Cannulation for the Skilled Cannulator

Vascular Access Educator Group of BC
Acknowledgement

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Vascular Access Nursing Education Program
Janet Graham, RN, MScN, CNeph(C)
VA Coordinator, Ottawa Hospital

Development of these slides were sponsored by AMGEN
# Match Cannulators and Accesses

<table>
<thead>
<tr>
<th>Skill Level of Cannulator</th>
<th>Access Rating Approved to Cannulate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>• Easy accesses:</td>
</tr>
<tr>
<td></td>
<td>– Established accesses with no complications</td>
</tr>
<tr>
<td></td>
<td>– AVFs in which buttonhole tracks are well-established*</td>
</tr>
<tr>
<td>Skilled</td>
<td>• Moderately complicated accesses:</td>
</tr>
<tr>
<td></td>
<td>• New accesses with no complications</td>
</tr>
<tr>
<td></td>
<td>• Established accesses with one complication</td>
</tr>
<tr>
<td></td>
<td>• AVFs in which buttonhole tracks are well-established*</td>
</tr>
<tr>
<td>Advanced</td>
<td>• Complicated accesses:</td>
</tr>
<tr>
<td></td>
<td>– All accesses (new &amp; established; with or without complications)</td>
</tr>
<tr>
<td></td>
<td>– Established and new AVFs in which buttonhole tracks are already established or are being established*</td>
</tr>
</tbody>
</table>

*Refer to PPT on BH cannulation at www.bcrenalagency.ca
Skilled Cannulators May...

- Cannulate **new** accesses with no complications
  - AVFs: 1\(^{st}\) six weeks of cannulation
  - AVGs: 1\(^{st}\) two weeks of cannulation
- Cannulate **moderately complicated** accesses
  - Accesses with one cannulation complication (e.g. difficult to palpate, deep, signs of edema, bruising or local infection)
- Cannulate buttonhole accesses with well-established tracks
- Utilize portable ultrasound to assist cannulation
Cannulating New Accesses

Come back here, Arnold!
Stacey isn’t needling today...

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To order a copy or more information please visit www.lightersideofdialysis.com or call 1-866-239-3279.
When to Cannulate New Accesses

- **AVFs:**
  - After adequate time (minimum 4 wks – often longer)
  - Signs show maturation has occurred
  - Assessed by MD or VA RN as “ready to needle”
  - Attempted by skilled or advanced cannulator only

- **AVGs:**
  - No swelling in the access limb (minimum 2 wks)
  - Assessed by MD or VA RN as “ready to needle”
  - Attempted by skilled or advanced cannulator only

- **Rationale:**
  - Cannulation is a *learned* skill that improves with practice
  - Cannulation done too early or on a problem access site may damage or result in loss of the access
Procedure for Cannulating New Accesses

• Same steps as for established accesses but possibly “trickier”
  – Physical assessment: LOOK! LISTEN! FEEL!
  – Cannulation:
    • Plan the site
    • Prepare the site
    • Insert the needles
    • Remove the needles
Procedure for Cannulating New Accesses

• If patient is on heparin, contact MD to reassess heparin orders and heparin stop times (if protocols available, consult them). Reassess regularly during initial cannulations
• Use smallest available needle(s) for first several treatments; increase needle size gradually
• Start with slow pump speed for first several treatments; increase to target pump speed gradually
• If infiltrates, rest for 1 week; if infiltrates a 2nd time, rest for 2 weeks; if it infiltrates a 3rd time, refer to MD
Cannulation: New AVF, with CVC

