Buttonhole Cannulation Technique: What You Need to Know to Develop and Maintain a Successful Buttonhole

Lynda K. Ball, MSN, RN, CNN

The Buttonhole Technique – What is it Exactly?

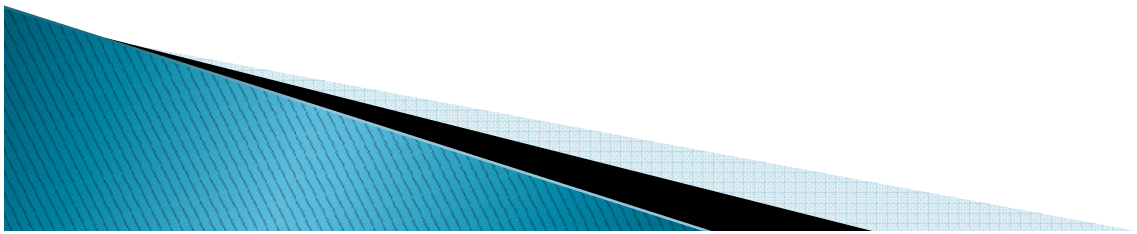
- A technique to fool the AV fistula into thinking that just one person is accessing it every time.
- A method of needle insertion into the same site, at the same angle, every cannulation.
- Requires every patient care staff member to do the entire cannulation process exactly the same way.
- Staff need to be clinically proficient in their cannulation skills.

The Buttonhole Technique

Only 8 new articles on the Buttonhole Technique in the last 5 years…nothing the 20 years prior

~Four research articles (Verhallen et al., 2007; Marticorena et al., 2006 & 2009; van Loon et al., 2009)

~Four educational articles (Ball, 2005; Ball, 2006; Ball et al., 2007; Doss et al., 2008)

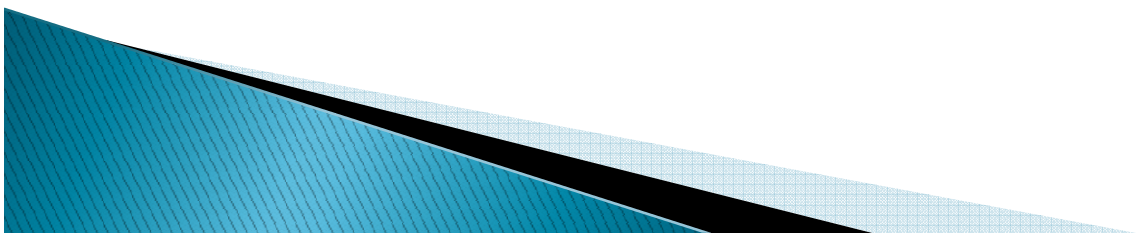


Site Rotation vs. Buttonhole

Major differences between

Site Rotation and the

Buttonhole Technique



Site Rotation (Rope Ladder)

- Site rotation with every cannulation
- Cannulators independently determine the
  angle of entry
- Avoid scabs
- Three-point technique
- For fistulae or grafts

Buttonhole Technique

- Reuse same sites each treatment
- Uses blunt needles
- Scab removal required
- Must follow the track of the original cannulator
- Side-to-side technique
- For AV fistulae only

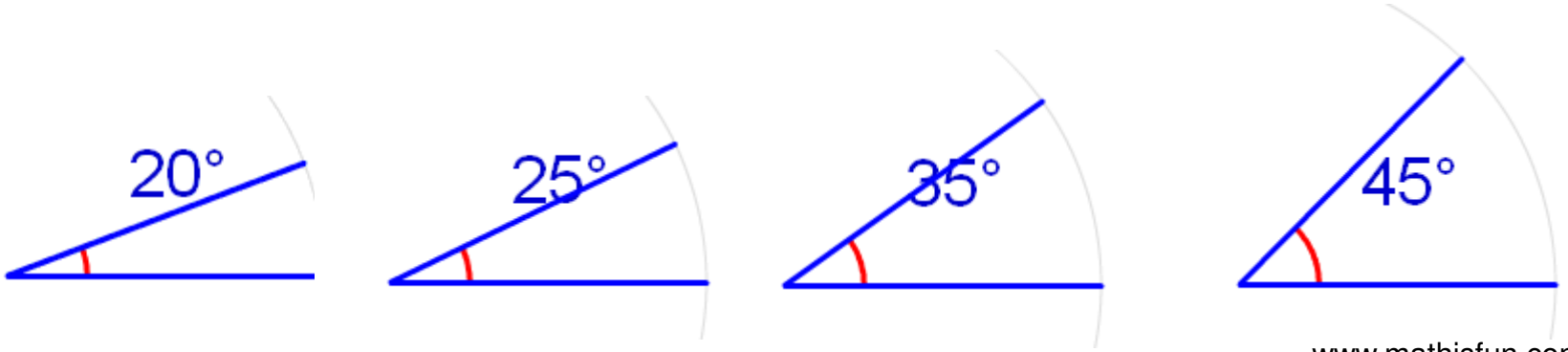
Important Concepts for Buttonhole Cannulation

Buttonhole

- Requires the same cannulator for creation
- Originator needs to show the angle of insertion to other cannulators
- Time to buttonhole completion:
  ~8-10 cannulations for people with good wound healing
  ~12-14 cannulations for people with poor wound healing
- Consistency among the staff is key

