Background: Optical coherence tomography (OCT) is a new intravascular imaging tool that has been recently introduced and has become the method of choice to investigate new treatment methods for coronary artery disease. Due to the OCT’s high image resolution, hundreds of stent struts are visualized per patient and therefore a computer-assisted stent strut detection method could help to improve accuracy by reducing analysis time.

Methods: OCT images are converted to rows from which feature vectors are extracted. The mean, maximum and the sum of values above the mean of each row were evaluated by a K-nearest neighbor algorithm (mKNN) with help of a-priori information (detected in 3 frames per patient) and tested in two populations: 1) Stents acquired directly after implantation and 2) patients returning for a follow-up including tissue coverage on top of the struts. A user-interface was available for easy adjustments to the results generated by the algorithm.

Results: A total of 29 OCT datasets were analyzed containing a total 4024 frames. In the post-implant-group (n=15), a total of 23608 struts were detected of which 3626 had to be removed, 115 moved and 1155 had to be added, resulting in a success rate of 77% for the algorithm. In the follow-up group (n=14), a total of 21077 struts were detected of which 5749 struts had to be removed, 1008 moved and 1915 added, resulting in a success rate of 50%. The average analysis time (automated plus correction), was on average 4.1 sec/frame for the post-implant and 6.3 sec/frame for the follow-up population.

Conclusion: Computer-assisted stent strut detection in OCT images is well feasible in patients directly after implantation. In patients who showed considerable tissue growth inside their struts at follow-up it is more challenging. However, the current proposed method can save considerable analysis time and helps to improve the accuracy.

TCT-675

In-vivo Assessment of Neatherosclerosis after Sirolimus-eluting Stent implantation: Comparisons of Serial Optical Coherence Tomography Findings between Early and Late Follow-up

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Background: A recent report has demonstrated a possible link between neointimal atherosclerotic change (neatherosclerosis) and late in-stent restenosis and subclinical thrombus attachment after sirolimus-eluting stent (SES) implantation. In-vivo serial evaluation of such change, however, has yet to be elucidated. This study is to clarify the natural history of neatherosclerosis after SES implantation by serial optical coherence tomography (OCT) evaluation.

Methods: Fifty-two SES from 39 patients were evaluated by OCT at the early (7months after implantation) and the late phase (57months). Stents with in-stent restenosis were excluded. In addition to standard OCT variables, the frequency of TCFA information on in-stent restenosis as well as de novo lesion.

Conclusion: Layered pattern on OCT assessment might contain widespread process of the lesion progression. Our results show that Virtual Histology can provide accurate TCFA information on in-stent restenosis as well as de novo lesion.

TCT-677

Optical Coherence Tomography Analysis for Restenosis of Everolimus-Eluting Stents In Comparison with Bare-Metal Stents and Paclitaxel-Eluting Stents

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Background: The vascular response observed as optical coherence tomography (OCT) signal pattern in in-stent restenosis (ISR) of first-generation drug-eluting stents (DES) are more various than in bare-metal stents (BMS). Although everolimus-eluting stents (EES) features a bio compatible polymer coated on a thin strut and is expected to provide minimal inflammatory reaction, the characteristics of ISR after EES implantation remain unclear. The aim of this study was to assess the ISR of EES compared with BMS and paclitaxel-eluting stents (PES) using OCT.

Methods: Between December 2010 and April 2011, OCT was performed to examine 29 ISR lesions in 29 consecutive patients (67±9 years, 22 male) within 1 years after implantation for de novo coronary lesions. Among 29 ISR lesions, there were 10 EES ISR, 9 BMS ISR, and 10 PES ISR. Lumen area, stent area, restenotic area, and OCT signal pattern of neointima were analyzed at the cross-section of minimal lumen area. The OCT signal pattern of neointima was categorized into homogeneous, layered, or heterogeneous speckled.

Results: There were no significant differences in lumen area, stent area, and restenotic area between the 3 stent types. Homogeneous pattern was more frequent in BMS than in EES and PES (87.5% vs. 50% vs. 20%, p=0.017). Layered pattern was no significant difference in 3 stent types, whereas heterogeneous speckled pattern was more frequent in PES than in BMS and EES (30% vs. 0% vs. 0%, p=0.048). Intra-stent thrombus was detected in only PES (20%).

Conclusion: The present OCT study shows that EES ISR is composed of homogeneous or layered pattern. In addition, heterogeneous speckled pattern and intra-stent thrombus, which may be related to inflammatory reaction of DES, are not recognized in EES ISR. These findings suggest that vessel response after EES implantation is better than that of PES, and similar to that of BMS.