A Practical Guide to Managing Acute and Chronic Access-related Limb Ischemia (Steal)
A Practical Guide “According to David Cull” to Managing Acute and Chronic Access-related Steal

David L. Cull MD
Department of Surgery
University of South Carolina School of Medicine- Greenville

Disclosures
• None

Available Treatment Options
– Treat arterial inflow stenosis (balloon angioplasty)
– Ligation
– Banding
– Bypass procedures
  • Distal Revascularization/Interval Ligation (DRIL)
  • Proximalization of the Arterial Inflow (PAI)
  • Revision Using Distal Inflow (RUDI)

Procedural complexity/expected hemodynamic result
– Treatment of arterial inflow stenosis
  • Simple
  • Excellent hemodynamic result
– Ligation
  • Simple
  • Excellent hemodynamic result
– Banding
  • Simple
  • Inconsistent hemodynamic result

– Distal Revascularization Interval Ligation
  • Complex
  • Excellent hemodynamic result

– Proximalization of Arterial Inflow
  • Intermediate complexity
  • Good hemodynamic result
Procedural complexity/expected hemodynamic result

- Distal Revascularization Interval Ligation
  - Complex
  - Excellent hemodynamic result

- Proximalization of Arterial Inflow
  - Intermediate complexity
  - Good hemodynamic result

- Revision Using Distal Inflow
  - Intermediate complexity
  - Intermediate hemodynamic result

Procedure Selection

- How valuable is the access?
  - Functional AVF or no access alternatives
    - All access options considered- including DRIL, PAI, RUDI
  - AVG, Diseased/poorly functioning AVF
    - Simple options- ligation, banding, angioplasty

Procedure Selection

- What is the acuity and severity of ischemia?
  - Severe/Acute/Tissue loss

- What is the acuity and severity of ischemia?
  - Severe/Acute/Tissue loss
    - Maximum hemodynamic benefit- DRIL, Ligation
**Procedure Selection**

- What is the acuity and severity of ischemia?
  - Severe/Acute/Tissue loss
    - Maximum hemodynamic benefit: DRIL, Ligation
  - Mild/Moderate

**Special Anatomic Considerations**

- Inflow stenosis - Angioplasty/stenting
- Limited vein - excludes DRIL and RUDI
- Upper arm loop AV grafts - excludes bypass procedures

**Special Physiologic Considerations**

- Noninvasive vascular testing
  - High flow accesses (>1000 cc/min) - banding

**Case**

- 40 yo male with a left brachial-cephalic fistula functioning well. Severe ischemia with tissue loss, neurologic deficit.

**Well-functioning AVF Severe Ischemia**

- Observation, pain management
- Angioplasty/stenting of arterial inflow stenosis
- Ligation
- Banding
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)
Well-functioning AVF
Severe Ischemia

• Angioplasty/stenting of arterial inflow stenosis
• Ligation
• Banding
• Proximalization of the Arterial Inflow
• Revascularization Using Distal Inflow (RUDI)
• Distal Revascularization Interval Ligation (DRIL)

Well-functioning AVF
Severe Ischemia

• Angioplasty/stenting of arterial inflow stenosis
• Banding
• Proximalization of the Arterial Inflow
• Revascularization Using Distal Inflow (RUDI)
• Distal Revascularization Interval Ligation (DRIL)

Well-functioning AVF
Severe Ischemia

• Angioplasty/stenting of arterial inflow stenosis
• Proximalization of the Arterial Inflow
• Revascularization Using Distal Inflow (RUDI)
• Distal Revascularization Interval Ligation (DRIL)

Well-functioning AVF
Severe Ischemia

• Angioplasty/stenting of arterial inflow stenosis

“Diseased” AV Graft,
Mild/Moderate Symptoms

• Observation, pain management
• Angioplasty/stenting of arterial inflow stenosis
• Ligation
• Banding
• Proximalization of the Arterial Inflow
• Revascularization Using Distal Inflow (RUDI)
• Distal Revascularization Interval Ligation (DRIL)

