P3949 | BENCH
Intra-coronary thrombus evolution during acute coronary syndrome: regression assessment by serial optical coherence tomography analyses

N. Amabile, S. Hammas, A. Veugeois, C. Caussin. *Marie Lannelongue Hospital, Department of Cardiology, Le Plessis-Robinson, France*

Aims: Time-domain optical coherence tomography (TD-OCT) allows assessment of the anatomy and features of unstable coronary artery lesions, including discrimination between the thrombotic and atherosclerotic plaque components. We sought to investigate the feasibility of thrombus quantification and its monitoring in patients with high thrombotic burden acute coronary syndromes (ACS).
Methods: Patients were suitable for inclusion if they presented with an ACS that was successfully revascularized by manual thrombo-aspiration with a residual large thrombus burden on coronary angiography and initial TD-OCT analysis. These patients underwent a second procedure with TD-OCT analysis after several days of optimal anti-thrombotic therapy and benefited eventually from an intra-coronary stent. Coronary lesion stenosis degree was determined by quantitative coronary angiography (QCA). TD-OCT analysis included measurement of thrombus score (as defined by ESC consensus document), thrombus volume, length and minimal luminal area (MLA), which were quantified by serial area measurement within the athero-thrombotic culprit lesion.
Results: Seventeen patients fulfilled inclusion criteria. The OCT image quality was suitable for thrombus quantification in n=14 subjects (86% men/ age=57.9±4.5y/ 93% STEMI). Low molecular weight heparin anticoagulation and dual antiplatelet therapy were given to all patients between the two procedures (mean delay: 3.9.±0.3 days). No adverse events were observed during study time.
The values of thrombus score and thrombus volume among individuals highly correlated together rho= 0.8, $p<0.0001$). We observed a progressive reduction of thrombus burden between the two analyses, as assessed by the significant reductions in thrombus score (22.1±2.6 vs. 10.4±1.4, p=0.001), thrombus volume (9.6±2.4 vs. 4.2±1.2 mm^3, p=0.003), length (11.1±1.4 vs. 7.6±0.9 mm, p=0.03) and increase of MLA (2.5±0.4 mm^2 vs. 1.7±0.2 mm^2, p=0.01). However, the degree of stenosis analyzed by QCA didn't significantly decrease over time.
The thrombus burden reduction was time dependent, as the greatest reductions of thrombus score and volume were observed for the longer optimal medical therapy times. The percentages of thrombus score and volume reduction were highly correlated with the inter-OCT analyses delay (respectively r=0.75 and r=0.87, $p<0.01$ for both). The observed thrombus volume reduction rate was evaluated to 12% of the initial volume per day of optimal medical therapy.
Conclusion: TD-OCT assessment of thrombus volume in patients with ACS is feasible, safe and could allow in vivo clot regression monitoring.

P3950 | BEDSIDE
Patients with acute coronary syndrome who required multiple aspirations to achieve TIMI III flow frequently had ruptured plaque at culprit lesions and distal embolization during balloon dilatation

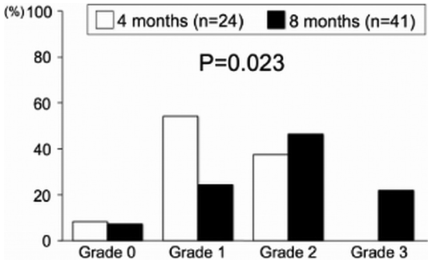
K. Matsuo, Y. Ueda. *Osaka Police Hospital, Osaka, Japan*

Background: Slow flow or no re-flow phenomenon (slow/no flow) during coronary intervention is mainly caused by distal embolization of thrombus and plaque debris, and is associated with unfavorable long-term clinical outcomes. We sometimes experience slow/no flow even after aspiration thrombectomy. Although the presence of ruptured plaque is known as a risk of slow/no flow, its detection is not clinically easy. Therefore, we examined if the patients who required multiple aspirations to achieve TIMI III flow were high-risk patients of distal embolization.
Methods: Consecutive patients with ACS (n=47) who received aspiration thrombectomy, coronary intervention with filter-type distal protection device (Filtrap), and angioscopic examination were prospectively enrolled. We classified them into two groups by the number of aspirations required to achieve TIMI III coronary flow: single aspiration (Group A, n=33) or multiple aspirations (Group B, n=14). We compared between the groups the frequency of filter slow/no flow, the frequency of distal embolization captured by filter device, and the frequency of ruptured yellow plaques at culprit lesion.
Results: Although distal embolization of thrombus (100% vs. 91%, P=0.25) was not different, that of plaque debris (100% vs. 15%, $P<0.0001$) was more frequent in Group B than in Group A. The occurrence of filter slow/no flow was also more frequent in Group B than in Group A (100% vs. 12%, $P<0.0001$). Ruptured plaque was detected more frequently in Group B than in Group A (100% vs. 27%, $P<0.0001$).
Conclusion: Culprit lesions that required multiple aspirations to achieve TIMI III flow were associated with high frequency of ruptured plaque at culprit lesion, high frequency of plaque debris distal embolization, and high frequency of filter slow/no flow.

