TCT-539

The longitudinal elongation of the contemporary drug eluting stent in a tapered bench-top model
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Background: The characteristics of new generation drug eluting stents (DES) are the combination of thinner struts and fewer connectors. These may affect longitudinal stent deformation. In tapered vessels, a diameter mismatch between vessel and stent at the proximal edge could lead to longitudinal stent elongation after fully stent expansion. The aim of this study was to analyze the longitudinal integrity among different DESs.

Methods: Six different DESs (Cypher select, Taxus Liberte, Xience V, Nobori, Taxus Element, and Endeavor) were examined using a tapered bench-top silicon model. The diameter of each stents is 3.5mm and the length is 23 or 24mm. The proximal stent edge was adjusted to 5mm away from the marker point of 4.0mm in diameter. First, every stents were deployed at nominal pressure. Second, they were dilated with the 4.0mm diameter non-compliant balloon at 10atm and 20atm at the same condition. Intravascular ultrasound was used to measure the luminal diameter and microscope was used to measure the longitudinal stent length of their overall, the length from the marker point to the proximal stent edge, and the uniformity of stent struts was evaluated. We used each three stents and their data were averaged.

Results: Results show the table. The uniformity of stent struts were not kept in Taxus Element stent.

<table>
<thead>
<tr>
<th>DES</th>
<th>pre deploy</th>
<th>stent deploy</th>
<th>post balloon dilatation at 10atm</th>
<th>post balloon dilatation at 20atm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cypher select</td>
<td>0.56 ± 0.02</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
</tr>
<tr>
<td>Taxus Liberte</td>
<td>0.56 ± 0.02</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
</tr>
<tr>
<td>Xience V</td>
<td>0.56 ± 0.02</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
</tr>
<tr>
<td>Nobori</td>
<td>0.56 ± 0.02</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
</tr>
<tr>
<td>Taxus Element</td>
<td>0.56 ± 0.02</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
</tr>
<tr>
<td>Endeavor</td>
<td>0.56 ± 0.02</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
<td>0.65 ± 0.21</td>
</tr>
</tbody>
</table>

Conclusions: Old generation DESs have more longitudinal strength than new generation DESs. On the other hand, new generation DESs showed longitudinal stent elongation. We should be careful when we use a new generation DESs, such as Xience V and Taxus Element, for the treatment of the ostial lesion.

TCT-540

Longitudinal Drug Eluting Stent Elongation Phenomenon due to high pressure additional dilatation: Insights from bench testing
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Background: Recently, stent longitudinal deformation is becoming to be one of the clinical issue. The objective of this study was to evaluate how post stent dilatation with large balloon has an impact on stent elongation.

Methods: A Silicon tube model was used. Two types of drug eluting stents (Taxus Element 3.0mm, Boston scientific, Massachusetts and Nobori 3.0mm, Terumo, Tokyo) were deployed into the model as follows; 10mm of one side of the stent was attached to the model wall and the 10mm on the opposite side of the stent was free from the vessel wall (shown in Fig. 1). Then, in both types of stents, post stent dilatation was performed with three different types of 3.5mm balloon at rated balloon pressure as shown in Fig. 2. A total of 6 stents were tested, and stent length were measured before and after post stent dilatation, difference of degree of stent elongation between stent types and balloon types were measured.

Results: Stent elongation was observed in all stents, and the length of the stent free from the model wall before and after post stent dilatation was 10.09 ± 0.26mm and 11.51 ± 0.66mm, respectively. There were no significant difference between the lengths of the two types of stents (1.61 ± 0.58 and 1.27 ± 0.12, p = 0.36), but significant difference between the three types of post stent balloons were found (1.11 ± 0.02 and 1.12 ± 0.00 and 1.19 ± 0.04, p = 0.0063).

Conclusions: Stent elongation after post stent dilatation was observed in this ex vivo model. Stent elongation after post stent dilatation may be influenced not only by stent type but also the type of balloon used in post stent dilatation.

TCT-541

Coronary Computered Tomography for Systematic Screening of Coronary Stent Fractures in Patients at High Risk
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Background: Stent fractures (SFs) contribute to in-stent-restenosis and life-threatening complications. Coronary computed tomography (CCT) may be an appropriate method for the detection of a SF. Aim: This study prospectively evaluated the incidence of SFs in high-risk patients using CCT and assessed the clinical relevance of this finding using catheter coronary angiography (CCA).

Methods: Patients with two or more risk factors for a SF defined as (1) stent length ≥28 mm, (2) overlapping stents, (3) stent localization in the right coronary artery, or saphenous vein graft and (4) vessel angulation ≥75° before implantation or stent angulation ≥45° after implantation were invited to undergo a CCT 6 months after the procedure. To differentiate between SF and overlap failure all stents were identified on the CCT image by measuring the distance between edges and comparing these measurements with the known stent lengths. A CCA was recommended in patients with a stent gap. Patients without stent gap but with pathological findings in the CCT who underwent CCA served as controls.

