


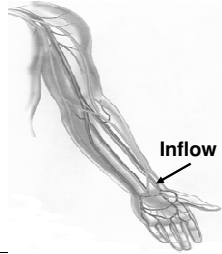
Assessing AVF Maturity

Lynda K. Ball, MSN, RN, CNN
October 13, 2011



Most Common Stenosis for Failure-to-Mature AVFs

- Juxta-anastomotic (inflow)
- Flat spot
- Prevents arterialization of the vein
- Typically due to surgical technique





Severe juxta-arterial anastomosis stenosis before and after angioplasty



Selected Cases from the Files of: Dr. George Nassar and Dr. Katalin Achkar
At the Dialysis Access Management Center, Houston, Texas

Other Causes of Non-Development

- Location, location, location
- Diseased vessels
- Poor cardiac output
- Accessory veins

Accessory Veins

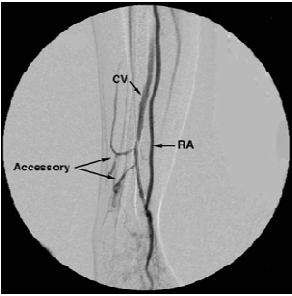


Photo: Gerald Beathard, MD

Coil Embolization

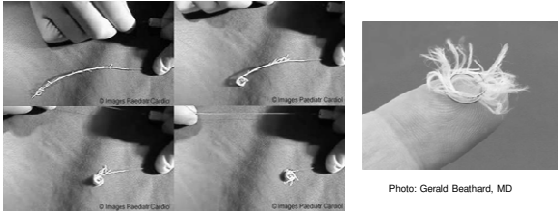




Photo: Gerald Beathard, MD



Requirements for Cannulation

- Vessel diameter to support large gauge needles
 - ~If diameter is ≥ 4 mm, the chance it would be adequate for dialysis was 89% vs. 44%
- Blood flow through the fistula
 - ~If ≥ 500 ml/min, the chance it would be adequate was 84% vs. 43%
- ❖ Combining the 2 variables, the chance that it would be adequate was 95% vs. 33%


Robbin (2002). *Radiology* 225:59-64



What Else Was Found?

- Increased blood flow occurs very early post-operatively
- There was no significant difference in fistula blood flow in the second, third, or fourth month following creation of the AVF
- There was also very little change in vessel diameter over the same period of time

Robbin (2002). *Radiology* 225:59-64



AVF Maturation Flow Study

Study of radial-cephalic fistula maturation


Early flow in the AVF

- ~1 day – 754
- ~7 days – 799
- ~42 days - 946


Tordoir et al. (2003). *Nephrol Dial Transplant* 18:378-383

The Nursing Assessment

Assessment


- Inspection 
 - ~surgical dressing
 - dry & intact; drainage – describe
 - ~swelling
 - color changes; amount – describe;
 - ask patient for symptoms
 - ~overall skin assessment

Assessment

- Auscultation 
 - ~Check bruit
 - patency
 - quality
 - character

Assessment

- Palpation
 - ~Thrill
 - patency; quality; character
 - ~Vessel
 - diameter – document a baseline
 - pliability – document a baseline
 - curves & flat spots
 - depth




The Nurse's Role

- Assess the new AVF every dialysis treatment after surgery
- Document details in the progress notes every treatment
- Report unusual findings to the nephrologist
- After one week, instruct the patient on access exercises


Did you know?

Experienced dialysis nurses have an 80% success rate identifying AVF maturity.
(Robbin et al, 2002)

New AV Fistula vs. Mature AV Fistula



vs.



The newborn baby

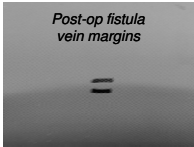
The 2-year old

New AVFs – Ready or Not?

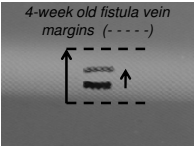
Maturity characteristics:

- Soft and pliable → springy and firm
- Diameter of vessel increasing (2mm → 4-6 mm)
- Thrill – strong, non-pulsatile
- Bruit – low pitched; continuous

**IF IN DOUBT –
LEAVE IT OUT!**



Post-op fistula vein margins




4-week old fistula vein margins (----)

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



Exercises to Develop AVFs

- Research indicates exercise aids in vessel dilation (Oder et al., 2003)

upper arm AVF exercise



forearm AVF exercises



Staff Rating System for Venipuncture P&P

- Four levels (new, novice, intermediate, expert)
 - ✓ Level 1 – no experience: training program
 - ✓ Level 2 – graft cannulation only
 - ✓ Level 3 – mature AVF and graft cannulation
 - ✓ Level 4 – new & mature AVF, and graft cannulation

