TCT-328
C-arm angiography (DYNA-CT) for 3D Coronary Reconstruction and Myocardial Perfusion Assessment
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Background: A three dimensional reconstruction of the coronary tree is nowadays usually performed using multidetector computed tomographic angiography whereas myocardial perfusion defects are assessed by SPECT, cardiac MRI or MSCT. A combination of a precise reconstruction of the coronary arteries in combination with an information about the perfusion situation in the supplied myocardium might also be desired to facilitate complex coronary interventions. The aim of our study was to prove the feasibility of a new C-arm based three-dimensional reconstruction algorithm of the coronary arteries in combination with myocardial perfusion assessment.

Methods: In 20 Patients, referred for PCI, a rotational coronary angiography using a monoplane C-arm system (Arts zee; Siemens, Erlangen, Germany) was performed. During the 5s run 133 projections were acquired along a 198° arc (99° right anterior oblique to 99° left anterior oblique view). A recently developed 3D-reconstruction technique was applied:and an initial reference 3D image at the desired cardiac phase was reconstructed from 20 projection images selected by ECG gating showing the coarse structure of the coronary tree. The intermediate 3D images are registered to the reference 3D image and accumulated yielding a tomographic 3D image. The perfusion assessment was done during the myocardial phase of the contrast transit. The resulting dataset was reconstructed and analyzed using short axis and long axis maximum intensity projections (MIP) with 5mm slice thickness. After this a fusion of the 3D-reconstructed coronary tree with the perfusion image was performed in 20 patients (mean age 71.2±9 yrs., 3 females). In all 20 cases the LCA was contrasted. This was feasible in all patients with a good imaging of the whole coronary tree and the perfusion situation of the myocardium.

Results: After this a fusion of the coronary tree with the perfusion image was performed in 20 patients (mean age 71.2±9 yrs.). This was feasible in all patients with a good imaging of the whole coronary tree and the perfusion situation of the myocardium.

Conclusions: These data suggest, that simultaneous motion corrected C-arm-CT reconstruction of coronary arteries and perfusion imaging is feasible.

TCT-329
Effectiveness of Fluoroscopy-Save versus Cinematography at Reducing Radiation Exposure during Diagnostic Coronary Angiography: A Randomized Controlled Trial
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Background: Coronary angiography is the gold standard for defining coronary artery disease. However, radiation exposure remains an unwanted hazard. There is a need to minimize radiation exposure in this era of complex and repeat procedures.

Methods: Patients referred for coronary angiography with abdominal circumference < 40 inches and glomerular filtration rate >60 mL/min were randomized 1:1 to either the fluoroscopy-save group (FS) (n=21) or cinematography group (Cine) (n=24). The trial was powered for superiority of FS when compared with Cine. Patients in the FS group underwent coronary angiography under fluoroscopy with repeat injection under cinematography only when needed, significantly reduces radiation exposure to both patients and operators and appears safe when compared with routine cinematography alone.

TCT-330
The Effect of Automated Contrast Injection Systems on Contrast Volume Use During Diagnostic Coronary Angiography And Percutaneous Coronary Interventions
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Background: Contrast-induced nephropathy (CIN) is an important cause of iatrogenic morbidity and mortality. The amount of contrast delivered is dependent on the complexity of the procedure and operator technique, and has a major impact on the incidence of CIN. It is unclear whether use of automated systems can reduce contrast volumes when low volumes are routinely used.

Methods: An automatic injector was introduced to one of our three cardiac catheterization labs in January 2011. From January 31 to May 31, 2011, 1358 consecutive patients undergoing diagnostic catheterizations and percutaneous coronary interventions (PCI) were randomly allocated to one of the three labs. Manual stopcock-manifold contrast injection was used in 1052 patients and automated contrast injection in 306 patients.

Results: Baseline and procedural characteristics in both groups were similar. There was no significant difference in contrast volume between manual and automated contrast injection systems. (Figure) The incidence of CIN following PCI was 9.8% in the manual group and 7.4% with automatic injector (p=0.43). Use of automated contrast injector was associated with a decrease in contrast use only among operators that routinely use large-caliber (7F) catheters (Manual 206.5mL vs Automated 161.4mL, p=0.005).

