Bifurcation PCI

T. Lefèvre, Massy, France
## Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

<table>
<thead>
<tr>
<th>Affiliation/Financial Relationship</th>
<th>Company</th>
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<tbody>
<tr>
<td>Grant/Research Support</td>
<td>Abbott, Astra Zeneca, BSc, Lily, Medtronic and Terumo</td>
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<tr>
<td>Consulting Fees/Honoraria</td>
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<tr>
<td>Major Stock Shareholder/Equity</td>
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<td>Royalty Income</td>
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<td>Ownership/Founder</td>
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<td>Intellectual Property Rights</td>
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<td>Other Financial Benefit</td>
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Percutaneous coronary intervention for coronary bifurcation disease: consensus from the first 10 years of the European Bifurcation Club meetings

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\textsuperscript{*}Corresponding author.
What is a Bifurcation?

A lesion occurring at, or adjacent to, a significant division of a major epicardial coronary artery.

A significant side branch is a side branch that the operator does not want to lose (evaluating the individual patient in a global context).
Structure-function scaling laws of vascular trees

Kassab et al. Eurointervention 2013; 8: 1461-3
The 3 Diameters Rule

Murray’s law

$$D_1^3 = D_2^3 + D_3^3$$

Finet’s law

$$D_1 = 0.678 \ (D_2 + D_3)$$

Adapted from Koo et al. EBC 2008
Carena is usually not diseased

- Virmani EBC 2007
- Oviedo et al. ACC 2008
- Nakazawa G, et al. JACC 2010
- Suarez de lezzo, Eurointervention 2011
Plaque shifting or carena shifting?

- Pre-intervention
- MB stenting
- Kissing balloon

Koo et al EBC 2008
SB ostial lesions are overestimated

Among 73 lesions with ≥75% stenosis by QCA, only 20 lesions were functionally significant.

Proximal Optimisation Technique
Proximal Optimisation Technique

Kissing balloon post dilatation + POT (Kaname®)
Provisional Side Branch Stenting Should Be the Default Approach

ESC/EACTS Guidelines 2014

ACC/AHA Guidelines 2011

EBC 2008 Consensus

Randomized DES studies

BMS Registries

DES Registries

EBC 2008 Consensus
BBC-Nordic: 5-year Death

Cox proportional hazards model stratified by study

BBC-Nordic I  5 year total death

p = 0.040

3.8% 7.0%

Number at risk
strategy = 0  443
strategy = 1  447

436  428  418  0
440  437  432  0

Two-stent  Provisional

Cox proportional hazards model stratified by study
## BBC-Nordic: 5-year Death

<table>
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<th>Simple N=457</th>
<th>Complex N=456</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>64±10</td>
<td>63±11</td>
<td>ns</td>
</tr>
<tr>
<td>”True” bifurcation (%)</td>
<td>69.4</td>
<td>74.3</td>
<td>ns</td>
</tr>
<tr>
<td>Procedure time (min)</td>
<td>58±27</td>
<td>77±35</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Contrast volume (mL)</td>
<td>244±109</td>
<td>300±130</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Fluoroscopy time (min.)</td>
<td>15±11</td>
<td>22±12</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Tx succesful* (%)</td>
<td>97.8</td>
<td>97.2</td>
<td>ns</td>
</tr>
<tr>
<td>Periprocedural MI (%)</td>
<td>3.5</td>
<td>9.9</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>TVR 9-months (%)</td>
<td>5.7</td>
<td>7.2</td>
<td>0.34</td>
</tr>
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</table>

* (Residual stenosis <30% of MV + TIMI flow III in SB)
Provisional Side Branch Stenting

TAP
(T & protrusion)

Culotte
One stent when we can

Optimal strategy for high success rate and low need for SB stenting

✓ Start with 2 wires
✓ Select the MB stent diameter according to the distal reference
✓ Liberal use of the POT technique
✓ When SB needs attention: FKB or POT/Side/POT
✓ Use NC balloons
One stent when we can