P3951 | BEDSIDE
Rapid progress in arterial repair from four to eight months following everolimus-eluting stent implantation: an angioscopic observation

M. Awata[1], T. Ishihara[1], M. Fujita[1], T. Watanabe[1], O. Iida[1], S. Okamoto[1], K. Nanto[1], Y. Mizukami[1], S. Nanto[2], M. Uematsu[1]. *[1]Kansai Rosai Hospital Cardiovascular Center, Amagasaki, Japan; [2]Department of Advanced Cardiovascular Therapeutics, Osaka University Graduate School of Medicine, Suita, Japan*

Purpose: Everolimus-eluting stent (EES) is expected to show expeditious arterial repair due to thin struts and high biocompatibility of the copolymer. Using angioscopy (VecmovaNEO), we sought to evaluate angioscopic findings 4 months after EES implantation (XIENCE PRIME), and compared with those taken 8 months following EES (XIENCE V) implantation.
Methods: Angioscopy was performed on 24 EES in consecutive 15 patients 4 months after the implantation, and on 41 EES in consecutive 28 patients 8 months after. All stents were implanted for de novo coronary artery lesions. Neointimal coverage (NIC) was graded: grade 0, stent struts exposed; grade 1, struts bulged into the lumen, although covered; grade 2, struts embedded by the neointima, but were translucently seen; grade 3, struts fully embedded and invisible. Existence of widely exposed struts (no NIC $\geq$30% of the stent surface area), yellow plaques (YP), and thrombus were also explored.
Results: Distribution of dominant NIC grades was statistically different between 4 and 8 months (figure). Although 68% of EESs were embedded by the neointima (grade 2/3) at 8 months, 67% of EESs were not embedded (grade 0/1) at 4 months. Widely exposed struts were detected in 12% of EESs at 4 months and 10% at 8 months (P=0.90). Although YP were similarly distributed in both groups (96% at 4 months vs 78% at 8 months, P=0.08), thrombi were highly detected at 4 months than at 8 months (33% vs 7%, P=0.01). All thrombi were detected at the site of grade 0/1 NIC regardless of the follow-up period.



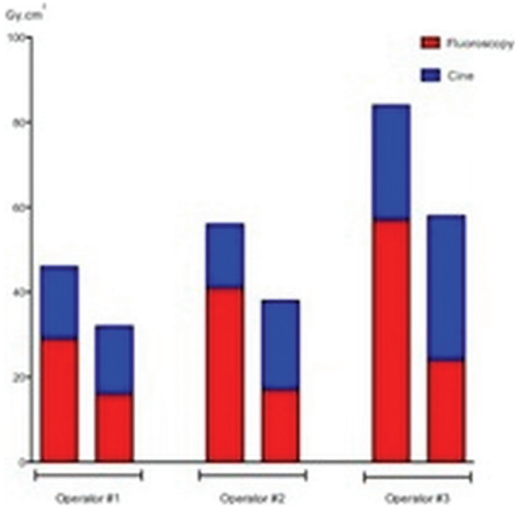
Dominant neointimal coverage grade

Conclusions: Grade 0/1 NIC was associated with subclinical thrombus adhesion; lower NIC grades as well as thrombus adhesion decreased from 4 to 8 months, suggesting that arterial repair rapidly progressed from 4 to 8 months following EES implantation.

P3952 | BEDSIDE
CathLab procedures change induce great improvements in radiation safety for patients and healthcare professionals

J. Abtan, M. Kerneis, A. Boccara, A. Chaib, L. Payot, S. Sayah, S. Alperin, S. Passefort, A. Koubbi, R. Gryman. *CHI Andre Gregoire, Montreuil, France*