Conclusions: The use of automated contrast injection for coronary angiography and PCI is not associated with reduced contrast volume as compared to manual injection. Beneficial effect may be seen when higher contrast volumes or large-caliber catheters are routinely used.

TCT-331
Experience Is Associated with Shorter Procedure Time And Reduced Radiation With Robotic-Enhanced Coronary Intervention – Results From The PRECISE Multi-Center Study
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Background: The PRECISE multi-center study demonstrated the safety and feasibility of robotic-enhanced coronary intervention (PCI). Robotic remote-control procedures were technically and clinically comparable to traditional manual operation, and operator exposure to radiation was 95% lower. We studied the learning curve experience with robotic PCI. Methods: The CorPath 200 robotic system was used in patient with clinical indication for PCI. The system consists of a remote interventional cockpit and a bedside single-use cassette that enables the operator to advance, retract, and rotate guidewires and rapid-exchange balloons and stents. The first 3 cases of each operator were considered as roll-in cases. We compared the procedure efficiency, patient radiation exposure, and outcomes in the roll-in patients as compared to the later cases. MACE was the composite of cardiac death, myocardial infarction (Q and non-Q) and target vessel revascularization.

<table>
<thead>
<tr>
<th>Fluoro-save group (n=21)</th>
<th>Cinematography group (n=24)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient’s peak skin dose, mGy</td>
<td>151±69</td>
<td>260±125</td>
</tr>
<tr>
<td>Dose area product, uGy*cm²</td>
<td>4351 [826-1722]</td>
<td>3445 [2464-4637]</td>
</tr>
<tr>
<td>Operator dose, uR</td>
<td>240 [174-656]</td>
<td>605 [322-897]</td>
</tr>
<tr>
<td>Contrast use, mL</td>
<td>56 [50-71]</td>
<td>52 [47-69]</td>
</tr>
</tbody>
</table>

Proportion of cases needing repeat injection under cinematography, %
35.0 --- ---
Results: A total of 164 robotic-enhanced PCI procedures were performed by 23 interventional cardiologists in 9 sites. Of these, 60 cases were part of the first 3 cases of each investigator (roll-ins). There were no differences between the roll-in and later cases in patient demographics, and clinical and anatomical characteristics. Procedure characteristics and outcomes are summarized in the Table. After the first 3 cases, there were no additional improvement in experience parameters or outcomes.

<table>
<thead>
<tr>
<th></th>
<th>Roll-in Cases</th>
<th>Late Cases</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=60</td>
<td>n=104</td>
<td></td>
</tr>
<tr>
<td>Conversion to manual</td>
<td>0</td>
<td>2 (1.9%)</td>
<td>ns</td>
</tr>
<tr>
<td>Procedure Duration, min</td>
<td>51.4 ± 25.0</td>
<td>42.3 ± 16.4</td>
<td>0.008</td>
</tr>
<tr>
<td>PCI duration, min</td>
<td>42.0 ± 17.0</td>
<td>34.3 ± 14.1</td>
<td>0.003</td>
</tr>
<tr>
<td>Robotic duration, min</td>
<td>28.4 ± 15.5</td>
<td>22.2 ± 12.8</td>
<td>0.007</td>
</tr>
<tr>
<td>X-ray duration, min</td>
<td>12.8 ± 7.9</td>
<td>12.2 ± 4.8</td>
<td>0.009</td>
</tr>
<tr>
<td>Contrast volume, ml</td>
<td>138.3 ± 53.1</td>
<td>147.6 ± 78.8</td>
<td>ns</td>
</tr>
<tr>
<td>Death</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Q-wave MI</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Non-Q MI</td>
<td>2 (3.3%)</td>
<td>2 (1.9%)</td>
<td>ns</td>
</tr>
<tr>
<td>TVR</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>MACE</td>
<td>2 (3.3%)</td>
<td>2 (1.9%)</td>
<td>ns</td>
</tr>
</tbody>
</table>

Conclusions: We observed a short learning curve in the performance of robotic-enhanced PCI in the multi-center PRECISE study. With experience of over 3 cases, interventional cardiologists were able to complete the robotic-enhanced PCI faster and with shorter duration of radiation without compromising safety.

