Clinical applications

Visualization of stent malapposition in the mid left anterior descending artery using StentBoost

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One of the problems of percutaneous coronary intervention (PCI) is subacute stent thrombosis. Malapposition and underexpansion of the stent are believed to be the major factors causing stent thrombosis [1], but these conditions are not always easily assessable on angiographic images. Although Intra Vascular Ultrasound (IVUS) can be used to give a conclusive answer on the presence of malapposition and underexpansion, it adds additional time and costs to the procedure.

In the following case, the deployment and apposition of the stent were visualized with StentBoost [2,3,4] (Philips Healthcare, Best, the Netherlands). This is an interventional tool designed to enhance the visibility of stents in relation to the surrounding vasculature.

To obtain a StentBoost image, the user acquires a short cine run which is then automatically processed. The first two seconds of the acquisition is without contrast followed with a short contrast injection for about two to three seconds. The software automatically detects the balloon markers of the stent delivery system, which are used to stabilize the images and to correct for motion between them. The stabilized and motion-corrected images are then superimposed to create an enhanced image of the stent.

Finally, a subtracted image is generated from the enhanced stent image and the corresponding vessel image.

Case study

Percutaneous coronary intervention was performed in a 60-year-old female patient, diagnosed with a non ST elevation acute coronary syndrome with a complex lesion in the mid left anterior descending (LAD) artery, using a 3.0 x 23 mm Cypher™ stent. The stent was deployed with a pressure of 18 bar for 20 seconds.

After the initial deployment, a StentBoost acquisition was performed (Figure 1), which showed malapposition of the stent (Figures 1b, 1c, 2a). It was decided to post-dilate the stent with a 3.5 x 15 mm Maverick™ balloon inflated to 16 bar for 30 seconds. The result was checked with StentBoost, which showed correct apposition of the stent with the vessel wall (Figures 1d, 2b).

StentBoost acquisition only takes a couple of seconds at normal cine dose and the result is almost instantly available without any user interaction. By providing a stabilized subtracted image of both stent and vessel, the visibility was improved, both of the malapposition and of the calcification that probably caused the poor deployment.
References