Background: High radiation doses during cardiovascular procedures exposes



patients and laboratory personnel to deterministic and stochastic effects. Several studies have demonstrated the benefits of a radiation safety policy in this regard.
Aim: To evaluate the impact of new imaging procedures and material changes to radiation safety for both patients and staff.
Methods: We prospectively reviewed every radiation emission expressed in the dose area product (DAP) during a 30 month period. CathLab change took place after 5 months from Integris 500 to Allura FD 10 and new imaging procedures were edited. The primary endpoint was the reduction of the ionizing radiation dose per-exam recorded before and after laboratory change.
Results: Among the 2802 procedures performed, there were 360 performed during the first period, and 2442 after the CathLab change; the angioplasty rate was about 50% in both groups. In the DAP there was a 36% reduction ($p < 0.0001$), and interestingly, exclusively in fluoroscopy: -55% against +0.2% for cine (cf. figure 1). Explanations for such a change may be the new ability for a low fluoroscopy mode, reduction of routine cine frame from 12.5 pictures/seconds to 7.5 pictures/seconds, and rotational cine acquisition.
Conclusion: Catheterization Laboratory Change and simple new imaging methods produce significant decrease of the radiation dose received by both patients and staff during cardiovascular procedures, mainly due to fluoroscopy reduction.

P3953 | BEDSIDE
Progression of native coronary artery disease measured by intravascular ultrasound: systematic review and meta-analysis

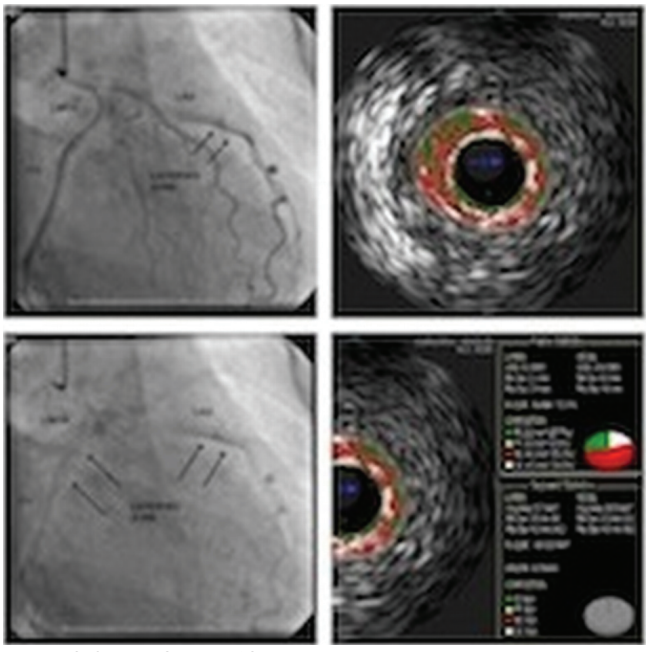
B. Nascimento[1], M.R. Sousa[1], D. Chamie[2], F.N. Demarqui[1], M.S. Marcolino[1], A.L.P. Ribeiro[1], M.A.A. Costa[2]. *[1]Federal University of Minas Gerais Hospital Clinics, Belo Horizonte, Brazil; [2]Case Western Reserve University, Cleveland, United States of America*

Introduction: Much effort has been made to understand the mechanisms and to develop therapies to prevent progression of atherosclerosis. Intravascular ultrasound (IVUS) has been widely used to evaluate plaque progression in response to specific therapies, but there has been no systematic analysis of pooled data focused on the progression pattern.
Objective: To investigate the pattern of coronary plaque volume progression over time by pooling data from prospective clinical trials utilizing serial IVUS imaging.
Methods: A Medline search was performed with 6 combinations of MeSH terms including "plaque", "progression" and "regression", to identify trials in English and Spanish that evaluated volumetric coronary plaque progression by IVUS, at least 2 points in time, published until September, 2012. Study arms were pooled, and a multivariate regression model was adjusted (linear mixed models with indirect comparison), considering the percent plaque volume change (%PVC) as the response, and follow up (FU) time and other relevant risk factors as independent variables.
Results: The search returned 1451 titles; 193 abstracts and 42 papers remained after exclusions, totaling 10169 patients in 86 study arms (24 control and 62 treatment), with a mean FU time of 16.3 (0.6 to 36) months. 24 papers were statin trials; there was significant plaque regression 34 arms (39.5%), and progression in only 7. In the univariate analysis (all arms pooled), there was no linear association between %PVC and FU time (β = -0.384, p = 0.563), and significant association between statin test and % change in LDL (%LDL-Dif) with %PVC (β = -3.848, p = 0.008 and β = 2.235, p = 0.002). Considering only the control arms, only baseline LDL associated with %PVC. In the multivariate analysis, FU time also showed no linear association with %PVC (β = 0.351, p = 0.696). The variables associated with %PVC were also statin test and %LDL-Dif (β = -5.099, p = 0.022 and β = 2.045, p = 0.035). Among control arms, none of the variables of the multivariate model associated with%PVC.
Conclusion: There seems to be no linear association between %PVC and FU time (with similar findings for the control arms), suggesting that atherosclerotic evolution is not linear in a moderate to high risk population in an overall time frame of 16.3 months. The use of statins and %LDL-Dif have significant negative association with plaque progression.

