

The Buttonhole Technique for AV Fistula Cannulation

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Cannulation - Definition

The insertion of a dialysis needle into
the center of the blood vessel where
you achieve low arterial and venous
pressures, maximum blood pump
speeds, no machine alarms, and
never have to flip the needle.

Cannulation is all about feel
Prevents the need to flip needles
Leads to more accurate cannulations

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Why offer the Buttonhole Technique?

- The Buttonhole Technique can:
 - Prolong AV fistula life
 - Decrease hospitalizations related to access infections and complications
 - Promote patient self-cannulation
 - Decrease pain associated with needle cannulation

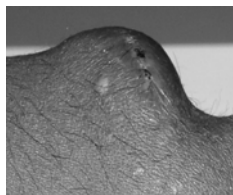
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Not to mention....

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Aneurysms

- Repeated sticks in the same general area
- Weakens vessel wall and pressure of blood flow pushes weakened area out
- Skin becomes thinner – could rupture
- Patients request cannulation there because it hurts less
- NEVER stick an aneurysm



Courtesy of P. Cade

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The Buttonhole Technique Scan

National Results (N=285)

Type of Complication	Percent	Number
Unable to transition to blunt needles	50%	142
Infection	28%	80
Excess bleeding	27%	78
Infiltration	20%	57
Other (pain, etc)	20%	56
Aneurysm formation	6%	16

Fistula First Breakthrough Initiative (FFBI). (2007). [Summary of the FFBI buttonhole technique environmental scan]. Unpublished raw data.

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The Buttonhole Technique

Only 6 new articles on the Buttonhole Technique in the last 20 years...

- Two research articles (Verhallen et al, 2007; Marticorena et al, 2006)
- Four educational articles (Ball, 2005; Ball, 2006; Ball et al., 2007; Doss et al., in press)

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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



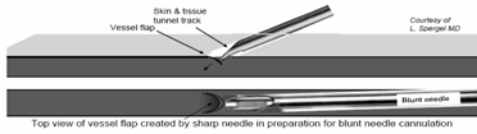
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The Buttonhole Technique

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.



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Site Rotation vs. Buttonhole

Major differences between

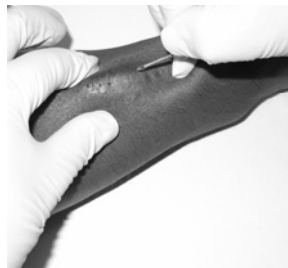
Site Rotation and the

Buttonhole Technique

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Site Rotation (Rope Ladder Technique)

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

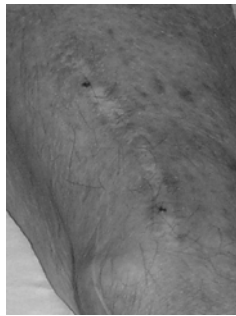


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Buttonhole Technique

- 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



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Buttonhole

Requires the same cannulator for creation

Originator needs to show the angle of insertion to other cannulators

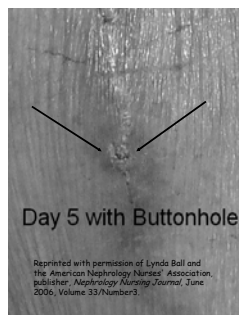
Time to buttonhole completion:

- 8-10 cannulations for people with good wound healing
- 12-14 cannulations for people with poor wound healing

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How to Know the Site is Ready?

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




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What are the issues we need to know about... and what can we do?


Infections Can Be A Big Problem...

- Improper skin cleansing
- Improper scab removal
- Contaminated needle
- Improper cannulation of the track

localized




systemic



Used with permission of Dr. Tony Samaha

Patient's Role in Infection Control



Washing the access arm just before dialysis

- CDC – Staph leading cause of infection in dialysis
- Reduces excess staph
- Make it an expectation in your facility

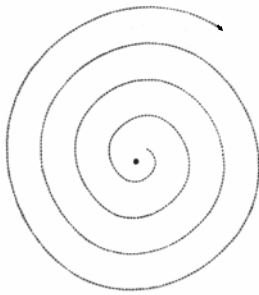
Cannulation – Site Preparation

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

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

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Proper cleansing technique



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



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Scabs...

- Can hide staph lurking around the opening of the track
- Are contaminated with staph
- Cannot be cleaned off with your skin prep

**Scabs
must be
removed**

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Do's and Don'ts of Scab Removal

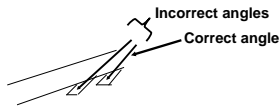
- **Don't** flip the scab off with the needle you will use for cannulation – this contaminates the needle.
- **Do** use either:
 - aseptic tweezers;
 - soak two 2 x 2s with NS or alcohol-based gel;
 - place a warm, moist washcloth over sites;
 - stretch skin around scab in opposite directions;
 - have patient tape alcohol squares over sites prior to dialysis.
- **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.

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Trouble Spot – In the Tunnel

Staff unable to cannulate

- Not following the originator's angle of entry.



