Buttonhole Technique for Cannulating AV Fistulae

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The Buttonhole Technique

Another technique for inserting needles into native AV fistulae

Results of the Environmental Scan ESRD Network 18, May 2007 data

- Facilities received the scan – 262
- Facilities completed – 196
- Facilities utilizing buttonhole cannulation technique – 61
  - no complications – 42
  - complications – 19

History & Introduction

- Europe and Japan have used the Buttonhole Technique for almost 30 years!
- Was originally called the constant site technique.
- No current published data or RCTs, but there is current unpublished data.

What is “Buttonhole” technique?

- Buttonhole technique is a cannulation method where an individual cannulates the AV Fistula in the exact same spot, at the exact same angle and depth of penetration every time.
- A scar tissue tunnel track develops allowing the eventual use of a buttonhole fistula needle (blunt, dull)

Myths of the Buttonhole Technique

- Cannot be used on mature AV fistulae
- Can only be used on limited access fistulae
- Cannot be used if blunt needles are not available
- Will cause aneurysm formation
- Increase stress level in dialysis staff

Buttonhole Bargains!

- Decrease in client and staff anxiety
- Decreases in access cannulation issues requiring hospitalization
- Increased client satisfaction
- Increase in client autonomy
- No increase in infection rates or thrombosis

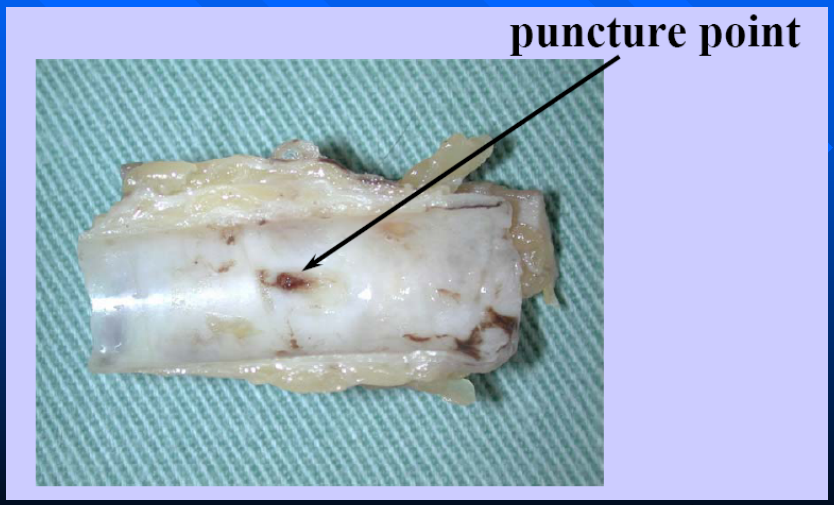
A. Flynn/A. Linton, Bendigo Health Dialysis, Australia

Benefits for the patient

- Less painful – elimination of anesthetic
- Fewer infections
- Fewer missed needle sticks
- Fewer infiltrations/hematomas
- Cannulation of access takes less time