<table>
<thead>
<tr>
<th>Week</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>Arterial (CVC for venous)</td>
<td>Arterial (CVC for venous)</td>
<td>Arterial (CVC for venous)</td>
<td>Venous (CVC for arterial)</td>
<td>Venous (CVC for arterial)</td>
<td>Venous (CVC for arterial)</td>
<td>Arterial &amp; venous</td>
<td>Arterial &amp; venous</td>
<td>Arterial &amp; venous</td>
</tr>
<tr>
<td>Needle location</td>
<td>Arterial (CVC for venous)</td>
<td>Arterial (CVC for venous)</td>
<td>Arterial (CVC for venous)</td>
<td>Venous (CVC for arterial)</td>
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<td>Arterial &amp; venous</td>
<td>Arterial &amp; venous</td>
<td>Arterial &amp; venous</td>
</tr>
<tr>
<td>Needles</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Needle gauge</td>
<td>17g</td>
<td>17g</td>
<td>17g</td>
<td>17g</td>
<td>17g</td>
<td>17g</td>
<td>17g</td>
<td>17g</td>
<td>17g</td>
</tr>
<tr>
<td>Max blood pump speed</td>
<td>200</td>
<td>200</td>
<td>250</td>
<td>200</td>
<td>200</td>
<td>250</td>
<td>200 - 250</td>
<td>200 - 250</td>
<td>200 - 250</td>
</tr>
</tbody>
</table>

See notes below.

<table>
<thead>
<tr>
<th>Weeks</th>
<th>4 - 6</th>
<th>7 - 9</th>
<th>10+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatments</td>
<td>10 - 18</td>
<td>19 - 27</td>
<td>28+</td>
</tr>
<tr>
<td>Needle location</td>
<td>Arterial &amp; venous</td>
<td>Arterial &amp; venous</td>
<td>Arterial &amp; venous</td>
</tr>
<tr>
<td>Needles</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Needle gauge</td>
<td>17g – 16g</td>
<td>16g – 15g</td>
<td>15g</td>
</tr>
<tr>
<td>Max blood pump speed</td>
<td>Recommended pump speed for gauge of needle</td>
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See notes below.
# Cannulation: AVF, no CVC

**One Needle Option**

<table>
<thead>
<tr>
<th>Week</th>
<th>Treatment</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needles</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Needle gauge</td>
<td>17g</td>
<td>17g</td>
<td>17g</td>
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<td>17g</td>
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<td>17g</td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>200</td>
<td>200</td>
<td>250</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

See notes under cannulation sequence for AVFs with functioning CVC in place.

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<tr>
<td>Needles</td>
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<td>Max blood pump speed</td>
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<td>Recommended pump speed for gauge of needle</td>
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</table>

See notes under cannulation sequence for AVFs with functioning CVC in place.
# Cannulation: AVF, no CVC

## Two Needle Option

<table>
<thead>
<tr>
<th>Weeks</th>
<th>4 - 6</th>
<th>7 - 9</th>
<th>10+</th>
</tr>
</thead>
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<tr>
<td>Treatments</td>
<td>10 - 18</td>
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<tr>
<td>Needle location</td>
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</tr>
<tr>
<td>Needles</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Needle gauge</td>
<td>17g – 16g</td>
<td>16g – 15g</td>
<td>15g</td>
</tr>
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<td>Recommended pump speed for gauge of needle</td>
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</table>

See notes under cannulation sequence for AVFs with functioning CVC in place.

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Cannulation for the Skilled Cannulator  
(Updated June 16, 2013)
AVG, with or without CVC

• Use two 16 gauge needles (one as the arterial source and one as the venous source) and a blood pump speed of 300 mL/min.
Desired Blood Pump Speed and Needle Gauge

Once cannulation has been established, correlate needle gauge, blood pump speed, and clinical condition (Kt/V or PRU)

<table>
<thead>
<tr>
<th>Desired Blood Pump Speed</th>
<th>AVF</th>
<th>AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;300 mL/min</td>
<td>17 g</td>
<td>16 g</td>
</tr>
<tr>
<td>300 – 350 mL/min</td>
<td>16 g</td>
<td>16 g</td>
</tr>
<tr>
<td>350 – 450 mL/min</td>
<td>15 g</td>
<td>15 g</td>
</tr>
<tr>
<td>&gt;450 mL/min</td>
<td>14 g</td>
<td>15 g</td>
</tr>
</tbody>
</table>
Cannulation for the Skilled Cannulator

Cannulating Complicated Accesses

Er, no. You haven’t got it quite right...