Angles of Entry

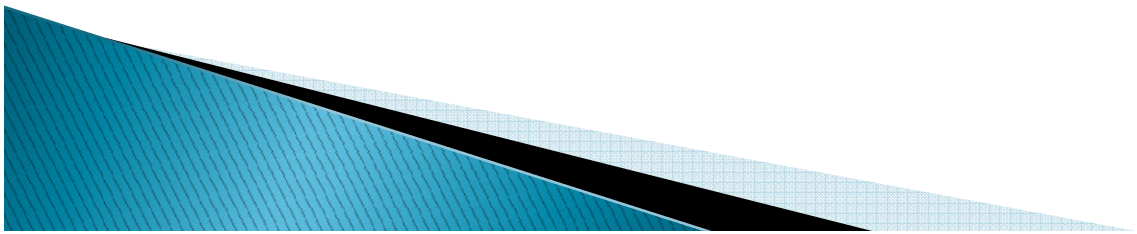
- It is <u>not</u> 25 degrees for every fistula
- The angle of entry is based on the depth of the access
- Depth is determined by assessing the fistula with a tourniquet on, and feeling how deep below the surface of the skin the access is
- Before cannulating an AVF, you should already know the angle of insertion



www.mathisfun.com

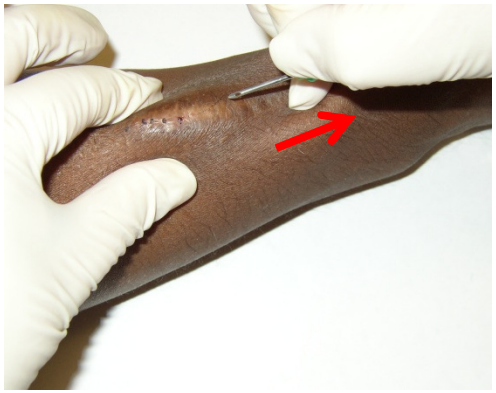
Use of Tourniquets

- **Tourniquets should be used on all AVFs regardless of age or size or development**
  - ~Firms the access
  - ~Allows you to see it better
  - ~Allows you to feel it better
- **Place in the axilla area (armpit) lightly**
  - ~displaces pressure along entire vein
  - ~prevents chance of infiltrate in thin-walled fistulas



Taut (tight) Skin Anchors the Vein and Decreases Pain

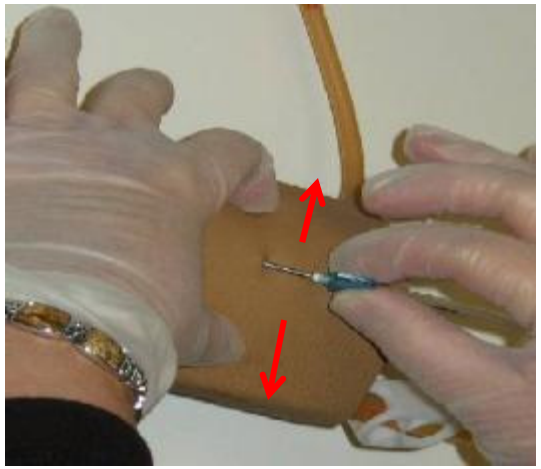
- Rope Ladder (site rotation)



⟵ three-point technique

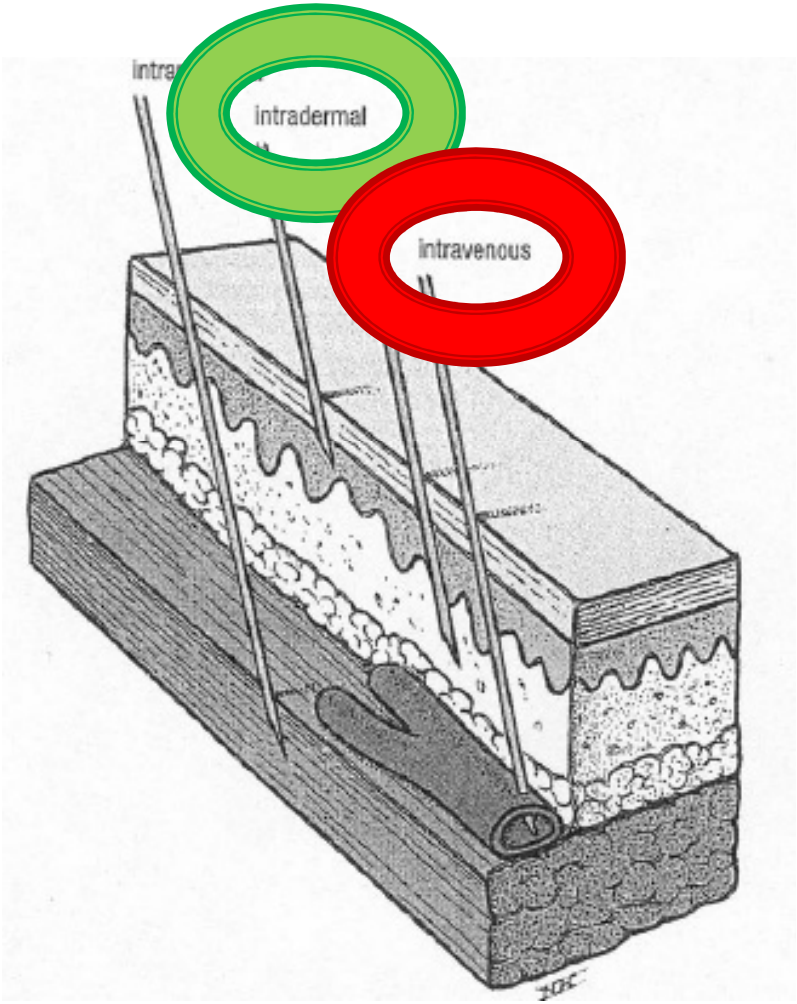
- Buttonhole (constant site)

two-point technique ⟶



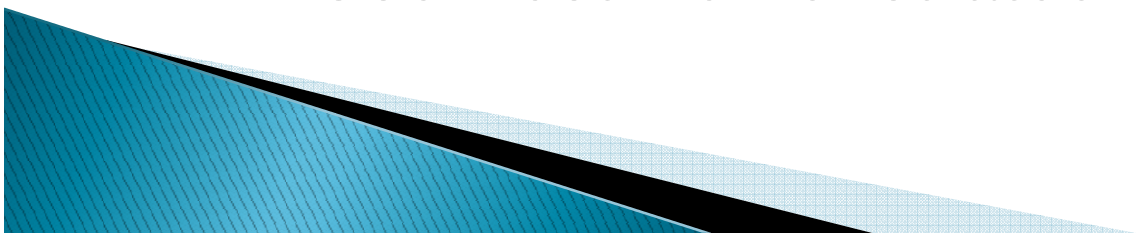
Use of Anesthetics

- Should not be used long-term – 1-2 weeks max.
- Topical anesthetics should be applied sparingly to prevent adverse effects
- **Do not** inject lidocaine down the tunnel
  - ✓ not intradermal (improper drug route)
  - ✓ causes vasoconstriction (changes the position of the flap)



