CRT-306

Comparison of Stentboost, Stentboost Subtract and Stentboost Angiogram Imaging Software

Xiaomei Lin, Kenneth Khaw
AtlantiCare Regional Med Ctr., Pomona, NJ

Background: StentBoost (SB) and StentBoost Subtract (SBSub) are part of Philips interventional tool programs in the catheterization laboratory. These two programs enhance stent visibility during stent procedures: SB acquires images at 30 fps for 30 frames, while SBSub acquires at 15 fps for up to 30 seconds (can be stopped after 2-3 seconds). We have added another term StentBoost Angio (SBAngio) to allow visualization of the vessel wall and stent using SB. The objective of this study was to assess whether the pair line resolutions are the same with SB, SBSub and SBAngio.
Method: Philip Allura Xper - FD 20 system with Interventional Tools program (Philip, Netherland. Software release 8.3.1.10200) was used. Three modes of imaging were tested: SB, SBSub (3 seconds acquisition) and SBAngio. Different contrast concentrations 30-100% (Omnipaque at 10% increments) were filled into a clear IV tubing system with Xience 2.25mm x 23mm stent (Abbott Vascular). Pair Line resolutions were measured using etched lead slide (Nr 94054, Nuclear Assoc. - Carle Place, NY). Motion resolution was tested by rotating and shifting axis by 1 and 3 cm during cine. Visual contrast and stent imaging were assessed by cardiologists with a scale 1-5 (1=not visualized, 5=excellent). Maximum pair line resolutions were recorded as line pairs/mm (LP/mm).
Result: With different concentrations of contrast, visual contrast rating was 4 for 30-80% and 5 for 90%-100%. The stent visualization quality was uniform at 4. The line pair resolutions (LP/mm) are as follows:

	SB (LP/mm)	SB Angio (LP/mm)	SBSub (LP/mm)
Resting	3.1	3.1	3.1
1 cm motion	2.8	2.8	2.5
3 cm motion	2.5	2.5	2.1 *

*SBSub had 2.5 LP/mm (after correcting for 6 missed frames).

Conclusion: Imaging qualities were similar between SB, SBAngio and SBSub on different contrast concentrations. SBSub had 11%-16% lower resolution due to 15 fps.

CRT-307

Left Ventricular Mass Index and Septal E/E′ Ratio is Associated with Coronary Artery Calcium Score Severity in Subjects with Normal Left Ventricular Ejection Fraction

Sang-Ho Park,[1] Seung-Woon Rha,[2] Byoung Geol Choi,[2] Se Yeon Choi,[2] Ji Young Park,[3] Yun-Hyeong Cho,[4] Won-Yu Kang,[5] Woong Gil Choi,[6] Dong Joo Oh[2]
[1]*Cardiology Department, Soonchunhyang University Cheonan Hospital, Cheonan, Korea, Republic of;* [2]*Cardiovascular Center, Korea University Guro Hospital, Seoul, Korea, Republic of;* [3]*Cardiovascular Center, Eulji University, Eulji General Hospital, Seoul, Korea, Republic of;* [4]*Cardiovascular Center, Myongji Hospital, Seoul, Korea, Republic of;* [5]*Cardiovascular Center, Kwanju Bohoon General Hospital, Kwangju, Korea, Republic of;* [6]*Cardiology, Chungju Kunkuk University, Chungju, Korea, Republic of*

Objectives: There have been little data regarding the association between composite of both left ventricular mass index (LVMI) and LV diastolic function and CACS. The objective of this study is to determine whether there are association between the composite of both LVMI and septal E/E′ ratio (E/E′) and coronary artery calcium score (CACS) severity in subjects with normal LV ejection fraction.
Methods: We investigated 1230 consecutive subjects that CACS, LVMI and E/E′ were measured by coronary computed tomography (CT) and echocardiography. LVMI and septal E/E′ ratio were compared between the CACS=0 group and CACS>0 group. Further, severity of CACS (no, mild, moderate, and severe calcification) were evaluated according to LVMI and septal E/E′ ratio. According to the composite of LVMI≥90 g/m2 and E/E′≥15, three groups were categorized as follows; 'echo scoring system'=0,1,2.
Results: In multivariate regression analysis, both LVMI, and E/E′ were independent predictors of CACS>0. Each CACS of the 3 groups was 155.99±386.50, 287.51±745.52, and 489.00±913.49, respectively (p<0.001). In the post hoc analysis, there was statistically significant difference among the three groups. In the multivariate linear regression analysis, 'echo scoring system' was an independent predictor of CACS.
Conclusions: In our study, LVMI and E/E′ were associated with presence and severity of CACS. The combination with LVMI and E/E' can be more accurate predictors of CASC than LVMI or E/E′ alone.

