Comparative Analysis of Two-dimensional (2D) and Three-dimensional (3D) Quantitative Coronary Angiography before Bioresorbable Vascular Scaffold (BVS) Implantation

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Background:
ABSORB EXTEND trail was intended to expand the treatment with the Bioresorbable Vascular Scaffold (BVS) to a larger subject population, including subjects with longer lesion. The target lesion must be located in a native coronary artery where target vessel diameter and target lesion length fall within required ranges. On-line quantitative coronary angiography (QCA) was required for the assessment of target vessel diameter for appropriate BSV size selection.

Aim:
To evaluate the accuracy of on-line 2D-QCA measurements preformed prior to BVS implantation, compared to various off-line QCA measurements.

Method:
13 patients were enrolled at our center for this study. The required range for target vessel diameter was assessed on-site by (1) online 2D-QCA (Siemens, fig1A) (2) offline 2D-QCA (Siemens) and (3) offline 3D-QCA (CardiOP-B, Paieon Medical, fig1B). The measurements were performed by independent technician, blinded to the online results. 2D-QCA was also measured retrospectively by “Cardialysis Core Laboratories" (Rotterdam, Netherlands, fig1C). Maximum lumen diameter was evaluated at the maximal distal and proximal ends (Dmax) of the target segment prior to BVS implantation. Correlations between the various measurement techniques were calculated and Bland-Altman plots were performed to appreciate whether they agree sufficiently.

Results:
On-line 2D-QCA showed a reasonable but suboptimal correlation compared to the Core Lab results and to the 3D-QCA (r^2=0.52 and 0.40, respectively). Nonetheless, all measurements agreed sufficiently (mean difference= 0.15 and 0.06, respectively). Offline 2D-QCA analysis demonstrated higher correlation and agreement compared to the Core Lab results and to the 3D-QCA (r^2=0.711 and 0.625, mean difference=0.04 and 0.03, respectively).

Conclusions:
All measurement techniques agreed sufficiently within the required range. However, the correlation to the Core Lab results improved considerably with off-line analysis. Furthermore, the 3D-QCA provides a more comprehensive analysis by overcoming the foreshortening effect, and may offer higher accuracy for the assessment of target vessel diameter for appropriate BSV size selection.