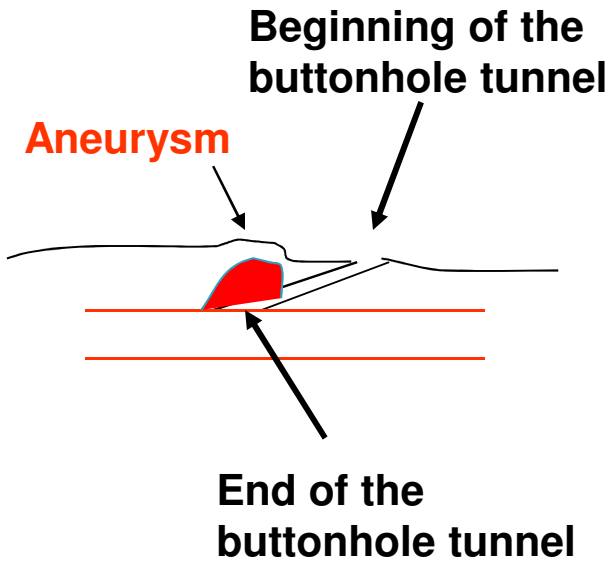
Use of Sharp Needles

- ✓ Once you transition to blunt needles you NEVER go back to a sharp needle down the tunnel
- ✓ Make sure you are meeting certain criteria before transitioning to blunts
- ✓ We now know that using sharps long-term is causing scarring to the tunnel and the fistula wall, and should therefore be discouraged
- ✓ Use Best Demonstrated Practices



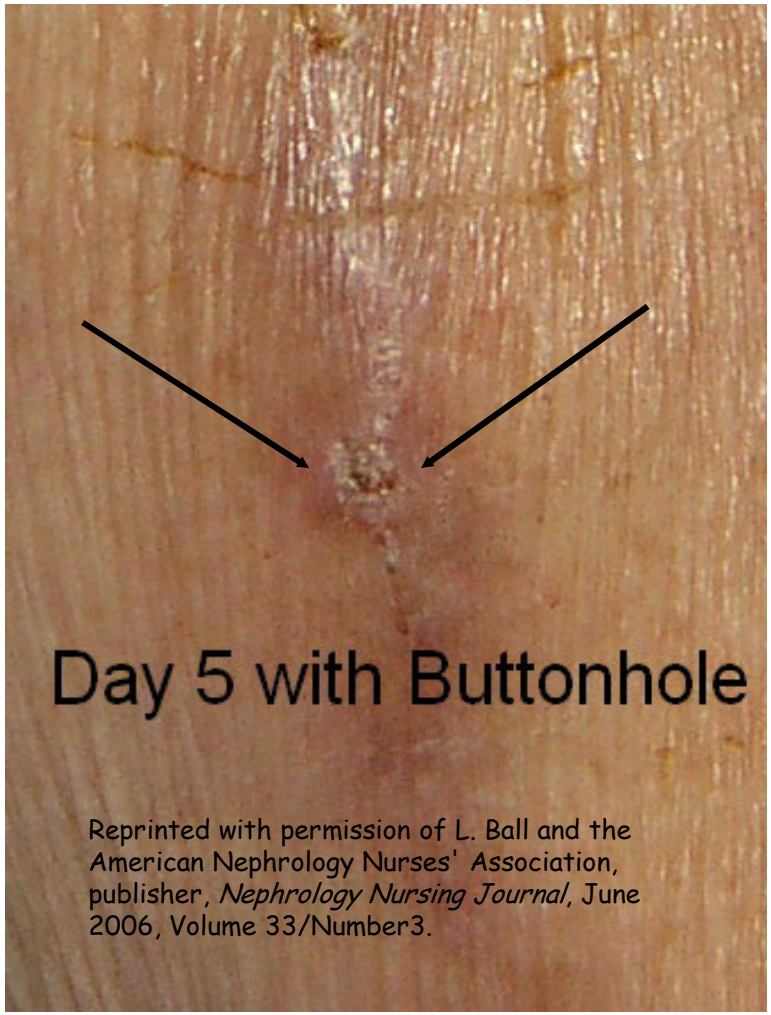
Aneurysms in Buttonholes

- Using sharps in the buttonhole when unable to advance the blunt needles – results in a small area being cannulated
- Weakens vessel wall and pressure of blood flow pushes weakened area out – this will not occur at the buttonhole site, but at the vessel flap site



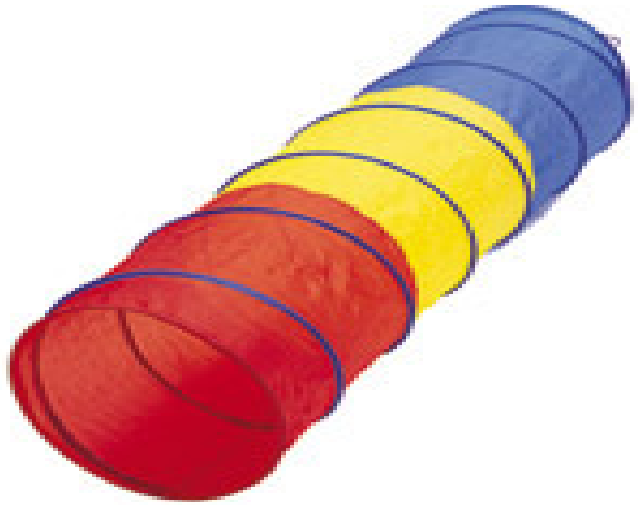
How to Know the Site is Ready?

