiltration.

# ARE FISTULAS A GOOD THING?

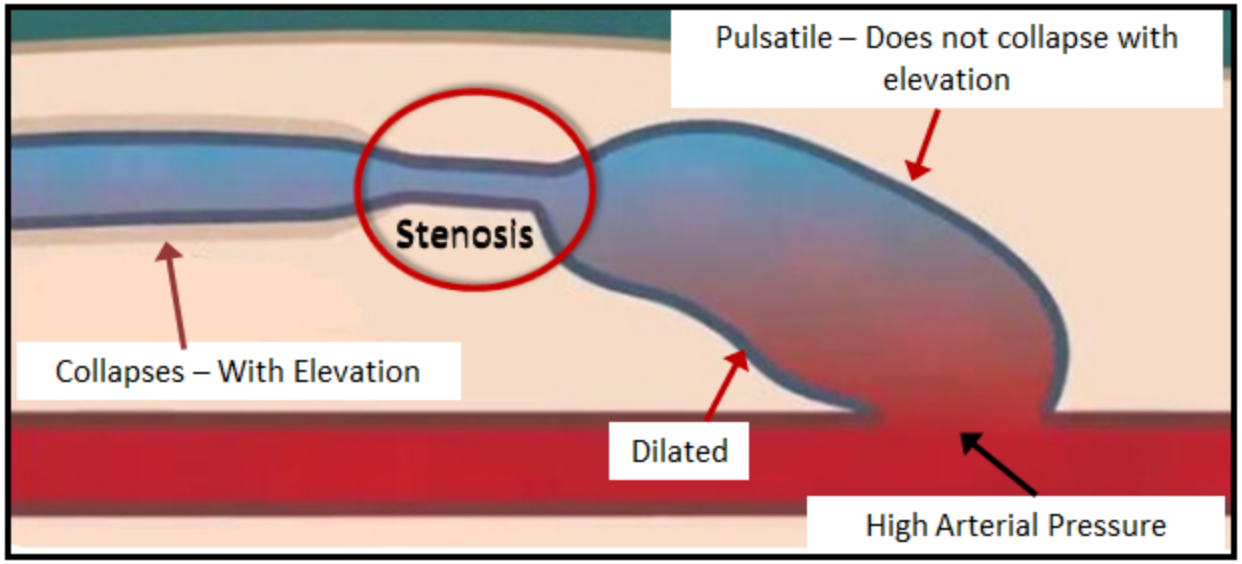
# Fistula Definition

- A connection of two body systems or organs that were never meant to be connected become connected
- You would find a surgeon and have your fistula fixed
- We create fistulas in our patients on purpose
- Problems that usually occur on the arterial side are now problems on the venous side
  - Stenosis
  - Aneurysms

# RECOGNIZING STENOSIS

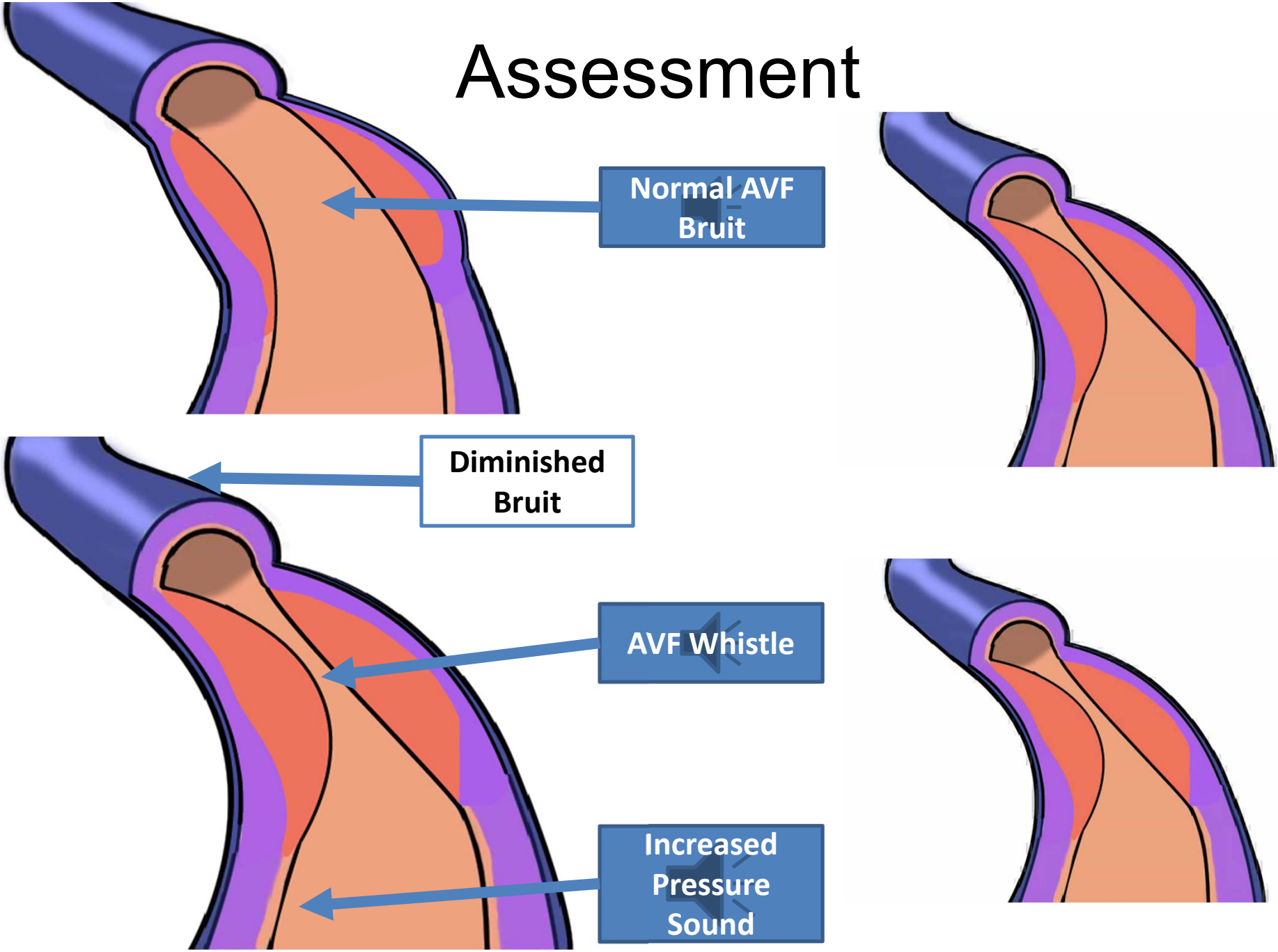
# Stenosis

- Narrowing of a blood vessel that interferes with the flow of blood, causing turbulence
- Causes decreased adequacy
- Responsible for >80% of clotting in AVFs/AVGs

