

Troubleshooting Complications of the Buttonhole Technique

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The Buttonhole Technique Research and Education

Year	Education	Research
2005	Ball	
2006	Ball	Martcorena et al.
2007	Ball et al.	Verhallen et al.
2008	Doss et al.	
2009		Martcorena et al.; van Loon et al.
2010	Ball & Mott; Ball; Birchenough et al.	
2011	Donato-Moore; Pergolotti et al.	Chow et al.; Martcorena et al.

Objectives

At the conclusion of this presentation, the participant will be able to:

1. Explain how the Buttonhole Cannulation Technique differs from Site Rotation Technique for AV fistula cannulation.
2. Describe how to determine the correct angle of insertion for AV fistula cannulation.
3. Discuss how patient care staff can reduce the incidence of infection of buttonhole sites.

Identification of Candidates

- ▶ Patients with limited access sites
 - A. Short segment
 - B. Large aneurysms
- ▶ Difficult cannulation
 - A. Excess skin
 - B. Excess tissue
 - C. Multiple sticks required
- ▶ Home therapies

What is the 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

Non-Suitable Candidates?

- ▶ Research shows that patients with poor hygiene:
 - ~ are more prone to vascular access infections than those with good hygiene
 - ~ had a significantly higher concentration of *S. aureus* on the skin of the vascular access site after application of antiseptic than patients with good hygiene¹
- ▶ Thin subcutaneous tissue; valvular heart disease; immunosuppression; prosthetic materials²
- ▶ Patients who pick their scabs

1. Kaplowitz et al., July & Dec 1988;
2. Sutherland & Mills 2010

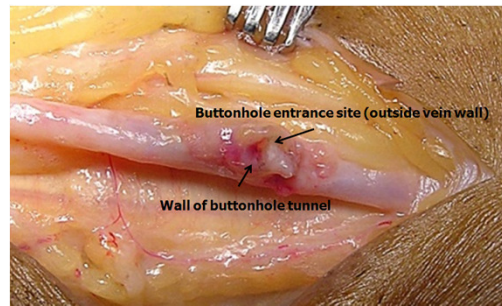
Major Differences in Techniques

- ▶ Change sites each time
- ▶ Sharps always used
- ▶ Scabs are avoided
- ▶ Each cannulator determines site, angle of entry, and direction of arterial needle
- ▶ Uses a 3-point skin stretching technique
- ▶ AV fistulas or grafts
- ▶ Reuse same sites
- ▶ Create with sharps, then change to blunts
- ▶ Scabs are removed
- ▶ Site, angle of entry, and direction of needle pre-determined by the originator
- ▶ Uses a 2-point skin stretching technique
- ▶ AV fistulas only

SITE ROTATION

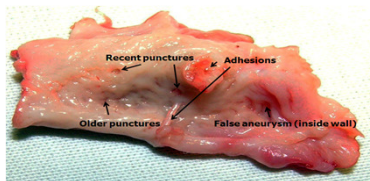
BUTTONHOLE

An Actual Buttonhole Site



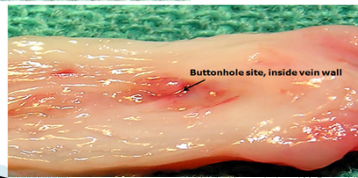
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Fistula Cannulation



Site rotation

Buttonhole



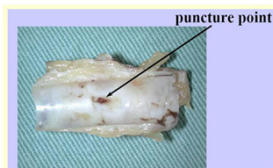
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Important Concepts for Buttonhole Cannulation



Components of the Buttonhole

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



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To Make the Best Buttonholes...