- This will be individual to each patient, but look for these things:
  - Does it look well-healed?
  - Can you visualize a round hole?
  - Is there a decrease in resistance from day-to-day?
- Do not use excessive force when changing to blunt needles.

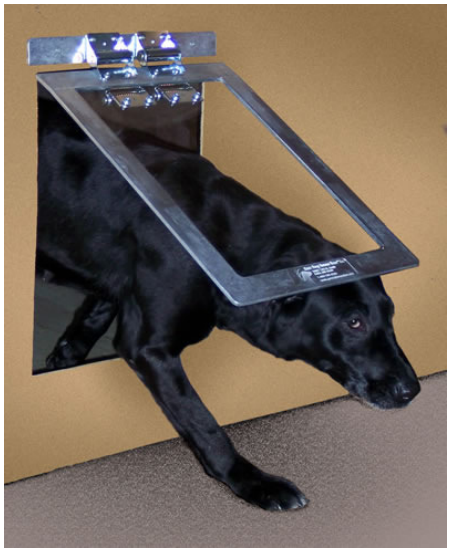


Components of the Buttonhole

- The creation of a tunnel between the surface of the skin and the blood vessel wall



- The development of a hinged flap similar to a doggie door leading into the blood stream

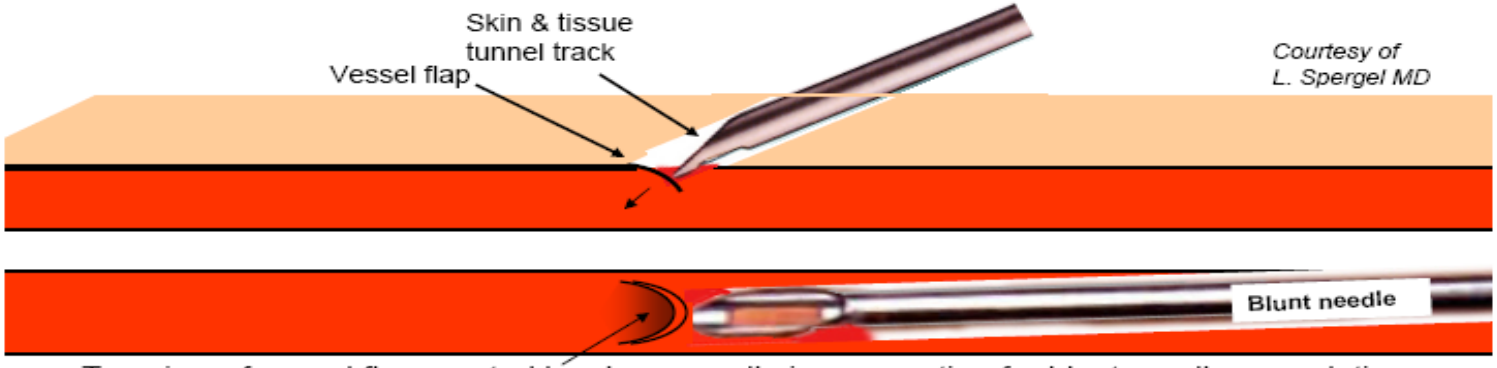


The Buttonhole Technique

Skin/Tissue Tunnel Track + Vessel Flap = Buttonhole Site

Skin / tissue buttonhole tunnel track forms like the scar tissue track from a pierced earring.

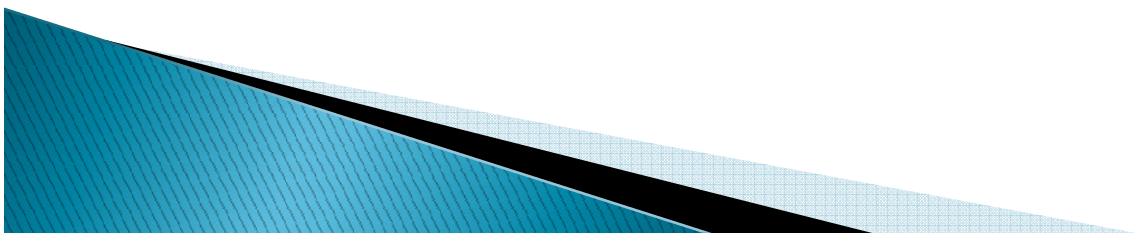
Vessel flap is created by repeated punctures with the sharp needle at the same site. Vessel flap will then be displaced by the blunt buttonhole needle at each cannulation after the tunnel and flap are established.



Top view of vessel flap created by sharp needle in preparation for blunt needle cannulation

Alignment Issues and What to do About Them

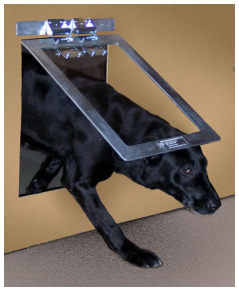
(inability to transition)



Needles Won't Go In

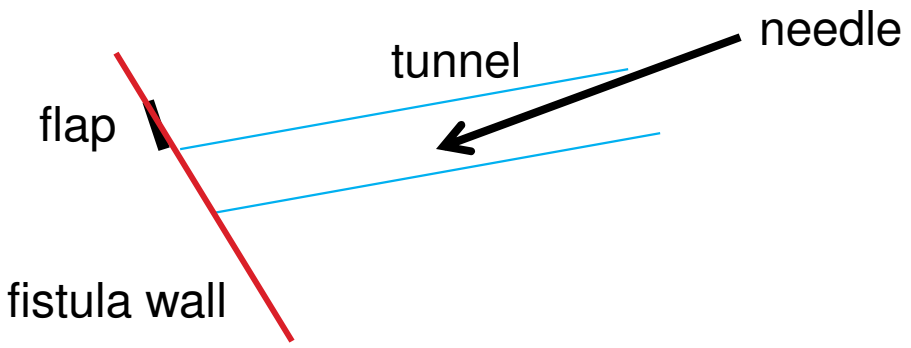
Day after the weekend

- Patients have an extra day to drink fluids.
- Fluids stay in the pipes, causing them to stretch.
- The flap moves out of position.
- So, if you have trouble with blunt needles on their first day back, insert the needle to the vessel, then gently lift up and try to find the flap.

