Algorithms for Managing Steal Syndrome: When is Banding Appropriate

- Hemodynamic adaptation
- Flow increase up to 20X
- Distal– limited adaptation

- 10-20% get some
- 4% require intervention

- DASS
  - diabetes mellitus
  - CTD
  - PVD
  - female / small vessels
  - distal brachial inflow
  - AVG early, AVF later
  - bilaterality common

- Steal symptoms
  - coldness
  - numbness
  - pain
  - weakness / hand claudication
  - digital ulceration
  - gangrene
Algorithms For Managing Steal Syndrome: When Is Banding Appropriate

- **DASS**

- **Steal vs. Neuropathy**
  - relationship to BP, access use
  - dermatomal pattern
  - digital pressures
  - PVR’s with AVF compression

Algorithms For Managing Steal Syndrome: When Is Banding Appropriate

- **DASS - diagnostic studies**
  
  **Digital Pressures**
  - < 60 mmHg
  - DBI < .6 or < .45
  - poor specificity

Algorithms For Managing Steal Syndrome: When Is Banding Appropriate

- **Treatment options**
  - Ligation
  - Banding
  - Distal Revasc Interval Ligation
  - Revision Using Distal Inflow
  - Proximalization of Arterial Inflow
Algorithms For Managing Steal Syndrome:
When Is Banding Appropriate

- **Ligation**
  - restores baseline anatomy
  - simple
  - abandons access

- **Banding**
  - restricts flow
  - simple
  - less predictable effect
  - poor choice for low flow
  - better for vein than prosthetic

- **DRIL**
  - no AVF flow restriction
  - additional distal flow
  - more morbid
  - good choice for low flow

- **RUDI**
Algorithms For Managing Steal Syndrome: When Is Banding Appropriate

- **RUDI**
  - flow restrictive
  - more complex than banding
  - less complex than DRIL
  - similar limitations to banding
  - clinical data VERY limited

- **PAI**
  - larger, proximal vessels
  - morbid
  - optimal for low flow / prosthetic
  - little data

Banding compared to DRIL

- less predictable effect
- necessarily lower AVF flow

**BUT:**

- no graft dependency
- minimal morbidity

Banding AVF 2004-11

- 31 patients
- steal by physiologic eval
- all with pain / numbness
- 3 with gangrene / ulcer
Banding AVF 2004-11

- mean age 66
- 80% diabetic
- 4.5 months mean AVF time
- 39% with < 3 weeks
Banding AVF results
- f/u 15.6 +/- 12.8 months
- 29 / 31 initially improved
- one ligated 12 days
- one DRIL at 3 months

Banding AVF results
- 4 occlusions (1-18 mos)
- 2 salvaged
**Banding AVF results**

- 2 late recurrences (1 PTA)
- NO OTHER MORBIDITY

**DRIL**

Table 3. Results of Distal Revascularization and Interval Ligation Procedure

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>No. of Patients</th>
<th>Patency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diehl</td>
<td>2003</td>
<td>1</td>
<td>90% at 6 months, 78% at 12 months, and 71% at 24 months</td>
</tr>
<tr>
<td>Knox</td>
<td>2003</td>
<td>5</td>
<td>83% at 12 months, and 71% at 48 months</td>
</tr>
<tr>
<td>Korzets</td>
<td>2003</td>
<td>11</td>
<td>90% and 80% at 12 and 24 months</td>
</tr>
<tr>
<td>Sessa</td>
<td>2004</td>
<td>18</td>
<td>94% at 12 months</td>
</tr>
</tbody>
</table>

**DRIL v. banding**

*Gupta et al, JVS 2011*

- DRIL late, banding early
- BP change
  - DRIL 43 to 75 mmHg
  - Banding 33 to 44 mmHg

**Fistula preservation**

- 0% for ligation
- 100% for DRIL
- 95% for RUDI
- 89% for banding

(P < .01)

**Leake AE Winger DG Leers SA Gupta N Dillavou ED. Management and outcomes of dialysis access-associated steal syndrome. JVasc Surg. 2015**

**Algorithms For Managing Steal Syndrome: When Is Banding Appropriate**

- High Mortality
  - Misskey et al 50% 3 years
  - Leake et al 1 yr 28%, 5 yr 79%

**Leake AE Winger DG Leers SA Gupta N Dillavou ED. Management and outcomes of dialysis access-associated steal syndrome. JVasc Surg. 2015**

**Improvement of symptoms**

- 75% (banding)
- 98% (DRIL)

(P = .005)
When is banding best first choice?

- absence of gangrene
- moderate pain
- morbidity risk / conduit

[Diagram showing flowchart with decision points and pathways for different options based on criteria like ischemic pain, gangrene, ulcer, autogenous vein conduit, and treatment options like banding, proximalization, DRIL, RUD, and ligation.]
Algorithms For Managing Steal Syndrome: When Is Banding Appropriate

- **Treatment options**
  - ligation
  - banding
  - DRIL
  - RUDI
  - proximalization


- **BP measured pre & post**
- >50 mm gradient pre DRIL
- no gradient after

Algorithms For Managing Steal Syndrome: When Is Banding Appropriate

- **DASS**
  - Grade 1 - minimal sx
  - Grade 2 - sx with HD, claudication
  - Grade 3 – rest pain, tissue loss

MILLER procedure (Kid Intl 2010)

- Minimally Invasive Limited Ligation Endoluminal-Assisted Revision

- narrows AVF to 3-4 mm over balloon
- 89% complete clinical success in 114 steal pts
- only 5 of 114 with < 30 day thrombosis
- 75% 6 month primary patency