Laser atherectomy was necessary due to significant calcification and fibrosis of the occlusion. The standard coronary laser catheter was used for 5 patients and the peripheral laser catheter was used for 6 patients. Laser was used to facilitate reverse CART in 5 patients and to debulk the angioplasty reentry zone in 6 patients. Average laser fluence was 66 mJ/mm² and laser time 75 ± 8 seconds. All target vessels were successfully recanalized and all patients were discharged from hospital uneventfully. One cracking of coronary perforation and one reocclusion were observed for use reverse CART, neither of which were clinically significant. Thrombosis of the left main from the diagnostic catheter used to inject collaterals occurred in one patient. Intravascular ultrasound post-subintimal laser atherectomy showed an intact channel with surrounding medial and adventitial layers.

Conclusions: We report the first successful use of subintimal laser atherectomy for percutaneous coronary interventions. The concern for coronary perforations and rupture has limited the use of laser to intraluminal debulking; however, we show that the subintimal stentless layer in a chronically occluded vessel provided a safe zone for laser atherectomy, even at high energy levels.

TCT-210
Optimized Immediate Angiographic Result After Percutaneous Coronary Intervention for Chronic Total Occlusion Is Associated With Lower Restenosis Rates. A Single Centre Experience
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Background: Angiographic success of percutaneous coronary intervention (PCI) for chronic total occlusion (CTO) is most often defined as a less than 30% residual diameter stenosis with restoration of TIMI grade 3 antegrade flow. The last ACC/AHA guidelines on PCI suggest that, in the drug-eluting stent era, a minimum diameter stenosis of less than 10% with an optimal goal of close to 0% as possible should be the target stenosis treated with percutaneous coronary intervention. However, it has not been demonstrated that such an optimized immediate angiographic result (OAR) reduces restenosis rate in patients treated by PCI for CTO.

Methods: Using quantitative coronary angiography (QCA) analysis, we assessed the immediate post-PCI angiographic results of 170 CTO lesions successfully treated in 165 patients who all underwent a control follow-up angiogram at 6 months. Six months angiographic binary restenosis was defined as a stenosis ≥ 50% of the lumen diameter.

Results: Post-PCI immediate residual diameter stenosis was < 30% in all 170 CTOs (mean 7 ± 5%, range 0-21%). Among these 170 CTOs, OAR defined as a < 10% residual stenosis was achieved in 133 (78%). Binary restenosis occurred in 35 cases (21%). Patients with restenosis were younger (60 ± 9 vs 65 ± 10 years, p = 0.010); CTO lesions with restenosis had a longer stenting length (89 ± 25 vs 75 ± 32 mm, p = 0.026); a higher stenting length/mean stent diameter ratio (31 ± 9 vs 27 ± 11, p = 0.03) and had a higher immediate post-PCI residual diameter stenosis (9.1% ± 7% vs 6.6 ± 4%, p = 0.007). Restenosis rate was 46% in lesions without OAR vs 14% in the OAR group (p = 0.0001). Multivariate analysis showed that both a younger age and OAR were independent factors of restenosis (p = 0.008 and p = 0.018, respectively).

Conclusions: Our study shows that an optimized immediate post-procedure angiographic result with a minimal diameter stenosis as close to 0% as possible is associated with a lower rate of restenosis after PCI for chronic coronary total occlusion and that restenosis also appears to occur more frequently in younger patients. These findings, if confirmed by further studies, should be taken into consideration in revascularization decisions for patients with CTO.

TCT-211
Long Term Clinical And Angiographic Outcome Of The Mini-STAR Technique As A Bail Out Strategy For Percutaneous Coronary Intervention Of Chronic Total Occlusion
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Background: A promising variant of the STAR technique, called mini-STAR, has been recently described as successful angioplasty rescue technique after failure revascularization by conventional techniques for coronary chronic total occlusion (CTO). This study sought to assess the long-term clinical and angiographic outcome of mini-STAR as a bail-out strategy for CTO revascularization.