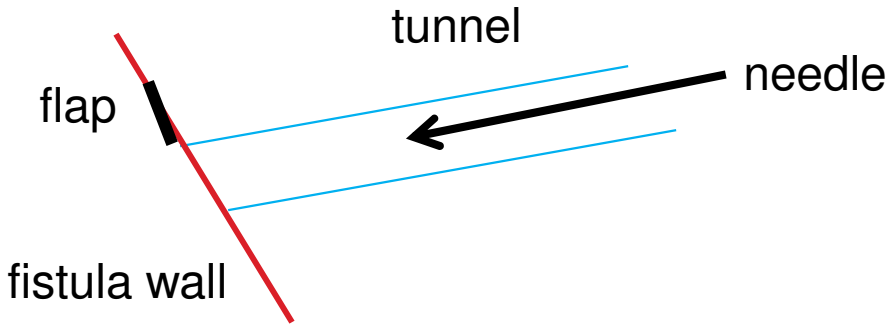


Why You Meet Resistance

- Manipulating the needle



- Tourniquet vs. no tourniquet

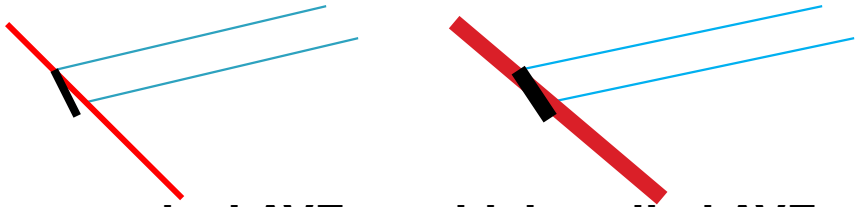


Well-Developed AVF Walls

"Trampoline Effect"

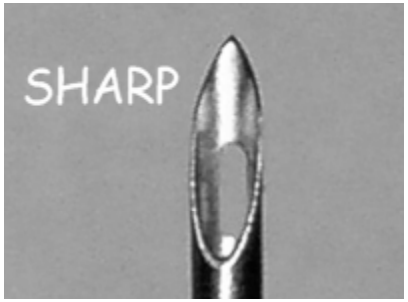
Difficulty getting the blunt needles into the fistula – Why?

1. Thick-walled fistulas
2. Blunt needles were not pointed enough

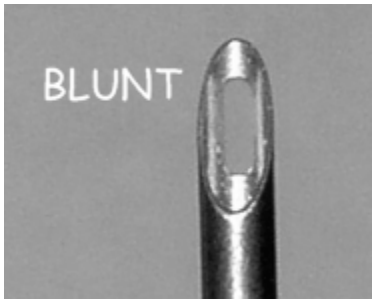


typical AVF vs. thick-walled AVF

Available needles



Nipro BioHole™



Medisystems Buttonhole™

(Dr. Twardowski personal correspondence, 2006; Milburn et al, n.d.)

Best Demonstrated Practice

Touch Cannulation Technique

- Allows the needle to direct the needle down the buttonhole, and not the cannulator
- Hold the tubing with thumb and forefinger just behind the wings

Mott & Prowant (2008). Nephrology Nursing Journal 35(1)

Photo used with permission

Unsuccessful Cannulation

~unstable buttonhole sites due to:

excess upper arm tissue……or excess skin

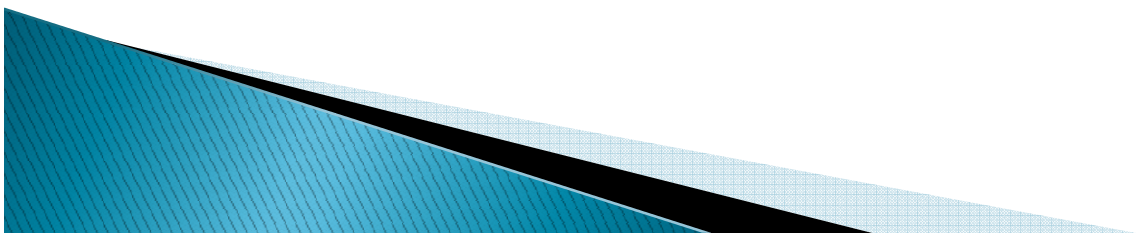
Best Demonstrated Practice

Cushion Cannulation Technique

- Wheelchair cushion placed under the access arm as far up in the axilla area as possible
- Allows for better visualization – raises the arm up for the cannulator
- Stabilizes the arm and tissue
- Easier to maintain same entry of angle when using the buttonhole technique

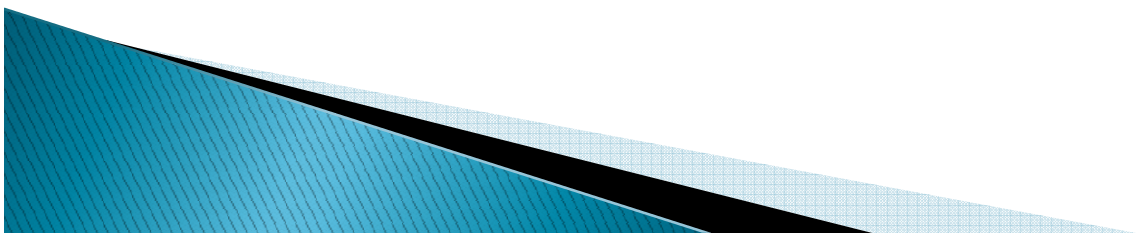
Mott & Prowant (2006). Nephrology Nursing Journal 33(6)

Infections and What to do About Them



Why are infection rates so high?