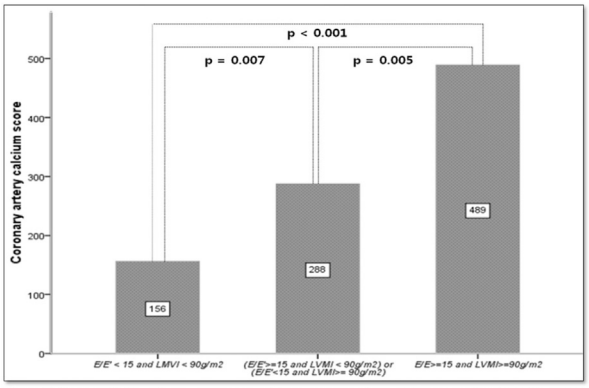


Figure 1. The association of coronary artery calcium score severity and the composite of LVMI and E/E'
In the presenting data, the median value of LVMI was 89.9 g/m2. In the criteria of E/E' ≥ 15 and LVMI ≥ 90 g/m2 , the CACS of three group was 155.99±386.50, 287.51±745.52, and 489.00±913.49 irrespectively.

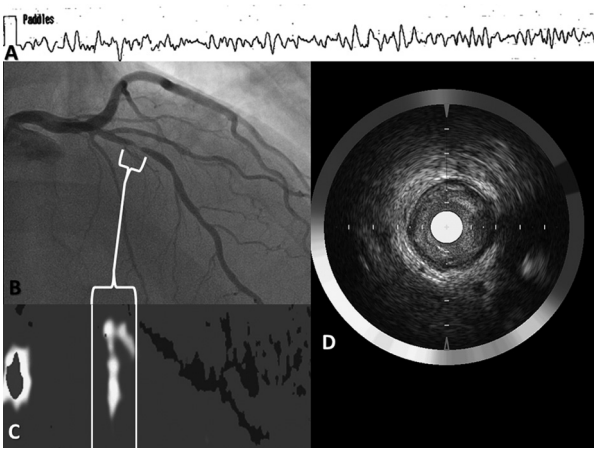
IVUS

CRT-308

Detection by Intracoronary Near-Infrared Spectroscopy of Lipid Core Plaque at Culprit Sites in Survivors of Cardiac Arrest

Zaahir Turfe,[1] Mustafa Husaini,[1] Margaret Chi,[1] Andrew Schmale,[1] Sarah Dionne,[1] Stacie Vanoosterhout,[2] Ryan D. Madder[2]
[1]*Michigan State University College of Human Medicine, Grand Rapids, MI;* [2]*Spectrum Health Meijer Heart Center, Grand Rapids, MI*

Objectives: We sought to describe the intracoronary near-infrared spectroscopy (NIRS) findings in survivors of sudden cardiac arrest.
Background: Sudden cardiac death remains a major public health problem. Autopsy studies have established that sudden death is often attributable to rupture of an intracoronary lipid core plaque (LCP) with subsequent thrombosis. Similar observations linking LCP to sudden cardiac death have not been firmly established in vivo.
Methods: We studied five consecutive patients who presented with a sudden cardiac arrest, were successfully resuscitated, had a culprit lesion thought to be responsible for the cardiac arrest, and who underwent combined NIRS and intravascular ultrasound (IVUS) imaging prior to stent placement. To quantify the amount of lipid present by NIRS, we scanned each culprit and non-culprit segment for the maximum lipid core burden index in any 4-mm region (maxLCBI4mm).
Results: NIRS-IVUS identified the presence of a large lipid core plaque within the culprit segment of all five sudden cardiac arrest victims. The maxLCBI4mm of the culprit segment was 604 ± 174 and the culprit lesion was characterized by a maxLCBI4mm >400 in all 5 cases. In contrast, of the 28 non-culprit segments imaged with NIRS-IVUS in the present analysis, only 1 (3.6%) had a maxLCBI4mm >400.
Conclusion: The novel observation in the present study is that NIRS imaging permitted identification of a large LCP underlying sudden cardiac arrest in vivo. These in vivo observations are in striking accord with prior autopsy observations implicating ruptured LCP in the pathogenesis of sudden cardiac death.



MRI

CRT-309

Body Mass Index is a Positive Determinant of Carotid Plaque Stabilization During Statin Therapy Assessed by MRI

Ryo Naito, Katsumi Miyauchi, Hiroyuki Daida
Juntendo University School of Medicine, Tokyo, Japan

