Coronary Bifurcation Lesions

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Definition:

Any $\geq 50\%$ stenosis adjacent ($\leq 5\, mm$) to and/or at the ostium of a side branch ($\geq 2\, mm$ of diameter)

Epidemiology:

15-20\% of all PCIs involve bifurcations of importance
Lower initial success rate
Higher restenosis rate
Higher thrombosis rate
**Stenting of Bifurcation Lesions**

- Mainvessel stenting ± sidebranch angioplasty
- (Provisional) T-stenting
- Y-stenting
- V-stenting
- Culotte-stenting
- Crush technique (reverse crush)
- Kissing stents
- Dedicated bifurcational stents
1 Stent is better than two stents (Plea for provisional T-Stenting)

BISCOR Registry n = 421

<table>
<thead>
<tr>
<th></th>
<th>6 mo TVR</th>
<th>6 mo MACE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>% of patients</td>
</tr>
<tr>
<td>Diabetes</td>
<td>18.4</td>
<td>26.2</td>
</tr>
<tr>
<td>single vessel disease</td>
<td>10.7</td>
<td>15.4</td>
</tr>
<tr>
<td>multiple vessel disease</td>
<td>21.4</td>
<td>29.0 *)</td>
</tr>
<tr>
<td>stent 1 branch</td>
<td>15.7</td>
<td>22.1</td>
</tr>
<tr>
<td>stent both branches</td>
<td>33.3</td>
<td>42.2 *)</td>
</tr>
<tr>
<td>Overall</td>
<td>17</td>
<td>22</td>
</tr>
</tbody>
</table>

*) p < 0.002

Rux...Kleber Am J Cardiol 2006; 98:1214
Survival free from MACE

Log-rank $P = 0.0028$

At-risk

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>0.5</th>
<th>1</th>
<th>1.5</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ostial or midshaft</td>
<td>334</td>
<td>259</td>
<td>194</td>
<td>125</td>
<td>100</td>
</tr>
<tr>
<td>Bifurcations, one stent</td>
<td>456</td>
<td>358</td>
<td>269</td>
<td>180</td>
<td>134</td>
</tr>
<tr>
<td>Bifurcations, two stents</td>
<td>317</td>
<td>227</td>
<td>164</td>
<td>121</td>
<td>102</td>
</tr>
</tbody>
</table>
General Practice

Provisional T-Stenting
About 1/3 of side branches „needs“ a second stent
Side branch access not always possible

Side branch access and main branch stent distortion are highly dependent on stent technology

DES are probably superior, however, stent design may play an even more important role

Latib Am Heart J 2008; 156: 745-50
Randomized Trials in Bifurcation Stenting support the concept of initial simple procedures with only provisional side branch stenting

Nordic I: provisional T stenting as good as systematic side branch stenting
Nordic II: Culotte better than Crush
Cactus: provisional T stenting not worse than crush
BBC ONE: step wise approach with provisional T stenting better than initial complex procedures
Bad Krozingen: no difference provisional vs systematic T
Double Kiss Crush Study: DK Crush better than conv. crush

Ferenc EHJ 2009; Chen J Interv Cardiol 2009; 22:121-27
View from proximal MV distally over side branch ostium after PTCA through stent mash

View from proximal main vessel into distal main vessel

Mortier Medical Engineering & Physics 2009;31:434-40
Coroflex®
Limitations of conventional bifurcation stenting

- stent material and design properties
- MV stent distortion by side access
- side branch and wire jailing
- side branch accessibility
- limitations in re-wiring, re-ballooning and stenting of SB-FKI with danger of dissection
- wire crossings
- inadequate location of re-wiring
- Incomplete coverage of bifurcational area
- complexity, duration and contrast and x ray exposure

Development of Dedicated Bifurcation Stents and other new Bifurcation Technologies
TriReme Antares Sidebranch Adaptive Stent
Zur Anzeige wird der QuickTime™ Dekompressor " benötigt.
Zur Anzeige wird der QuickTime™ Dekompressor „Dekompressor“ benötigt.
Zur Anzeige wird der QuickTime™ Dekompressor benötigt.
The Taxus Petal stent. A micro-computer...
Is a New Car a new car forever?

Is a drug eluting device, which elutes drugs for few weeks and serves for many years, correctly called a drug eluting stent, or better a polymer presenting metal mesh?
Bifurcations have an increased restenosis rate: Would you like to prevent restenosis by treating 15% of the vessel surface in the hope to achieve a good result in 100% of it.