Case Presentation

• History
  – Forearm loop AV graft x 4 years.
  – 6 weeks of hand pain at the end of dialysis, decreased grip strength
"Diseased" AV Graft, Mild/Moderate Symptoms

- Angioplasty/stenting of arterial inflow stenosis
- Ligation
- Banding
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)

Case

- Straight upper arm AV graft
- Severe steal- early after access placement
- Options for other access available

"Diseased" AV Graft, Mild/Moderate Symptoms

- Angioplasty/stenting of arterial inflow stenosis
- Ligation
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)

Straight Upper Arm AV Graft Severe Ischemia

- Observation, pain management
- Angioplasty/stenting of arterial inflow stenosis
- Ligation
- Banding
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)
**Straight Upper Arm AV Graft**
**Severe Ischemia**

- Angioplasty/stenting of arterial inflow stenosis
- Ligation
- Banding
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)

**Conclusions**

- Patients with steal should first be assessed for inflow stenosis
- Treatment option should be tailored to the particular situation.
  - Anatomic considerations
  - Value of the access
  - Severity/acuity of the ischemia

**Case**

- Straight upper arm AV graft
- Chronic mild/moderate symptoms.
- Alternative access options available

**Straight Upper Arm AV Graft**
**Chronic Moderate Symptoms**

- Observation, pain management
- Angioplasty/stenting of arterial inflow stenosis
- Ligation
- Banding
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)
**Straight Upper Arm AV Graft Chronic Moderate Symptoms**

- Angioplasty/stenting of arterial inflow stenosis
- Ligation
- Banding
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)

**Case**

- 35 yo Lt brachial-cephalic fistula functioning well. Moderate ischemia developed over time, mild neurologic deficit. All other options available.

**Well-functioning AVF Mild/Moderate Ischemia**

- Observation, pain management
- Angioplasty/stenting of arterial inflow stenosis
- Ligation
- Banding
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)

**Well-functioning AVF Mild/Moderate Ischemia**

- Angioplasty/stenting of arterial inflow stenosis
- Ligation
- Banding
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)
Well-functioning AVF
Mild/Moderate Ischemia

- Angioplasty/stenting of arterial inflow stenosis
- Banding
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)

Well-functioning AVF
Mild/Moderate Ischemia

- Angioplasty/stenting of arterial inflow stenosis
- Banding- if flow rate exceeds 1000 cc/min.
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)

Case

- 60 y.o. patient with diabetes mellitus on dialysis via a left brachial-cephalic fistula presents with finger gangrene. Finger PPGs do not improve with AVF compression.

Well-functioning BCF
Severe Ischemia, Finger PPGs Don’t Improve With Compression

- Observation, pain management
- Angioplasty/stenting of arterial inflow stenosis
- Ligation
- Banding
- Proximalization of the Arterial Inflow
- Revascularization Using Distal Inflow (RUDI)
- Distal Revascularization Interval Ligation (DRIL)
Well-functioning BCF
Severe Ischemia, Finger PPGs Don’t Improve With Compression
• Observation, pain management
• Angioplasty/stenting of arterial inflow stenosis

Well-functioning BCF
Severe Ischemia, Finger PPGs Don’t Improve With Compression
• Angioplasty/stenting of arterial inflow stenosis
• Proximalization of the Arterial Inflow
• Distal Revascularization Interval Ligation (DRIL)

Case
• 55 yo diabetic male undergoes left brachial-cephalic fistula creation. The patient presents to your office 24 hours later with severe pain in the forearm/hand, decreased grip strength. Palpable radial pulse. Forearm soft. Incision OK

• Diagnosis?
• Treatment?

Ischemic Monomelic Neuropathy
• Ischemia (steal?) localized to the radial, ulnar, median nerve trunks.
• Pain, paresthesias, numbness out of proportion to physical findings
• Weakness and paralysis: radial, ulnar, median nerve distribution.
• Manifestations usually immediate
• Treatment- Ligation of the fistula