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

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Best Demonstrated Practice

2-Step Skin Cleaning Protocol

- The patient should wash their arm prior to the cannulation procedure
- The arm should be cleansed prior to scab removal with facility antimicrobial
- Remove the scabs
- Prep the skin with facility antimicrobial

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

Procedure	Rationale
1. Have the patient wash their access arms 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 scales from the buttonhole sites using an appropriate technique.	3. Scales contain Staph aureus from the skin. See attached guide for "Dox & Dorts of Scalp 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 identity of the needles.	5. Contaminated needles and improper needle insertion can lead to tunnel infections and/or sepsis.

1. Kapowitz, I. G., Comstock, J.A., Landwehr, D. M., Dalton, M.P. and Mayhall, C.G. Prospective study of microbial colonization of the nose and skin and infection of the vascular access site in hemodialysis patients. Journal of Clinical Microbiology 20(7):1287-1292
2. Bell, L.R. (2007). The buttonhole technique for arteriovenous fistula cannulation. Nephrology Nursing Journal 33(3): 296-305.
3. National Kidney Foundation. (2006). KDOQI clinical practice guidelines and clinical practice recommendations for 2006 updates: Hemodialysis adequacy, peritoneal dialysis adequacy and vascular access. American Journal of Kidney Diseases, vol. 48, 3-92. Issue 1.
4. Bell, L.R. (2007) Preparing the vascular access for cannulation. Retrieved from <http://www.hemodialysis.org/education/pdf>

Antimicrobial Ointment Use?

The Debate...

Yes – Use

No – Don't Use

- Could this prevent colonization of the tunnel?
- Could this prevent exit site infections?
- Could this cause resistant organisms?

Troubleshooting - Excessive Bleeding

- Check for stenosis
- Track being cut
- Sharp needles used long-term
- Flipping needles
- Damage to vessel wall flap
- Evaluate anticoagulation

Troubleshooting – Unsuccessful Cannulation

Unsuccessful cannulation?
-unstable buttonhole sites due to:

excess upper arm tissue.....or excess skin



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Troubleshooting – 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 or lower and try to insert.

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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) 35

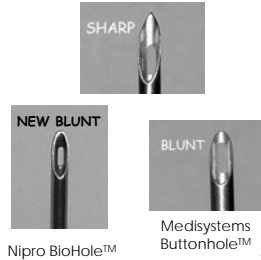
Troubleshooting - Well-developed AVF walls

"Trampoline Effect"

Difficulty getting the blunt needles into the fistula – Why?

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

Available needles



Source: Dr. Twardowski

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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



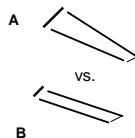
Mott & Prowant (2008). *Nephrology Nursing Journal* 35(1)
Photo used with permission

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Troubleshooting – Oozing & Large Scabs

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)



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Buttonhole Wisdom

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- ### 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
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- ### Use of Tourniquets
- Tourniquets should be used on all AVFs regardless of age
 - Firms the access, helps prevent rolling
 - 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
 - Never leave on during dialysis
 - Access problems require fixing
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Infiltrations

- Think permanent sites
- Use correct angle of entry
- Determine a comfortable position for the access arm

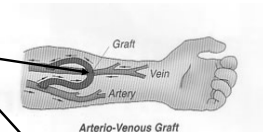


Courtesy of Deborah Brower, RN

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Determining Direction of Flow

- Compress at the curve of a graft or middle of an AVF
- Blood is dammed up when compressed, so flow will only be on one side
- Listen for side with the bruit – that's the arterial side



Arterio-Venous Graft

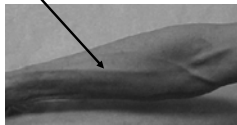
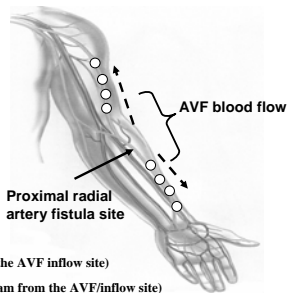


Photo courtesy of Dr. Vo Nguyen

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Reverse Flow - Proximal Radial Artery AVF

- Some fistulae have flow in the opposite direction
- Get drawing post surgery
- Compress fistula in the middle and auscultate



- Arterial puncture sites (closer to the AVF inflow site)
- Venous puncture sites (down stream from the AVF/inflow site)

Graphic courtesy of William Jennings, MD and Lynda Ball, RN 44

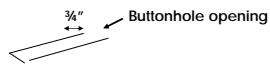
Cannulating New AVFs using Buttonholes

- Start with sharp 17-gauge needles
- Advance sharp needle gauges as you normally would, but using the same sites
- When you reach the ordered needle gauge, continue cannulations with sharp needles until you have determined the sites are ready for blunt needles
- Switch to blunt needles

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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 $\frac{3}{4}$ of an inch away from the front of the buttonhole tunnels.



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Buttonholes do not all look alike...



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Questions?

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www.nwrenalnetwork.org/staff.htm

Also visit:

www.fistulafirst.org

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