Left Main PCI

TCTAP Seoul 2014

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Evolution of Bifurcation Therapy


Angio success  In-hospital MACE  12 month TVR

- Kissing balloons
- Provisional SB stenting
- Jailed wires
- POT
- Final kiss w NC balloons

BMS  DES  DES Gen 2

TCTAP 2014  Courtesy of T. Lefevre; EBC 2012
LM: How To Simplify

Standardized approach
Secured SB
Optimized technique (step by step)
Predictable technique
# Left Main Bifurcation PCI

**Table 3** 1-Year Outcomes in Left Main Patients Revascularized by PCI or CABG

<table>
<thead>
<tr>
<th>Endpoint</th>
<th>PCI (n = 809)</th>
<th>CABG (n = 802)</th>
<th>Absolute Difference (95% CI)</th>
<th>Number Needed to Treat</th>
<th>Number Needed to Harm</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACCE</td>
<td>14.5 (117/807)</td>
<td>11.8 (93/790)</td>
<td>2.7 (-0.6 to 6.0)</td>
<td>—</td>
<td>37</td>
<td>0.11</td>
</tr>
<tr>
<td>Death/MI/CVA</td>
<td>5.3 (35/655)</td>
<td>6.8 (43/636)</td>
<td>-1.5 (-4.1 to 1.2)</td>
<td>67</td>
<td>—</td>
<td>0.26</td>
</tr>
<tr>
<td>Death</td>
<td>3.0 (24/807)</td>
<td>4.1 (32/790)</td>
<td>-1.1 (-3.0 to 0.8)</td>
<td>91</td>
<td>—</td>
<td>0.29</td>
</tr>
<tr>
<td>MI</td>
<td>2.8 (23/807)</td>
<td>2.9 (23/790)</td>
<td>-0.1 (-1.8 to 1.6)</td>
<td>1,000</td>
<td>—</td>
<td>0.95</td>
</tr>
<tr>
<td>CVA</td>
<td>0.1 (1/707)</td>
<td>1.7 (12/689)</td>
<td>-1.6 (-2.9 to -0.6)</td>
<td>63</td>
<td>—</td>
<td>0.013</td>
</tr>
<tr>
<td>TVR</td>
<td>11.4 (92/807)</td>
<td>5.4 (43/790)</td>
<td>6.0 (3.3 to 8.7)</td>
<td>—</td>
<td>17</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**Death, Myocardial Infarction or Stroke**

- **Model**: Study name
- **Statistics for each study**: Odds ratio, Lower limit, Upper limit, p-Value
- **Events / Total**: Odds ratio and 95% CI
- **Favors PCI**: Favors CABG
Bifurcation Anatomy

Stepwise difference - range [0.23 - 1.42 mm]^{12}

$Q_0 = Q_1 + Q_2$

$D_0^3 = D_1^3 + D_2^3$

$D_0^{7/3} = D_1^{7/3} + D_2^{7/3}$

$D_0 = 0.678 * (D_1 + D_2)$

Law of flow (mass) conservation

Murray’s law (7)

HK 7/3 model (11)

Linear law (12) (epicardial coronary artery)

Provisional vs. Elective 2 Stent

- True bifurcation / side branch involvement
- Large myocardial areas perfused in LMCA disease
- Distal LMCA: Cx is frequently considered to be the “side branch”
- Will DEB help ? ?