- Dialysis patients are immunocompromised
- Their first line of defense is compromised
- Dialysis patients have more staph on their skin/nares than the general population
- Lack of proper infection control practices
- Tunnel that can harbor microorganisms
- Increased potential for colonization



Infection: A Big Problem…

Localized

- Improper skin cleansing
- Improper scab removal

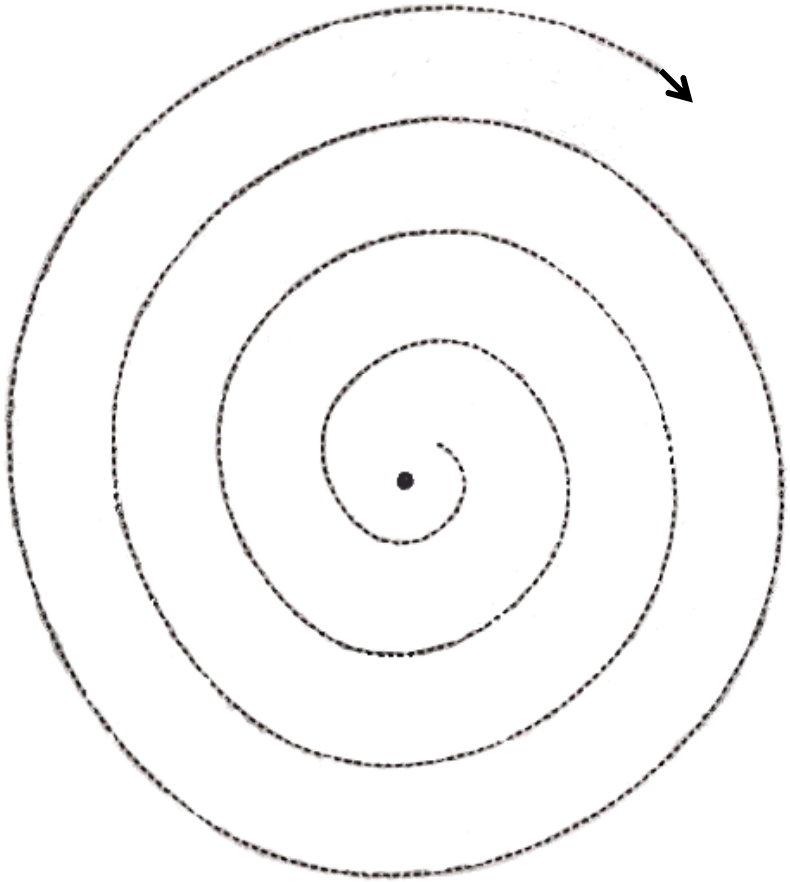
Courtesy of Dr. Tony Samaha

Cannulation – Site Preparation

Cleansing Agent	Contact Time	Cannulation
Betadine®	3-5 minutes	When dry
ExSept®	2 minutes	When dry
ChloraPrep®	30 seconds	When dry
Alcohol	60 seconds each site	Immediately after applying

http://www.nwrenalnetwork.org/fist1st/cleanaccess.pdf

Proper cleansing technique



- Proper needle site preparation reduces infection rates
- Use a circular, outward motion
- Do not paint

Patient's Role - Infection Control

- CDC – Staph leading cause of infection in dialysis
- Reduces the excess staph
- Make it an expectation in your facility - create a policy and procedure

Do's and Don'ts of Scab Removal

- Don't flip the scab off with the needle you will use for cannulation – this contaminates the needle.
- Don't use a sterile needle – you could cut the patient's skin.
- Don't let patients pick off their scabs.
- Don't stick through scabs.

- Do use either:
  - ~aseptic tweezers;
  - ~soak two 2 x 2s with NS or alcohol-based gel;
  - ~place a warm, moist washcloth over sites;
  - ~stretch skin around scab in opposite directions;
  - ~have patient tape alcohol squares over sites prior to dialysis; and
  - ~lifting devices (JMS, Medisystems, needleless system needles).

Types of Infections Reported

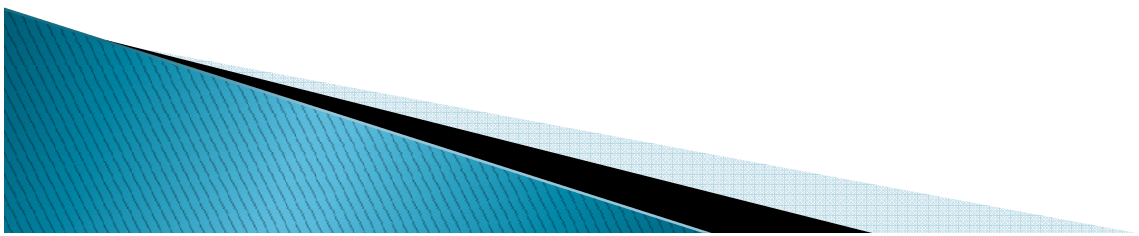
- ***Staph aureus***[1]
  ~septic arthritis
  ~endocarditis
  ~mitral valve replacement
- *MRSA*
- *Clostridium perfringens*[3]
- ***Staph lugdunensis***[2]
  ~coagulase-negative staph
  ~endocarditis
  ~vegetation on pulmonary valve
- ***Staph epidermidis***

1. Marticorena et al., 2006
2. Arduino (CDC) personal correspondence, 2008
3. van Loon et al., 2009

Best Demonstrated Practice

2-Step Skin Cleaning Protocol for the Buttonhole Technique

- The patient should wash their arm immediately before the cannulation procedure.
- Step 1: Cleanse the needle sites prior to scab removal with an antimicrobial agent
- Remove the scabs
- Step 2: Re-prep the needle sites with an antimicrobial agent
- Cannulate



Two-Step Cleaning Protocol for Buttonhole Sites Prior to Cannulation to Prevent Infections

