Stent Summit 2005
Bifurcation Lesions

A/Prof LIM YEAN TENG
MBBS, MMed (Int Med), MRCP(UK),
FAMS, FRCP, FACC, FSCAI
Senior Consultant
The Heart Institute @ National University Hospital
Chairman, Medical Board
National University Hospital
Bifurcation Lesions
- Side branch protection and stenting

- Not all side branches are created equal!
- While many side branches are protected during procedure for true bifurcation lesion, considerations for strategy to be employed during stenting is dependent on:
  - Location of the side branch
  - Size
  - Angle of origin
  - Presence of disease at ostium and length of lesion

How important is the branch!
Essentially,
the question in bifurcation stenting is
- one or two stents?
Simpler is better!

- Stent the main vessel in all cases, with provisional stenting for side branch
- Placing 2 stents is not better than one
- Stent design and stenting techniques do matter

Kiss before saying good-bye!
DES in bifurcation stenting
Cypher Bifurcation Stenting

* High cross-over rate from Stent + Balloon to Stent + Stent group (22/43, 51%)

**Cypher™ Bifurcation Feasibility Study**

**Site of Restenosis (17 cases)**

* Two cases with restenosis in both main and side branch

- **Stent + Stent**
  - 11
  - 1
  - 1
  - *2*

- **Stent + PTCA**
  - 3
  - *1*

**High restenosis rate (11/15) because of gap during stenting (uncovered part of the side branch ostium)**

My take from the study

- When bifurcation lesions can be treated with main vessel DES-stenting alone, the restenosis rate for main vessel is single digit, and side branch restenosis rate is in low teens.

- We may not get good enough result for the side branch using provisional stenting in about half the patients.

- Kissing balloon dilatation (disruption of DES stent architecture) does not lead to increase restenosis rate.

- The high incidence of restenosis of bifurcation lesion using T-stenting is due to “geographic miss” of side branch ostium during stenting.
The “default” strategy for bifurcation lesions for most interventionists is **Provisional Stenting**

- stenting of main vessel with kissing balloon inflation to the side branch
Alternatively, some choose to systematically use two stents.

Many techniques have been described:
- T-stenting / Modified T-stenting
- Crushing / Reverse-Crushing
- “Culotte” stenting (Y-stenting)
- V-stenting (“Kissing stents”)
- Skirt stenting
## DES Bifurcation Stent Crushing - Restenosis rate

<table>
<thead>
<tr>
<th></th>
<th>SIRIUS Bifur. (n=85)</th>
<th>Milan Experience (n=65)</th>
<th>RESEARCH (n=199)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Restenosis rate (%)</td>
<td>19</td>
<td>19.6 (no ks)</td>
<td>12.5</td>
</tr>
<tr>
<td>Main br.</td>
<td>5.7</td>
<td>9.2 (ks)</td>
<td>9</td>
</tr>
<tr>
<td>Side br.</td>
<td>14.8</td>
<td>4 (K) 8 (NK)</td>
<td>14</td>
</tr>
<tr>
<td>TLR/TVR (%)</td>
<td>10.5</td>
<td>18.6%</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>29 (NK) 7 (K)</td>
<td></td>
</tr>
</tbody>
</table>
Multiple DESs for bifurcation lesions

- Will safety be an issue?
Final Kissing Necessary during Crushing with DES?

In-Hospital Clinical Outcome

Crush with Cypher
- Final Kissing (n=27)
- No Final Kissing (n=38)

4.7% Q-AMI +

26% 24%

MACE
Non-Q MI

P=0.7

3.7% 5.2%
Stent thrombosis with Stent Crushing

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Milan</td>
<td>3.2 %</td>
</tr>
<tr>
<td>Lenox Hill</td>
<td>1.9 %</td>
</tr>
<tr>
<td>RESEARCH</td>
<td>2.5 %</td>
</tr>
</tbody>
</table>
Dedicated Bifurcation Stents

- The currently available stents are not designed to treat bifurcation lesions
- Because of this, many different stenting techniques are developed (improvisation), mainly to deal with ostial side branch recoil / lesion, or plaque shift as a result of “snow-plow” effect
- Very often side branch problem following main branch stenting is limited to the ostium only
Early Experience with dedicated bifurcation stents - 6 months TLR

- AST SLK-View stent
  - ASAN Medical Centre (2004) 45%

- Guidant Frontier stent
  - Lefevre (TCT 2003) 13%
  - NUH 16.7%
Dedicated Bifurcation Stents

AST
SLK

Frontier
We need drug-coated, dedicated bifurcation stents!
The AXXESS PLUS Trial

DEVAX Inc.
Proposed Approach to Bifurcation Lesions with DES in 2004

Side branch has ostial disease

- Yes
  - Sizable side branch
    - Accept sub-optimal SB result
    - Modified-T, Culotte, Reverse- or Mini- Crush stenting, followed by KB inflation
  - No
    - Main vessel stenting with provisional side branch stenting, followed by kissing balloon inflation if needed
Proposed Approach to Bifurcation Lesions with DES in 2004

Side branch has ostial disease

Sizable side branch (eg > 2.5mm)

- Balloon or Cutting balloon to main / side branch. Stent main vessel only, followed by KBT. Stent side branch only if necessary
- If two stents are deemed necessary – Culotte vs Crushing vs V-stenting vs T-stenting, followed by KB inflation
- Dedicated bifurcation stents

No

Side branch is < 2.5 mm

- Main branch stenting with provisional side branch stenting, followed by kissing balloon inflation