IVUS Guided PCI
Case presentation

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Patient characteristics

- Female
- 65 years old
- Stable angina class II, previous MI (2001)
- CV risk factors – arterial hypertension, family history, no smoking, cholesterol 4.4mmol/l
- Angiography – RCA long chronic calcified lesion
Angiography before intervention

RCA long chronic calcified lesion
Pre-dilatation with Maverick
1.5-20 mm 7atm
Angiography after pre-dilatation with Maverick 1.5-20 mm 7atm

QCA results:

*MLD*=1.34 mm  
*MSA*=1.41 mm²  
Difficult to select the size of balloon/sten
IVUS after predilatation with Maverick 1.5/20 mm 7atm
IVUS distal to mid part of RCA

Measurements On Current Frame

<table>
<thead>
<tr>
<th>Area (mm²)</th>
<th>Diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumen</td>
<td>4.30</td>
</tr>
<tr>
<td>Vessel</td>
<td>2.35</td>
</tr>
<tr>
<td>Siert</td>
<td>4.00</td>
</tr>
<tr>
<td>Plaque</td>
<td>7.93</td>
</tr>
<tr>
<td>NIH</td>
<td>0.85</td>
</tr>
</tbody>
</table>

IVUS distal to mid part of RCA

RCA mid

RCA distal

[Table and images of IVUS scans and measurements]
IVUS mid to prox part of RCA
Cutting balloon Ultra 3.5-10 mm (distal RCA) 3 times 6→9 atm in each segment
Cutting balloon Ultra 4.0-15 mm (prox)
3 times 7 → 10 atm in each segment
Post cutting balloon intervention

 Totally opened artery

 Significant luminal gain
IVUS distal to mid part of RCA
Stent implantation

Stent implantation

distal 1/3 of RCA

proximal 1/3 of RCA

Express 3.5-16 mm, 13 atm, 21 secs

Express 4.0-20 mm, 13 atm, 21 secs
Final result after stent implantation

Stents are successfully implanted avoiding high pressure.
Final result after stent implantation

Post implantation angiogramm shows good result
IVUS after stent implantation

RCA mid ← RCA dist

RCA prox ← RCA mid

Measurement Table:

<table>
<thead>
<tr>
<th>Metric</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
<th>Min/Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumen</td>
<td>5.66</td>
<td>3.00</td>
<td>8.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Vessel</td>
<td>14.49</td>
<td>9.48</td>
<td>19.48</td>
<td>0.00</td>
</tr>
<tr>
<td>Stent</td>
<td>3.42</td>
<td>2.00</td>
<td>4.94</td>
<td>0.00</td>
</tr>
<tr>
<td>Plaque</td>
<td>5.43 (27.1% of Vessel)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>NIH</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mucosa</td>
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</tr>
</tbody>
</table>
6-month follow-up

The patient is free of symptoms

Minimal neointimal proliferation within both stents
6-month follow-up

**RCA prox**

**RCA mid**
6 - year follow-up

The patient is still free of symptoms
CARVING study: IVUS guided cutting balloon coronary intervention followed by stenting for long calcified lesions

- 64 consecutive patients (or 65 B2 and C type lesions, length ≥20 mm) were enrolled
- After CB intervention spot stenting (max 13 atm) for the most dissected areas was performed
- The CB and stent size was selected by IVUS measurements following the “media to media” treatment principle
- Clinical review after 30 days and 6 months angiographic and IVUS follow-up was performed
eICARVING study

70 Chronic Total Occlusions

- Baseline angio + IVUS
  (if not possible to cross with IVUS catheter after predilatation with small balloon)
- CB or RB intervention + IVUS
- DES deployment + IVUS
- Postdilatation + IVUS

Serial IVUS Minimum Lumen Area

- Angiographic restenosis – 13% in RB vs 8% in CB group
- TLR – 8% in RB vs 6% in CB group
- Re-occlusions 4 in each group
- No death during 9 mo f-up

Graph: Regular balloon (red) vs Cutting balloon (blue)
- After PCI
  - Regular balloon: 7.31
  - Cutting balloon: 7.04
- Follow-up
  - Regular balloon: 5.81
  - Cutting balloon: 5.85
- Late loss
  - Regular balloon: 1.37
  - Cutting balloon: 0.53

P=0.027
Patrick Serruys: Is the future bioabsorbable?

Our Hypothesis

• **IVUS guided plaque modification** before stent deployment may minimize arterial injury and subsequent neointimal proliferation and may prevent restenosis formation:
  
  ▪ it minimizes plaque shifting between main branch and side branch and thus helps avoiding side branch stenting
  ▪ it gives perfect stent apposition with reduced inflation pressure even if very long stents are deployed
  
  ▪ *in the future when bioabsorbable stents will be available it can be an essential tool to perform complete “vessel repair procedures”*