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Procedure for Cannulating Complicated Accesses

• Procedure is the same as for easy accesses but cannulation can be “trickier”
• Consult MD or VA coordinator if:
  – Difficult to cannulate
  – Unable to achieve a BPS of >300 mL/min by week 3 or <350 mL/min in established HD in 2 consecutive runs
  – Low arterial or high venous pressure on 3 consecutive runs
  – Unexplained, prolonged bleeding (>10 – 15 min) from cannulation site on 3 consecutive runs
  – Signs of access complications

Cannulation for the Skilled Cannulator
(Updated June 16, 2013)
Tips for Success with Complicated Accesses

- Wrap patient limb in warm blanket prior to cannulating (to achieve vasodilation)
- For fistulas, if access is hard to feel, apply a tourniquet (for vasodilation)
- If access is hard to feel, use a stethoscope or doppler to listen for bruit & to ensure you are above the vessel. Needle where the sound is loudest
- Use a wet needle. Attach syringe with 5cc NS to the needle and flush saline through to the end of the needle prior to inserting (to prevent clotting)
- If cannulation problems occur, go back to small needle size. Increase needle size slowly
## Access Complications

<table>
<thead>
<tr>
<th></th>
<th>AVFs</th>
<th>AVGs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Early Failure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inadequate vein or artery used for creation</td>
<td>Stenosis: arterial or venous</td>
<td>Steal syndrome</td>
</tr>
<tr>
<td>Juxta-anastomotic venous (JAV) stenosis</td>
<td>Thrombosis</td>
<td>Ischemic monomelic neuropathy</td>
</tr>
<tr>
<td>Accessory veins</td>
<td>Aneurysm</td>
<td>Graft stenosis (venous)</td>
</tr>
<tr>
<td>Inflow stenosis within arterial system</td>
<td>Infection</td>
<td>Pseudoaneurysm</td>
</tr>
<tr>
<td><strong>Late Failure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ischemic steal syndrome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thrombosis</td>
</tr>
</tbody>
</table>
Early Fistulae Failure

• Inadequate vein or artery used for creation
• Juxta-anastomotic venous (JAV) stenosis*
• Accessory veins*
• Inflow stenosis within arterial system
# Early Fistulae Failure

## Juxta-anastomotic Venous (JAV) Stenosis

<table>
<thead>
<tr>
<th>Normal</th>
<th>JAV Stenosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrill continuous &amp; felt at the anastomosis</td>
<td>Thrill only felt in systole</td>
</tr>
<tr>
<td>Pulse easily compressible</td>
<td>Strong pulse felt at anastomosis only; disappears quickly at site of stenosis</td>
</tr>
<tr>
<td></td>
<td>Often felt as severe dip in vein or shelf in vein</td>
</tr>
<tr>
<td></td>
<td>Above area of stenosis, pulse is weak and vein may be small or difficult to palpate¹</td>
</tr>
</tbody>
</table>

¹Ball LK. *Nephrol Nurs J* 2005;32:611-17.
Stenosis at Arterial Anastomosis of Brachiocephalic AV Fistula

© Janet Graham
Early AV Fistulae Failure: Accessory Veins

• Visually examine fistula
• If veins not visible, fistula can be occluded distal to arterial anastomosis
• If thrill over anastomosis does not disappear, accessory veins may exist below area being occluded
• Continue procedure up vein to evaluate if accessory veins exist further on
Later Fistula Failure

• Stenosis: arterial or venous*
• Thrombosis*
• Aneurysm*
• Infection*
• Ischemic steal syndrome*
Later Fistula Failure: Venous Stenosis or Occlusion

• Most common location is at arterial anastomosis
• Cause-Theory:
  – Manipulation and mobilization of vein at time of surgery
  – Trauma and stretching of vein during surgery
• Presents as:
  – Arterial insufficiency-arterial pressure > limiting flow
  – “Spasm”
  – Small underdeveloped fistula
Later Fistula Failure: Venous Stenosis or Occlusion

