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Device Motion Indicator, a New Feature to Evaluate Relative Stent Movement Inside Coronary Artery

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Background: The cyclic movement of the heart and the coronary arteries induces relative axial movement between the artery and a pre-deployed intra-luminal device such as balloon or stent which may cause mal-positioning of these devices. The exact nature and extent of this phenomenon is not known yet. The Sync-Rx System is an add-on image processing system with unique enhancement and stabilization power. A new feature of this system, the Device Motion Indicator (DMI), can detect the intra-luminal device in the X-Ray image stream and measure its relative axial movement in an enhanced and stabilized background.
Purpose: Using the DMI feature in patients undergoing PCI, we measured the pre-deployment, relative, intra-luminal stent axial movement in the different coronary arteries and their sub-segments.
Preliminary Results: In an on-going study, 50 patients underwent regular PCI with the support of the Sync-Rx image processing system. Twenty five with MI, ACS, or primary PCI, 14 with chest pain and objective evidence of ischemia, and 11 with chest pain only. The DMI feature identified relative stent axial movement in 64 treated segments: 26 in LAD, 14 in LCX, and 24 in RCA and measured the proximal and distal markers (over the stent carrying balloon) displacement span (DS in millimeters), as displayed in the table:

segment	proximal LAD	mid LAD	proximal LCX	OM1 OM2	proximal RCA	mid RCA	distal RCA
proximal marker DS	2.1±1.6	1.2±1.8	1.8±0.8	2.5±1.5	1.8±0.1	3.4±1.8	4±2.2
distal marker DS	2.4±1.7	1.4±2.5	1.2±0.7	3.4±0.2	1.8±0.1	3.5±2	3.7±1.8

Conclusions: Intra luminal relative axial movement of a stent during its positioning at a lesion site, prior to deployment, is a significant phenomenon seen mainly at the distal and mid RCA, OM1/OM2, and proximal LAD segments (in decreased order). This movement can cause stent mal-positioning. To minimize the relative movement effect, a possible solution to optimize, stent deployment site, may be an ECG-gated balloon inflation device.