Procedure	Rationale
1. Have the patient wash their access arm before coming to their dialysis chair.	1. Dialysis patients have more staph on their skin than those without kidney failure. *Staph aureus* is the leading cause of infection in dialysis patients[1].
2. Using your facility's antimicrobial agent, cleanse the buttonhole sites, using a circular rubbing motion.	2. Pre-cleaning buttonhole sites will continue to reduce *Staph aureus* and help to prevent infection.
3. Remove the scabs from the buttonhole sites using an appropriate technique.	3. Scabs contain Staph aureus as well as the skin. See attached guide for "Dos & Don'ts of Scab Removal."[2]
4. Using your facility's antimicrobial agent, cleanse the buttonhole sites and leave on according to the manufacturer's recommendation.	4. KDOQI™ 2006 Vascular Access Guidelines[3] states to follow manufacturer's guidelines for correct contact time. See attached guide "Preparing the Vascular Access for Cannulation."[4]
5. Cannulate per facility policy while maintaining sterility of the needles.	5. Contaminated needles and improper needle insertion can lead to tunnel infections and/or sepsis.

http://www.nwrenalnetwork.org/fist1st/2StepCleaning.pdf

Infection: A Bigger Problem…

Tunnel/Systemic

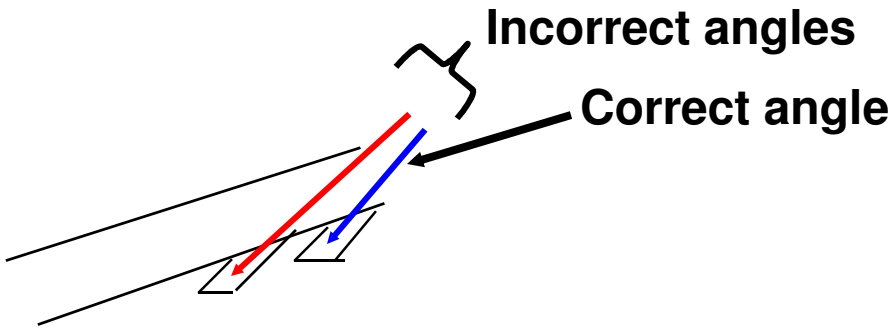
- Contaminated needle
- Improper cannulation of the track

Courtesy of Dr. Tony Samaha

Down the Tunnel

Staff unable to cannulate

~Not following the originator's angle of entry.



~Not holding the skin taut every cannulation

~Creates pockets that can allow bacteria and blood to collect, which can cause a tunnel infection.

Hubbing - What's This?

Photos: Stuart Mott

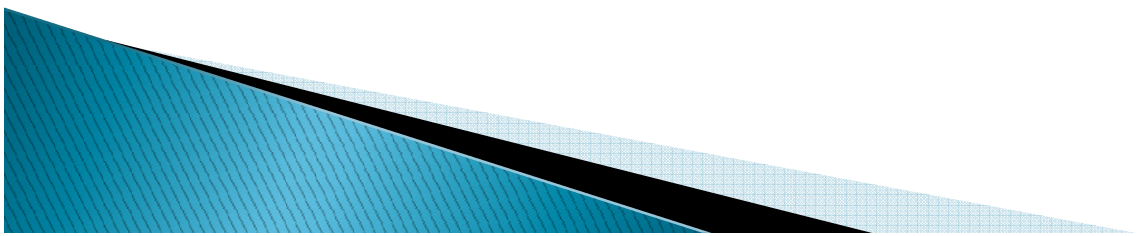
Preventing “Hubbing”

- Leave space between the hub and the skin to prevent the bowl effect called “hubbing”

(Ball & Mott, in press)

Courtesy of Stuart Mott

Other Issues with the Buttonhole Technique



Excessive Bleeding

- Check for stenosis
- Track being cut
- Sharp needles used long-term
- Flipping needles
- Evaluate anticoagulation
- Poor muscle tone

Exercise to Improve Muscle Tone

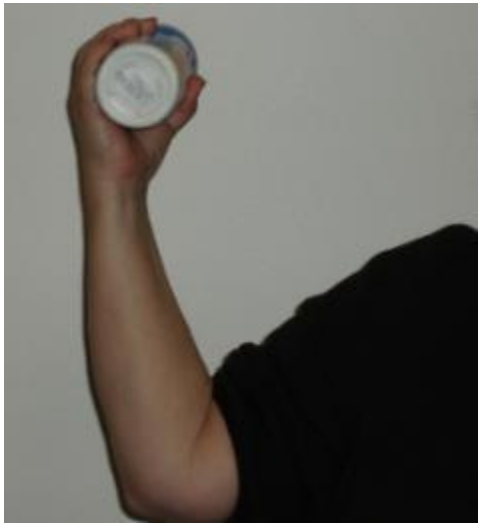
Patients with poor muscle tone

- excessive bleeding
- infiltrations
- difficulty with cannulation

Try exercise

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

forearm AVF exercises



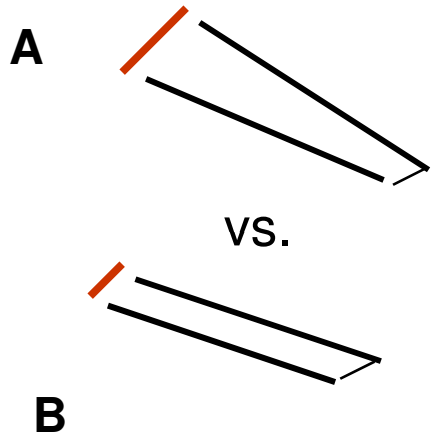
upper arm AVF exercise

The Cone-Shaped Tunnel

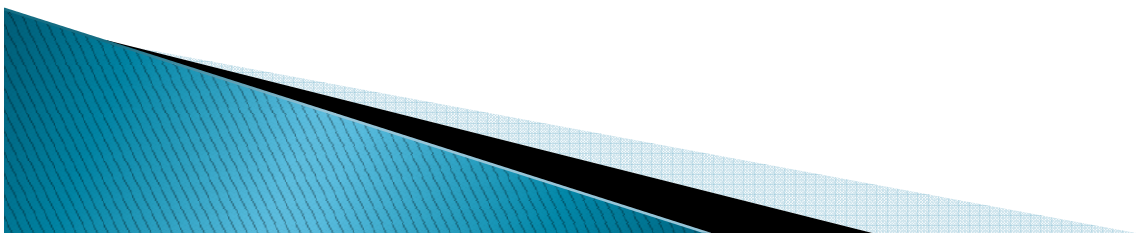
Why a Single Cannulator?

