Cannulation Techniques Webinar

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ESRD Network of Texas

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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\(^1\)
- 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 \(^2,3\)

\(^1\)Robbin et al, 2002; \(^2\)Beathard, 2003; \(^3\)Singh et al., 2008
Exercises to Develop AVFs

- Research indicates exercise aids in vessel dilation

Oder et al., 2003; Leaf et al., 2002; Rus et al., 2003
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!

Ball, Touch Briefings ESRD Vascular Access 2007, p. 32.
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

Beathard, 2004
Checking for Accessory Veins

Accessory Vein

ABSENCE OF THRILL

Accessory Vein: THRILL

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

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<thead>
<tr>
<th>Year</th>
<th>Education</th>
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<tr>
<td>2005</td>
<td>Ball</td>
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<td>2006</td>
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<td>Marticorena et al.</td>
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<td>2007</td>
<td>Ball et al.</td>
<td>Verhallen et al.</td>
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<td>2008</td>
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<td>Marticorena et al.; van Loon et al.</td>
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<td>Ball &amp; Mott; Ball; Birchenough et al.</td>
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<td>Donato-Moore; Pergolotti et al.</td>
<td>Chow et al.; Marticorena et al.</td>
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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
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\(^2\)

Twardowski, 1995, \(^2\)Ball et al., 2007
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 leaves scabs intact
- Patients who are chronically taking antibiotics for one reason or another
- Patients with certain co-morbid conditions\(^1\):
  - Endocarditis
  - Heart valve issues
  - Return from failed transplant

\(^1\)Sutherland & Mills, 2010
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?

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Cannulation Resources:

www.fistulafirst.org (change concept #8: Cannulation Training)
www.esrdnetwork.org/professionals/quality-improvement/fistula-first/index.asp