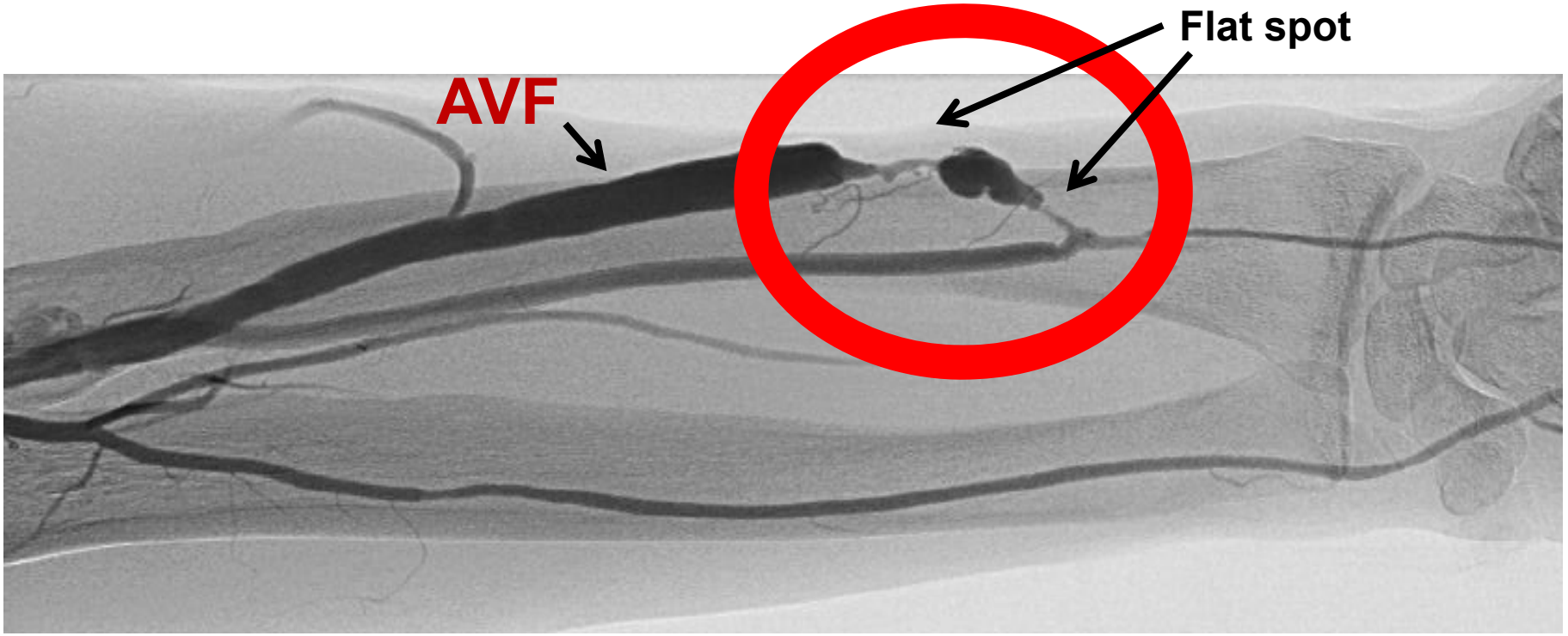



Source: T. Vachharajani

# Assessment


Normal AVF Bruit
Diminished Bruit
AVF Whistle
Increased Pressure Sound

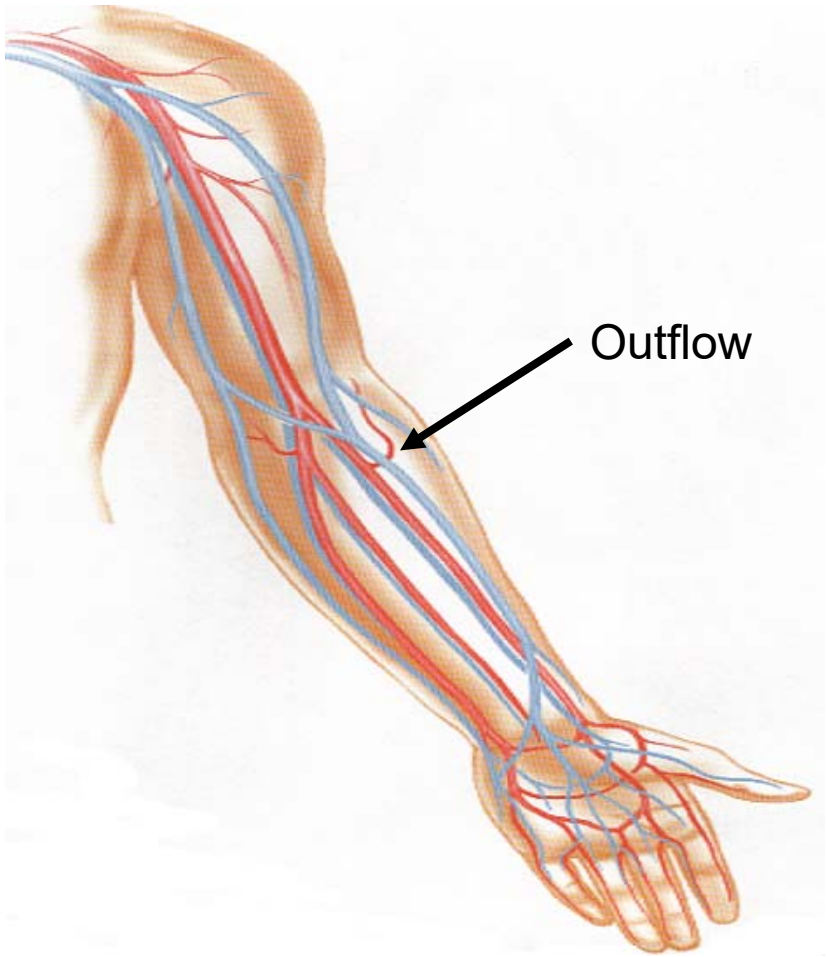
# Juxta-anastomotic Stenosis - AVF



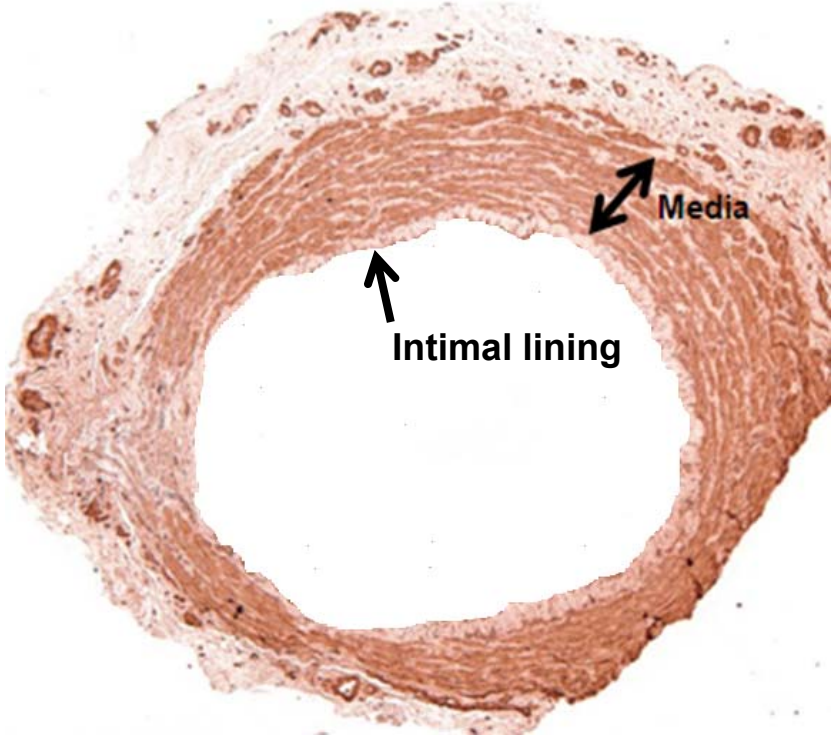

Source: T. Vachharajani

# Outflow Stenosis - Graft

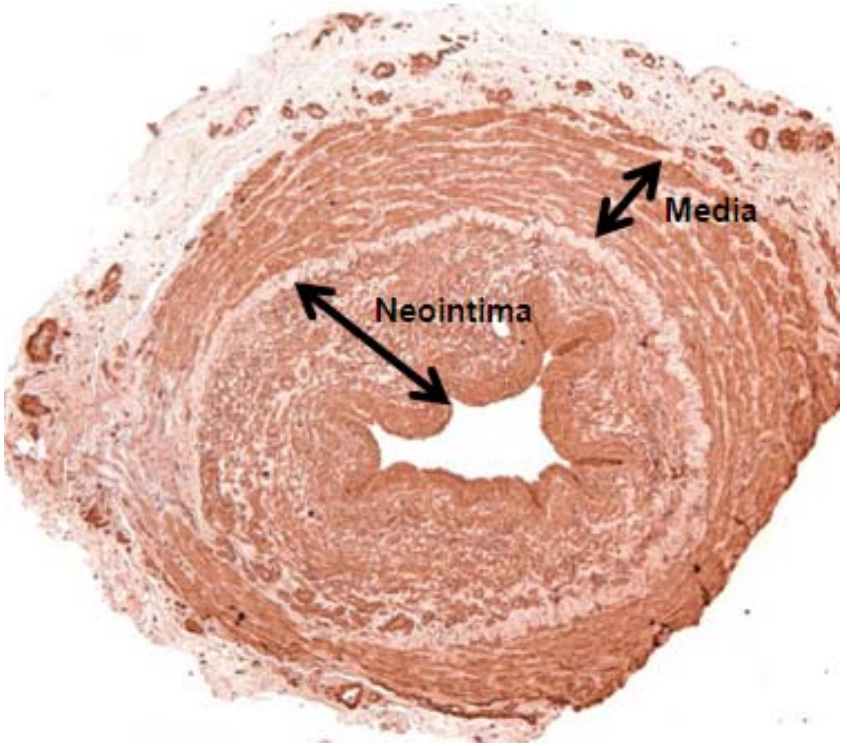
- Occurs with grafts at the venous anastomosis
- Rigid graft attached to a stretchy vein, and differences in diameter
- Trauma causes neointimal hyperplasia



# Neointimal Hyperplasia




Normal vessel

