TCT-382
Safety and Feasibility of Optical Coherence Tomography: A Single Center Experience
Jorn van der SlieTe1, Antonios Karamanou2, Gijs van Soest1, Nicolas M. Van Mieghem1, Peter De Jaegere2, Robert J. Van Geuns3, Roberto Diletti5, Felix Zijlstra1, Ron Van Domburg2, Evelyn Regar4
1Thoraxcenter, Erasmus MC, Rotterdam, Zuid-Holland, 2Thoraxcenter, Erasmus MC, Rotterdam, Zuid-Holland, 3Thoraxcenter, Erasmus MC, Rotterdam, Netherlands, 4Thoraxcenter, Erasmus Medical Center, Rotterdam, Rotterdam, Rotterdam, Netherlands, 5Thoraxcenter, Rotterdam, The Netherlands, 6Thoraxcenter, Rotterdam, Netherlands, 7Thoraxcenter, Rotterdam, Netherlands

Background: Optical coherence tomography (OCT) is increasingly used in the catheterization laboratory. Previous smaller studies have reported the safety of OCT in different clinical settings, however large datasets are still lacking. We report safety of intracoronary Fourier Domain OCT (FD-OCT) imaging in a real world series of consecutive patients that underwent OCT during coronary catheterization in our center.

Methods: Prospective, single center registry in patients scheduled for coronary angiography or intervention (n=1,157) undergoing intracoronary OCT between April 2008 and December 2013. In total, 3,076 pullbacks were performed with 7 different OCT-systems. Any complication that occurred during or within the immediate 24-hour period following OCT examination was registered and classified as either procedure or OCT-related event (self-limiting, requiring action or major adverse event). FD-OCT was performed during continuous intracoronary flushing with x-ray contrast through the guide catheter using an injector pump (flow rate 3-4ml/sec). A bolus of intracoronary nitroglycerine was routinely administered before introduction of the OCT catheter into the coronary artery.

Results: OCT was performed in an unselected group of patients with the only exclusion criteria of acute life-threatening hemodynamic instability and extensive calcification (Table 1). OCT imaging was successfully performed in all patients. There were 47 angiographic adverse findings related to the catheterization and/or PCI procedure and no major adverse cardiac events were related to OCT imaging. Nine different events were directly related to OCT imaging, but all were considered self-limiting or easily treatable. The event rate was 0.8% per patient and 0.3% per pullback.

Table 1. Patient characteristics and complication overview. * All transient. LAD: left anterior descending artery; LCX: left circumflex artery; RCA: right coronary artery.

<table>
<thead>
<tr>
<th>Indicators of catheterization</th>
<th>n = 1,157 (%)</th>
<th>Imaged vessel</th>
<th>Pullbacks, n = 3,076 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stable angiography</td>
<td>435 (37.6)</td>
<td>LAD</td>
<td>1,152 (44.5)</td>
</tr>
<tr>
<td>Unstable angina</td>
<td>180 (15.6)</td>
<td>Cs</td>
<td>767 (25.7)</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>379 (32.9)</td>
<td>RCA</td>
<td>846 (27.5)</td>
</tr>
<tr>
<td>Follow-up</td>
<td>125 (10.8)</td>
<td>Other</td>
<td>172 (5.6)</td>
</tr>
<tr>
<td>Other</td>
<td>38 (3.3)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Procedure related complications: OCT related complications*

| Dissection                    | 36 (3.1)     | ST elevation  | 3 (0.3)     |
| Perforation                   | 0            | Bradycardia   | 1 (0.1)     |
| Vessel occlusion              | 0            | Dissection    | 0           |
| Sidebranch occlusion          | 5 (0.4)      | Perforation   | 0           |
| No reflow (including TIMI-II flow) | 6 (0.5)  | Coronary spasm| 4 (0.3)     |

Conclusions: OCT is safe and feasible in unselected patients. Imaging related events were scarce, self-limiting or easily treatable, and transient.

TCT-383
Long-term Vascular Response to Biodegradable Polymer Biolimus-Eluting Stents in Comparison With Durable Polymer Sirolimus-Eluting Stents and Bare-Metal Stents: Five-year Follow-up Optical Coherence Tomography Study
Shoichi Karamatsu1, Shinji Sonoda2, Taketori Domei3, Shinichi Shirai1, Kenji Ando1,1 Kokura Memorial Hospital, Kitakyushu, Japan, 2University of Occupational and Environmental Health, Kitakyushu, Japan, 3Kokura Memorial Hospital, Kitakyushu, Fukuoka, 4Kokura Memorial Hospital, Kitakyushu, Fukuoka, 5Kokura memorial hospital, Kitakyushu, Japan

Background: Long-term vessel response after biodegradable polymer biolimus-eluting stents (BES) implantation remains unclear. We sought to evaluate the vascular response of biodegradable polymer BES at 5 years after stent implantation using optical coherence tomography (OCT) as compared with that of durable polymer sirolimus-eluting stents (SES) and bare-metal stents (BMS).

