


# Cannulation Techniques Webinar



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ESRD Network of Texas

Lynda K. Ball, MSN, RN, CNN

# Objectives

- Discuss assessment skills – inspection, palpation, and auscultation of an AV fistula to determine readiness for cannulation
- List 3 common mistakes in determining AVF readiness for cannulation
- Explain the Buttonhole Technique Procedure

# Inspection

- Redness
  - Drainage
  - Abscess
- Infection

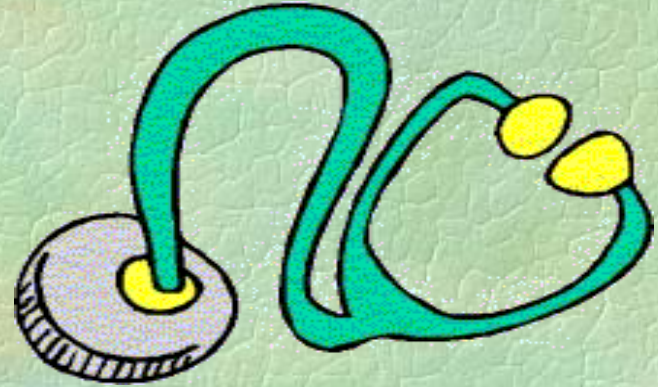
- Skin color
  - Edema
  - Small blue or purple veins
- Central or outflow vein stenosis

- Hands: Cold Painful Numb
  - Fingers: discolored
- Steal Syndrome



# Auscultation

## Bruit

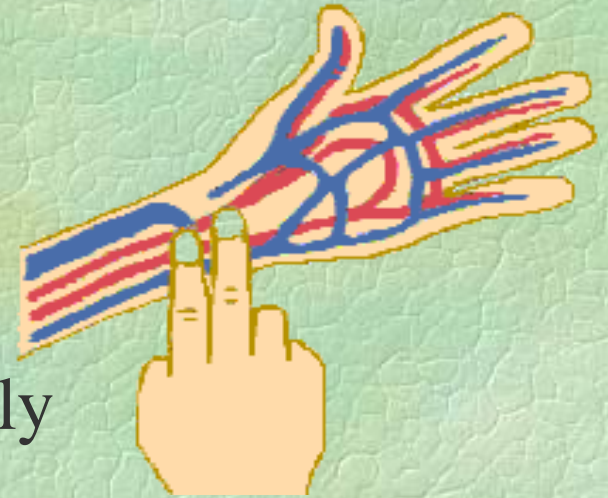


- ✓ Listen every treatment for:
  - changes in characteristics
    - discontinuous / choppy sounds
    - high-pitched sounds
    - louder-pitched sounds
- ✓ Determine direction of flow

# Palpation

## Temperature

- ✓ Warmth = infection
- ✓ Cold = decreased blood supply



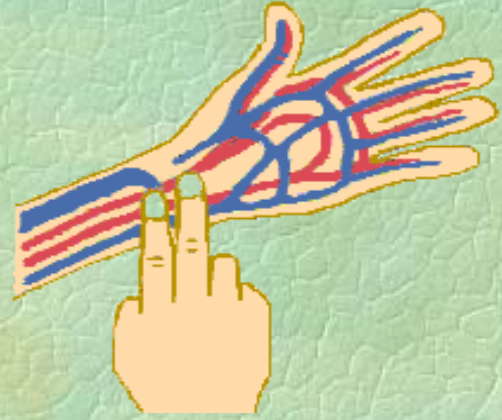
## Thrill

- ✓ Present at the anastomosis.
- ✓ Should either purr or vibrate, not thump
- ✓ In patients with powerful blood flows, a thrill can be felt along the entire access.
- ✓ A thrill can be felt at a stenosis.

# Arm Raise Technique

- Easy, quick, and non-invasive way to check the venous outflow for a stenosis.
- Steps:
  - AVF must be visible
  - Squeeze fist to engorge AVF and hold fist
  - Patient elevates the arm above their head
  - Immediately assess whether all or part or none of the fistula collapses
  - Have patient drop arm immediately
- Goal: to see full collapse of the AVF

# Palpation

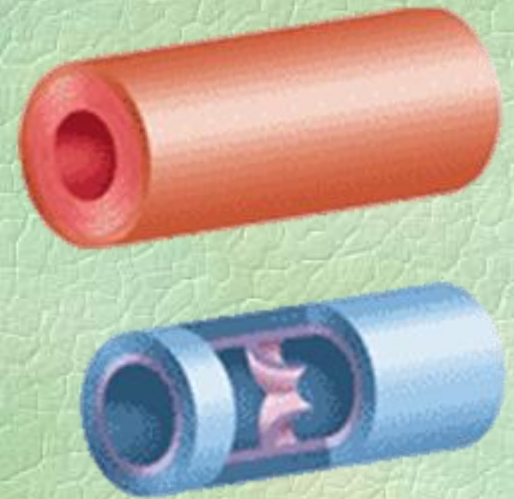


## Vein Diameter

- ✓ Feel the entire length of the AVF.
- ✓ Evaluate for needle site selection.
- ✓ Flat spots – might be a stenosis; check for a thrill.
- ✓ Evaluate if new AVF is ready to cannulate.