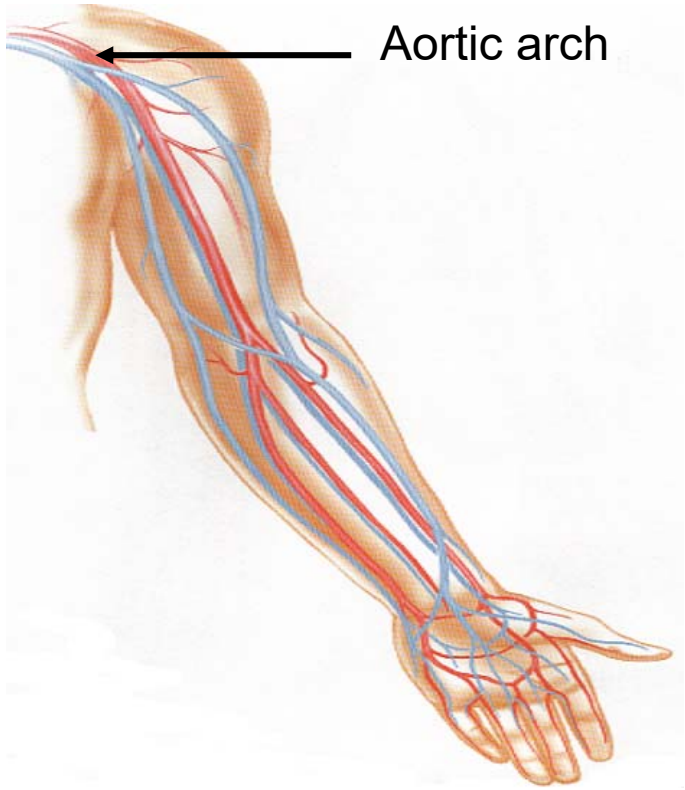



Traumatized vessel

(Source: P. Roy-Chaudhury)

# Central Vein Stenosis

- Possible causes:
  - ~Prior catheters
  - ~Pacemakers
  - ~PICC lines
  - ~Plaque
  - ~Diseased vessels
  - ~Broken bones
  - ~High flow AVFs



# Central Venous Stenosis



(Source: T. Vachharajani)

# Collateral Circulation from Stenosis

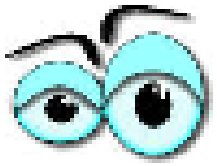
(Source: B. Inman)

# INTERVENTIONS BY PATIENT CARE TECHNICIANS

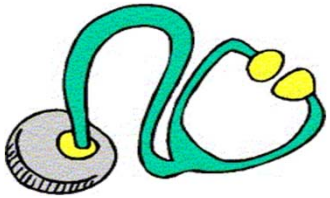
# Stenosis – How Do You Know?