TCT-332
Validation of Transapical Access Accuracy of Computed Tomographic Angiography-Fluoroscopy Fusion Guided Structural Heart Disease Interventions
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Background: Transapical (TA) access has been increasingly utilized for structural heart disease interventions and is most commonly obtained under fluoroscopic guidance. However, a major limitation of fluoroscopy is its ability to provide only 2D projections with inadequate spatial information. Computed tomographic angiography (CTA)-fluoroscopy fusion can offer the 3D information necessary for accurate planning and guidance for TA puncture. Although its utility and safety have been described, the accuracy of TA access by fusion guidance has not been previously validated.

Methods: We reviewed 15 consecutive patients (mean age 69.1±11.8 years, 60% male) presenting to our center from June 2011 to June 2012 who underwent percutaneous left ventricular (LV) puncture, and subsequent closure, using CTA-fluoroscopy fusion guidance, and who had post-procedural CTA. We used a prototype software, HeartNavigator (Philips, Best Netherlands), that allowed for landmark placement on the LV epicardial surface (planned puncture site-PS) to guide needle entry. These landmarks were compared to the position of the TA closure device on the post-procedure CTA (actual puncture site-APS). Imaged software (NIH, Bethesda MD) was used to calculate the difference between the APS and APS. Each distance measurement was taken in three planes: lateral (X), antero-posterior (Y), and cranio-caudal (Z). Additional X and Y measurements were also obtained to assess the distance between the PPS and APS. Each investigator (roll-ins). There were no differences between the roll-in and later cases in patient demographics, and clinical and anatomical characteristics. Procedure characteristics and outcomes are summarized in the Table. After the first 3 cases, there were no additional improvement in experience parameters or outcomes.

Conclusions: We observed a short learning curve in the performance of robotic-enhanced PCI in the multi-center PRECISE study. With experience of over 3 cases, interventional cardiologists were able to complete the robotic-enhanced PCI faster and with shorter duration of radiation without compromising safety.

TCT-334
Fusion of a fullscale patient simulator with an endovascular simulator to improve quality of human factors trainings with cathlab teams
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Background: Interventional endovascular procedures are frequently associated with complications. The use of endovascular virtual reality simulators allow the training of procedural complications. Periprocedural complications can be only trained with additional use of a fullscale patient simulator. Until today no integration of an endovascular simulator into a fullscale patient simulator has been shown.

Methods: We invented and constructed a totally new fusion of two simulators to put the idea into action. The hardware of both the endovascular simulator and the patient simulator was modified. We integrated the endovascular simulator into the body of the patient simulator. The construction had to fulfill several safety and maintenance issues. The handling of the newly designed simulator was evaluated by Cardiokills-technicians and the clinical Cardioskills-Trainer Team that brings multi-year experience in simulator based trainings with cathlab teams.

Results: We were able to present a fully functioning new fusion of two formerly separate virtual reality simulators. Procedural and periprocedural complication management could be trained with high realism with cathlab teams. Initial technical problems of the implementation could be handled and no compromises had to be accepted.

Conclusions: Simulator based trainings of procedural and periprocedural complications in the cathlab should be trained with our new simulator setup instead of the formerly used simulators alone as we were able to deliver a higher grade of realism and were able to present technical feasibility.

TCT-335
MITOS Multimodality Imaging Operating System
Andreas Melzer¹, Luc Bidaut¹, ¹University of Dundee, Dundee, United Kingdom

Background: A new Clinical Research Imaging Facility has been established with a unique combination of the MRI, PET/CT and an interconnecting Interventional Surgical Suite.

Methods: A novel layout provides access to a MRI suite, PET/CT and further connection into an interventional suite with standard image guidance. Interventional TAVI / cardiovascular probes can be placed under MR imaging, and EP ablation performed under MRI guidance. Alternatively, a procedure that initially starts with MR imaging - e.g., for planning purposes - may proceed into the ISS or under continued MR guidance to access