- Stenosis may occur anywhere along vein
- Causes:
  - Repeated needling causing scar tissue
  - Site of previous intravenous or phlebotomy causing scarring of vein
  - Site of previous hematoma
  - Central stenosis from current or past central catheter, PICC catheter insertion or pace maker (can present as swelling of arm or breast)
  - Deep vein thrombosis unrelated to central catheter insertion
  - Increased turbulence from arterialization of a vein (theory)
## Later Fistula Failure: Venous Stenosis or Occlusion

<table>
<thead>
<tr>
<th>Normal Mature Fistula</th>
<th>Venous Stenosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Soft pulse</td>
<td>• Firm and pulsatile proximal to stenosis</td>
</tr>
<tr>
<td>• Easily compressed</td>
<td>• Portion of vein peripheral to stenosis stays distended and central portion of vein collapses</td>
</tr>
<tr>
<td>• Collapses partially or completely when arm or leg elevated</td>
<td>• Aneurysmal dilatations often appear below stenotic site</td>
</tr>
</tbody>
</table>

Later Fistula Failure: Venous Stenosis or Occlusion

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Normal</th>
<th>Stenosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrill</td>
<td>-Only at arterial anastomosis</td>
<td>-At site of stenotic lesion</td>
</tr>
<tr>
<td>Pulse</td>
<td>-Soft, easily compressible</td>
<td>-Water hammer</td>
</tr>
<tr>
<td>Bruit</td>
<td>-Low pitched, Continuous, Diastolic and systolic</td>
<td>-High pitched, Discontinuous, Systolic only</td>
</tr>
</tbody>
</table>
Diagnosis of Stenosis or Occlusion in Fistula

Fistulogram

- Puncture fistula with small gauge needle
- Inject contrast
- Visualize fistula from arterial anastomosis to central veins
- Reflux of contrast into artery during injection necessary to examine arterial anastomosis and arterial limb
Stenosis in the Cephalic Vein of a Radiocephalic AV Fistula

© Janet Graham
Stenosis in Basilic Vein Between Aneurysmal Dilations

© Janet Graham
Multiple Areas of Stenosis in Radiocephalic Fistula

© Janet Graham
Management of Stenosis in AV Fistulae

- Venous stenoses do not respond as well to angioplasty as arterial stenoses
- Guidelines recommend treatment of stenosis ≥50% reduction of normal vessel diameter accompanied by hemodynamic, functional or clinical abnormality
Management of Stenosis in AV Fistulae with Angioplasty

- Short vascular sheath inserted
- Guidewire advanced into fistula
- Normal vein proximal to stenosis or distal to post-stenotic dilatation measured
- Angioplasty balloons inflated for ~ 20 – 30 seconds
- Balloon removed and another angiogram performed
- If residual stenosis > 30%, angioplasty repeated with larger balloon
Pre- and Post-angioplasty of Severe Stenosis above Arterial Anastomosis in Radiocephalic Fistula

Areas of arterial anastomosis © Janet Graham

Cannulation for the Skilled Cannulator
(Updated June 16, 2013)
Later Fistulae Failure: Thrombosis

• In most patients, thrombosis is the final complication after a period of AV fistula dysfunction

• Treatment should start as early as possible
  – Delay may increase risk of progressive growth of thrombus and future thrombotic events
  – Early intervention increases chance that same AV fistula can be used for future dialysis
Treatment of Thrombosed AV Fistulae

Three options available:

• Surgical thrombectomy +/- revision
• Mechanical thrombectomy +/- angioplasty
• Pharmacomechanical thrombectomy with angioplasty
Should a Thrombosed AV Fistula be Salvaged?