- Edema of the access extremity
- Discoloration
- ↑venous pressures
- Recirculation
- Blood squirting around needles when cannulating
- Extended clotting time post dialysis

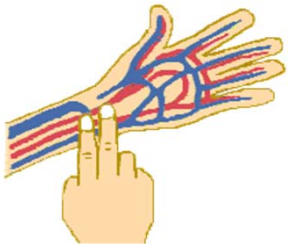
# Response to Stenosis



for new aneurysms, increased size of old aneurysms, and increased venous pressures



for changes in the bruit



for changes in the thrill, and enlargement of the base of aneurysms

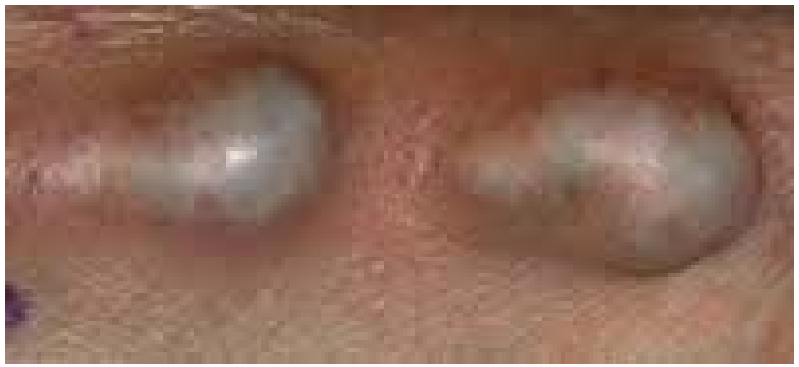
# Arm Raise Technique



Source: T. Vachharajani

# HOW TO REDUCE ANEURYSM AND PSEUDOANEURYSM FORMATION

# Hypertrophy vs. Aneurysm

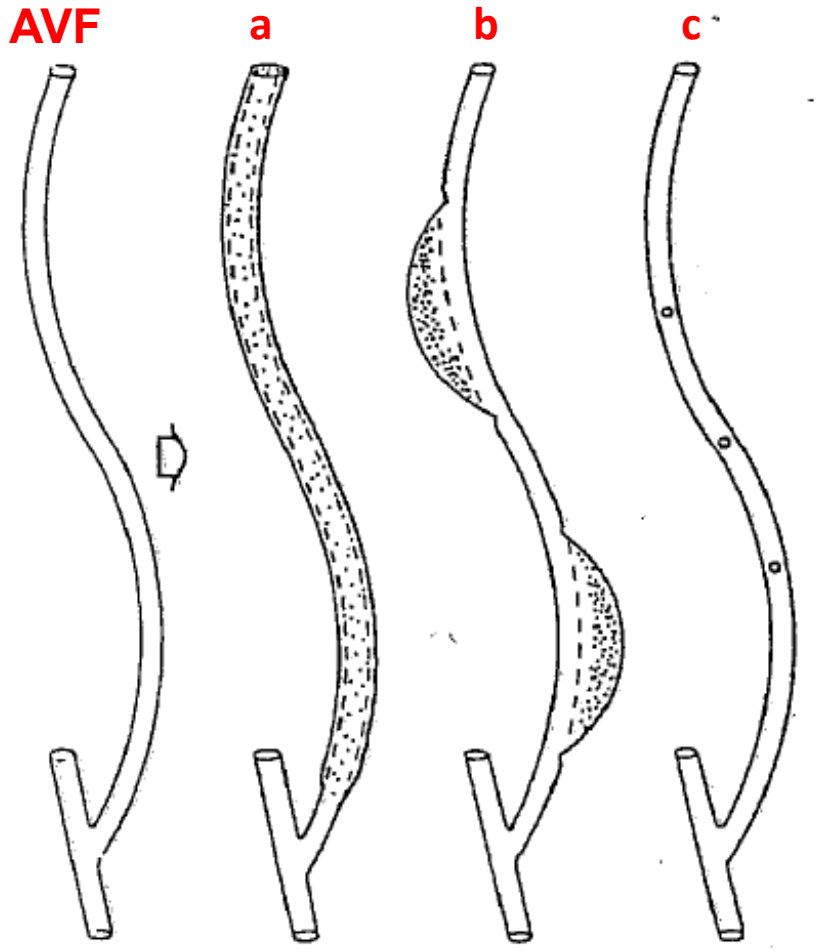


# Cannulation Techniques for Arteriovenous Fistula (AVF)

a. Site Rotation

b. Area Puncture

c. Buttonhole




Source: Kronung

# Area Puncture Technique

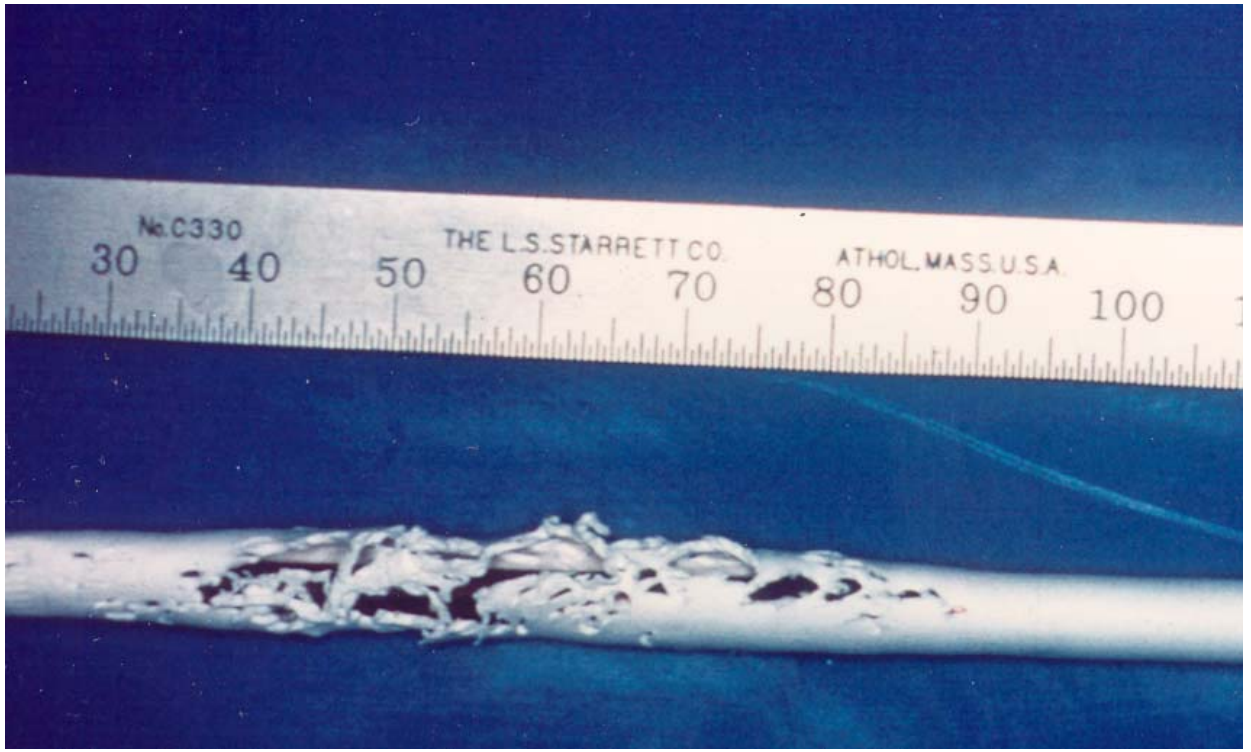
- Repeated punctures in the same small area causes the “two mountains and a valley” effect.
- Results in a decreased cannulation zone.
- Increased access interventions.