Methods: From March 2009 to September 2011, 100 patients (mean age 61.4 ± 10.9 years) underwent a successful revascularization for CTO lesion by mini-STAR technique as a bail-out strategy.

Results: Drug eluting stents (DES) were implanted in all cases with an angiographic success of 92%. At 2-year follow-up, the MACE-free survival was 89.2% with a target-vessel revascularization rate of 6.5%. Angiographic follow-up was performed in 72% of patients. CTO target-lesion restenosis was observed in 25% of patients, whereas reocclusion rate was 12.5%. At multivariate Cox analysis, final TIMI flow < 3 was related to MACE occurrence (HR: 5.9, 95% CI: 1.4 to 24.4; p = 0.013). Final TIMI flow < 3 (OR:5.41, 95% CI: 1.05 to 27.33; p = 0.043) and CTO stent length (OR: 0.96, 95% CI: 0.93 to 0.99; p = 0.017) were independent predictors of reocclusion. The independent variables related to restenosis were first-generation DES (OR: 4.10, 95% CI: 1.23 to 13.64; p = 0.022) and CTO stent length (OR: 0.97, 95% CI: 0.95 to 1.00; p = 0.027).

Conclusions: As a bail out strategy for CTO lesions revascularization, the mini-STAR technique shows low MACE and target-lesion revascularization rates at long-term follow-up.

TCT-212
Percutaneous intervention of circumflex chronic total occlusions is associated with worse procedural outcomes: insights from a multicenter US registry
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Background: We sought to determine whether outcomes of chronic total occlusion (CTO) percutaneous coronary intervention (PCI) correlate with CTO target vessel: left anterior descending artery (LAD), left circumflex artery (LCX), and right coronary artery (RCA).

Methods: We evaluated the clinical and angiographic characteristics and procedural outcomes of 656 patients who underwent CTO PCI at six experienced centers in the United States between January 2012 and March 2014.

Results: The CTO target vessel was the RCA in 387 cases (61%), LAD in 123 (22%) and LCX in 117 (18%). LCX lesions were more tortuous and RCA lesions had higher occlusion length and J-CTO score, but were less likely to have a side branch at the proximal cap and had more developed collateral circulation. Procedural success was lower in LCX CTOs (84.6%), followed by RCA (91.7%) and LAD (94.7%) CTOs (p=0.016). Major complications tended to occur more frequently in LCX PCI (4.3% vs. 1.0% for RCA vs. 2.3% for LAD, p=0.07). LCX and RCA CTO PCI required higher fluoroscopy times [45 (30-74) min vs. 45 (21-69) min for RCA vs. 34 (20-60) min for LAD, p = 0.018] and LCX and LAD CTOs required more contrast administration [280 (210-370) mL vs. 250 (184-350) mL for RCA and 280 (200-400) mL for LAD].

Conclusions: In a contemporary, multicenter CTO registry, LCX was the least common target vessel. Compared to LAD and RCA, PCI of LCX CTOs was associated with lower procedural success, less efficiency and higher complication rates.

TCT-213
Prospective estimation of Chronic Total Occlusion complexity based on Clinical and Anatomic (Invasive and non-invasive Angiography) characteristics
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Background: One of the reasons for the low application rates of chronic total occlusion (CTO) percutaneous coronary intervention (PCI) by most physicians, may be uncertainty concerning the success rate of the procedure. Improved guidelines for case selection, may favourably impact these patients.

Methods: During 2012-2014, 106 eligible patients who were scheduled for percutaneous recanalization of a true CTO were included prospectively in the study. 101
patients underwent multislice computed tomography (MSCT) prior to the procedure. By protocol we pre-defined the same 10 anatomic characteristics by conventional angiography (CA) and MSCT based on previously published independent predictors of failure and our team experience. Two-experienced interventional cardiologist and two imaging specialists, respectively, analysed CTO characteristics. Prospectively, the Japanese-CTO score complexity was calculated by CA and MSCT.

