Recent Data from Japanese Registry Study in Comparison between Everolimus-eluting Stent and Sirolimus-eluting Stent for the Bifurcation Lesion (J – REVERSE)

Yoshinobu Murasato¹, Yoshihisa Kinoshita², Toshiro Shinke³, Masahiro Yamawaki⁴, Yoshihiro Takeda⁵, Kenichi Fujii⁶, Shin-ichiro Yamada⁷, Yoshihisa Shimada⁸, Takehiro Yamashita⁹, Kazuhiko Yumoto¹⁰, Masaya Arikawa¹¹, Yoritaka Otsuka¹² and Masaki Tanabe¹³

On behalf of J-REVERSE investigators

1. New Yukuhashi Hospital, 2. Toyohashi Heart Center, 3. Kobe University, 4. Saiseikai Yokohama Eastern Hospital, 5. Rinku General Medical Center, 6. Hyogo Medical University, 7. Himeji Cardiovascular Center, 8. Shiroyama Hospital, 9. Hokkaido Ono Hospital, 10. Yokohama Rosai Hospital, 11. Oita Medical Center, 12. Fukuoka Wajiro Hospital, 13. The Second Okamoto Hospital
Purpose of the study

Study-1
To compare clinical outcome of provisional stenting between EES and SES deployment under the IVUS guidance.

Study-2
To investigate whether asymmetrical expansion in the bifurcation lesion leads to more disturbance of neointimalization.

Endpoints

Study-1
Major adverse cardiac events (MACE) during 9-mo F/U period
Death, Myocardial infarction, Target lesion revascularization (TLR), Target vessel revascularization (TVR), Stent thrombosis

Study-2
OCT abnormal findings (unevenness of intimal growth, uncovered struts, thrombus attachment)
J-REVERSE: Patient flow

Non-LM Bifurcation lesion
Provisional stenting
IVUS guided

≧75% stenosis in MV with /wo SB stenosis (≧75% )
Size: MV ≧ 2.5mm
SB ≧ 2mm
Lesion length < 46mm

EES 239 Ins
(Xience V / Promus)

KBT (+)
129 Ins

KBT (-)
110 Ins

KBT group
162pts, 163 lesions

SES 60 Ins
(Cypher select plus)

KBT (+)
34 Ins

KBT (-)
26 Ins

NKB group
136pts, 136 lesions

KBT performance: 55%

Exclusion
3pts, 3Ins

299pts, 302 lesions

9-mo F/U CAG completion:
132pts, 133 lesions (82%)

97pts, 97 lesions (71%)
J-REVERSE Study-2

KBT vs. non-KBT

Murasato Y, EBC 2010
### Baseline patient characteristics (1)

<table>
<thead>
<tr>
<th></th>
<th>KBT</th>
<th>NKB</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient No.</td>
<td>162</td>
<td>136</td>
<td></td>
</tr>
<tr>
<td>Lesion</td>
<td>163</td>
<td>136</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>67.6±8.5</td>
<td>67.6±10.0</td>
<td>0.990</td>
</tr>
<tr>
<td>Male gender, n (%)</td>
<td>131 80.4%</td>
<td>110 80.9%</td>
<td>1.000</td>
</tr>
<tr>
<td>Body mass index (Kg/m²)</td>
<td>23.6±3.3</td>
<td>24.1±3.1</td>
<td>0.199</td>
</tr>
<tr>
<td>Hypertension, n (%)</td>
<td>120 73.6%</td>
<td>109 80.1%</td>
<td>0.218</td>
</tr>
<tr>
<td>Dyslipidemia, n (%)</td>
<td>118 72.4%</td>
<td>100 73.5%</td>
<td>0.178</td>
</tr>
<tr>
<td>Statin, n (%)</td>
<td>95 58.3%</td>
<td>82 60.3%</td>
<td>0.813</td>
</tr>
<tr>
<td>LDL</td>
<td>110.1±31.8</td>
<td>108.1±31.4</td>
<td>0.589</td>
</tr>
<tr>
<td>Diabetes mellitus, n (%)</td>
<td>63 38.7%</td>
<td>69 50.7%</td>
<td>0.047</td>
</tr>
<tr>
<td>Insulin, n (%)</td>
<td>5  3.1%</td>
<td>14 10.3%</td>
<td>0.016</td>
</tr>
<tr>
<td>HbA1C</td>
<td>5.9±0.9</td>
<td>6.2±1.4</td>
<td>0.017</td>
</tr>
<tr>
<td>Current Smoker</td>
<td>48 29.4%</td>
<td>35 25.7%</td>
<td>0.518</td>
</tr>
</tbody>
</table>
## Baseline lesion characteristics

<table>
<thead>
<tr>
<th></th>
<th>KBT</th>
<th>Non-KBT</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diseased vessel</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1VD</td>
<td>91</td>
<td>55.8%</td>
<td>72</td>
</tr>
<tr>
<td>2VD</td>
<td>54</td>
<td>33.1%</td>
<td>36</td>
</tr>
<tr>
<td>3VD</td>
<td>18</td>
<td>11.0%</td>
<td>28</td>
</tr>
<tr>
<td><strong>Culprit vessel</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LAD</td>
<td>124</td>
<td>76.1%</td>
<td>90</td>
</tr>
<tr>
<td>LCX</td>
<td>23</td>
<td>14.1%</td>
<td>29</td>
</tr>
<tr>
<td>RCA</td>
<td>16</td>
<td>9.8%</td>
<td>17</td>
</tr>
</tbody>
</table>
# Procedural characteristics (2)