Source: L. Ball

# “One-site-itis” in AVFs

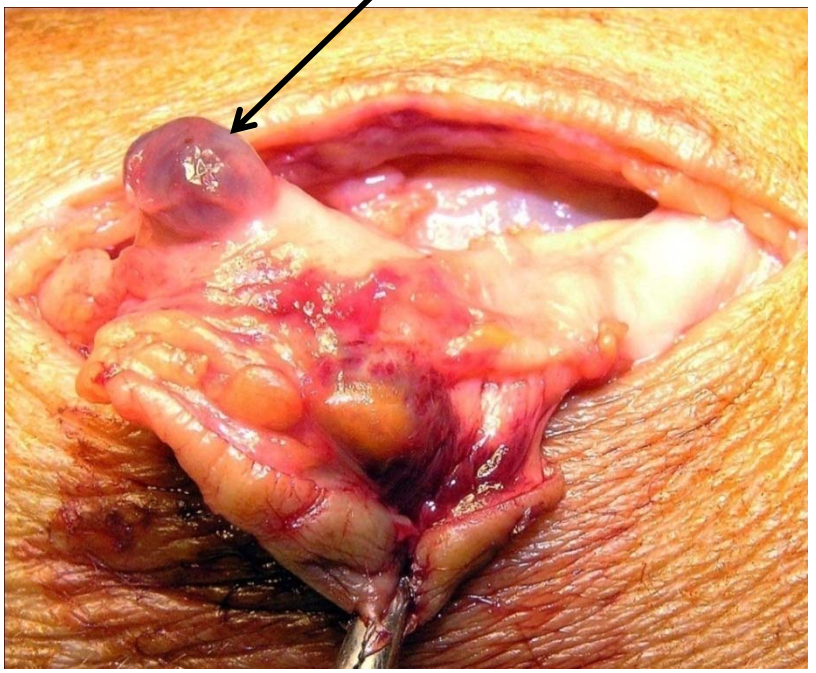
Source: V. Nguyen, MD

# “One-site-itis” in Grafts




Source: Gore

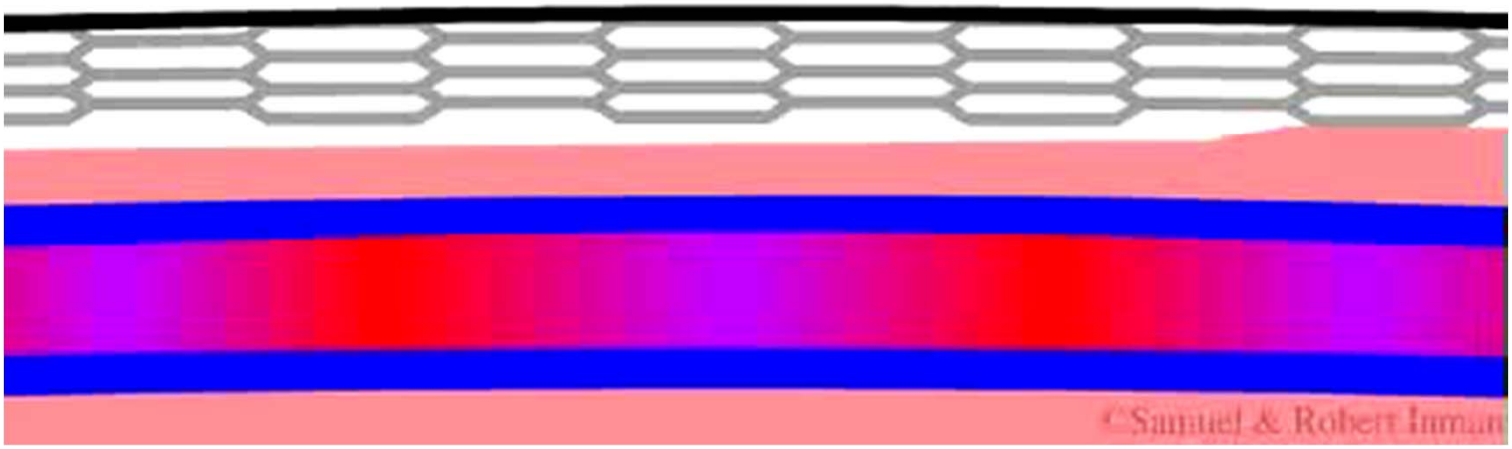
# Pseudoaneurysms




Source: M. Rawa, MD

# Aneurysm Formation: Area Puncture Technique

- Wall structure change to fibrosis, thins, bulges with additional pressure
- Skin also thins and becomes shiny and tight




Source: R. Inman, RN

# SIGNS OF A DAMAGED ACCESS

# Shiny, Tight, Change in Color

Source: T. Vachharajani, MD

# Depigmentation

Source: S. Shenoy, MD

# Missing Layers of Tissue

Source: E. Peden, MD

# Leaking Aneurysm

Source: J. Ross, MD

# Full-Thickness Skin Ulcer Over AVG

Courtesy of S. Glazer, MD

# INTERVENTIONS BY PATIENT CARE TECHNICIANS

# Report These Issues to Nurse

- Aneurysms[1]:
  - Skin over the AVF is compromised
  - Risk of fistula rupture
  - Available puncture sites are limited
- Pseudoaneurysms[2]:
  - Greater than twice the diameter of the graft
  - Difficulty achieving hemostasis post tx
  - Spontaneous bleeding from sites