Results: According to the CA-Japanese-CTO score of complexity 47% of lesions were classified as difficult or very difficult. By CA 52% were severe calcified lesions. In most cases (88%) the strategy was anastomosis. The total stent length implanted per lesion was of 51.6 ± 20.3mm. In all case last generation DES was implanted. Successful guidewire crossing was 86.4% and the overall success rate was 85.2%. Significant calcification by CA (37.5% vs. 11.5%, p = 0.001) and by MSCT (> 50% cross sectional area) (26.6% vs. 60.0%, p = 0.016) was more prevalent in failed cases. It is important to note a new anatomic characteristic “bad landing zone” (defined as distal vessel just after the CTO exit point, with reference diameter ≤ 2mm) by CA (30.5% vs. 63.3%, p = 0.01) was more prevalent in failed cases. By multivariable logistic regression, the only independent predictor of procedural failure was the CA-J-CTO score (odds ratio (OR) 2.5, 95% confidence interval (CI) 1.37-4.59, p=0.003, for each unit increase in J-CTO score) and silent ischemia as baseline clinic status before PCI-CTO (OR 4.71, CI 1.23-17.95, p=0.02).

Conclusions: According to the results of this prospective study, the Japanese-CTO score of complexity assessed by conventional angiography had a significant impact in procedural outcomes.

TCT-214
Procedural outcomes of CTO specific intravascular ultrasound Navifocus WR-guided PCI for CTO
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Background: At percutaneous coronary intervention (PCI) for chronic total occlusion (CTO), the first guidewire is sometimes inserted into the subintimal space, and in this situation the strategy of intravascular ultrasound (IVUS)-guided wiring that is leading the second guidewire into the true lumen under observing by IVUS from subintimal space, was the last procedure because of the absence of the suitable IVUS for this usage. Therefore we have produced CTO specific IVUS, which is named Navifocus WR, with Terumo Corp (Tokyo, Japan). It has a small profile transducer (2.5F) with short length of tip to transducer (9mm) and will be inserted into subintimal space with minimum vessel damage. It has been approved since September 2012 in Japan.

Methods: From September in 2012 to March in 2014, in 16 CTO cases, Navifocus WR was used during the antegrade PCI approach after the first guidewire was inserted into the subintimal space. We succeeded the Navifocus WR-guided antegrade wiring in 10 (63%) of 16 cases. The patients were divided into 2 groups based on the success or failure of Navifocus WR-guided antegrade wiring.

Results: The reference diameter was larger in the success group compared to the failure group (2.87 ± 0.73 mm vs. 2.43 ± 0.39 mm, P = 0.2). The procedural time of IVUS-guided wiring was significantly shorter in the success group compared to the failure group (20.2 ± 27.2 minutes vs. 58.5 ± 41.2 minutes, P = 0.041). In the failure group the guidewire was changed to the retrograde approach, etc. and succeeded the PCI procedure in 15 (94%) of 16 cases.

Conclusions: At CTO PCI, the success rate of Navifocus WR-guided wiring was acceptable and with the combination of the retrograde approach, etc the high success rate could be achieved.

TCT-215
Impact of Gender on the Outcomes of Percutaneous Coronary Intervention of Chronic Total Occlusions: insights from a multicenter registry
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Background: We sought to investigate the impact of gender on outcomes of percutaneous coronary intervention (PCI) for chronic total occlusions (CTO).

Methods: We examined 2,038 patients who underwent CTO PCI between January 2006 to May 2014 at 6 high volume CTO PCI centers in the United States. Clinical, angiographic and procedural characteristics were compared between male and female patients.

Results: Women represented 15% of the CTO PCI population. Significant differences were observed in the baseline characteristics of the study patients (Table). Women were more likely to have diabetes and to have the right coronary artery as CTO target vessel, and less likely to have prior myocardial infarction or prior coronary artery bypass graft surgery (Table). Technical and procedural success were higher among women, even though procedural and fluoroscopy time, air kerma radiation exposure, and contrast administration were lower among women.