- ▶ 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 slower wound healing
- ▶ Consistency among the staff is key

Angles of Entry

- ▶ It is not 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

KNOW THE ANGLE OF INSERTION BEFORE CANNULATING



Use of Anesthetics

- ▶ Should not be used long-term: 1-2 weeks max.
- ▶ Topical anesthetics should NOT be used on buttonhole sites
 - EMLA: Directions for use (DFU) states “use on intact skin only”
 - Ethyl Chloride: DFU – “do not use on broken skin”

Use of Tourniquets

- ▶ Tourniquets should ALWAYS be used on all AVFs regardless of the age of the access, size, or skill set of cannulator
- ▶ Will not be able to successfully enter the AVF if half the staff uses a tourniquet and the other half does not – entranceway will be in a different position

Use of Anesthetics – Cryotherapy

Newest research out of India:

Cryotherapy or ice massage

- Place ice chips in a glove
- Ten minutes before cannulation time, have patient massage the webbing between the thumb and forefinger of the non-access hand with the ice glove
- This will numb the entire access arm for cannulation

Sabitha P. B., D. C. Khakha, S. Mahajan, S. Gupta, M. Agarwal, and S. L. Yadav. (2008). *Indian J Nephrol.* 18(4): 155-158.

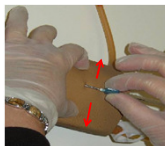
Taut (tight) Skin Anchors the Vein in Place while Decreasing Pain

- ▶ Rope Ladder (site rotation)



← three-point technique

- ▶ Buttonhole (constant site)



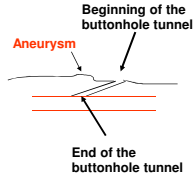
two-point technique →

Use of Sharp Needles

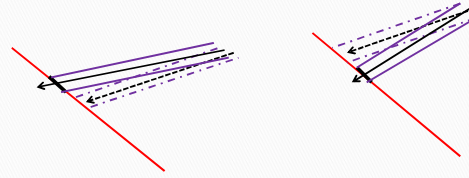
- ✓ Once you transition to blunt needles you NEVER go back to a sharp needle down the tunnel
- ✓ We now know that using sharps long-term is causing scarring to the tunnel, and should therefore be discouraged
- ✓ Use Best Demonstrated Practices

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 Get the Blunt Needle in When Alignment is Off



TIPPING UP

TIPPING DOWN

Alignment Issues and What to do About Them (inability to transition)

Best Demonstrated Practice

Touch Cannulation Technique

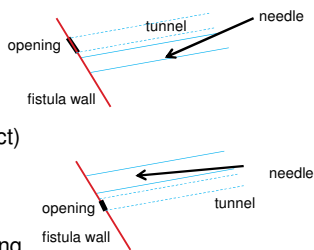
- ▶ Allows the needle to direct the needle down the buttonhole, and not the cannulator
- ▶ Hold the tubing with thumb and forefinger just behind the wings



Used with permission of Stuart Mott

Why You Meet Resistance

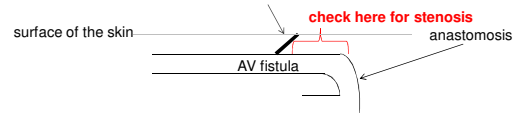
- ▶ Manipulating the needle
- ▶ Patient drinks excessively ("after the weekend" effect)
- ▶ Tourniquet vs. no tourniquet
- ▶ Patient with vomiting and diarrhea



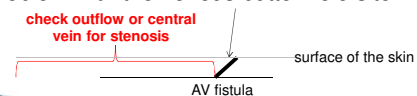
**dashed line – correct tunnel position
solid line – displaced buttonhole tunnel

When You Meet Resistance at Just One Site

Problem with the arterial buttonhole site



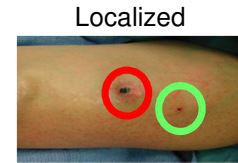
Problem with the venous buttonhole site



Infections and What to do About Them

Infection: A Big Problem...

- Improper skin cleansing
- Improper scab removal
- Cutting the skin with a sharp needle
- Observe scab size



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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
- ▶ Tunnels can harbor microorganisms
- ▶ Increased potential for colonization due to same site entry over and over again
- ▶ Lack of proper infection control practices

Cannulation – Site Preparation

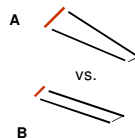
Cleansing Agent ¹	Contact Time	Cannulation
Betadine®	3 minutes	When dry
Chloraprep®	30 seconds	When dry
Alcohol	30 seconds²	When dry

1-CDC recommended skin cleaning preparations
2-WHO, 2008

The Cone-Shaped Tunnel

Careful creation of the buttonholes:

- ~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)
- ~prevents multiple tunnels that can harbor bacteria