([1]NKF KDOQI, 2000; [2]NKF KDOQI, 2006)

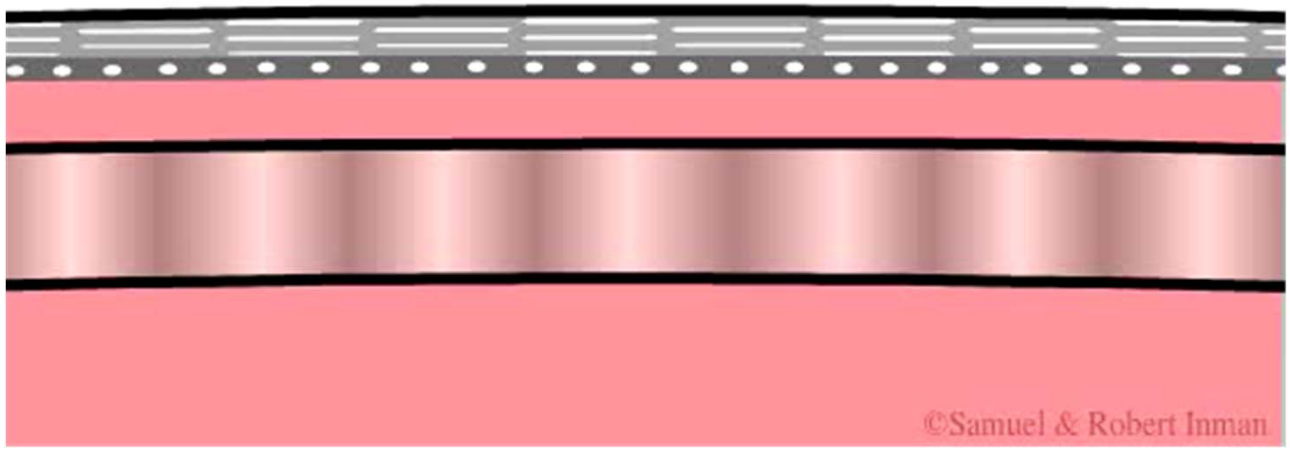
# Cannulation Tips

- Keep needle tips at least 2 inches apart
- Keep at least ¼ inch between last scab and need needle insertion
- Stick to full-thickness vessel wall in AVF cannulation
- Ask the patient about access bleeding in between dialysis treatment

# REDUCING INFILTRATIONS

# Back Wall Infiltration

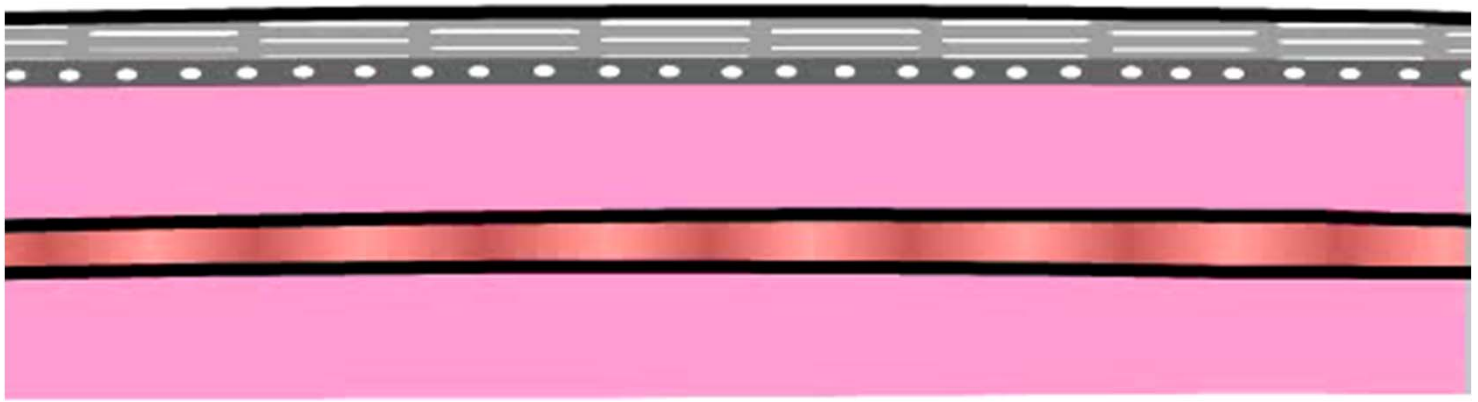
- Too steep an angle causes back wall infiltrate
- Can you see it?
- Can you feel it?




Source: R. Inman, RN

# Needle Pop Out

Not enough of the needle in the vessel, then when tourniquet removed, the needle pops out

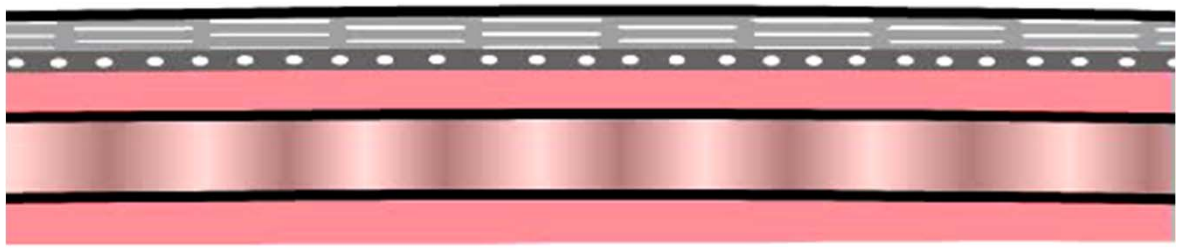




Source: R. Inman, RN

# Top Wall Infiltration

- Vessel wall not thick enough to support cannulation
- Vessel wall not supported by tourniquet during cannulation
- Tourniquet on too tight