Results: In 14 out of 41 patients (34%) coronary CCT revealed a stent gap including 8 patients with a SF (20%) and 6 patients with an overlap failure (15%). In the following CCA all stent gaps were confirmed by optical coherence tomography. A clinically relevant stent-related pathology could be detected in 4 out of 8 patients (50%) with SF (in-stent-restenosis in two patients, chronic total occlusion and coronary aneurysm in one patient, respectively), but in none out of 7 controls (chi-square p = 0.001).

Conclusions: Stent gaps are frequent in high-risk patients. The majority of these gaps result from a SF, which is often associated with a clinically relevant pathology. Therefore, screening for SFs using CCT in high-risk patients might be beneficial.

TCT-542

Axial Integrity of Coronary Stents: Evaluation Using Intravascular Ultrasound
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Background: Longitudinal stent deformation (i.e. the axial shortening or lengthening of a stent after implantation) is increasingly being reported. However, the axial integrity of stents has not been systematically studied using intravascular ultrasound (IVUS).

TUESDAY, OCTOBER 23, 8:00 AM–10:00 AM www.jacc.tctabstracts2012.com
Conclusions:

We report for the first time a specific pattern of stent strut fracture in everolimus-eluting stents (EES).

Methods: We retrospectively analyzed 439 consecutive stented lesions in 364 pts who underwent intravascular ultrasound (IVUS) during EES follow-up from January 2011 to February 2012.

Results: EES fractures were observed in 13 Xience V stents in 9 RCAs, 3 SVGs, and 1 LAD; 7 stent fractures (53.8%) were located near the ostium. Two layers of stent struts were present within the length of a single stent in 11 of 13 stent fractures (84.6%), indicating that fracture was followed by partial longitudinal stent overlap (Figure). By IVUS, a 10.7% smaller stent area was observed at the fractured site compared to the adjacent non-fracture site. Focal in-stent restenosis (defined as an in-stent minimum lumen area < 4mm² that was <10mm in length) was observed at 12 fractured sites (92%); and cardiac events occurred in 12 pts (92%: 2 NSTEMI without angiographic thrombus and 12 target lesion revascularizations).

Conclusions: Partial strut fracture with Xience V EES may result in overlap of the stent edges proximal and distal to the site of fracture.

TCT-543
Partial strut fracture in everolimus-eluting stents: An intravascular ultrasound study
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TCT-544
Case Series of 100 cases of longitudinal stent Deformation
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Background: Case series have reported LSD associated with a range mechanisms, platforms and clinical events. To further elucidate mechanisms we amalgamated published reports with additional unpublished cases.

Methods: We reviewed reports and angiographic images from 38 cases from 6 centres. An additional, 5 published cases and procedural details from 57 cases published from the MAUDE database were included. 20 published cases were excluded due to insufficient details.

Results: In 100 cases, LSD most commonly involved LAD and RCA interventions (38 and 34 cases) and LMS intervention (13 cases) and less commonly circumflex and graft interventions (5 and 8 cases). LSD was associated with the Element type platform in 78 cases and associated with Driver/Endovar, Biomatrix/Nobori, Resolute, Xience, and Cypher platforms in 7, 4, 3, 3, 3 cases. The mechanism of LSD was identified in 78 cases. LSD of the proximal stent was induced by the guide catheter in 25 cases (35%), re-entry by a balloon catheter in 30 cases, and other equipment in 3 cases. LSD of the distal stent was induced by equipment withdrawal in 20 cases (25 %) involving IVUS catheters, filter devices, previously inflated balloons, trapped wires. Several cases of distal LSD involved secondary guide induced proximal LSD when the guide was sucked in. Treatment involved further stenting or reballoning in 66 and 22 cases; with 12 cases that were not re-expanded. Adverse procedural outcome involving emergency CABG was reported in 2 cases, and stent thrombosis in 5 cases.

Conclusions: The commonest mechanism causing LSD were guide catheter contact and postdilation balloon re-entry, with a further 25 cases caused by equipment withdrawal. LSD occurred uncommonly with circumflex and graft interventions. It was successfully treated by reballoning and/or restenting in most cases, but with a 7% incidence of MACCE. The commonest distal stent platform was the element type platform.

TCT-545
The impact of sirolimus-eluting stent and evololimus-eluting stent on the in-stent restenosis and late stent thrombosis
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Background: The clinical implication of PSS after EES implantation was quite different between SES and DES.

Results: The incidence of in-stent restenosis and stent fracture among the lesions with diagnosis of PSS was compared between SES and DES.

Conclusions: The clinical implication of PSS after EES implantation was quite different from those of SES implantation.