FFR in Bifurcations

Professor Keith G Oldroyd
West of Scotland Regional Heart & Lung Centre
Golden Jubilee National Hospital
Glasgow
Bifurcation Stenting
FFR < 0.75 vs QCA in Jailed Side Branches

FFR in Jailed Side Branches

Side branch results following main vessel stent

QCA (% stenosis)

FFR

Bellenger NG et al. Heart 2007; 93: 249-250
Pre-stenting %DS in SB to predict FFR ≤ 0.80 in jailed SB after stenting

Figure 1. FFR and Pre-Interventional DS of Side Branches

Incidence of side branches with fractional flow reserve (FFR) ≤0.80 after stent implantation according to angiographic diameter stenosis (DS) of the side branch before stent implantation in the main vessel.

FFR ≤ 0.80 vs QCA in Jailed Side Branches

Figure 2. FFR and Post-Interventional DS of Side Branches

Scatter plot comparing FFR and angiographic DS of the side branch after stent implantation in the main vessel. The lines represent 50% DS and an FFR of ≤0.80. Abbreviations as in Figure 1.

# Operator Assessment of Jailed SBs

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>PPV (%)</th>
<th>NPV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Diameter stenosis ≥ 75% by QCA</td>
<td>56.7</td>
<td>56.7</td>
<td>56.7</td>
<td>56.7</td>
</tr>
<tr>
<td>Ischemia-inducible lesion&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBC members</td>
<td>74.0</td>
<td>50.0</td>
<td>59.7</td>
<td>65.8</td>
</tr>
<tr>
<td>Korean experts</td>
<td>66.0</td>
<td>46.0</td>
<td>55.0</td>
<td>57.5</td>
</tr>
<tr>
<td>Trainees</td>
<td>54.0</td>
<td>48.0</td>
<td>50.9</td>
<td>51.1</td>
</tr>
<tr>
<td>Overall</td>
<td>64.7</td>
<td>48.0</td>
<td>55.4</td>
<td>57.6</td>
</tr>
<tr>
<td>% Diameter stenosis ≥ 75% by VE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBC members</td>
<td>60.0</td>
<td>50.0</td>
<td>54.5</td>
<td>55.6</td>
</tr>
<tr>
<td>Korean experts</td>
<td>80.0</td>
<td>26.0</td>
<td>51.9</td>
<td>56.5</td>
</tr>
<tr>
<td>Trainees</td>
<td>78.0</td>
<td>44.0</td>
<td>58.2</td>
<td>66.7</td>
</tr>
<tr>
<td>Overall</td>
<td>72.7</td>
<td>40.0</td>
<td>54.8</td>
<td>59.4</td>
</tr>
</tbody>
</table>

<sup>a</sup>From responses to the question of “Do you think this side-branch lesion will cause inducible myocardial ischemia?”

FFR, fractional flow reserve; QCA, quantitative coronary angiography; VE, visual estimation; PPV, positive predictive value; NPV, negative predictive value.
Nordic-Baltic III
FFR Sub-Study – index procedure

$r = -0.369$
$p = 0.001$

$R_{linear} = 0.136$
Figure 4. A) Mean FFR in SB after PCI. B) Mean FFR in SB at 8-month follow-up.
Nordic-Baltic III
FFR Sub-Study

FFR at index procedure vs. follow-up in the FKB D group

<table>
<thead>
<tr>
<th></th>
<th>After PCI</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=25</td>
<td>0.92</td>
<td>0.91</td>
</tr>
<tr>
<td>p=0.804</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FFR at index procedure vs. follow-up in the No-FKB D group

<table>
<thead>
<tr>
<th></th>
<th>After PCI</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=21</td>
<td>0.87</td>
<td>0.87</td>
</tr>
<tr>
<td>p=0.911</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

EuroIntervention 2012;7:1155-1161
Nordic-Baltic III
FFR Sub-Study

- Immediately post stenting
  - 6 lesions (19%) had FFR < 0.75; all in no FKBD
  - No FKBD predicted FFR < 0.75; p=0.006

- At 8/12 follow-up angiogram
  - 4 lesions (9%) had FFR < 0.75

- In patients with paired FFR data
  - 5/6 with initial FFR < 0.75 now had FFR > 0.80
  - 3 lesions FFR < 0.75
    - 1 in FKBD
    - 2 in no FKBD
JR – 5 weeks post PCI to LCx
JR – 5 weeks post PCI to LCx
JR – 5 weeks post PCI to LCx
JR – PW in OM1
JR - FKB
JR – Final Result
FFR in Bifurcations

• Time
• Contrast
• Complications
  – 83 patients in Nordic-Baltic III FFR Substudy
  – 3 FTC with PW
  – 5 dissections
• Cost
  – microcatheter
EBC 2013 Summary
FFR to Assess Jailed SBs

• Don’t jail the pressure wire.

• Pre-intervention SB-FFR is not helpful in predicting jailed SB-FFR

• SB-FFR reflects the functional significance of both the residual proximal MB disease and any SB ostial disease.

• The ischaemic burden is the issue so decisions to measure FFR should be focussed on large SBs.
  – ostial Cx post cross-over LM stenting
Thank You