LASER atherectomy and in-stent restenosis: where does it fit in my algorithm

George S. Chrysant, M.D. FACC, FSCAI, FSCCT
INTEGRIS Baptist Medical Center
Oklahoma City, Oklahoma
I have the following potential conflicts of interest to report:

X Consulting
Abbott Vascular
Boston Scientific
Medtronic
Spectranetics
This is the problem we face
Fem-pop Trials Show Restenosis / Loss of Patency is an Issue for All Stents

Results May be Understated

1. Are these “real world” patient sets with inclusion of
   - Long lesions
   - Multiple stents
   - Repeat ISR
   - Severity of underlying disease

2. Has disease stabilized at 2 years or will restenosis continue?

---

SFA Stent Trials

- **Complete SE**
  - Medtronic
  - Patency @ 1 year = 73%

- **Everflex**
  - Covidien
  - Patency @ 1 year = 78%
  - Patency @ 2 years = 66%

- **Absolute**
  - Abbott
  - Restenosis @ 2 years = 49%

- **Zilver BMS**
  - Cook
  - Restenosis @ 1 year = 27%
  - Restenosis @ 2 years = 37%

- **Zilver PTX**
  - Cook
  - Restenosis @ 1 year = 10%
  - Restenosis @ 2 years = 19%

---

1 “Drug Eluting Stents are Not the Default Therapy,” Garcia, TCT 2012
2 “Safety and Efficacy of the EverFlex Sten,” Razavi, ISET 2014
4 “The Zilver PTX Randomized Trial of Paclitaxel-Eluting Stents for Femoropopliteal Disease: 24-Month Update,” Dake, ISET 2011
Class I: Short, focal lesions (≤ 50mm)

Class II: Diffuse lesions (> 50mm)

Class III: Total Occlusions

Fem-pop ISR Treatment Sub-Optimal

2-Year Restenosis Rate

Laser Benefits

- Only FDA indicated atherectomy technology for ISR
- Treat multiple lesion morphologies
- Debulk lesion from the tip with no moving parts
- Directional debulking now possible
Areas where I use laser atherectomy

- Calcium
- ISR
- Long Lesions
- CTOs
# Key Study Results

<table>
<thead>
<tr>
<th></th>
<th>Laser + DCB (n=24)</th>
<th>DCB Alone (n=24)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ISR Length (cm)</td>
<td>20</td>
<td>23</td>
<td>n/a</td>
</tr>
<tr>
<td>Primary Patency (12 mon)</td>
<td>66.7%</td>
<td>37.5%</td>
<td>0.01</td>
</tr>
<tr>
<td>TLR (12 mon)</td>
<td>16.7%</td>
<td>50%</td>
<td>0.01</td>
</tr>
<tr>
<td>Major Amputation</td>
<td>2 (8%)</td>
<td>11 (46%)</td>
<td>0.003</td>
</tr>
<tr>
<td>Limb Salvage (12 mon)</td>
<td>91.7%</td>
<td>54.2%</td>
<td>0.003</td>
</tr>
<tr>
<td>Wound Healing (12 mon)</td>
<td>87.5%</td>
<td>62.5%</td>
<td>0.03</td>
</tr>
</tbody>
</table>

- Complex patients – 100% of patients Tosaka III
- Significant difference between Laser + DCB arm and stand alone DCB

EXCITE ISR Trial Overview

**Design**

- **DESIGN**: Prospective, randomized, multi-center clinical evaluation of excimer laser atherectomy (ELA)

- **OBJECTIVE**: To evaluate safety and efficacy of ELA with adjunctive PTA (ELA+PTA) versus PTA alone for treating femoropopliteal in-stent restenosis

- **PRINCIPAL INVESTIGATORS**
  Eric J Dippel, MD
  Craig Walker, MD

---

250 patients enrolled between June 2011 and February 2014 in 40 clinical sites in United States

7 lesions uncrossable

250 lesions crossable by guidewire

169 ELA + PTA

Primary Safety endpoint at 37 days (n=155)

Primary Efficacy endpoint at 212 days (n=117)

81 PTA

Primary Safety endpoint at 37 days (n=73)

Primary Efficacy endpoint at 212 days (n=56)
### Baseline Lesion Characteristics

#### Angiographic Core Lab Assessment

<table>
<thead>
<tr>
<th></th>
<th>ELA + PTA (N=169)</th>
<th>PTA Alone (N=81)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Lesion Length (cm)</td>
<td>19.6</td>
<td>19.3</td>
<td>0.85</td>
</tr>
<tr>
<td>Diameter Stenosis (%)</td>
<td>81.7%</td>
<td>83.5%</td>
<td>0.42</td>
</tr>
<tr>
<td>Popliteal Lesion</td>
<td>21.3%</td>
<td>23.4%</td>
<td>0.93</td>
</tr>
<tr>
<td>Total Occlusion</td>
<td>30.5%</td>
<td>36.8%</td>
<td>0.37</td>
</tr>
<tr>
<td>Calcium (Mod/Sev)</td>
<td>27.1%</td>
<td>9.1%</td>
<td>0.002</td>
</tr>
<tr>
<td>Stent Fracture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>85.8%</td>
<td>95.8%</td>
<td>0.16</td>
</tr>
<tr>
<td>1</td>
<td>5.0%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>6.4%</td>
<td>4.2%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2.1%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.0%</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.7%</td>
<td>0.0%</td>
<td></td>
</tr>
</tbody>
</table>