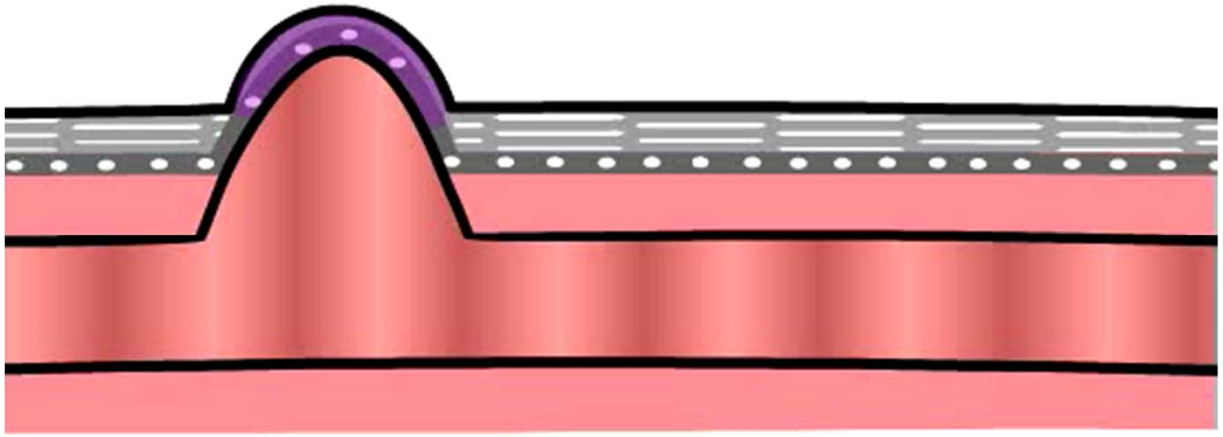




Source: R. Inman, RN

# Taping-Assisted Puncture

- Needles at steeper angles require propped up
- Attempting to flatten the needle down to tape can result in infiltration and/or the need to flip needles

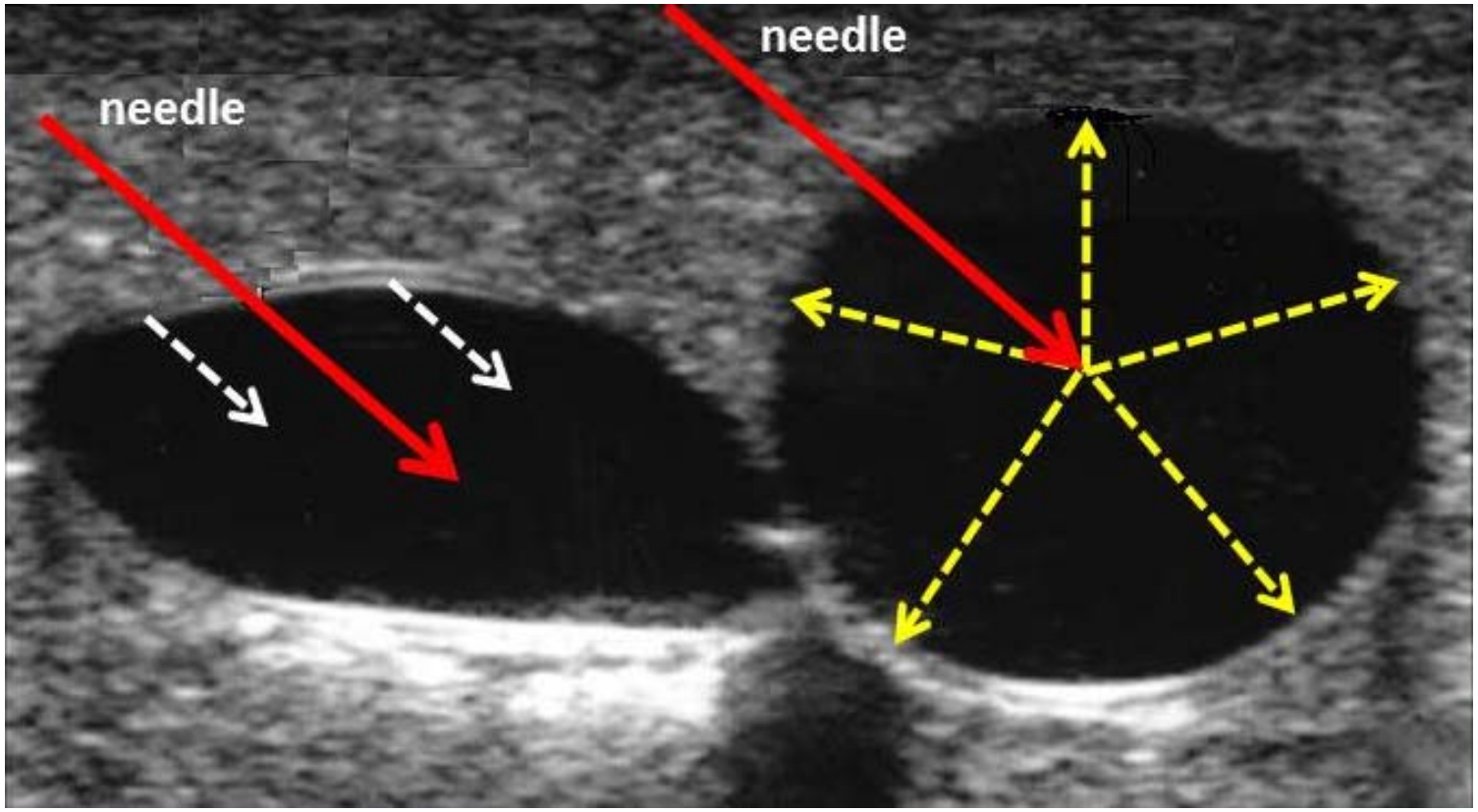




Source: R. Inman, RN

# INTERVENTIONS BY PATIENT CARE TECHNICIANS

# Always Use a Tourniquet on AVFs



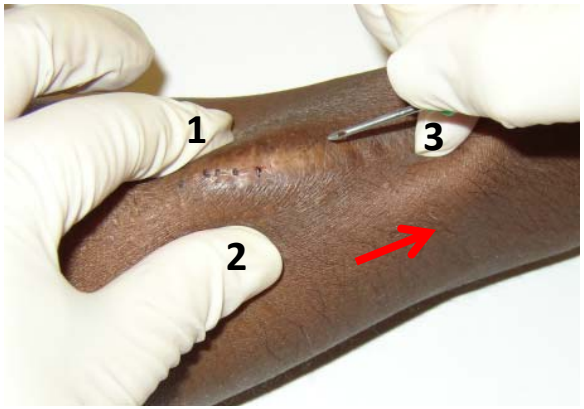

Adapted from Kendall, 2007 by L. Ball

Plump it Up!