~prevents cone-shaped tunnels that lead to oozing up the tunnel

~prevents the creation of larger-than-normal scabs (brick-colored line A vs.B)

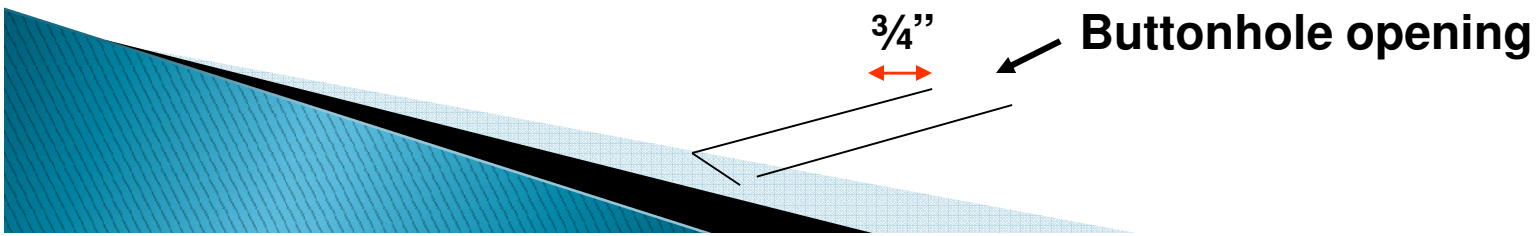


Protecting Established Buttonhole Sites



Hospitalizations, Procedures, or Traveling

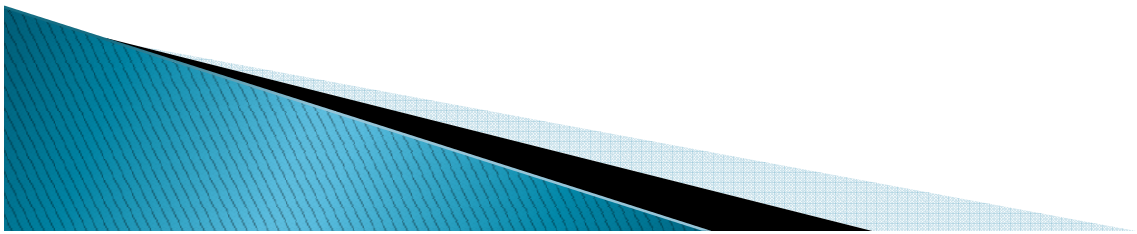
- Tunnels can be ruined if healthcare professionals are unfamiliar with the Buttonhole Technique.
- If your patient is hospitalized, having a procedure, or traveling and the professional does not know how to access a buttonhole, tell them to rotate sites using sharp needles, staying ¾ of an inch away from the front of the buttonhole tunnels.



Buttonhole Technique Issues

Need to know before cannulating:

- Developed buttonholes use blunt needles
- Direction of the buttonholes
- Angle of insertion
- How to remove scabs
- Never flip needles in buttonhole sites



Buttonhole Cards for Patients

NEW!!!

I AM A DIALYSIS PATIENT
WITH AN AV FISTULA.

I USE THE BUTTONHOLE
TECHNIQUE FOR INSERTING
MY NEEDLES.

NAME_____

Dialysis Facility Name _____

Facility Phone Number (____) _____

NEW!!

Buttonhole Cannulation Skills Checklist

arteriovenous FISTULA FIRST
AVF – The first choice for hemodialysis

Employee Name/Title: _____ Date: _____

Unit Name: _____

Evaluator's Name: _____

Rating Definitions:

Expert: Teaches others; **Independent:** Performs without coaching or supervision; **Novice:** Performs with coaching (Action Plan required); **Not Met:** Currently unable to perform even with coaching (Action Plan required)

Criteria/Performance Indicator	Expert	Independent	Novice	Not Met
Establishing a Buttonhole Site with Sharp Needles				

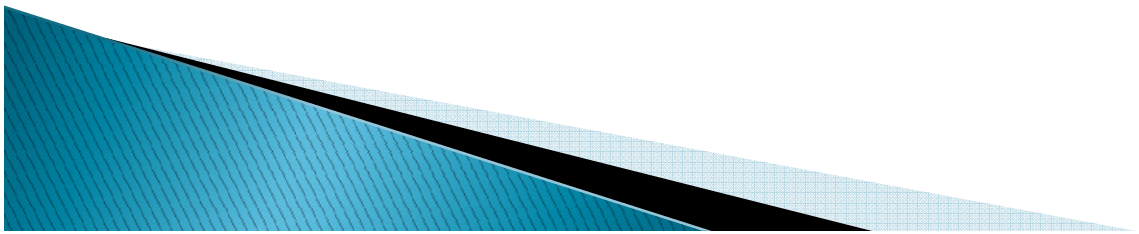
Criteria/Performance Indicator	Expert	Independent	Novice	Not Met
Cannulating a Buttonhole with Blunt Needles				

http://www.fistulafirst.org/pdfs/Buttonhole_Cannulation_Skills_Checklist_3_09.pdf

In Closing…Consistency Rules

All staff need to do the same things:

- ✓ Use tourniquet in the axilla area every time
- ✓ Use a two-point, rather than a three-point technique for pulling skin taut
- ✓ Use the originator's angle of entry
- ✓ Let the needle guide the needle down the track



Questions?

For more information:

Lynda K. Ball, MSN, RN, CNN
Quality Improvement Director
206.923.0714 x 111
lball@nw16.esrd.net
206.923.0716 (fax)

www.nwrenalnetwork.org/QI/QI.htm

For more resources, including the national AVF cannulation video: www.fistulafirst.org; cannulation is Change Concept #8