- Longest lesions in any IDE peripheral study
- 20% of lesions > 30 cm
Procedural Complications

All events adjudicated by CEC

- Procedural TLR
- Any Dissection
- > Grade C
- Bailout Stenting
- Embolization
- Thrombosis
- Abrupt Closure

P-values:
- Procedural TLR: P=0.008
- Any Dissection: P=0.03
- > Grade C: P=0.08
- Bailout Stenting: P=0.02
- Embolization: P=0.47
- Thrombosis: P=0.25
- Abrupt Closure: P=0.23
Primary Safety Endpoint

Freedom from MAE thru 30 days

- **ITT**: 94.2% (P<0.001) vs 79.2%
- **ITT w/o Bailout Stenting as TLR**: 98.7% (P=0.01) vs 91.8%
- **Per protocol**: 95.3% (P=0.003) vs 82.0%
### Primary Efficacy Endpoint

Freedom from TLR thru 6 months

<table>
<thead>
<tr>
<th></th>
<th>ELA + PTA</th>
<th>PTA</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ITT</td>
<td>73.5%</td>
<td>51.8%</td>
<td>$P&lt;0.005$</td>
</tr>
<tr>
<td>ITT w/o Bailout Stenting as TLR</td>
<td>78.1%</td>
<td>61.7%</td>
<td>$P&lt;0.05$</td>
</tr>
<tr>
<td>Per protocol</td>
<td>78.8%</td>
<td>46.7%</td>
<td>$P&lt;0.001$</td>
</tr>
</tbody>
</table>
Primary Patency

Product-Limit Survival Estimates
With number of subjects at risk

Survival Probability

Days from Index Procedure

Internal Field - randomization group:
1: Excimer Laser Atherectomy + PTA
2: PTA Alone

p < 0.005
Freedom from MAE

Product-Limit Survival Estimates
With number of subjects at risk

Survival Probability

Days from Index Procedure

Internal Field - randomization group:
1: Excimer Laser Atherectomy + PTA
2: PTA Alone

p < 0.001
<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate</th>
<th>Lower CL</th>
<th>Upper CL</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>0.48</td>
<td>0.31</td>
<td>0.74</td>
<td>0.001</td>
</tr>
<tr>
<td>Age &gt; 70</td>
<td>0.047</td>
<td>0.23</td>
<td>0.95</td>
<td>0.04</td>
</tr>
<tr>
<td>Diabetes</td>
<td>0.65</td>
<td>0.34</td>
<td>1.26</td>
<td>0.20</td>
</tr>
<tr>
<td>Previous ISR</td>
<td>0.54</td>
<td>0.31</td>
<td>0.93</td>
<td>0.03</td>
</tr>
<tr>
<td>RVD &lt; 5.5</td>
<td>0.52</td>
<td>0.33</td>
<td>0.82</td>
<td>0.005</td>
</tr>
<tr>
<td>TASC D</td>
<td>0.42</td>
<td>0.20</td>
<td>0.91</td>
<td>0.03</td>
</tr>
<tr>
<td>Occlusion</td>
<td>0.46</td>
<td>0.24</td>
<td>0.91</td>
<td>0.02</td>
</tr>
<tr>
<td>&gt; 10 cm</td>
<td>0.53</td>
<td>0.34</td>
<td>0.84</td>
<td>0.007</td>
</tr>
</tbody>
</table>
### Length Variability

<table>
<thead>
<tr>
<th>Variable (Lesion Length)</th>
<th>Estimate</th>
<th>Lower CL</th>
<th>Upper CL</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 cm</td>
<td>0.96</td>
<td>0.43</td>
<td>2.14</td>
</tr>
<tr>
<td>15 cm</td>
<td>0.66</td>
<td>0.39</td>
<td>1.12</td>
</tr>
<tr>
<td>25 cm</td>
<td>0.46</td>
<td>0.29</td>
<td>0.70</td>
</tr>
<tr>
<td>35 cm</td>
<td>0.31</td>
<td>0.17</td>
<td>0.58</td>
</tr>
</tbody>
</table>

Benefit was greatest with longest lesions
Areas where I use laser atherectomy

- Calcium
- ISR
- Long Lesions
- CTOs
Laser + DCB for ISR: indicated and it works
LASER atherectomy and in-stent restenosis: where does it fit in my algorithm

George S. Chrysant, M.D. FACC, FSCAI, FSCCT
INTEGRIS Baptist Medical Center
Oklahoma City, Oklahoma