Very late stent thrombosis with stent fracture and stent recoil after drug-eluting stent implantation

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Background

• It was reported that stent fracture could be a potential risk factor of stent thrombosis.
• We experienced a case of very late stent thrombosis (VLST) after paclitaxel-eluting stent implantation.
• VLST might have been influenced by stent fracture and stent recoil in this case.
Stent Fracture (SF)
SF was defined as apparent strut separation by CAG.

Stent Recoil (SR)
SR was defined as axial recoil less than 80% of stent diameter by CAG.

Distance:
- Reference : a
- SF site : b
- SR : $b \leq 0.8 \times a$
Male patient in his 80s

【Present Illness】
• Dec. 1986  AMI RCA seg.3 POBA
• Jun. 1992  AMI RCA seg.1 POBA
• Nov. 1992  AP LCX seg.13 POBA, LAD seg.7 POBA
• Feb. 2009  RCA CTO seg.1-seg.3 Taxus × 3, seg.4PD Cypher
• May. 2009  f/u CAG 3Mo; ISR(-)
• Sep. 2010  transferred to our hospital due to acute chest pain

【Medical History】 ASO
【Coronary Risk Factor】 HT(+), HL(+)
【Medication】 Aspirin 100 mg, Clopidogrel 75 mg, Cilostazol 200 mg
Imaging test

【electrocardiogram】
HR 76/min, Q wave in III,
ST depression in aVL, V2-6

【chest X-ray】 cardiomegaly (+), congestion (-)

【echocardiogram】
regional wall motion abnormality in the RCA territory with severe LV systolic dysfunction (LVEF=30%)
## Blood test

### Biochemistry

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HbA1c</strong></td>
<td>4.9 %</td>
</tr>
<tr>
<td><strong>CRP</strong></td>
<td>0.04 mg/dl</td>
</tr>
<tr>
<td><strong>TP</strong></td>
<td>6.5 g/dl</td>
</tr>
<tr>
<td><strong>Alb</strong></td>
<td>3.8 g/dl</td>
</tr>
<tr>
<td><strong>T-BIL</strong></td>
<td>0.3 mg/dl</td>
</tr>
<tr>
<td><strong>AST(GOT)</strong></td>
<td>20 IU/l</td>
</tr>
<tr>
<td><strong>ALT(GPT)</strong></td>
<td>12 IU/l</td>
</tr>
<tr>
<td><strong>LDH</strong></td>
<td>166 IU/l</td>
</tr>
<tr>
<td><strong>ALP</strong></td>
<td>157 IU/l</td>
</tr>
<tr>
<td><strong>γ-GTP</strong></td>
<td>27 IU/l</td>
</tr>
<tr>
<td><strong>UA</strong></td>
<td>7.7 mg/dl</td>
</tr>
<tr>
<td><strong>Cr</strong></td>
<td>1.57 mg/dl</td>
</tr>
<tr>
<td><strong>BUN</strong></td>
<td>22 mg/dl</td>
</tr>
<tr>
<td><strong>Na</strong></td>
<td>140 mEq/l</td>
</tr>
<tr>
<td><strong>K</strong></td>
<td>3.0 mEq/l</td>
</tr>
<tr>
<td><strong>Cl</strong></td>
<td>102 mEq/l</td>
</tr>
<tr>
<td><strong>CK(CPK)</strong></td>
<td>66 IU/l</td>
</tr>
<tr>
<td><strong>CK-MB</strong></td>
<td>4.1 IU/l</td>
</tr>
<tr>
<td><strong>TCH</strong></td>
<td>139 mg/dl</td>
</tr>
<tr>
<td><strong>TG</strong></td>
<td>79 mg/dl</td>
</tr>
<tr>
<td><strong>HDL-C</strong></td>
<td>39 mg/dl</td>
</tr>
<tr>
<td><strong>LDL-F</strong></td>
<td>84 mg/dl</td>
</tr>
<tr>
<td><strong>non HDL-C</strong></td>
<td>100 mg/dl</td>
</tr>
<tr>
<td><strong>BNP</strong></td>
<td>221 pg/ml</td>
</tr>
</tbody>
</table>

### Blood Count

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RBC</strong></td>
<td>2.97 X10^6/μl</td>
</tr>
<tr>
<td><strong>Ht</strong></td>
<td>28.3 %</td>
</tr>
<tr>
<td><strong>Hb</strong></td>
<td>9.2 g/dl</td>
</tr>
<tr>
<td><strong>WBC</strong></td>
<td>7.5 X10^3/μl</td>
</tr>
<tr>
<td><strong>PLT</strong></td>
<td>18.8 X10^4/μl</td>
</tr>
</tbody>
</table>
PCI for RCA CTO

Total occlusion in the proximal RCA
Collateral vessels from the LCA
PCI for RCA CTO

Seg.4PD  SES 2.5 × 18mm

Seg.3    PES 2.75 × 32mm

Seg.2    PES 3.0 × 32mm

Seg.1    PES 3.5 × 32mm
PCI for RCA CTO Post
3-m f/u CAG

New stenotic lesion(-), In-stent restenosis(-)
VLST 19-m after PCI for RCA

Thrombus aspiration → rich red thrombus

RCA ostium total occlusion

After 1st aspiration

After 2nd aspiration
VLST 19-m after PCI for RCA

Focus image shows SF and SR
Irregular contour of intravascular lumen at the especially proximal site.
IVUS

1. Stent recoil
2. Stent fracture
3. [Images of IVUS findings]
IVUS

1. Stent recoil
2. Stent fracture
3. Stent strut

NOT CALIBRATED

stent strut
VLST Post

RCA  seg.1 → Xience V stent
optimal stent dilation after stenting
The mean number of eosinophils per high-power field was 10 ± 5.
Summary

- We experienced a case of VLST after drug-eluting stent implantation.
- CAG showed the total occlusion at the RCA ostium. In this site, stent fracture and stent recoil were observed by IVUS.
- After stenting, IVUS showed the optimal stent dilation again.
- Histopathological analysis showed pieces of fresh thrombus with eosinophils. The number of eosinophils was similar to that of PES thrombosis which had been previously reported.
- Although follow-up CAG was not performed after PCI because of renal dysfunction, stress myocardial scintigraphy in May 2011 did not show cardiac ischemia.
Speculation

- A previous pathological analysis has reported that stent fracture had a significant impact on the occurrence of stent thrombosis.
- Stent fracture and stent recoil increase the risk of stent thrombosis due to free metal struts protruding into the vessel lumen and triggering off inflammatory responses, as seen in this case.
Conclusion

- Although the effects of stent fracture and stent recoil leading to stent thrombosis were uncertain, histopathological analysis of aspiration thrombus showed that the cause of VLST might be related to inflammatory reaction in this case.