Methods: Five-year follow-up OCT was performed in 30 patients with 33 stents (10 with 12 BES; 10 with 11 SES; 10 with 10 BMS). Quantitative parameters and qualitative characteristics of the neointima were evaluated.

Results: A total of 5,178 struts (BES, n=2,056; SES, n=1,110; BMS, n=1,712) were analyzed. The percentage of uncovered struts was 0.7% of the BES group, which was significantly lower and higher than that of the SES and BMS groups (3.8% and 0.0% P<0.001, respectively). Malapposed struts in the BES group were significantly lower than the SES group (0.2% vs. 2.4%, P<0.001), whereas they did not differ from the BMS group (0.2% vs. 0.0%, P=0.439). Cross-sectional qualitative analysis of neointimal tissue showed that the frequency of lipid-laden neointima was significantly lower in the BES group than the SES group (6.3% vs. 13.9%, P=0.031), and similar to the BMS group (6.3% vs. 5.2%, P=0.83).

Conclusions: Biodegradable polymer BES shows a favorable vascular response compared to SES, but slightly different response from BMS at 5-year follow-up. The observed frequency of in-stent neatherosclerosis within BES is similar to SES and significantly lower than SES, which may be due to the difference of polymer between BES and SES.

TCT-384
Effect of Ezetimibe in addition to Statin Therapy in statin naïve STEMI patients assessed by Optical Coherence Tomography and Intravascular Ultrasound with iMap (The OTCIVUS trial
Mikkel Hougaard1, Henrik S. Hansen, Anders Junker1, Per Thayssen2, Lisbeth Antonsen3, Aiko Maehara4, Lisette Okkel Jensen1
1Department of Cardiology, Odense University Hospital, Odense, Denmark, 2Cardiovascular Research Foundation and Columbia University Medical Center, New York, United States

Background: The benefits of statin treatment in ischemic heart disease and its ability to induce plaque regression assessed by intravascular ultrasound (IVUS) are well established. Further reduction in levels of Low Density Lipoproteins (LDL) can be obtained by additional treatment with the cholesterol absorption inhibitor Ezetimibe, but its clinical significance has yet to be determined. The aim of the OTCIVUS study was to examine the optical coherence tomography (OCT) and intravascular ultrasound (IVUS) with iMap changes in plaque composition and volume of atorvastatin, as monotherapy and in combination with Ezetimibe, in patients with ST-segment elevation myocardial infarction.

Methods: The OTCIVUS trial (ClinicalTrials.gov ID: NCT01385631) is a single center prospective double blinded randomized trial designed to determine the change in plaque volume and composition using IVUS with iMap and OCT. Statin naïve patients with STEMI were randomized to receive atorvastatin (80 mg) as monotherapy or atorvastatin 80 mg in combination with Ezetimibe 10 mg, and underwent IVUS with iMap and OCT at baseline (n = 86) and study completion at 12 months (n = 82).

Results: The overall study cohort is as follows: Mean age: 56.2 years ± 10.1 years, male gender: n = 74 (86%), Mean BMI: 27.7 ± 4.5 kg/m², family history of ischemic heart disease: n = 41 (47.7%), hypertension: n = 54 (64%), diabetes mellitus: n = 2 (2.4%), smokers: n = 48 (55.8%) and diabetes mellitus: n = 2 (23.2%). The distribution between groups cannot be assessed until unblinding. Endpoint results are presented at TCT 2014.

Conclusions: The high resolution of OCT in conjunction with the histologic classification (iMap) enables a more detailed assessment of vulnerable plaque features, such as fibroatheroma cap thickness, necrotic core and the presence of macrophages and cholesterol crystals. An improvement in these parameters might be a useful indicator of the possible clinical benefits in real world patient treatment.