• What caused the thrombosis?
• Does the fistula have a history of previous angioplasties?
• Is there history of central vein stenosis?
• If present, what size are the aneurysmal dilatations?
• What portion of the vein remains patent?
Challenges of Thrombectomy

- Fistulae are thin-walled
- Can be difficult to locate anastomosis and remove clot due to irregular anatomy
- Stenosis can be in artery or anywhere along vein, including central veins
- Stenosis is usually very severe
  - fistulae can remain patent under low flows
- Collateral veins can cause confusion when identifying main vein
- Large volume of clot may be present in aneurysmal dilatations
Later Fistulae Failure: Aneurysm Formation

- Localized dilation of vein
- Over time, flow in fistula increases and vein enlarges
- Can develop upstream from venous stenosis
Later Fistulae Failure: Pseudoaneurysm Formation
Later Fistulae Failure: Aneurysm Formation

- Requires close monitoring for:
  - Thinning of skin over fistula, often white and shiny
  - Ulceration or non-healing needle sites
  - Evidence of bleeding or difficulty with prolonged bleeding from a particular needle site
- Often the only treatment is surgery

Later Fistulae Failure: Infection

- Relatively rare
- May occur post-operatively over incision lines
- In mature fistulae, may present as:
  - perivascular cellulitis with localized erythema
  - swelling or tenderness, or as infected aneurysms
  - abscesses from infected needle sites

Later AV Fistulae Failure: Ischemic Steal Syndrome

- Assess both hands and all digits for
  - skin temperature
  - gross sensation
  - signs of skin breakdown, tissue necrosis or infection
  - range of motion
  - presence and quality of radial and ulnar pulses
  - numbness/tingling

Later AV Fistulae Failure: Ischemic Steal Syndrome
Graft Complications

• Infection*
• Steal syndrome*
• Ischemic monomelic neuropathy*
• Graft stenosis (venous)*
• Pseudoaneurysm*
• Thrombosis*

* = To be discussed in next section
## Infection: Assessment

<table>
<thead>
<tr>
<th>Superficial</th>
<th>Deep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pustules (previous cannulation sites)</td>
<td>Erythema</td>
</tr>
<tr>
<td>Cellulitis</td>
<td>Swelling</td>
</tr>
<tr>
<td>Inflammation</td>
<td>+/- Pain</td>
</tr>
<tr>
<td>+/- Pain</td>
<td>Warmth</td>
</tr>
<tr>
<td>Warmth, fever</td>
<td>Elevated WBC count</td>
</tr>
</tbody>
</table>


Cannulation for the Skilled Cannulator (Updated June 16, 2013)
Infection: Assessment & Treatment

Assessment
• Infections may feel warm, but skin over functioning graft always warmer than normal
• Post-operatively: erythema, swelling and/or evidence of a hematoma may be confused with infection due to invasive tunnelling

Treatment
• Antibiotics and may require surgical removal
Steal Syndrome: Assessment

- Mild to severe numbness
- Tingling of hand
- Increased coolness of hand and digits
- Pale appearance of hand and digits
- Cyanosis
- Mild to severe pain of hands and digits

Ischemic Monomelic Neuropathy: Assessment

- Profound weakness of hand
- Severe pain and numbness
- Unable to feel palpation to hand, fingers
- No appearance of ischemia to hand
- Hand warm
- Radial and ulnar pulses same as in other hand

This clinical presentation requires immediate surgical intervention

## Graft Stenosis or Occlusion: Assessment

<table>
<thead>
<tr>
<th>Normal</th>
<th>Stenosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Easily compressible pulse</td>
<td>• As stenosis increases, pulse in graft stronger and pitch of bruit increases</td>
</tr>
<tr>
<td>• Continuous thrill palpable at arterial anastomosis</td>
<td>• Second thrill heard downstream from arterial anastomosis</td>
</tr>
<tr>
<td>• Low-pitched bruit continuous throughout systole and diastole and decreases as move up arm</td>
<td>• Thrill can be palpated at site of stenosis</td>
</tr>
<tr>
<td></td>
<td>• High-pitched bruit heard only in systole: severe stenosis</td>
</tr>
<tr>
<td></td>
<td>• Swelling of upper or lower arm and/or hand or breast: central stenosis</td>
</tr>
<tr>
<td></td>
<td>• Collateral veins in chest wall: central stenosis</td>
</tr>
</tbody>
</table>
Graft Stenosis or Occlusion: Assessment