Optimal strategy for high success rate and low need for SB stenting

Two stents when needed

Develop strategies to make it easy, safe and effective
Lesions
1,0,0  1,1,0  0,1,0 Lesions
1,0,0  1,1,0  0,1,0 Lesions
Lesions
Lesions
0,1,1  1,01,  1,1,1  Lesions
0,1,1 1,0,1 1,1,1 Lesions
Lesions
0,1,1  1,0,1  1,1,1 Lesions
Lesions
0,1,1  1,0,1  1,1,1 Lesions
0,1,1  1,0,1  1,1,1 Lesions
0,1,1  1,0,1  1,1,1  Lesions
0,1,1  1,0,1  1,1,1 Lesions
0,1,1  1,0,1  1,1,1 Lesions
0,1,1  1,0,1  1,1,1 Lesions
0,1,1  1,0,1  1,1,1 Lesions
0,1,1  1,0,1  1,1,1  Lesions
0,1,1  1,0,1  1,1,1 Lesions
Main vessel stenting with provisional SB treatment is the preferred technique for most bifurcation lesions.

A two-stent technique may be considered up-front for bifurcations with large SB (ref. diameter ≥ 2.75 mm) and significant disease extending more than 5 mm into the SB. This also applies to the left main bifurcation.
Conclusion

✓ When a two-stent technique is needed, it can be safely done if the technique is optimal and FKB is performed.

✓ The preferred approach is MB stenting first

✓ SB stenting first may be used for safety reasons when SB access is challenging.
For more information:
EBC consensus, Eurointervention (2004 to 2014)
Bifurcation supplement, Eurointervention 2011
Updated bifurcation chapter, PCR-EAPCI textbook 2014
Back up slides
Provisional SB stenting (2009 vs 2005)  
2-years Outcome

Mylotte et al. JACC intervention 2012
Provisional SB stenting (2009 vs 2005)

2-years Outcome

Log-Rank P=0.02

MACE (%)

Patients at risk

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>2005 Patients</th>
<th>2009 Patients</th>
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<tr>
<td></td>
<td>0</td>
<td>300</td>
<td>300</td>
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<td>6</td>
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<td>24</td>
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<td>126</td>
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Provisional SB stenting (2009 vs 2005)
2-years Outcome

Log-Rank P=0.20

Ischemic TLR (%)

Patients at risk

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<tr>
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<tr>
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<tr>
<td>0</td>
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Mylotte et al. JACC intervention 2012
Provisional SB stenting (2009 vs 2005)

2-years Outcome

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<td>260</td>
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<td>132</td>
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</tbody>
</table>

- SB stenting: 9 vs 22% (p<0.001)
- POT: 36 vs 0% (p<0.001)
- NC balloons: 81 vs 0% (p<0.001)

Mylotte et al. JACC intervention 2012
Provisional vs SB first

Inverse probability weight

Cardiac death, MI & ST

- Side branch first (S)
- Main across side first (A)

Cumulative incidence (%)

- 3.8%
- 0%

Months after the index procedure

P = 0.013

Any man who can drive safely while kissing a pretty girl is simply not giving the kiss the attention it deserves.

— Albert Einstein
Kissing Recommandations

✓ Optional for simple techniques
✓ Obligatory for complex techniques
✓ SB inflated first
✓ Short balloons
✓ NC Balloons
✓ Long inflations
Start with 2 Wires

- Keep the SB open ?*
- Good Marker of the SB ostium
- Modified favorably the angle between MB and SB**
- Not working with 2 wires is a predictor of SB occlusion***
- Decrease the risk of TVR ***

* Colombo et al. personal communication, TCT 2008
** Louvard et al. TCT 2003
*** Brunel et al. TULIP Study, CCVI 2006
The 3 Diameters Rule

DM

DM' D1
The 3 Diameters Rule