TCT-385
Association of Target Lesion Coronary Caiification with Stent Expansion and Eccentricity: An Optical Coherence Tomography Study
Yuhei Kobayashi1, Teryoishy Kame1, Ryutarou Yamada2, Yukari Kobayashi1, Kenzo Fukuhara1, Terunasa Koyama1, Yoji Neishi1, Hiroyuki Okura1
1Kokura Memorial hospital, Kitakyushu, Japan

Background: Although target lesion calcification negatively affects stent expansion, previous IVUS studies failed to demonstrate a relationship between stent expansion and the amount of coronary calcium. Optical coherence tomography (OCT) offers better quantitative assessment of coronary calcium than IVUS, and therefore may have potential to predict stent expansion.

Methods: 51 de novo native coronary artery lesions treated by single 2nd generation drug-eluting stent (DES) were enrolled. Prior to intervention, arc and area of calcium at the largest calcification site were measured using OCT. After stent implantation, OCT imaging was repeated to assess minimum stent diameter and area (MSD and MSA). Stent expansion was defined as MSD (or MSA) divided by the values predicted by the compliance charts. Stent eccentricity was calculated using MSD (or MSA). Stent eccentricity was divided into 4 groups according to the median values of arc and area of calcium.

Results: Arc of calcium was associated with stent expansion defined by MSD (r = 0.01) and MSA (p=0.02). Area of calcium was also associated with stent expansion defined by MSA (p=0.01) but not statistically significant with MSA.
Conclusions: The amount of coronary calcium as assessed by OCT may predict stent expansion. Area of calcium appers to be a contributing factor for eccentric stent expansion.

TCT-386
Cut-plane Analysis: A new method of three-dimensional OCT rendering for side-branch ostial assessment from a main vessel pullback
Antonios Karanasos1, Shengxian Tu2, Nienke S. van Ditzhuijzen3, Jurgen Ligthart4, Nicolas M. Van Meeghem3, Robert J. Van Geuns3, Felix Zijlstra3, Johan H. Reiber5, Evelyn Regar6
1Thoraxcenter, Erasmus MC, Rotterdam, Zuid Holland, 2Division of Image Processing, Department of Radiology, Leiden University Medical Center, Leiden, Leiden, 3Erasmus University Medical Centre, Rotterdam, Zuid-Holland, 4Erasmus MC Rotterdam, Rotterdam, Netherlands, 5Erasmus MC. Rotterdam, Netherlands, 6Thoraxcenter, Erasmus Medical Center, Rotterdam, Rotterdam, Netherlands, 7Erasmus University Medical Center, Leiden, Netherlands, 8Thoraxcenter, Rotterdam, Netherlands

Background: In the assessment of coronary bifurcations, evaluation of side branch (SB) ostia by an optical coherence tomography (OCT) pullback performed in the main branch(MB) could speed up lesion evaluation. This assessment can be performed through dedicated software that renders the image segment in 3-D and reconstructs the cross-sections perpendicular to the SB centerline (cut-plane analysis). We aimed to validate the feasibility of using cut-plane analysis to compare the SB ostium against reference measurements from a SB OCT pullback.

Methods: Thirty-one sets of six-dimensional OCT pullbacks from 28 patients, from both the MB and the SB of a coronary artery bifurcation were analyzed. Measurements of the SB ostium from the MB pullback were performed by a conventional analysis and 2 cut-plane analysis, and the measurement error for each analysis versus reference measurements of the SB ostium from the SB pullback was estimated. We further analyzed an additional series of 12 consecutive sets of SB and MB pullbacks, in which SB ostium is not completely visualized in the MB pullback, in order to show the feasibility of imaging in this population.

Results: Correlations of SB ostium measurements acquired from the MB pullback in comparison to reference measurements acquired from the SB pullback, were higher with cut-plane analysis than with conventional analysis, albeit not reaching significance (area: \( r_{cutplane} = 0.93 \) vs. \( r_{conventional} = 0.87 \), \( p = 0.26 \)). Cut-plane analysis was associated with lower absolute error for SB ostium measurements than conventional analysis (area: \( 0.56 \pm 0.45 \text{mm}^2 \) vs. \( 1.50 \pm 1.31 \text{mm}^2 \), \( p < 0.001 \)). Inter- and observer agreement for cut plane analysis was high. In the additional set of images without complete SB ostium visualization, the correlation coefficient of area by SB cut-plane analysis and reference measurements was 0.88.

Conclusions: Area measurements of SB ostium performed by cut-plane analysis of an OCT pullback performed in the MB have high correlation with reference measurements performed from a SB OCT pullback and lower error compared to conventional analysis. This approach could potentially reduce procedural complexity in assessment of bifurcations.