Coronary Perforation of Proximal LAD after Debulking for LMCA Ostial Stenosis, Treated with PTEE-covered JoStent

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Clinical History

- Male, 62 years old
- Resting chest pain for 3 months
- Electrocardiogram: normal
- Exercise EKG: positive at stage 2 by Bruce protocol
- Echocardiogram: normal LV function without regional wall motion abnormality
Baseline angiography

Tight stenosis at LMCA
How do you treat this lesion?

1. Bypass surgery
2. Stenting with bare metal stent
3. Debulking alone
4. Debulking and stenting
5. Stenting with drug eluting stent
Subject

310 Patients  
(M/F=209/101, Age: 56 years)

- Elective Stenting in Patients with Normal LV function 258
- Follow-up angiogram at 6 month 178/220 (86%)
**Procedural Success Rate:** 99%

**In-Hospital Clinical Courses**

<table>
<thead>
<tr>
<th>Event</th>
<th>Count</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute closure</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subacute thrombosis</td>
<td>1</td>
<td>(0.5%)</td>
</tr>
<tr>
<td>Death</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Q-MI</td>
<td>0</td>
<td></td>
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<tr>
<td>Emergent CABG</td>
<td>0</td>
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</tr>
</tbody>
</table>
6 month Angiographic Restenosis Rate

Unprotected Left Main Stenting

Angiographic follow-up rate:
178/220 eligible patients (86%)

42/178 (23.1%)
Restenosis Rate & TLR at overall

- Ostium:
  - Restenosis: 27%
  - TLR: 15%
  - P = 0.071

- Shaft:
  - Restenosis: 5%
  - TLR: 4%

- Bifurcation:
  - Restenosis: 28%
  - TLR: 12%
  - P = 0.282

AMC data
Unprotected Left Main Stenting

Survival Curve

Cardiac death free survival 98 ± 1 %
Total death free survival 96 ± 2 %
MACE free survival 81 ± 3 %
Planned Strategy

- PCI due to patient preference
- Optimal debulking followed by stenting
Debulking first...

Nine cut was done.
Coronary perforation after debulking
LAD perforation after DCA
How do you treat this complication?

1. High pressure balloon dilatation
2. Emergent bypass surgery in all cases
3. PTEE-covered stent
4. Coil embolization
5. Percardiocentesis and let it alone
PTEE-covered stent for perforation

3.5 × 19mm PTEE-covered JoStent at LAD and
4.0 × 9mm NIR stent at LMCA ostium
Good result with successful seal of perforation
Patent stents at follow-up
Coronary Perforation

- Serious complication of coronary angioplasty, which might result in tamponade or death.
- The incidence of perforation after DCA has been < 1% which is probably higher than the 0.2% of incidence after conventional balloon angioplasty.
PTEE-coated JoStent

• Constructed using a sandwich technique, whereby an ultrathin layer of expandable PTFE is placed between two stents
• 2.5–5.0-mm vessels and is available in 9-mm, 12-mm, 16-mm, 19-mm and 26-mm lengths
• Effective tool for sealing the perforation and treating the narrowed lesion
Specific lessons from this case

- Is IVUS necessary?
- When can we use debulking?
Debulking at LMCA Ostial lesion

Restenosis rate and TLR

Debulking

Non-Debulking

Restenosis: 6% Debulking, 33% Non-Debulking

TLR: 0% Debulking, 19% Non-Debulking

P=0.025 (Restenosis)
P=0.026 (TLR)

AMC data
# IVUS-guided vs. Angiography-guided

<table>
<thead>
<tr>
<th></th>
<th>IVUS-guided</th>
<th>Angio-guided</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of lesions</strong></td>
<td>133</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td><strong>Lesion site</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Os</td>
<td>72 (54)</td>
<td>35 (42)</td>
<td></td>
</tr>
<tr>
<td>Body</td>
<td>24 (18)</td>
<td>4 (5)</td>
<td></td>
</tr>
<tr>
<td>Bifurcation</td>
<td>37 (28)</td>
<td>44 (53)</td>
<td></td>
</tr>
<tr>
<td><strong>Debulking before stenting</strong></td>
<td>54 (41)</td>
<td>17 (21)</td>
<td>0.002</td>
</tr>
<tr>
<td><strong>Reference vessel DM (mm)</strong></td>
<td>4.1 ± 0.7</td>
<td>3.8 ± 0.6</td>
<td>0.005</td>
</tr>
<tr>
<td><strong>MLD (mm)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-intervention</td>
<td>1.3 ± 0.5</td>
<td>1.1 ± 0.5</td>
<td>0.011</td>
</tr>
<tr>
<td>Post-intervention</td>
<td>4.2 ± 0.6</td>
<td>4.0 ± 0.6</td>
<td>0.002</td>
</tr>
<tr>
<td>Follow-up</td>
<td>2.8 ± 1.1</td>
<td>2.6 ± 1.1</td>
<td>0.160</td>
</tr>
<tr>
<td><strong>Restenosis Rate (%)</strong></td>
<td>24/105 (23)</td>
<td>12/52 (23)</td>
<td>0.980</td>
</tr>
</tbody>
</table>
IVUS findings of Left Main Disease

- Soft plaque 63%
- Fibrous Calcific 18%
  (Mean calcification: 147°)
- Eccentricity index 6.5 ± 6.2
- Negative Remodeling in Ostial Lesions 47/72 (65%)
  (Mean NRI: 0.91 ± 0.25)
Vascular remodeling

Postive remodeling
(RI > 1.05)

Intermediate remodeling
(0.95 ≤ RI ≤ 1.05)

Negative remodeling
(RI < 0.95)
Vascular remodeling of Ostial LAD

AMC data

Positive remodeling 27%
Intermediate remodeling 15%
Negative remodeling 36%

N=67
Effect of Debulking
In Negative Vascular Remodeling

AMC data

Stent CSA (mm²)

P=0.103

13.8
12.3

Debulking (n=17)  Non-debulking (n=25)

Restenosis rate (%)

P=1.000

23 %
24 %

Debulking (n=17)  Non-debulking (n=25)
Effect of Debulking

In Non-negative Vascular Remodeling

AMC data

Stent CSA (mm²)

Debulking (n=24)

13.4

Non-debulking (n=20)

12.0

P=0.098

Restenosis rate (%)

Debulking (n=24)

8 %

Non-debulking (n=20)

45 %

P=0.012

Cardiovascular Research Foundation
Unprotected Left Main Stenting

**IVUS-guiding is Necessary**

- Clinical outcomes may be not different
- Assess unusual lesion morphology (severe negative remodeling, calcium, thrombi, etc)
- We can change treatment strategy
- Optimized final results
- Effective and essential device during DCA
Take home message

- Coronary perforation is not an unusual complication of PCI with debulking.
- Stenting with PTEE-covered JoStent might be a good option for treatment of coronary perforation.
- IVUS may be necessary to investigate the lesion characteristic during LMCA PCI.
- Debulking before stenting might be an effective strategy in LMCA ostial stenosis with non-negative remodeling.