Is it concise to make the metal surface of a stent smaller to decrease the rate of restenosis (ISAR trials) and to apply drugs by an as large as possible metal-polymer surface?
Total vessel surface coverage with drug is important, coverage with metal is not helpful.

Bifurcation Stenting has an increased thrombosis rate: Several layers of metal are not helpful, not even one single layer.
SeQuent® (uncoated balloon)

SeQuent® Please (coated balloon)
The Paclitaxel-Eluting PTCA-Balloon Catheter in Coronary Artery Disease
PEPCAD V-BIF

PI: F.X. Kleber, D. Mathey
Berlin/Hamburg, Germany

Core Lab/CEC: R. Degenhardt/M. Unverdorben
Rotenburg an der Fulda, Germany, Richmond, VA
Objective

Aim: feasibility of paclitaxel-eluting PTCA-balloon dilation (SeQuent® Please) followed by bare-metal stent (Coroflex®) deployment in MV

Inclusion Criteria:

- MV reference Ø ≥2.5 mm - ≤3.8 mm
- SB reference Ø ≥2.0 mm - ≤3.5 mm
- stenosis length in either branch ≤20 mm
- >70% de-novo-bifurcation stenoses
- any Medina classification type in native LCA
Study Design

- Prospective, non-randomized, dual-center, one-arm phase-II pilot study

Primary Variable

- Procedural success (main branch: $\leq 30\%$, side branch: $\leq 50\%$, TIMI Flow 3)

Secondary Variables

- In-segment late lumen loss at 9 months in either branch
- Acute ($\leq 24$hrs), subacute ($\leq 30$d), & late ($\geq 30$d) thrombosis
- MACE up to 3 years
- At 9 months in either branch…
  - percent in-stent/in-segment stenosis
  - in-stent/in-segment late loss & late loss index
  - binary in-stent/in-segment stenosis rate
Patients

- Age [years] 65 ± 10
- Male 69.6%
- BMI [kg/m²] 27.2 ± 3.4
- Serum cholesterol [mg/dl] 189.1 ± 43.5
- Serum LDL [mg/dl] 121.4 ± 40.7
- Diabetes mellitus 5.9%
- Current/ex-smokers 43.8%
- Hypertension 76.5%
- Family history of CAD 31.3%
- Previous myocardial infarction 11.8%
- Peripheral arterial occlusive disease 11.8%
- Serum creatinine [mg/dL] 0.8 ± 0.2
PEPCAD V – bifurcational lesions:
pilot study, 27 Pat. (66 ± 10 J., 69% male)

Location: LAD/Diag = 18, LCX/PLA = 9

Medina Classification:
- 29%
- 13%
- 34%
- 8%
- 4%
- 4%

Antiplatelet therapy: Aspirin 100 mg + 75 mg Clopidogrel for 3 months
Bifurcation stenosis
LAD/D2
BMS Implantation in MV (Coroflex, B. BRAUN)

07-02-2195_11
Stenosis at side branch ostium
PTCA of SB
Non-DEB
PEPCAD V: acute results

- Success rate 100 %
- BMS in main branch in 27/27
- BMS in side branch in 4/27 (14.8%)
PEPCAD V: acute results

30 days MACE: 0%
DEB LAD-D1 Bifurcation before and after PCI II
DEB LAD-D1 3 months after PCI II

Zur Anzeige wird der QuickTime™ Dekompressor „benötigt.
Thank you
Lunch Symposium Bbraun Sequent Please
1230 hr Opening Address by Dato’ Dr. Rosli Mohd Ali
1235 hr Not All Paclitaxel Drug Eluting Balloons Created Equal
Dr. Martin Unverdorben
1255 hr PEPCAP IV DM (Paclitaxel-eluting PTCA Cathether in Coronary Artery Disease IV – Diabetic Mellitus): Preliminary results
Dato’ Dr. Rosli Mohd Ali
1315 hr Future / Potential Use of Drug-Eluting Balloon – PEPCAP V Bifurcation
Prof. Dr. Franz X. Kleber 15-20 min
1335 hr Drug-Eluting Balloon in ST-Elevation MI: Preliminary results of the DEBAMI Trial
Dr. Victor Lim
1350 hr Q & A
1400 hr Closing
29.07.09
Dinner mit Film und Diskussion, Beispiele
30.07.09:
9.45 – 11.00 life session: panelist: bifurcation and ostial lesions
10.45-11.00 Vortrag: What is new in treating bifurcation lesions 15 min
11:15-12.30: panelist: LMS and CTO
12:30 sequent please lunch symp
15:30 operator life session in stent restenosis
21.30 abflug