P3954 | BEDSIDE
Contrast layering; late clearance of contrast dye, a new angiographic phenomenon

I.M. Caglar[1], A. Vural[1], F.N. Turhan Caglar[2], B. Demir[1], I. Ungan[1], M. Ugurlucan[3], H. Tureli[1], S. Ciftci[1], O. Karakaya[1]. *[1]Bakirkoy Training and Research Hospital, Department of Cardiology, Istanbul, Turkey; [2]Istanbul Education and Research Hospital, Istanbul, Turkey; [3]Anadolu Medical Center, Istanbul, Turkey*

Background: Some patients evaluated for chest pain with angiographically normal coronary arteries show late clearance of contrast dye in the vessel lumen of coronary artery, which we defined as contrast layering (CL). We examined the hypothesis that CL is associated with early atherosclerosis. Therefore we assessed endothelial dysfunction (ED) and oxidative stress (OS) markers in this patient population and analyzed intravascular ultrasound (IVUS) images.
Methods: We performed angiogram to 58 patients with chest pain. We divided patients into two groups according to angiogram images. Group 1 (n=26); patients with normal coronary arteries and CL, group 2 (n=32); patients with normal coronary arteries. We excluded patients with any atherosclerotic plaques. ED and OS; as markers of early atherosclerosis was studied by measuring high sensitive C-reactive protein (hsCRP), nitric oxide (NO), malondialdehyde (MDA) plasma levels, total antioxidant status (TAS), total oxidant status (TOS) and oxidative stress index (OSI). Further we performed IVUS to group 1 and compared the segments with and without CL of the same coronary artery in terms of plaque burden (PB), fat tissue (FaT), fibrotic tissue (FiT), calcification (CT) and necrotic tissue (NT).
Results: CL was observed in 36 coronary arteries of 26 patients in group 1. TAS and NO levels were significantly lower; TOS, MDA and OSI were significantly higher in patients with CL than controls (p=0.015, $p<0.0001$, $p<0.0001$, $p<0.0001$ and $p<0.0001$ respectively). IVUS study revealed that PB, FiT, C and NT ratios were significantly higher in the coronary segments with CL ($p<0.0001$, p=0.003, $p<0.0001$ and $p<0.0001$ respectively).



Picture 1. CAG and IVUS images of CL

Conclusion: Our results supports the idea of CL being a new angiographic appereance of early atherosclerosis.

P3955 | BEDSIDE
Suboptimal stent deployment in presence of subacute thrombosis: a comparative FD-OCT study

T. Kodama[1], L. Di Vito[2], A. Chisari[2], V. Marco[2], A. Cremonesi[3], G. Parodi[4], M. Albertucci[2], F. Alfonso[5], F. Prati[2]. *[1]Foundation IRCCS Polyclinic San Matteo, Pavia, Italy; [2]San Giovanni - Addolorata Hospital Complex, Interventional Cardiology, Rome, Italy; [3]Ettore Sansavini Health Science Foundation, GVM Care and Research, Cotignola, Italy; [4]Careggi Hospital, Department of Cardiology, Florence, Italy; [5]Hospital Clinic San Carlos, Cardiovascular Institute, Madrid, Spain*

Purpose: Acute or subacute stent thrombosis (ST) is associated with a high mortality presenting often as acute coronary syndromes or sudden unexplained death.
To better understand the possible role of OCT for reducing stent thrombosis we have compared the OCT aspects of stented segments that underwent subacute stent thrombosis with the OCT findings obtained in a control group during an early follow-up.
Methods: Twenty-one consecutive patients presenting with acute coronary syndrome due to a definite subacute ST of either bare metal stents or drug eluting stent were matched 1:2 with a control group of 42 patients undergoing OCT for stent follow-up assessment.
Stents were assessed by OCT to address the features indicative of non-optimal stent deployment such as stent underexpansion, malapposition, edge dissection and reference lumen narrowing.
Results: Lumen area and stent area measurements were smaller in the ST group. Of note for the MLA and the MSA inside the stented segments the differences were highly significant (p were 0.004 and 0.03, respectively). Dissections imaged both at proximal and distal edges were more commonly detected in ST group (p= 0.007and p=0.0001, respectively). Dissection width at distal edge (but not at proximal edge) was significantly higher in ST group (p=0.03). Reference lumen narrowing was significantly higher in ST group (p=0.03)
In the group with ST at least one missed criteria of optimal stent deployment was revealed in 20 cases out of 21 and the difference was statistically significant in comparison with the control group (95.2% vs 44.5%, p=0.0003).