New Developments in the Diagnosis and Treatment of Adventitial Cystic Disease

Peter Lawrence M.D.
Chief of Vascular/Endovascular Surgery, UCLA
On behalf of the Vascular Low-Frequency Disease Consortium:
Raghu Motaganahalli, Matthew Smeds, Michael Harlander-Locke, Peter Lawrence, Nakhi Fujimura, Alvaro Montalvo, Giovani DeCarli, Alberto Munoz, Sherene Shahid, Susanna Shin, Kwame Amankwah, Jeffrey Siracuse, Alik Farber, Sebastian Debus, Christian Behrends, Jin Jih, Catherine Wittgen

Incidence/prevalence unknown
– ~500 cases reported
– Very few series > 5 patients
Most commonly occurs in the popliteal artery
Several theories regarding etiology
– Mesenchymal migration from tendon to adjacent artery during development
  ▪ Mucin secreting cells in adventitia → cyst formation

Several treatment options used for management
– Cyst aspiration, cyst excision, resection with interposition graft, bypass
– Early results variable with each option
– Regional and institutional variation in procedures
– Current approaches based only on case reports
No long term follow up data reported in the literature

The aim of ACD multi-center study was to:
– Identify current practice patterns in the diagnosis and work-up of these patients
– Determine differences in outcomes following the various treatment options
ACD: Methods
- Adventitial cystic disease of any site
  - Diagnosed or treated between 2005-2015 by:
    - Physician log books
    - Pathology & radiology databases
    - Billing: ICD 443.9 (PAD not otherwise specified); ICD 447.8 (other specified disorder or arteries or arterioles)
    - Procedure codes
- Demographic, comorbidity, imaging, pre-operative, operative, and follow-up data collected
- Primary endpoints: vessel patency, need for re-intervention

VLFDC Database
- VLFDC process and data collection
  - Standardized database
  - Data points based on prior reports in literature
  - Input on data collection, analysis, and presentation by all authors
- Each participating site obtained IRB
- De-identified data collected using SVS reporting standards, analyzed, and reviewed by all participating sites
- Centralized in a protected server
- Statistical analysis: SPSS Statistics v24.0 software (IBM Corp., Armonk, NY) and Prism 7.0 software

ACD: Results
- 47 patients
  - 75% Male; Age = 43 (25-56)
- Location of cystic disease
  - Arterial
    - Popliteal
    - Arm
  - Venous
- Presenting symptoms:
  - Lower extremity
    - 93% claudication
    - 5% ischemic rest pain
    - 2% tissue loss
  - Upper extremity
    - Pain (100%)

ACD: Risk Factors
- Comorbidity Number (%)
  - Current or Ex-smoker 30 (70%)
  - Hypertension 12 (28%)
  - Hyperlipidemia 3 (7%)
  - Diabetes Mellitus 3 (7%)
  - Dyslipidemia 4 (10%)

ACD: Diagnostic Imaging
- Imaging Modality Number (%)
  - Duplex Ultrasound 30 (79%)
  - MRI/MRA 18 (47%)
  - CTA 16 (42%)
  - Angiogram 14 (37%)

MRI/MRA
- 47%
### Results – Resection Procedures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyst resection w/ interposition graft</td>
<td>21 (49%)</td>
</tr>
<tr>
<td>Cyst resection w/ bypass graft</td>
<td>5 (12%)</td>
</tr>
</tbody>
</table>

### ACD: Results – Cyst Procedures

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyst resection alone</td>
<td>13 (30%)</td>
</tr>
<tr>
<td>Cyst resection w/ patch</td>
<td>2 (5%)</td>
</tr>
<tr>
<td>Cyst drainage w/o resection</td>
<td>2 (5%)</td>
</tr>
</tbody>
</table>

### Peri-Operative Period

<table>
<thead>
<tr>
<th></th>
<th>Cyst resection</th>
<th>Cyst resection w/ bypass graft</th>
<th>Cyst resection w/ patch</th>
<th>Cyst drainage w/o resection</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>9</td>
<td>5</td>
<td>4</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Complications</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Time to return to work</td>
<td>18</td>
<td>23</td>
<td>30</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>Post-op procedures</td>
<td>1 (2%)</td>
<td>3 (7%)</td>
<td>2 (5%)</td>
<td>1 (2%)</td>
<td>.371</td>
</tr>
</tbody>
</table>

*Complications included: graft infection, thrombus, hematoma, and wound dehiscence

### Outcomes

- **Cyst resection w/ bypass**:
  - P = .243

- **Cyst resection w/ interposition**:
  - P = .404

- **Cyst resection w/ patch**:
  - P = .109

- **Cyst resection only**:
  - P = .129

- **Cyst drainage only**:
  - P = .371
**Results**

- Modalities
  - Duplex ultrasound = 53%
  - ABI = 30%
  - MR = 12%
  - CT = 5%
  - Clinical = 7%

- Symptoms
  - Persistent claudication
  - Mild (cyst resection only) = 1
  - Unchanged (cyst resection only, required balloon angioplasty) = 1

**Follow-Up: Mean=20 mo (1-95)**

**Conclusion**

- Multi-institutional experience cystic adventitial disease:
  - ACD most commonly occurs in the popliteal artery
  - Both arterial and venous adventitial cystic disease occur
  - Frequent association with smoking
  - Non-invasive imaging is frequently utilized for diagnosis
  - Cyst aspiration or resection alone is associated with cyst recurrence and symptoms
  - Cyst resection with interposition or bypass graft
    - Relieved symptoms
    - Reduced the need for re-intervention

On behalf of the Vascular Low-Frequency Disease Consortium Investigators