The value of SFA gray scale median in predicting successful crossing in CTO and popliteal artery volume flow as a predictor for successful SFA stenting

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The Vascular Institute of New York®
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No disclosures
Duplex-Guided Balloon Angioplasty
Duplex - Guided Balloon Angioplasty
Duplex - Guided Subintimal Dissection
Results

- **Technical success**
  - 387 / 407 (95%)

- **Stenoses**
  - 264 / 265 (99.6%)

- **Occlusions**
  - 123 / 142 (87%) *

* P < 0.0001
Failure to Reenter Popliteal Artery
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 $\rightarrow$ 185 to 195
- Blood $\rightarrow$ 0 to 5
Femoral – Popliteal Plaque GSM = 48
Duplex - Guided Subintimal Balloon Angioplasty

- Overall plaque GSM  
  - Successful cases (99) 18.4 ± 7.8
  - Failed reentry (17) 46.4 ± 8.1 *

* P < 0.0001
## Predictive value of plaque GSM

**GSM** | **N (Total)** | **N (Success)** | **Success rate**
---|---|---|---
≤ 25 | 82 | 82 | 100 %
> 25 | 34 | 17 | 50 %
> 30 | 24 | 7 | 29 %
> 35 | 19 | 2 | 10 %
> 40 | 12 | 0 | 0 %
<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Mean GSM (+)</th>
<th>Mean GSM (-)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco (46/70)</td>
<td>21.7 ± 10</td>
<td>23 ± 14.1</td>
<td>0.59</td>
</tr>
<tr>
<td>DM (64/52)</td>
<td>23.3 ± 13.5</td>
<td>21.5 ± 11.4</td>
<td>0.45</td>
</tr>
<tr>
<td>CRI (52/64)</td>
<td>22.7 ± 13.2</td>
<td>22.4 ± 12.2</td>
<td>0.9</td>
</tr>
<tr>
<td>HD (8/108)</td>
<td>36.8 ± 17</td>
<td>21.7 ± 12</td>
<td>&lt; 0.002</td>
</tr>
</tbody>
</table>
Duplex - Guided Balloon Angioplasty

Pre / Post Procedure Duplex Protocol

- Image (Sagittal + Transverse)
- Spectral Analysis (PSV Ratios)
- PAVF x 3 (Pre -, Post -, Papaverine)
- Infrapopliteal Run – Off (Embolization?)
Mean Intraoperative ICA Volume Flow (CEA)

<table>
<thead>
<tr>
<th>MICAVF (ml/min)</th>
<th>Cases (n)</th>
<th>Range</th>
<th>Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>( &gt; 100 )</td>
<td>25</td>
<td>102 – 299</td>
<td>0</td>
</tr>
<tr>
<td>( &lt; 100 )</td>
<td>4</td>
<td>48 – 90</td>
<td>2</td>
</tr>
</tbody>
</table>

\( p < 0.02 \)
Popliteal Artery Volume Flow As a Predictor of Patency
### Duplex-Guided Balloon Angioplasty

#### Popliteal Artery Volume Flow (268 cases)

<table>
<thead>
<tr>
<th>PAVF (ml/min)</th>
<th>Pre-op</th>
<th>Post-op</th>
<th>Papaverine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>60 ± 28</td>
<td>169 ± 65*</td>
<td>388 ± 213 **</td>
</tr>
</tbody>
</table>

* P < 0.001  
** P < 0.001
Correlation of PAVF & Acute Thrombosis
268 Patients

<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
# Duplex-Guided Balloon Angioplasty

## 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>
Predictors of 1-Month Thrombosis

Multivariate analysis
Predictors of 6-Month Thrombosis

Multivariate analysis
From the Society for Vascular Surgery

Popliteal artery volume flow measurement: A new and reliable predictor of early patency after infrainguinal balloon angioplasty and subintimal dissection

Enrico Ascher, MD, Anil P. Hingorani, MD, and Natalie A. Marks, MD, RVT, Brooklyn, NY

Objective: We have investigated whether popliteal artery volume flow (PAVF) measured immediately after balloon angioplasties of the superficial femoral artery–popliteal segments (SFA/POP) was predictive of early (30 days) and mid-term (6 months) arterial thrombosis.

Methods: During the last 24 months, 203 patients (56% men) with a mean age of 73 ± 9 years had 268 duplex-guided balloon angioplasties of the SFA/POP. Critical ischemia was the indication in 36%. Group I included 176 (66%) with stenoses, and group II had 92 (34%) with occlusions. All patients had completion duplex examinations that included three measurements of PAVF of below-the-knee popliteal artery.

Results: Early (30 days) thrombosis of the treated femoropopliteal arterial segment developed in 10 patients (3.7%), three in group I (1.7%) and seven in group II (7.6%; P < .04). All 10 cases of early thrombosis were in patients with TransAtlantic Inter-Society Consensus (TASC) class C (6/185, 3.2%) and D (4/26, 15%) lesions. Moreover, the 19% incidence (n = 4) of early thrombosis in patients with PAVF <100 mL/min (mean, 73 ± 24 mL/min; range, 20 to 99 mL/min) was higher compared with the 2.4% rate for patients with higher flows (mean, 176 ± 60 mL/min; range,
Thank You
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