• Most common location is at venous anastomosis
• Cause-Theory:
  – Neointimal hyperplasia – smooth muscle proliferation and accumulation of extracellular matrix at site of venous anastomosis
• Presents as:
  – Increased venous pressure that can be flow limiting

Graft Stenosis or Occlusion: Assessment

• May occur throughout graft or draining veins
• Causes:
  – Repeated needling causing damage to AV graft
  – Central stenosis from current or previous central catheter, PICC catheter or pace maker, which can present as swollen arm or breast
  – Previous venipuncture or intravenous of draining vein

Graft Stenosis or Occlusion: Diagnosis

Angiography

• Puncture graft with small gauge needle
• Inject contrast
• Visualize graft from venous anastomosis to central veins
Stenosis in Draining Vein of AV Graft

AV graft © Janet Graham

Stenosis in draining vein © Janet Graham
Stenosis in Draining Basilic Vein of AV Graft

© Janet Graham
Stenosis at Venous Anastomosis of AV Graft

© Janet Graham
Graft Stenosis: Treatment

- Venous stenoses do not respond as well to angioplasty as arterial stenoses
- Guidelines recommend treatment of stenosis ≥50% reduction of normal vessel diameter accompanied by hemodynamic, functional or clinical abnormality
- Prospective surveillance plus correction improves patency and reduces incidence of thrombosis

Graft Stenosis: Angioplasty

1. Short vascular sheath inserted
2. Guidewire advanced into graft
3. Normal vein proximal to stenosis or distal to post-stenotic dilatation measured
4. Angioplasty balloons inflated for ~20 – 30 seconds
5. Balloon removed and another angiogram performed
Pseudoaneurysm: Assessment

- Palpation: dip or missing piece of graft felt
- Appears pulsatile
- Only thin skin and thin layer of fibrosed subcutaneous tissue at defect site
- Over time, graft will dilate at defect site and form pseudoaneurysm

Pseudoaneurysm: Assessment & Treatment

Assessment
- Monitor poorly healed needle sites
- Will grow in size
- Can ulcerate and bleed spontaneously
- If thrombosed, clot can adhere to inside of pseudoaneurysm

Surgery required when:
- Palpation of aneurysms twice “normal” diameter of graft
- Thin, shiny areas on graft that appear red
- Unhealed needle sites
- Necrotic areas

Thrombosed Grafts: Treatment

- Surgical thrombectomy +/- revision
- Mechanical thrombectomy
- Pharmacomechanical thrombectomy
Thrombosis in AV Graft

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USING PORTABLE ULTRASOUND TO ASSIST WITH CANNULATION

Don’t worry, I’ll find a good site soon.

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Portable Ultrasound Use

Before Cannulation
• To determine the depth & direction of the vessel
• To identify areas of the vessel that are straight for threading the needle its full length
• To draw the location of the vessel on the patient (to make it easier for other nurses; may also photograph location & put in chart)

After Cannulation
• To determine the position of the needle (is it straight & deep enough? Is it in the wall of the vessel?)
Ultrasound Enables Lengthwise Mapping

This picture shows there is an area of the access that is straight enough for a fistula needle to be threaded completely.

Note downward trend of vessel indicated by white arrows that show distance from skin to the vessel. This suggests fistula needle should not be flattened out too much, assuming needle is being directed according to angle of the green arrow.
Ultrasound Enables Crosswise Mapping

The dotted lines below show the diameter of the vessel, while the white arrow shows the depth. The diameter is approximately 0.6 cm and the depth is approximately 0.25 cm.

As fistula needles are 2.5 cm long, a diameter of 0.6 cm makes it possible to get the needle well into the fistula before flattening out and threading.
Ultrasound Enables Marking the Location of the Vessel

Black dots may be used to show the location of the vessel (to ensure aneurysm is not being needled). Sharpie black felt pens work well & do not wash off.
Tips for Success Using Ultrasound

• Use lots of **warm** lubricant (warm lubricant encourages vasodilation)

• Don’t press down too hard with the ultrasound (or it flattens the vessel and makes it harder to find)

• Face the dot on the ultrasound probe toward the patient’s head