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## Elective 2 Stent Techniques

<table>
<thead>
<tr>
<th></th>
<th>PRO</th>
<th>CON</th>
</tr>
</thead>
</table>
| **Modified T Stenting** | - Provide immediate patency of both branches.  
- Provide good coverage of SB ostium with limited deformity. | - Not optimal technique for Y bifurcations.  
- Requires wire/balloon re crossing of one branch. |
| **Mini Crush Stenting**  | - Provide immediate patency of both branches  
-- Can be used in a wide variety of bifurcation morphology. | - Not optimal technique for T bifurcations.  
- Potential for stent deformity at the SB ostium.  
- Requires wire / balloon re crossing of one branch which can be challenging due to metal multilayer. |
| **Culotte Stenting**   | - Provides the best coverage and the least strut deformity at the SB ostium. | - Not optimal in patients with:  
- Large mismatch between LM and LCX  
- Critical disease involving the LAD and LCX  
- One branch is unprotected during the procedure.  
- Requires rewiring of both branches.  
- Limited utility with closed cell design stents. |
| **V Stenting**         | - Preservation of patency and wire access to both branches at all stages. | - Best when LM disease is limited to the carina  
- Potential for asymmetric stent expansion. |
| **SKS**               | - Preservation of patency | - Creation of permanent new metal carina. |
# Tryton® Side Branch System

<table>
<thead>
<tr>
<th>Side Branch</th>
<th>Main Branch</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diameter (mm)</strong></td>
<td><strong>Diameter (mm)</strong></td>
</tr>
<tr>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>2.5</td>
<td>3.0</td>
</tr>
<tr>
<td>2.5</td>
<td>3.5</td>
</tr>
<tr>
<td>3.0</td>
<td>3.5</td>
</tr>
<tr>
<td>3.5</td>
<td>4.0</td>
</tr>
</tbody>
</table>

*Stent Length: 19mm*

**Zone 1 - Side Branch (SB)**

- 6.5mm

**Zone 2 - Transition**

- 4.5mm

**Zone 3 - Main Branch (MB)**

- 8mm

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Deployment: “Culotte” Sequence

Position Side Branch Stent

Deploy Side Branch Stent

Advance Wire into Main Branch

Position Main Vessel Stent

Kissing Post-Dilatation of Bifurcation

Procedure Complete
Acute procedural and six-month clinical outcome in patients treated with a dedicated bifurcation stent for left main stem disease: the TRYTON LM multicentre registry

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Guest Editor: Henning Kelbaek, MD, DMSc, Department of Cardiology and Cardiac Catheterization Laboratory, Rigshospitalet, University of Copenhagen, Copenhagen, Denmark.

Abstract

Aims: Tryton side branch (SB) reverse culotte stenting has been employed for the treatment of left main (LM) stem bifurcations in patients at high risk for bypass surgery. The aim of this study was to assess acute angiographic results and six-month clinical outcome after implantation of the Tryton stent in the LM.

Methods and results: We studied 42 consecutive patients with LM disease treated in nine European centres. Angiographic and clinical data analysis was performed centrally. Fifty-one of 52 patients (age 68±11 yrs, 75% male, 42% unstable angina, SYNTAX score 20±5) were successfully treated with the Tryton stent. Medina class was 1,1,1 in 33 (63%), 1,1,0 in 7 (13%), 1,0,1 in 3 (6%), 0,1,1 in 8 (15%) and 0,0,1 in 1 (2%). The Tryton stent on a stepped balloon (diameter 3.5-2.5 mm) was used in 41/51 (80%) of cases. The mean main vessel stent diameter was 3.4±0.4 mm with an everolimus-eluting stent employed in 30/51 (59%) of cases. Final kissing balloon dilatation was performed in 48/51 (94%). Acute gain was 1.52±0.86 mm in the LM and 0.92±0.47 mm in the SB. The angiographic success rate was 100%; the procedural success rate reached 94%. Periprocedural MI occurred in three patients. At six-month follow-up, the TLR rate was 12%, MACE 10% and cardiac death 2%. The hierarchical MACE rate at six months was 22%. No cases of definite stent thrombosis occurred.

Conclusions: The use of the Tryton stent for treatment of LM bifurcation disease in combination with a conventional drug-eluting stent is feasible and achieves an optimal angiographic result. Safety of the procedure and six-month outcome are acceptable in this high-risk lesion PCI. Further safety and efficacy studies with long-term outcome assessment of this strategy are warranted.

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Live Case TCT 2012

Left Main
Thank you