Twardowski, 1995

Buttonhole Blood Vessel Wall



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Doppler Ultrasound Tunnel

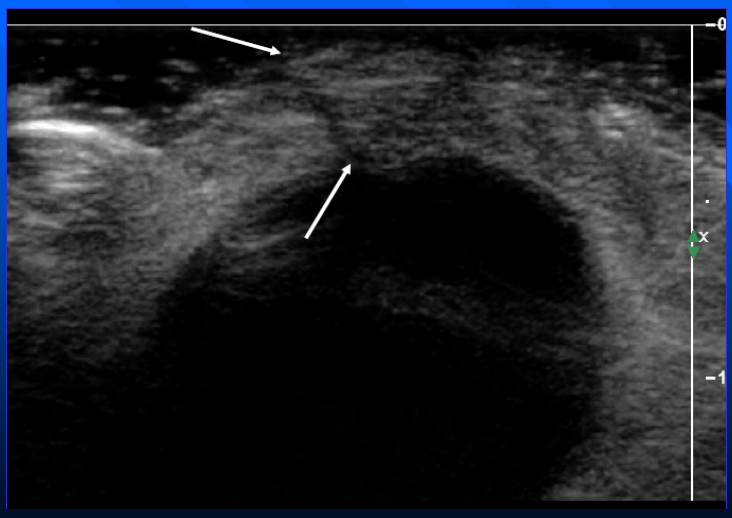


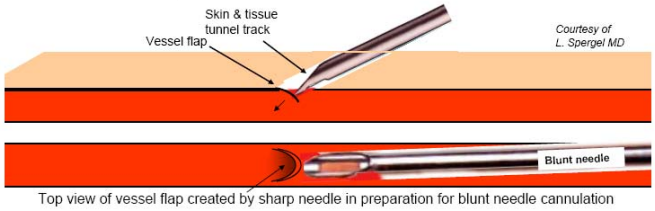
Photo courtesy of Tony Goovaerts

Buttonhole Structure

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

Barriers to success

- Heavily scarred accesses from:
  - multiple problematic needle sticks
  - long-lived AV fistulae
  - lidocaine use
  - keloid formation
- Large amount of subcutaneous tissue or excess skin
- Not dedicating one staff person for cannulation during the track formation

Assessment

- Do a complete physical assessment on the access - inspect, auscultate, and palpate.
- Determine the best two sites on the access – good (low) arterial and venous pressures, good (high) blood pump speeds, and least likely areas for infiltrates (review recordings from two previous cannulations)

Assessment (cont).

- Look for straight, not over-used sections of the fistula
- Consider who will be accomplishing the cannulations
- Always use a tourniquet placed in the axilla area of the upper arm
- Stay away from aneurysm areas!

Differences…

Rotating sites

vs.

Buttonhole

Rope Ladder Technique

- Site rotation with every cannulation
- Cannulators independently determine angle of entry
- Avoid scabs

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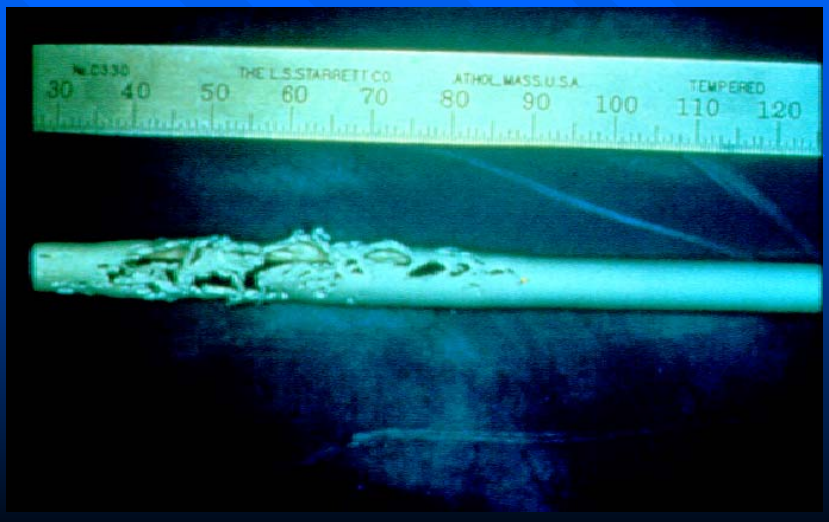
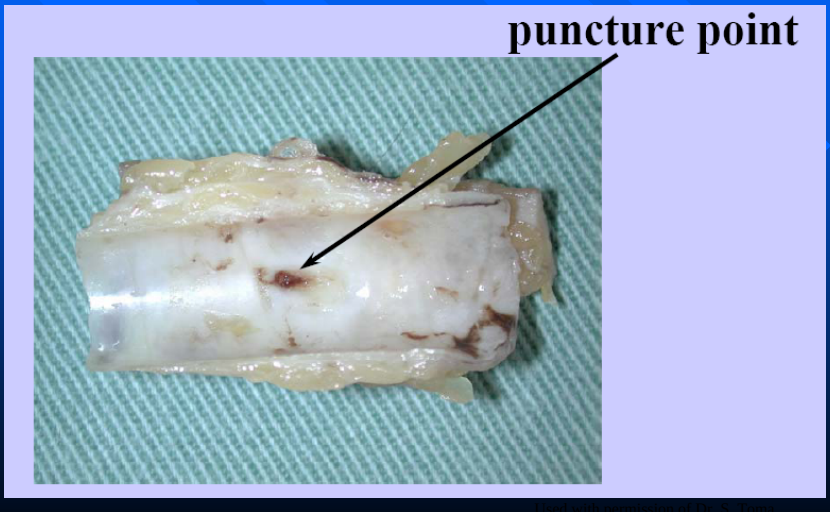
What's Wrong with this Picture?



Buttonhole Technique

- Reuse same sites each treatment with blunt needles
- Scab removal
  ~Most important to prevent infections
- Must follow the track/tunnel of the original cannulator

Buttonhole Blood Vessel Wall



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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.
- 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.

