The PRELUDE Study

Prospective Study for the Treatment of Atherosclerotic Lesions in the Superficial Femoral and/or Popliteal Arteries Using the Serranator Device

Andrew Holden
FRANZCR, EBIR
Disclosure

Speaker name: Andrew Holden

I have the following potential conflicts of interest to report:

- Consulting
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other – Clinical Investigator

- I do not have any potential conflict of interest
Serranator® Alto PTA Serration Balloon Catheter

Designed to create linear, interrupted scoring along the endoluminal surface

- 4 embedded serrated metal strips
- Nylon, semi-compliant balloon
- 6F Sheath with 0.018” GW
- 4.0, 5.0, 6.0 mm balloon diameters
- 40, 80, 120 mm balloon lengths

Indication for Use: The Serranator® Alto PTA Serration Balloon Catheter is intended for balloon dilatation of lesions in the iliac, femoral, popliteal arteries, and for the treatment of obstructive lesions of native or synthetic arteriovenous dialysis fistulae. Not for use in the coronary or neuro-vasculature.
Serranator: Mechanism of Action

Serrated material is more responsive to directed energy.

Serrations are responsive to the balloon’s energy, enabling predictable and controlled lumen expansion along the lines.

Scanning Electron Microscopy (SEM) of porcine tissue at 7-days.

Serrations create linear and circumferential expansion.
PRELUDE Study Overview

Study Design:
Single arm, prospective, multi-center feasibility study enrolling up to 30 subjects with obstructive superficial femoral or popliteal artery lesions.

Follow-up: 30 days & 6 months
Enrollment Completed: May 2017 (n=25)
Study End: December 2017

Investigators
• Andrew Holden, MD (PI)
• Marianne Brodmann, MD
• Marek Krzanowski, MD
• Przemyslaw Nowakowski, MD

Independent Physician Adjudicator
William Gray, MD

Core Lab Adjudicated Data
Angio: Yale Cardiovascular Research Group
DUS: Vascore Ultrasound Core Laboratory
OCT/IVUS: Harrington Heart & Vascular Institute
100% Data Monitoring
## Summary: Study Objectives/Endpoints

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Primary Endpoints</th>
<th>Key Secondary Endpoints</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Objective</strong></td>
<td>Safety: Composite of MAEs and Peri-procedural death (POD) at 30 days post procedure</td>
<td>Core lab assessment of pre- and post-procedure angiogram assessment</td>
</tr>
<tr>
<td><strong>Secondary Objective</strong></td>
<td>Efficacy: Device success: successful delivery, balloon inflation/deflation, device retrieval with a final diameter stenosis of &lt;50%</td>
<td>Primary patency: absence of CD-TLR and lack of target lesion restenosis by DUS*</td>
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<td></td>
<td>*(PSVR) ≤ 2.4 or percent diameter stenosis of &lt;50% by angiography at 30 days and 6 months</td>
<td>TLR &amp; TVR at 30 days, and 6 months</td>
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</tbody>
</table>

- **Primary Objective**
  - Technical feasibility of using the Serranator in critical SFA or popliteal artery lesions.

- **Secondary Objective**
  - Feasibility of OCT and or IVUS in a sub-set (n=10) of subjects to evaluate the presence of serrations.
**Key Inclusion/Exclusion Criteria**

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>Exclusion</th>
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<tbody>
<tr>
<td>• Resting ABI (&lt;) 0.9</td>
<td>• Rutherford 1, 5, or 6</td>
</tr>
<tr>
<td>• <strong>Rutherford 2, 3, or 4</strong></td>
<td>• Previously implanted stent</td>
</tr>
<tr>
<td>• Lesions within the SFA or popliteal</td>
<td>• <strong>CTO &gt; 6 cm</strong></td>
</tr>
<tr>
<td>• <strong>Stenosis (\geq) 70% or occlusion</strong></td>
<td>• Evidence of acute thrombus</td>
</tr>
<tr>
<td>• Lesion length (&lt;) 10 cm</td>
<td>• <strong>Severe calcification</strong></td>
</tr>
<tr>
<td>• De-novo, or non-stented restenotic lesions</td>
<td>• Atherectomy</td>
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</table>

* Circumferential calcification \(>\) 50\% of lesion length
### PRELUDE Demographics

<table>
<thead>
<tr>
<th>Baseline Demographic</th>
<th>N=25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>18 (72%)</td>
</tr>
<tr>
<td>Age Avg. (range)</td>
<td>66 (50-81)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>9/25 (36%)</td>
</tr>
<tr>
<td>Current/Former Smoker</td>
<td>22/25 (88%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>21/25 (84%)</td>
</tr>
<tr>
<td>High Cholesterol</td>
<td>18/25 (72%)</td>
</tr>
<tr>
<td>Coronary Artery Disease</td>
<td>10/25 (40%)</td>
</tr>
<tr>
<td>Carotid Artery Disease</td>
<td>3/25 (12%)</td>
</tr>
<tr>
<td>Rutherford Clinical Category 2</td>
<td>5/25 (20%)</td>
</tr>
<tr>
<td><strong>Rutherford Clinical Category 3</strong></td>
<td><strong>19/25 (76%)</strong></td>
</tr>
<tr>
<td>Rutherford Clinical Category 4</td>
<td>1/25 (4%)</td>
</tr>
</tbody>
</table>
### PRELUDE Acute Results