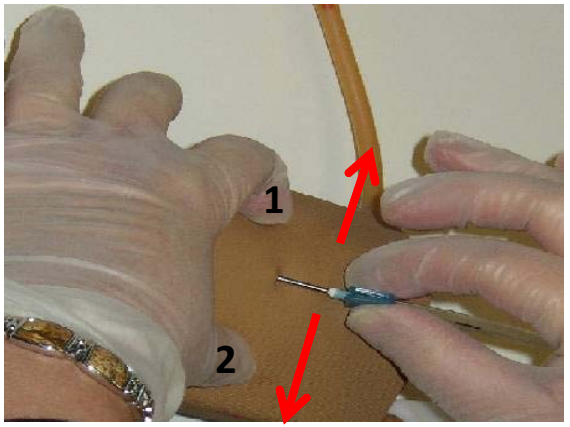
# Secure Rolling Veins

**Anchor the vein by stretching the skin taut (tight).**

- Rope Ladder
  - 3-point technique



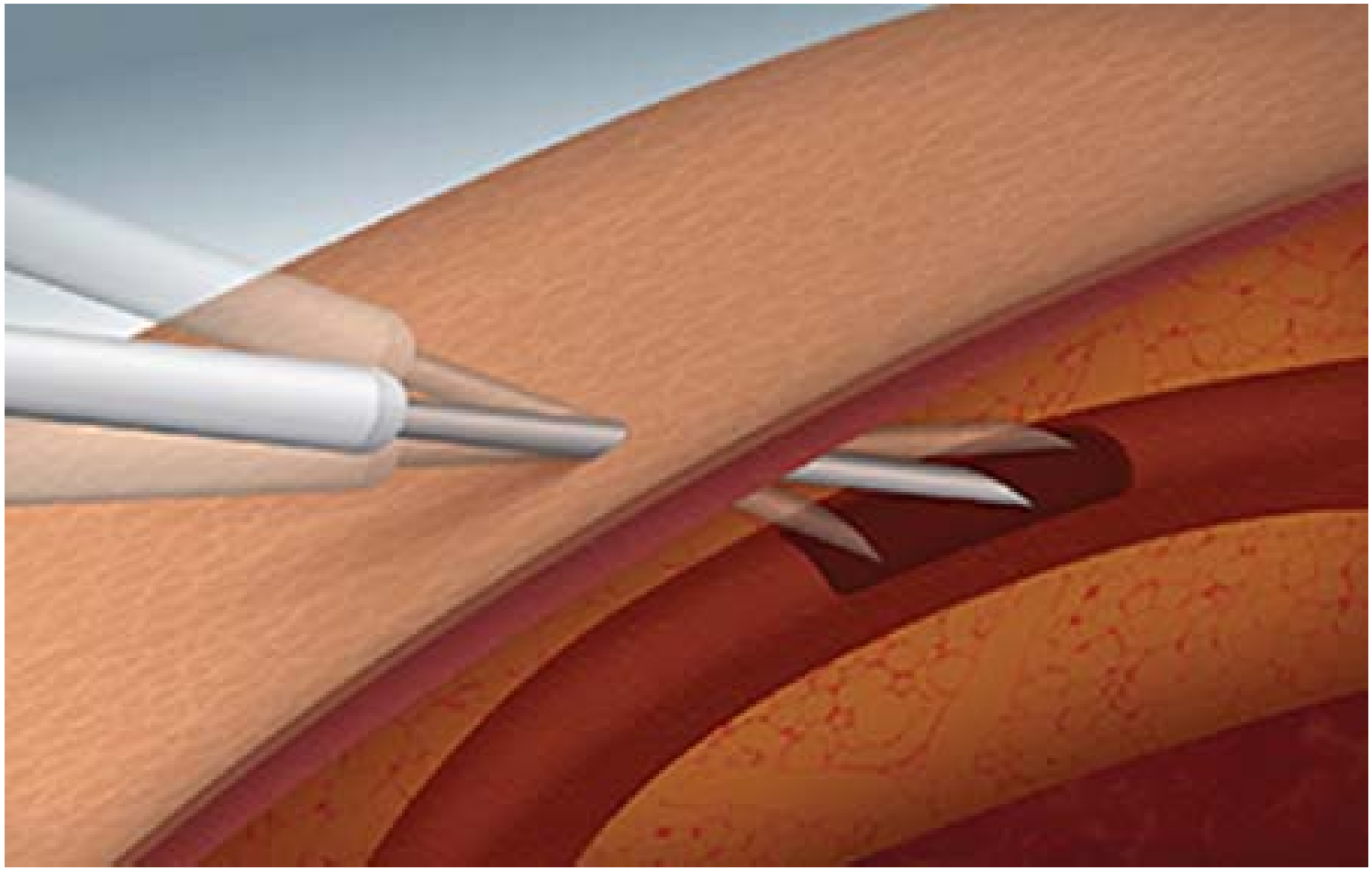

- Buttonhole
  - 2-point technique




**Bonus: It also decreases the pain of needle insertion!**

Source: L. Ball

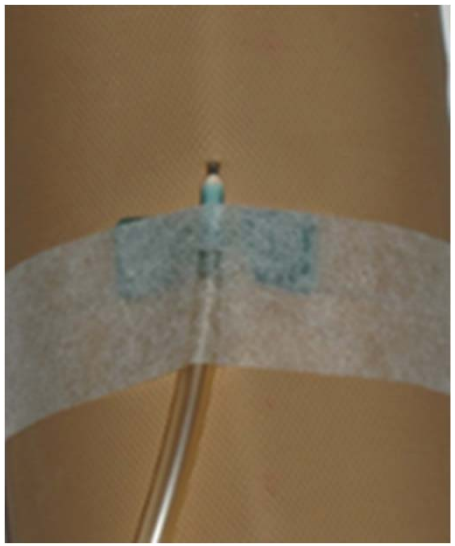
# Correct Angle, Lower, Advance



Source: Vital Access

# Secure Taping Method

- Prevents: needle dislodgement, hubbing, infection
- Stabilizes needle, minimizes leaking



This tape stabilizes the needle tip in the blood vessel.

This “V” tape (chevron) prevents the needle from falling out.

This tape covers the opening preventing migration of bacteria, and secures “V” piece.



Source: L. Ball

# Other Infiltration Prevention Tips

- Check for flashback and aspirate
- If you feel resistance, STOP pushing
- Avoid flipping needles
  - Tape wings securely not tightly
  - Prop steeper angled needles

# In Summary…

- Pay attention to the details
- Treat patients like this is the first time you have seen them
- Be prepared to change your practice if new evidence is identified
- If in doubt, ask for help
- Good practices produce good outcomes

# Acknowledgement


- Thank you to Bobby Inman, RN from San Antonio, TX and his son Samuel for permission to use the animated graphics in this presentation.

# References


Ball, L.K. (2005). Improving arteriovenous fistula cannulation skills. *Nephrology Nursing Journal*, 32(6), 611-617.

Beathard, G.A. (2004). Endovascular Strategies to Improve Arteriovenous Fistula Patency Rates, power point presentation.

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# For More Information:

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www.esrdncc.org/ffcl/
Fistula First Catheter Last Website