What Coronary Specialists Teach The Vascular Community About Vessel Prep?

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Stent Era Lessons on Vessel Preparation

• Under expanded stent consequences
  • Abrupt closure
  • Subacute thrombosis
  • Restenosis

• Vessel expansion Tools
  • IVUS for Coronary Area

• Vessel Preparation Options
  • PTCA
  • Directional Atherectomy- BOAT and OARS Trials
  • Atherectomy- Rotational and Orbital

• Bioresorbable Coronary stent preparation
Risk Factors for Morbidity and Mortality in PCI

- Multivessel CAD
- Lesion Eccentricity
- Presence of Calcium in the Lesion
- Female Gender
- Lesion Length

Stent Expansion Lessons IVUS
Stent Underexpansion Consequences: Thrombosis

- Minimum Cross Sectional Area by IVUS (MSA)
- Stent Expansion %
- Significant Segment Stenosis

Kenichi Fuji et al. JACC April 2005;Volume 45, Issue 7. pp 995-998
Stent Underexpansion Consequences: Restenosis

- IVUS for assessment of ISR
- MSA of < 5mm$^2$ associated with absence of restenosis
Vessel Preparation Options
Rotational and Laser Atherectomy

- Pre Stent Rotational Atherectomy - vessel prep
- Post Stent - Underexpanded stent treatment - “Stentblation”
- Post Stent Underexpanded - Contrast assisted Laser Ablation
Vessel Preparation Options
Directional Atherectomy

- Developed in 1984
- 1020 Procedures studied
- Goal <20% residual stenosis
- “Bigger is Better”

CAVEAT Trial Results

Topol et al. NEJM 1993; 329;221-227 CAVEAT Trial Comparison of Directional Atherectomy with Coronary Angioplasty in Patients with CAD
Lesion Calcification Impact on DES Implantation in Real-World Patients

- Severe calcium makes stent expansion difficult and can contribute to higher MACE and mortality rates in complex PCI patients
- Optimal stent expansion may decrease rates
- May reduce length of stay and complications

ORBIT II Clinical Data

• 443 Patients
• Severely Calcified Cor. Lesions
• Primary Safety Endpoint: Freedom from 30d MACE 89.6% with performance goal of 82%
• Primary Efficacy Endpoint (<50% residual and w/o MACE in hospital) 88.9% compared to performance goal of 82%
• Stent Delivery Success 97.7%
• 1 yr TLR of 4.7%

Chambers JW et. Al. JACC Cardiovasc Interv. 2014 May; 7(5);510-8
Compliance 360° Study Design

- Prospective, multi-center
- Randomized (1:1)
- Calcified ATK lesions

The Lowest Balloon Inflation Pressure Used to Achieve Desired Outcome = Compliance Change

<table>
<thead>
<tr>
<th>Procedure</th>
<th>N</th>
<th>Mean Max Balloon Pressure</th>
<th>% Lesions Requiring Bail-Out</th>
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<tbody>
<tr>
<td>OAS + POBA</td>
<td>25</td>
<td>9.1±3.5</td>
<td>77.8</td>
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<tr>
<td>POBA</td>
<td>25</td>
<td>4.0±1.3</td>
<td>5.3</td>
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</tbody>
</table>

\[ \text{Mean Max Balloon Pressure} = 9.1±3.5 \]  
\[ \text{% Lesions Requiring Bail-Out} = 77.8 \]  
\[ \text{Mean Balloon Pressure} = 4.0±1.3 \]  
\[ \text{% Lesions Requiring Bail-Out} = 5.3 \]  

\[^{*}p < 0.0001\]
Figure 1. Qualitative and Quantitative Assessment of OCT Characteristics

A. An example of incomplete strut apposition (ISA). There are 4 malapposed struts between 10 and 12 o'clock position in A1.

B. Tissue prolapse. In the presence of tissue prolapse, defined as tissue protruding between the struts, the prolapse area was measured as the difference between the stent and lumen area (highlighted in green in B2).

C. An example of edge dissection (arrow) distal to the BVS.

D. A BVS strut fracture.
Three Year Outcomes with Absorb Bioresorbable Scaffold (Individual-Patient-Data Meta-Analysis from the ABSORB trial)

Ali ZA, Stone G. et. al. Circulation 2017;136:

[Graph showing outcomes for Absorb vs. Everolimus DES]
Conclusions

• Coronary Vessel Preparation may have implications on acute procedural and post procedural outcomes
• Coronary Calcification portends worse outcomes
• Poor Stent expansion is directly related to increased rates of thrombosis and restenosis
• Unclear correlation between coronary vessel preparation and peripheral arterial vessel preparation
• Proponents of Vessel Prep site DEFINITIVE AR and look towards REALITY and DEB trials
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