<table>
<thead>
<tr>
<th>Core Lab Assessment (n=25)</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Lesion Length (cm)</td>
<td>4.65 (1.52-9.77)</td>
</tr>
<tr>
<td>SFA Lesions</td>
<td>20 (80%)</td>
</tr>
<tr>
<td>Popliteal Lesions</td>
<td>5 (20%)</td>
</tr>
<tr>
<td>RVD (mm)</td>
<td>5.05 (3.96-6.12)</td>
</tr>
<tr>
<td>CTO (&lt;6cm)</td>
<td>8 (32%)</td>
</tr>
<tr>
<td>Moderate/Severe* Calcification</td>
<td>14 (56%)</td>
</tr>
<tr>
<td>Pre Diameter Stenosis</td>
<td>88% (59%-100%)</td>
</tr>
<tr>
<td>Final Diameter Stenosis</td>
<td>23% (13%-29%)</td>
</tr>
<tr>
<td>Flow Limiting Dissections</td>
<td>0</td>
</tr>
<tr>
<td>Bailout Stent (Spiral Dissection in CTO)</td>
<td>1 (4%)</td>
</tr>
</tbody>
</table>

* Severe calcification of target lesion described as circumferential calcium and >50% of lesion length
PRELUDE Study Effectiveness

100% Device Success

**Efficacy:** Device Success defined as the achievement of successful delivery, balloon inflation and deflation, and retrieval of the study device(s) with a final diameter stenosis of <50% by visual assessment at the intended target site using only the Serranator device.

*Core lab assessment*
Similar Effect in Severe Calcification

<table>
<thead>
<tr>
<th>Mean Lumen Gain</th>
<th>Mean Maximum Atmospheric Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Severe Calcification (n=7)</strong></td>
<td><strong>None/Mild/Moderate Calcification (n=18)</strong></td>
</tr>
<tr>
<td>3.45 mm</td>
<td>3.33 mm</td>
</tr>
<tr>
<td>8.57 ATM</td>
<td>7.67 ATM</td>
</tr>
</tbody>
</table>

*Severe calcification of target lesion described as circumferential calcium and >50% of lesion length.*
PRELUDE Case: Right Distal SFA

Severe Calcification

**Pre-Treatment**
- RVD: 6.12 mm
- % stenosis: 94.59%
- Lesion length: 30.04 mm

**Post-Treatment**
- Residual stenosis: 24.07%
- No dissection

*Case performed by Dr. Krzanowski*
PRELUDE Case: L Mid Popliteal

Pre-Treatment
RVD: 4.56 mm
% Stenosis: 100%
Lesion Length: 30.48 mm

Post-Treatment
Residual Stenosis: 28.65%
Dissection Type: B

*Case performed by Dr. Krzanowski
PRELUDE Results

Subset analysis: Serration effect n=10 (100%)

OCT Imaging by Dr. A. Holden

IVUS Imaging by Dr. P. Nowakowski
PRELUDE Case: Right Popliteal

Severe Calcification

*Case performed by Dr. Holden*
PRELUDE Case: Right Popliteal

Severe Calcification

*Case performed by Dr. Holden
PRELUDE Case: Right Popliteal

Severe Calcification

*Case performed by Dr. Holden*
PRELUDE Case: Right Popliteal

Severe Calcification

*Case performed by Dr. Holden
PRELUDE Safety & Effectiveness

(Preliminary data)

Safety

• 0 Major Adverse Events
• 0 Deaths
• 1 SAE reported, not related to device or procedure

Effectiveness

• 100% patency by DUS (n=25*) at 30 Days
  *1 subject non compliant for 30 day follow up visit, the 6 month DUS was patent
• 100% Freedom from TLR at 30 Days and 6 Months

<table>
<thead>
<tr>
<th>Rutherford Clinical Category (RCC)</th>
<th>Pre-Treatment</th>
<th>6-Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>N/A</td>
<td>7/25 (28%)</td>
</tr>
<tr>
<td>1</td>
<td>N/A</td>
<td>9/25 (36%)</td>
</tr>
<tr>
<td>2</td>
<td>5/25 (20%)</td>
<td>6/25 (24%)</td>
</tr>
<tr>
<td>3</td>
<td>19/25 (76%)</td>
<td>3/25 (12%)</td>
</tr>
<tr>
<td>4</td>
<td>1/25 (4%)</td>
<td>0</td>
</tr>
</tbody>
</table>
PRELUDE Conclusions

- Study Objectives & Primary Endpoints achieved
- Serranator is safe and effective in treating critical femoro-popliteal lesions
- 100% device success
- 100% serration effect demonstrated in OCT and IVUS (n=10)
- Acute results show low residual stenosis (mean 23%)
- Equally effective in lumen gain in both moderate and severely calcified lesions
- 100% Patency at 30 days
- 100% freedom from TLR at 30 days and 6 months
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