Patient's Role - Infection Control

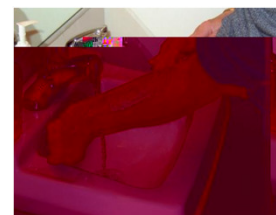


Photo: Lynda Ball

- ▶ CDC—Staph leading cause of infection in dialysis
- ▶ Infection is the second leading cause of death in dialysis
- ▶ Reduces excess staph
- ▶ Make it an expectation in your facility

Do's and Don'ts of Scab Removal

- ▶ **Don't** flip the scab off with the needle you will use for cannulation
- ▶ **Don't** use a sterile needle
- ▶ **Don't** let patients pick off scabs with their fingernails
- ▶ **Don't** stick through scabs
- ▶ **Don't** dig scabs out
- ▶ **Don't** use reusable materials to remove scabs (i.e., facial sponges or bath scrubbies)
- ▶ **Do** use either:
 - ~scab-lifting devices
 - ~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
 - ~aseptic non-reusable tweezers

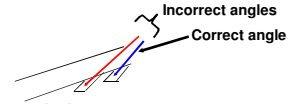
Down the Tunnel

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.

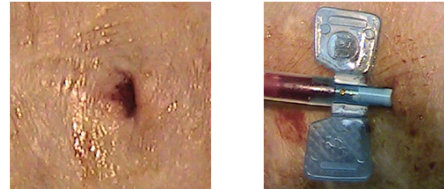


Best Demonstrated Practice

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

Hubbing - What's This?



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- Creates a cave-like entranceway of buttonhole exit site
- Inability to remove scab completely can cause infection
- Could contaminate the needle as you touch skin that could not be cleaned

Infection: A Bigger Problem...

Tunnel/Systemic

- Contaminated needle
- Improper cannulation of the track
- Observe the large scabs



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Preventing "Hubbing"

- ▶ Leave space between the hub and the skin to prevent the bowl effect called "hubbing"
- ▶ Have approximately 1/8 inch of the needle showing



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Ball, L.K., & Mott, S. (2010). How do you prevent indented buttonhole sites? *Nephrology Nursing Journal*, 37(4), 427-428, 431.

Buttonhole and Clots

- ▶ The Buttonhole Technique does not cause accesses to clot
- ▶ Clots form because staff are not using the 2-finger hold technique when removing needles
- ▶ The tunnel then has a complete clot that forms and is very hard to remove
- ▶ The blood pump can pull the clot into the arterial tubing where it lodges in the header of the dialyzer, which could affect adequacy
- ▶ Clots can harbor bacteria, increasing risk for infection

Wearing a Mask



RIGHT



WRONG

Topical Antimicrobial Use?

The Debate...

Yes – Use

- ▶ Prevent colonization of the tunnel?
- ▶ Prevent exit site infections?

No – Don't Use

- ▶ Cause resistant organisms?

The Buttonhole Research...

Nesrallah, Meaghan, Wong, and Pierratos (2010). *Staphylococcus aureus* bacteremia and buttonhole cannulation: Long-term safety and efficacy of mupirocin prophylaxis. *CJASN*, 5: 1047-1053.

Monitor Staff Competencies

Buttonhole Cannulation Skills Checklist



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

Alternative – Wear a Mask

- ▶ Dialysis patients have more staph on their skin and in their nares than the general population.¹
- ▶ If you have staph in your nose, just breathing on the access site may be a source of infection.
- ▶ Should we mask staff and patients when buttonholing?
- ▶ Should we culture everyone?



(Kaplowitz, et al., 1988)

In Summary...

- ✓ Buttonhole Technique is an effective method of needle insertion when done correctly.
- ✓ Good assessment skills, meticulous cleaning, and attention to detail will result in long-term buttonhole sites without complications.
- ✓ It is necessary to review your cannulation practice, and eliminate poor technique.
- ✓ Standardization of cannulation technique is necessary; periodic competency reviews should be required.

Questions?

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Buttonhole Resources:

- ❖ www.fistulafirst.org - National Cannulation Video;
Change Concept #8 – Cannulation Training
- ❖ www.nwrenalnetwork.org/QI/QI.htm
- ❖ www.5diamondpatientsafety.org/