# Arterialization Causes Maturation

- High pressure arterial blood flow will cause a thickening of the vein wall, and increased blood flow rates through the AVF
- Flow rates can increase from 10's to 1000's of mL/min
- This thickening allows us to cannulate with large bore needles





# What Should Staff Do?

- Experienced dialysis nurses have an 80% success rate identifying AVF maturity<sup>1</sup>
- Nurses should look, listen, and feel the new AVF every dialysis treatment and document
- Report unusual findings to the nephrologist
- Start access exercises 1 week post-op
- If no signs or maturation at 4 weeks refer back to surgeon or interventionalist <sup>2,3</sup>

# Exercises to Develop AVFs

- Research indicates exercise aids in vessel dilation

**forearm AVF exercises**



**upper arm  
AVF  
exercise**



# Causes of Non-Development that Require Intervention

- Location, location, location
- Poor cardiac output
- Diseased vessels
- Juxta-anastomotic stenosis
- Accessory veins

# Common Mistakes in Determining AVF Readiness

- Not evaluating the access every treatment for the first 4 weeks post-operatively

# Research Supporting Early Referral

- Robbin (2002) study found:
  - ✓ no significant difference in fistula blood flow in the second, third or fourth month following creation
  - ✓ vessel diameter changed very little
- Tordoir (2003) study of radial-cephalic fistula maturation:
  - ✓ at 1 day 754 mL/min
  - ✓ at 7 days 799 mL/min
  - ✓ at 42 days (6 weeks) 946 mL/min

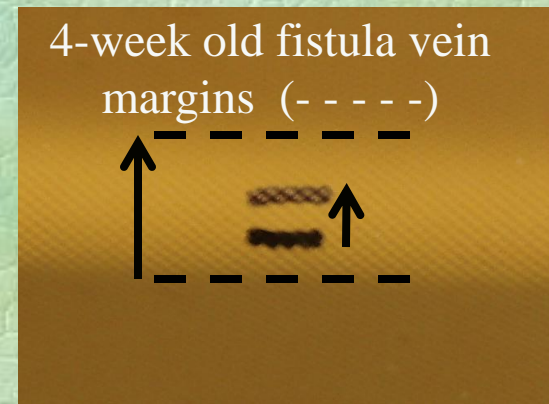
# Common Mistakes in Determining AVF Readiness

- Not saying "no" if the access is not yet ready to cannulate

# New AVFs – Ready or Not?

## Maturity characteristics:

- Diameter of vessel increasing (2mm → 4-6 mm)
- Soft and pliable → springy and firm to touch vessel wall
- No prominent accessory veins
- Thrill – strong, non-pulsatile at the anastomosis
- Bruit – low pitched; continuous at the anastomosis



**IF IN DOUBT –  
LEAVE IT OUT!**

# Common Mistakes in Determining AVF Readiness

- Not assessing accessory veins as a reason for non-development of the AVF.

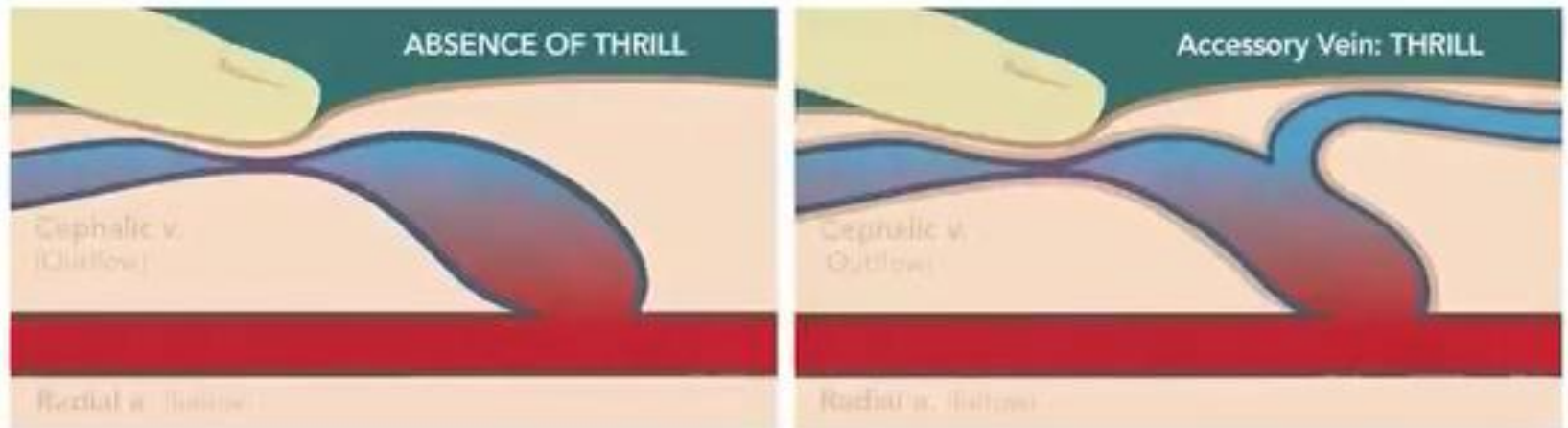


# Accessory Veins

- Can slow or prevent maturation due to diversion of flow
- Normal anatomy
- Not a result of stenosis causing blood to back up and engorge the vessels
- Significant Accessory Veins:
  - 25% of the size of the AVF or more
  - Changes with manual occlusion
  - Requires intervention

