Duplex Guidance For Endovascular Interventions In Patients With Renal Insufficiency: Tips And Tricks To Make It Work

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Nothing to disclose

Duplex - Guided Vascular Interventions

Advantages - I

- No nephrotoxic contrast
- No radiation
- Multi-planar, magnification
- Visualization of arterial wall

Advantages - II

- Selection & placement of:
  - Balloon
  - Stent
- Treatment of complications
- Adequacy of the technique
  - Anatomical
  - Hemodynamic

Duplex - Guided Balloon Angioplasty

1200 Cases (2005 to 2015)

- Femoral - popliteal 402
- A-V access 563
- Infrapopliteal 74
- Infragenual bypasses 56
- Carotid artery 62
- Others 26
- Popliteal aneurysm 17

Tip #1

Start with procedures for superficial vessels (AVF)
### Duplex – Guided Office AVF BAM

15 months - 70 patients (257 procedures)

- # Cases per AVF: 1-8 (mean 4.1 ± 2)
- # Patients per type of AVF:
  - RC-AVF: 49
  - BC-AVF: 12
  - BB-AVF: 8
  - UC-AVF: 1

### Duplex – Guided Office Angioplasty of AV Access

### Tip # 2

Try all infrainguinal procedures (arteries < 3 cm deep).

### Duplex - Guided Balloon Angioplasty

**Femoral-popliteal segment**

- Male: 174 (56%)
- Age: 73 ± 10 Years (Range 42 - 97)
- Risk Factors:
  - Hypertension: 241 (78%)
  - Diabetes: 161 (52%)
  - CAD: 124 (40%)
  - Tobacco: 122 (39%)
  - CRI: 115 (37%)

### Duplex - Guided Balloon Angioplasty

*TransAtlantic Inter-Society Consensus (TASC)*

- Class A: 21 (5%)
- Class B: 68 (17%)
- Class C: 281 (70%)
- Class D: 32 (8%)
**Duplex - Guided Subintimal Dissection**

- Technical success: 382 / 402 (95%)
- Stenoses: 259 / 260 (99.6%)
- Occlusions: 123 / 142 (87%)

**Results**

- Technical success: 382 / 402 (95%)
- Stenoses: 259 / 260 (99.6%)
- Occlusions: 123 / 142 (87%)

* P < 0.0001

**Popliteal Artery Volume Flow As a Predictor of Patency**

**Tip # 3**
Assess popliteal volume flow to predict patency

**Correlation of PAVF & Acute Thrombosis**

<table>
<thead>
<tr>
<th>PAVF</th>
<th>Cases</th>
<th>1 Mo Thrombosis</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 100 ml/min</td>
<td>21</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>≥ 100 ml/min</td>
<td>247</td>
<td>6</td>
<td>2.4*</td>
</tr>
</tbody>
</table>

* P < 0.01

**Predictive Factors of 1 and 6-month Patency**

<table>
<thead>
<tr>
<th>Predictive Factor</th>
<th>1 month</th>
<th>6 month</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAVF &lt; 100 ml/min</td>
<td>&lt;0.00001</td>
<td>&lt; 0.00001</td>
</tr>
<tr>
<td>TASC class</td>
<td>0.0016</td>
<td>0.0015</td>
</tr>
<tr>
<td>Run-off score</td>
<td>0.12</td>
<td>0.01</td>
</tr>
<tr>
<td>Critical ischemia</td>
<td>0.39</td>
<td>0.23</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.15</td>
<td>0.84</td>
</tr>
</tbody>
</table>
Tip # 4

Plan ahead for CRI / HD patients with arterial occlusions (plaque GSM) for success estimate

Femoral – Popliteal Plaque GSM = 6

Femoral – Popliteal Plaque GSM = 48

Duplex - Guided Subintimal Balloon Angioplasty

<table>
<thead>
<tr>
<th>GSM</th>
<th>N (Total)</th>
<th>N (Success)</th>
<th>Success rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 25</td>
<td>82</td>
<td>82</td>
<td>100 %</td>
</tr>
<tr>
<td>&gt; 25</td>
<td>34</td>
<td>17</td>
<td>50 %</td>
</tr>
<tr>
<td>&gt; 30</td>
<td>24</td>
<td>7</td>
<td>29 %</td>
</tr>
<tr>
<td>&gt; 35</td>
<td>19</td>
<td>2</td>
<td>10 %</td>
</tr>
<tr>
<td>&gt; 40</td>
<td>12</td>
<td>0</td>
<td>0 %</td>
</tr>
</tbody>
</table>

Femoral – Popliteal Plaque Echogenicity Quantification

Gray Scale Median = GSM

- Gray scale US
- Distal 2 cm prior to reentry
- Photoshop CS2 histogram
- Normalized & Digitalized
- Linear scale 0 to 255
- Adventitia → 185 to 195
- Blood → 0 to 5

Duplex - Guided Subintimal Balloon Angioplasty

Failed subintimal dissections (17 cases)

- DM 12 / 64 (19 %)
- CRI 8 / 52 (15 %)
- HD 5 / 8 (63 %) *

* P < 0.002
Tip # 5
Take on challenging cases

Duplex - Guided Popliteal Aneurysm Repair
- 82 year old male patient
  - Rt Nephrectomy
  - Cr = 2.2 mg/dL
  - HTN, MI, Stroke
  - EF: 25%
- 32 mm partially thrombosed PAA

“If you can see a lesion, you can treat it…”

Duplex-Guided Balloon Angioplasty