Conclusions: In a large multicenter CTO PCI registry, women constituted 15% of the patients. Technical and procedural success rates were higher among women.

Clinical, Angiographic and Procedural Characteristics

<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall (n=2038)</th>
<th>Female (n=295)</th>
<th>Male (n=1743)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>64.8 ± 10.1</td>
<td>64.5 ± 10.7</td>
<td>64.9 ± 9.9</td>
<td>0.564</td>
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<tr>
<td>Diabetes (%)</td>
<td>41</td>
<td>46</td>
<td>40</td>
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<tr>
<td>Prior myocardial infarction (%)</td>
<td>41</td>
<td>34</td>
<td>42</td>
<td>0.013</td>
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<tr>
<td>Prior coronary artery bypass graft surgery (%)</td>
<td>37</td>
<td>31</td>
<td>38</td>
<td>0.030</td>
</tr>
<tr>
<td>CTO Target Vessel (%)</td>
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<td></td>
<td></td>
<td>0.004</td>
</tr>
<tr>
<td>Right Coronary Artery</td>
<td>57</td>
<td>62</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Circumflex</td>
<td>21</td>
<td>14</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Left Anterior Descending</td>
<td>21</td>
<td>24</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Technical success (%)</td>
<td>88</td>
<td>92</td>
<td>87</td>
<td>0.040</td>
</tr>
<tr>
<td>Procedural success (%)</td>
<td>87</td>
<td>90</td>
<td>86</td>
<td>0.053</td>
</tr>
<tr>
<td>Procedure time (min)</td>
<td>116.9 ± 63.1</td>
<td>101.3 ± 52.0</td>
<td>119.3 ± 64.4</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Fluoroscopy time (min)</td>
<td>44.7 ± 30.6</td>
<td>40.2 ± 26.1</td>
<td>45.5 ± 31.2</td>
<td>0.003</td>
</tr>
<tr>
<td>Air Kerma radiation exposure (Gray)</td>
<td>4.4 ± 3.2</td>
<td>3.7 ± 2.8</td>
<td>4.5 ± 3.2</td>
<td>0.005</td>
</tr>
</tbody>
</table>

TCT-216
Delayed coverage of drug eluting stents after interventional recanalization of chronic total occlusions assessed by optical coherence tomography: the ALSTER-OCT-CTO registry
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Background: Following percutaneous coronary interventions (PCI) for recanalization of chronic total occlusions (CTO) patients are at increased risk for stent thrombosis (ST). Delayed drug eluting stent (DES) coverage was previously shown to be related to ST. Using optical coherence tomography (OCT) we tested the hypothesis, that CTO-PCI is associated with delayed DES coverage compared to non-CTO lesions.

Methods: From 06/2010 to 11/2013 105 patients (111 lesions) with clinical driven follow-up angiography after PCI with DES received an OCT analysis. Patients with successful CTO-PCI (19 patients/20 lesions, 6.5±2.1 months post-PCI) were included into the CTO-group, patients with non-CTO lesions and total stent length >24mm (28 patients/28 lesions, 4.9±2.2 months post-PCI) were used as control-group.

Results: Struts were analyzed by OCT (CTO vs. control, mean±SD): Covered: 68.9±21.9% vs. 89.6±10.4%, p<0.001; uncovered apposed: 20.2±16.2% vs. 7.5±8.7%, p<0.001; uncovered malapposed: 10.9±10.3% vs. 2.9±2.6%, p<0.001. Neointimal thickness was 92.0±16.2 μm vs. 109.3±39.2 μm, p<0.033. No differences concerning different CTO-PCI approaches were found.

Conclusions: A significantly delayed DES coverage after CTO-PCI was observed. Given the known increased rate of ST following CTO-PCI and the known association