Objectives

- To review the technique of buttonhole creation
- To report the 10 year experience of St. Michael’s Hospital
- To define the role of buttonhole cannulation in HD access

What is BH Cannulation?

- Is cannulating the fistula in the exact same spot, at the exact same angle and depth every time the needles are inserted1.
  - AKA “Constant Site Technique”
- Worldwide technique to cannulate native AV fistulas for over 25 years.
- Development of a scar tissue tunnel track → eventual use of a BH fistula needle (blunt, dull)

Creation of the Buttonhole

4 Methods

1. Traditional sharp needles
   (single cannulator / modified multiple cannulators)
2. BioHole method
3. Angiocath method
4. VWING method

2. Creation of tunnel tracks with the BioHole (Peg)
- Needle removal hemostasis
- Exchanged every HD
- Total 14 days

3. Clampcath: Insertion technique
- Aseptic technique
- Hold with good grip
- Withdraw steel guide once catheter has been advanced in the fistula

3. Clampcath: securing procedure
- Secured
- Dressed
- Locked c citrate 4%
- Protector bandage
- Dressing changed q/ Hd
- Indwelling for 10-14 days

4. VWING
- Use ultrasound to map the AVF and determine implant location
- Determine VWING size
- Create incision and expose ~ 3cm of the fistula.
- Align and attach the VWING
- The VWING should be just below the skin surface to ensure maximum palpability

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Importance of Successful Cannulation
- Each puncture
- Vessel injury

3x/week treatments
312 punctures/annum
Buttonhole cannulation was first introduced in the 1970s in the 80's – Home-based Cannulation in Canada.

In-Center Cannulation: Multiple Cannulators
- Original indications – Rescue or limited cannulation
- BH Cannulation gains traction -> more widespread usage
- Concern Over Infection Risks

Canadian Experience: Infection Rates
Surveyed 13 centres across Ontario:
- All initiated BH Cannulation prior to 2011
  - Currently 3 are still ongoing
  - Of 10 remaining, 8 cited "infections" as reason for ceasing usage of technique.
Overall infection rates (per 1000 AVF-days):

<table>
<thead>
<tr>
<th>Method</th>
<th>Overall In-Center</th>
<th>Overall BH</th>
<th>On Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Cannulation</td>
<td>0.035</td>
<td>0.037</td>
<td>0.034</td>
</tr>
<tr>
<td>Failed Infection</td>
<td>0.018</td>
<td>0.013</td>
<td>0.015</td>
</tr>
</tbody>
</table>

BioHole Resulted in Significantly Lower Pain Compared to Modified BH

BioHole

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General guidelines to select patients

**Inclusion**
- Limited cannulation sites
- Difficult cannulation
- Daily dialysis
- Self cannulators/home hd
- Aneurysm development
- Patient preference and MD prescribes

**Exclusion**
- Valvular disease (mechanical valves, rheumatic heart disease, hx endocarditis
- Other implants (pacemaker)
- Poor hygiene
- Immune suppression (failed Tx), Lupus

Inconsistent Evidence on BH Cannulation

Four RCTs to date showed BH vs. rope-ladder (RL) resulted in:
- Vaux et al., 2013:
  - Increased AVF survival
  - Decreased need for access interventions
  - Reduced existing aneurysm enlargement
  - No increased infection rates or prolonged bleeding times.
- MacRae et al., 2012:
  - No difference in pain
  - Fewer hematomas
  - Increased risk of bacteremia
  - Increased localized signs of infection.

Inconsistent Evidence on BH Cannulation

Chow et al., 2011:
- More infections
- More haematoma formation
- More site pain during dialysis.

Struthers et al., 2010 –
- No difference in bleeding times
- BH needling is preferred by both patients and staff
- Reduces discomfort during needling
- Reduces AVF enlargement.
- Low level of complication.

Summary

- Develop empirical research base for BH Cannulation:
  - Inconsistent results from Clinical Trials and Observational Studies.
  - Inform future usage of BH Cannulation with better science
  - BH can be highly valuable in certain patients and under certain circumstances:
    - Prolong AV fistula life
    - Decrease hospitalizations related to access infections and complications
    - Promote patient self-cannulation (transitioning patient to home HD)
    - Decrease pain associated with needle cannulation

Acknowledgments

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