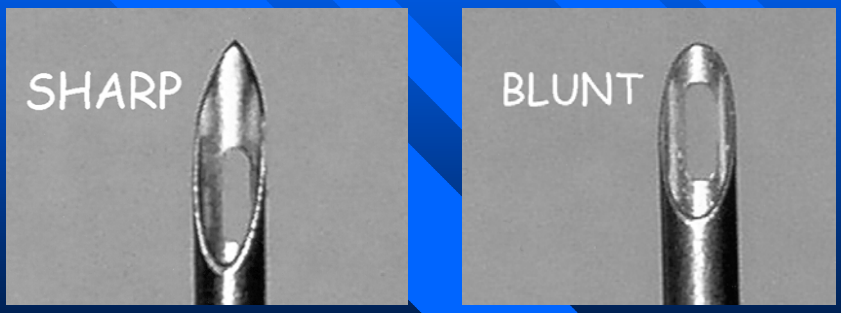
Establishing the track/tunnel*

- For good wound healers: It will take approximately 8-10 cannulations.
- For diabetics or poor wound healers: It will take approximately 12-14 cannulations.
- You need the same staff person doing the cannulation until the track is established, otherwise a conical track develops.

*A track/tunnel is similar to a pierced earring hole

Sources: Northwest Renal Network facilities

Needles – sharp and blunt



Cannulation

- Chose a needle size for the blood pump speed ordered:
  - BFR < 300 ml/min = 17 gauge needle
  - BFR 300 to 350 ml/min = 16 gauge needle
  - BFR 350 to 450 ml/min = 15 gauge needle
  - BFR > 450 ml/min = 14 gauge needle
- Sharp needle and blunt needle gauges need to be the same

Source: National CMS Fistula First Project

Cannulating New AVFs

- 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

Changing to Blunt Needles

- 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.
- You may need to rotate the needle slightly while advancing down the track.

A Developing Buttonhole

- A ridge is starting to develop.
- A hole is starting to develop.
- This site is not yet ready for a blunt needle.

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Buttonhole Complications

- Infiltration
- Excessive bleeding
- Aneurism formation
- Infection
- Inability to transition to blunt needles
- Other?

Troubleshooting the buttonhole

- Bleeding can occur around the needles during dialysis if:
  - You are using sharp needles and have cut the track.
  - The track has stretched because of trying to direct the needle instead of following the track.
  - More than one person made the initial track

Troubleshooting the buttonhole

- If, after the weekend you have trouble with blunt needles, insert the needle to the vessel, then gently lift up or lower and try to insert. The vessel may be swollen with fluid and the flap has moved.
- "Trampoline Effect" - Some people have very thick blood vessel walls which will require careful use of sharp needles all the time.
- If a site is not progressing or there is a lot of pain, it is ok to abandon that site and find another site.

Troubleshooting the buttonhole

- If your patient is hospitalized or traveling, and the nurses do not know how to access a buttonhole, tell them to rotate sites staying ¾-inch away from the front of the buttonhole tracks.
- If you have blood flow or pressure problems:
  ~have you changed needle direction during cannulation?
  ~have you taped the needle too tightly?

Infected Buttonholes

- Improper skin cleansing
- Improper scab removal

localized infection

systemic infection

- Contaminated needles
- Improper cannulation of the track

Used with permission of Dr. Tony Samaha

"Cushion Cannulation" Technique

- Place access over a foam cushion in the cannulator's lap
- Slide cushion up the arm to axilla
- Stabilizes the arm and tissue, especially upper arm
- Allows for better sight for better angle of insertion and consistent cannulations
- Excellent for either type of cannulation technique

Developed by Stuart Mott

Buttonholes do not all look alike…

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

Champion Facility Tips on Tweezers:

- Use a laboratory germicide “Control 111 Laboratory Germicide” to disinfect tweezers – it is “ready to use” disinfectant
- Maintain 2 containers for – “Clean” and “Dirty”, alternate 2 batches of tweezers to allow them to soak for 24 hours

Buttonhole Resources

- www.fistulafirst.org
- Change Concept #8 – Cannulation Training for AV Fistulas
- Cannulation videos are coming up soon!
- http://www.therenalnetwork.org/QualityImprovement/ConstantSite.html (Dr. Twardowski Article)

For more buttonhole information:

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http://www.nwrenalnetwork.org/fist1st/ffcannu.htm