# Checking for Accessory Veins

## Accessory Vein



Buttonhole

Cannulation

Technique

# What is the Buttonhole Technique?

- Another technique for inserting needles into native AV fistulas
- Inserting sharp needles in to exactly the same spot, at the same angle and depth until a tunnel and entranceway into the blood vessel are formed
- Transition to blunt needles occurs after healing is complete

# Buttonhole Technique

- *Follow-the-Leader Technique*

- ✓ Sites are pre-determined
- ✓ Direction of needles pre-determined
- ✓ Angle of insertion pre-determined

- *A way to standardize cannulation skills*

- ✓ Must utilize expert cannulators
- ✓ One cannulator for creation period (3-4 weeks)

# The Buttonhole Technique

## Research and Education

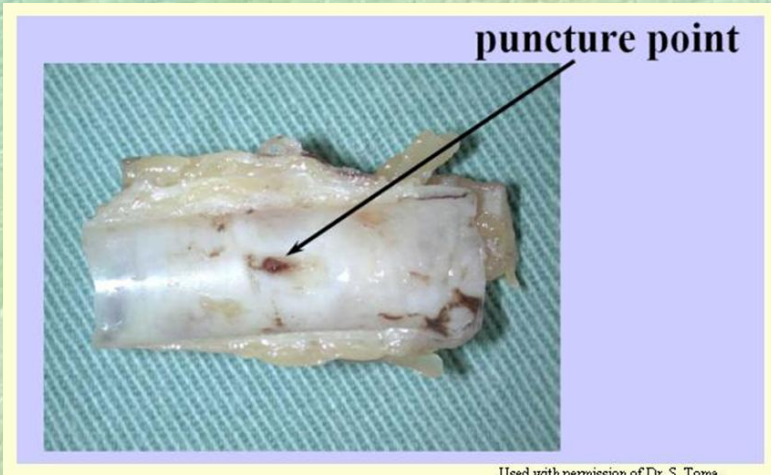
<b>Year</b>	<b>Education</b>	<b>Research</b>
<b>2005</b>	<b>Ball</b>	
<b>2006</b>	<b>Ball</b>	<b>Marticorena et al.</b>
<b>2007</b>	<b>Ball et al.</b>	<b>Verhallen et al.</b>
<b>2008</b>	<b>Doss et al.</b>	
<b>2009</b>		<b>Marticorena et al.;</b> <b>van Loon et al.</b>
<b>2010</b>	<b>Ball &amp; Mott;</b> <b>Ball;</b> <b>Birchenough et al.</b>	
<b>2011</b>	<b>Donato-Moore;</b> <b>Pergolotti et al.</b>	<b>Chow et al.;</b> <b>Marticorena et al.</b>

# Components of a Buttonhole

- The creation of a tunnel between the surface of the skin and the blood vessel wall
- The development of an opening or doorway leading into the blood stream



Courtesy of T. Goovaerts



Used with permission of Dr. S. Toma

# Benefits for the patient

- Less painful – elimination of anesthetic
- Fewer missed needle sticks
- Fewer infiltrations/hematomas
- Cannulation of access takes less time
- Accesses clot faster at the end of treatment<sup>2</sup>



# Suitable Candidates

## Patients with AV Fistulas:

- Short segment
- Difficult to cannulate
- One-site-itis
- Repeated infiltrations
- Fear of needles
- Self-cannulation

# Possible Unsuitable Candidates?

- Patients who cannot leave scabs intact
- Patients who are chronically taking antibiotics for one reason or another
- Patients with certain co-morbid conditions<sup>1</sup>:
  - Endocarditis
  - Heart valve issues
  - Return from failed transplant

# In Conclusion...

- A good assessment skillset ensures that the majority of new AV fistulas will mature – **do it every day**
- Waiting, and waiting, and waiting is not beneficial to the access or the patient – **refer those non-developing AV fistulas at 4 weeks**
- The Buttonhole Technique is another cannulation technique available to patients with AV fistulas – **consider if this technique would be beneficial for your patient**

# Questions?

Lynda K. Ball, MSN, RN, CNN

Vascular Access Specialist

Fresenius Medical Care

Lynda.K.Ball@fmc-na.com

## **Cannulation Resources:**

[www.fistulafirst.org](http://www.fistulafirst.org) (change concept #8: Cannulation Training)

[www.esrdnetwork.org/professionals/quality-improvement/fistula-first/index.asp](http://www.esrdnetwork.org/professionals/quality-improvement/fistula-first/index.asp)