- Competency rating done by the educator or a designee with a Level 4 rating

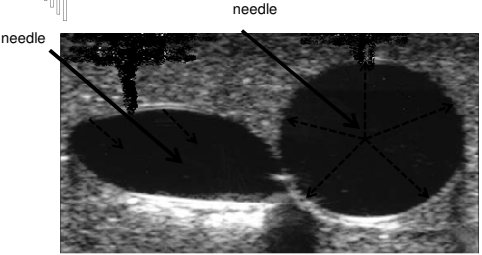
<http://www.fistulafirst.org/professionals/tools.php#CannulationTraining>

Tips for More Successful Cannulation of New AVFs

Use of Tourniquets - ALWAYS

- Tourniquets should be used on all AVFs regardless of development, age, or skill set
 - ~Firms the access
 - ~Allows you to see it better
 - ~Allows you to feel it better for correct angle of insertion
 - ~Decreases the risk of infiltration

No Tourniquet versus Tourniquet



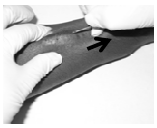
needle

needle

Plump it Up!

Decreasing Pain and Anchoring the Vein – Taut (tight) Skin

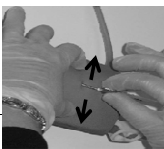
- Rope Ladder (site rotation)



← three-point technique

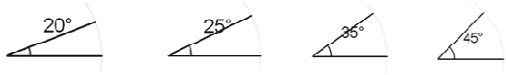
- Buttonhole (constant site)

two-point technique →



Angles of Entry

- Not the same for every fistula (e.g., 25 degrees)
- The angle is based on the depth of the access
- Depth is determined by assessing the fistula with a tourniquet on, and feeling how deep below the surface of the skin the access is
- Know the angle of insertion before cannulating



20° 25° 35° 45°

www.mathisfun.com

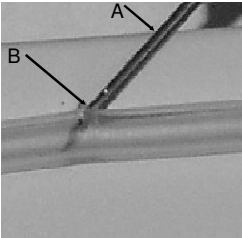
Clamps vs. Holding Sites

- Clamps should NEVER be used on new AVFs – no way to adjust pressure properly.
- Compression of the vessel, along with hypotension can cause the access to clot off.
- Sites for new AVF should be held 10 minutes, no peeking, to ensure complete clot formation.

<http://www.fistulafirst.org/professionals/tools.php#CannulationTraining>

Bruising - Holding Sites

- Capillaries break easily causing bruising.
- The surface site has clotted (A), but the vessel wall site (B) has not.
- Use two fingers per site, one over "A," the other over "B."
- Hold one site at a time.*



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*Recommendation of the Fistula First Breakthrough Initiative: Clamp Usage P&P

Cannulating a New AVF

- Must have a physician's order to cannulate.
- Must have an experienced, qualified staff person who is successful with all types of accesses.
- Use 17-gauge needles initially.
- Obtain order to decrease heparin dose by 50% (need Saline flushes) - optional

Cannulating a New AVF (cont)

- Always use a tourniquet or some form of vessel engorgement technique (e.g., staff or patient compressing the vein).
- No clamps.
- Hold manual pressure for 10 minutes, no peeking – no exception.
- If patient has a catheter, use one limb and one needle.

1 Needle - Arterial or Venous?


<p>ARTERIAL **</p> <ul style="list-style-type: none"> ➢ If an infiltration occurs, blood is not being forced into tissue. ➢ Pre-pump AP tells us if the AVF has good flow. ➢ Lower risk of complications. 	<p>VENOUS</p> <ul style="list-style-type: none"> ➢ To help “develop” the fistula. ➢ Infiltration with the blood pump force can cause massive hematoma. ➢ No use until hematoma resolves.
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** Recommended by KDOQI and the CMS Fistula First Breakthrough Initiative

Infiltrations in the New AVF

- If the fistula infiltrates, let it “rest” until the swelling is resolved;
- If the AVF infiltrates a second time, wait 2 weeks (or until the swelling has resolved). Notify the physician;
- If the AVF infiltrates a 3rd time, notify nephrologist and surgeon;
- No further cannulation until ordered by nephrologist or surgeon.


NKF-KDOQI VA guidelines, 2000



Infiltrations in the New AVF


- Let the fistula rest for at least 1 treatment
- If unable, the next cannulation should be above the site of the infiltration
- If the patient still has a catheter, restart use of the fistula with 1 needle
- Advance to 2 needles, larger needle size, and greater BFRs

NKF KDOQI 2006 Update



Catheter Removal

- Once the patient has had three *successful* treatments, the RN should get an order to have the catheter removed.
- Successful* = getting two needles in, no infiltrations, and reaching the prescribed blood flow rate for three successive treatments.



In Summary...

- Improve assessment skills for new accesses
- Improve your cannulation skills
- Refer failure-to-mature accesses immediately
- If in doubt, leave it out!
- Communicate with the interdisciplinary team about your patients' access needs



Questions?

For more information:
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Cannulation Resources:
<http://www.nwrenalnetwork.org/fist1st/ffcannu.htm>
www.fistulafirst.org (change concept #8)