Background: Carotid plaque volume and composition have high predictive value of cardiovascular coronary events. High-resolution magnetic resonance imaging (MRI) is a noninvasive imaging modality that enables the quantitative and compositional assessment of the carotid artery. To date, little is known regarding an effect of intensive lipid lowering therapy on carotid plaque characteristics. The purpose of the present study was to evaluate clinical factors that have an impact on plaque change using statin therapy.
Methods: Prospective, open-label blinded end-points trial was performed using 1.5-T MRI to image carotid atherosclerotic plaques. Patients with maximum carotid intima-media thickness (IMT) >= 1.8 mm as measured by ultrasound and a plasma LDL-C of more than 120 mg/dL without statin treatment were enrolled from 2007 to 2010. All patients were administrated by rosuvastatin 5mg/day after baseline MRI. MRI was performed at baseline and 24-month of follow-up. The endpoint was the change of necrotic core and plaque volume.
Results: After 24 months, 38 patients had taken MRI scans to compare by reviewers blinded to clinical data, and temporal sequence of scans. LDL-C was significantly reduced from baseline by 46.6%. At 24 months, there was a significant decrease in the ratio of necrotic core and vessel volume, whereas plaque volume was no significant change. We found a linear association between the change of necrotic core and baseline body mass index (BMI). Analysis of covariance revealed that baseline BMI influenced the change of % necrotic core (p=0.0002).
Conclusions: The greater degree of carotid plaque stabilization was found according to the increase of baseline BMI after 24-month rosuvastatin treatment.

IMAGING

OCT

CRT-310

Stent Sizing and Atmospheric Pressure in Balloon (Stent / Post Dilatation): An Optical Coherence Tomography (OCT) Based Study

Ashish Shah,[1] Tim Kinnaird,[1] Muezz Uddin,[1] Rito Mitra,[2] Richard Anderson[1]
[1]*University Hospital of Wales, Cardiff, Cardiff, United Kingdom;* [2]*Royal Glamorgan Hospital, Llantrisant, United Kingdom*

Background: In present day interventional cardiology practice, balloons (with / without mounted stent) are provided with manufacturers' sizing charts, based upon experiments performed in controlled environment, whereas in coronaries balloon size is influenced by the vessel wall compliance. Many operators rely on these charts to choose the stent / balloon size and use the inflation pressure during Percutaneous Coronary Intervention (PCI) to achieve expected stent size.
Methods: We have retrospectively collected data from 35 consecutive patients, who have undergone OCT after stent deployment. We measured stent diameter (d) and mean luminal area (MLA) at various points and compared them with the values provided on manufacturers' chart. Patients, who required stent overlap or stenting for in-stent restenosis were excluded.
Results: Average stent diameter was 3.3 ± 0.2 mm, length was 21.1 ± 1.9 mm and deployment pressure was 14.0 ± 1.0 atm, which should have resulted in expected stent diameter of 3.5 ± 0.2 mm and mean luminal area (MLA) of 10.1 ± 1.0 mm^2 as per the chart provided. Average inflation time was 30 seconds. OCT study demonstrated that the achieved average stent diameter was 3.2 ± 0.2 mm (92 ± 2 % of the expected diameter, $P < 0.01$). We found that stent was better expanded at both the ends in comparison to mid part. Average achieved MLA in stented segment was 8.1 ± 1.1 mm^2 (80.2 ± 1.9 % of expected MLA, ranging from 69 to 88%). Minimum MLA through out the stented segment was 7.0 ± 1.0 mm^2 (69.7 ± 3.2% of expected, ranging from 54 to 83%). Stents were well apposed in the area of minimum MLA, and under-expansion was not always related to presence of calcium in the vessel wall. Minimum MLA, in comparison to expected, was less of an issue in those, who were treated with post dilatation.
Conclusion: 1. Mean stent diameter and MLA achieved in human subjects is significantly less than what is proposed by the manufacturers. 2. Operator has to be aware about these limitations / differences, and should take extra precaution to obtain satisfactory procedure result. 3. Post dilatation should be considered more often to achieve good sizing. Study limitations: 1. This was a retrospective study with limited numbers. 2. We have not compared differences between various stent platforms and different designs. 3. Balloon inflation was maintained for different time period in these subjects and that may have an impact on stent sizing.

CRT-311

The Octivus Study (Optical Coherence Tomography vs Intravascular Ultrasound): Evaluation of Observer Variability and Reliability in the Assessment of Stent Deployment

Patrick C. Magnus,[1] John E. Jayne,[1] Hector M. Garcia-Garcia,[2] Michael Swart,[3] Gerrit-Anne van Es,[4] Jan Tijssen,[3] Aaron V. Kaplan[1]
[1]*Dartmouth-Hitchcock Medical Center, Lebanon, NH;* [2]*Thoraxcenter, Erasmus Medical Center and Cardialysis, Rotterdam, Netherlands;* [3]*Cardialysis, Rotterdam, Netherlands;* [4]*ECRI, Rotterdam, Netherlands*

Background: Intravascular ultrasound (IVUS) is well established and validated in the evaluation of coronary stents. However, for the practicing interventionalist (PI) without core lab expertise, the utility of IVUS is often limited by difficulty interpreting images. Frequency Domain-Optical Coherence Tomography (OCT) is a new intracoronary imaging modality, which is now readily available to cath labs in the U.S. and Europe. OCT yields higher image resolution compared with IVUS. However, the consistency and accuracy with which PI's interpret OCT images has not been fully evaluated or compared with IVUS.