<table>
<thead>
<tr>
<th></th>
<th>KBT</th>
<th>NKB</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MV stent size</td>
<td>2.97±0.34</td>
<td>2.95±0.34</td>
<td>0.73</td>
</tr>
<tr>
<td>MV stent length</td>
<td>22.2±5.2</td>
<td>21.1±5.4</td>
<td>0.06</td>
</tr>
<tr>
<td>MV stent pressure</td>
<td>11.1±2.8</td>
<td>11.4±3.0</td>
<td>0.27</td>
</tr>
<tr>
<td>Additional MV stent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Additional MV stent size</td>
<td>3.07±0.37</td>
<td>2.90±0.30</td>
<td>0.07</td>
</tr>
<tr>
<td>Additional MV stent length</td>
<td>18.6±6.8</td>
<td>18.3±4.9</td>
<td>0.87</td>
</tr>
<tr>
<td>Additional MV stent pressure</td>
<td>12.2±2.7</td>
<td>11.3±2.7</td>
<td>0.20</td>
</tr>
<tr>
<td>Predilation balloon (MV)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predilation balloon size</td>
<td>2.64±0.42</td>
<td>2.62±0.40</td>
<td>0.68</td>
</tr>
<tr>
<td>Predilation balloon length</td>
<td>14.5±3.0</td>
<td>14.0±3.3</td>
<td>0.30</td>
</tr>
<tr>
<td>Predilation balloon (SB)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predilation balloon size</td>
<td>2.11±0.28</td>
<td>2.26±0.45</td>
<td>0.15</td>
</tr>
<tr>
<td>Predilation balloon length</td>
<td>13.8±2.0</td>
<td>14.0±3.2</td>
<td>0.69</td>
</tr>
</tbody>
</table>
QCU: Areal changes in MLA site

Prox MV

Dist MV

SB

- Plaque CSA
- Lumen CSA

※: p<0.05 vs. non-KBT

(pre) KBT  post

(pre) NKB  post

(pre) KBT  post

(pre) NKB  post

(pre) KBT  post

(pre) NKB  post
QCU: Asymmetric expansion induced by KBT

Stent Eccentric Index

% Lumen volume gain: prox MV vs. dist MV

P < 0.001
Procedure related complications

<table>
<thead>
<tr>
<th></th>
<th>KBT</th>
<th>Non-KBT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>12.9%</td>
<td>5.8%</td>
</tr>
<tr>
<td>MI</td>
<td>1.2%</td>
<td>1.5%</td>
</tr>
<tr>
<td>SB dissection</td>
<td>10.5%</td>
<td>1.5%</td>
</tr>
<tr>
<td>SB occlusion</td>
<td>1.2%</td>
<td>2.2%</td>
</tr>
<tr>
<td>SB stenting</td>
<td>5.6%</td>
<td>0.7%</td>
</tr>
<tr>
<td>MV or SB TIMI≤1</td>
<td>3.7%</td>
<td>0%</td>
</tr>
</tbody>
</table>

* P<0.05 vs. non-KBT
Major Adverse Cardiac Events (MACE) at 9Mo

- MI: KBT 0.6, Non-KBT 0.7
- Death: KBT 0.6, Non-KBT 0.0
- ST: KBT 0.6, Non-KBT 0.0
- TLR: KBT 4.9, Non-KBT 6.6
- TVR: KBT 5.5, Non-KBT 6.6
- Non-TV: KBT 4.9, Non-KBT 7.4
MACE: TLR

Location of TLR

MV: 15 cases, SB: 2 cases

Type of restenosis

- Focal: 15 cases
- Diffuse: 2 cases

Treatment

- DES: 10 cases
- POBA: 7 cases

MV edge restenosis

- KBT: 5/6
- NKB: 1/9 (P<0.05)
QCA: Binary restenosis in bifurcation area

Prox MV Dist MV

KBT Non-KBT

5mm 5mm 5mm

P<0.05

15.2 42.1

SB
% Diameter stenosis

**KBT**
※: p<0.05 vs. pre PCI
†: p<0.05 vs. post PCI
‡: p<0.05 vs. non-KBT

**Non-KBT**
- MB prox
- MB dist
- SB

Late loss

- MV prox
- MV dist
- SB

※
※
※
※
※
†
†
†
†
‡
‡
‡
QCA: Minimum lumen diameter
Cumulative distribution curve

**EBC**

**KBT**

Prox MV
Dist MV
SB

**Non-KBT**

(mm)

pre PCI
post PCI
F/U
SES + KBT

IVUS: ViewIt
Proximal MV

Distal MV
3Y F/U CAG

Pre PCI  Post PCI  9mo  3Y
OCT @ 3-year F/U
Late malapposition was observed only in the overdilated proximal MV.

Overexpansion by KBT
- Destruction or degradation of internal elastic lamina
- Persistent inflammation
- Ectasic degeneration
EES + KBT

IVUS: ViewIt
EES + KBT

Xience V 3.5/23
KBT: Hiryu 3.5/15
i-BP22 2.75/15
Time course of resolution of vasospasm around the stent

9mo  15mo  3Y

Overexpansion might be related to vasospasm induced by persistent inflammation.
The EES has a potential to sedate inflammation even in the overdilated area.
Conclusion

• The KBT induced more SB dissection required stenting and asymmetrical stent expansion in the proximal MV, however, it led to maintaining lower SB stenosis and larger proximal MV lumen during the 9-month F/U period without any increase in MACE.

• Asymmetric or overexpansion induced by KBT has a potential to generate more intimal disturbance in the long-term F/U period.
J-REVERSE Study-1

EES vs. SES
MACE: Composite endpoint of MI, death, ST, and TVR
MACE: TLR

MV 15 cases, SB 2 cases

EES NKBT  EES KBT  SES NKBT  SES KBT
QCA: Binary restenosis in bifurcation area

Prox MV

Dist MV

EES

SES

SB

(%)

5mm

5mm

5mm

0

0,6

1,7

26,0

28,9

10

20

30