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Abstracts of original contributions

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1-P

Higher thrombus burden and its impact on infarct size in young as compared to older men with acute myocardial infarction

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Aim: We sought to investigate coronary thrombus burden and its impact on infarct size in young men with acute MI as compared to older patients.

Methods: Coronary thrombus was evaluated by angiography and scored according to TIMI Thrombus Scale. High thrombus burden (HTB) was defined as TIMI Thrombus Grade 4–5. We evaluated predictors of HTB and its impact on enzymatic infarct size.

Results: A total of 102 (55 aged < 55 years; 47 aged ≥ 55 years) men with acute MI who underwent PCI were enrolled in the study. HTB was significantly more prevalent in younger patients (32.7% vs. 10.6%; $p = 0.0078$). Univariate and multivariate logistic regression analysis revealed that independent predictors of HTB were: age < 55 years (OR = 2.40, 95% CI: 1.24–4.63; $p = 0.009$), GFR < 60 ml/min (OR = 3.17, 95% CI: 1.45–6.94; $p = 0.004$) and baseline TIMI 0-1 flow (OR = 6.31, 95% CI: 2.05–19.44; $p = 0.001$). Patients with HTB had significantly worse final TIMI flow and MBG, 5-fold higher rate of procedural ischemic complications (30.4% vs. 6.3%, $p = 0.05$) and higher maximal troponin I level (34.8 ng/ml vs. 11.2 ng/ml; $p = 0.003$) compared to those with low thrombus burden. In a multivariable linear regression model only HTB ($\beta = 0.19$; $p = 0.047$), anterior STEMI ($\beta = 0.34$; $p = 0.01$) and dysglicemia ($\beta = 0.23$; $p = 0.01$) were independent predictors of the infarct size ($R^2 = 0.34$). Initial TIMI flow 0–1 was significant only in a univariate analysis.

Conclusions: Young patients with acute MI more frequently than older present with a high coronary thrombus burden. High thrombus burden and not initial TIMI flow independently predicts larger infarct size.

2-P

Early DES and BMS healing profile assessed by OCT and proteomics in pig model

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Background: The strut coverage in OCT is used as a surrogate marker of chronic stent healing, however less data is available regarding the acute healing response in the first week.

Methods: There were 13 BMS and 15 DES implanted into the coronary arteries in an overstretch model. OCT follow-up was performed at 1, 3, 7, 14, and 28 days post implantation and assessed strut apposition, coverage and neoinitmal volume per 1 mm of stent (CAAS intravascular, Pie Medical). A proteomic approach was used to measure changes in proteins expression in the arterial neointima over time following implantation of drug-eluting (DES, Xience Pro, Abbott, USA) and same metallic platform bare-metal stents (BMS, MLVision, Abbott, USA) compared to balloon angioplasty in porcine coronary arteries.

Results: In the early period after implantation a higher neointimal volume per 1 mm for BMS (0.24 ±0.028 mm^3 vs. 0.25 ±0.024 mm^3; $p = 0.025$) without differences between BMS and DES in the stent struts malapposition (6.84 ±2.63% vs. 8.04 ±2.35%; $p = 0.75$) and in stent strut coverage (45.50 ±4.94% vs. 36.73 ±4.41%; $p = 0.25$) was found. At 28 days post implantation the difference in in-stent neoinitmal volume per 1mm (0.70 ±0.13 vs. 0.68 ±0.02; $p = 0.89$), struts coverage (94.844 ±2.89 vs. 98.931 ±0.51; $p = 0.778$) and number of malapposed struts (0.866 ±0.52 vs. 0.407 ±0.40; $p = 0.238$) were similar for BMS and DES. Animals were sacrificed at each of these time-points and their coronary arteries were retrieved with subsequent separate analysis of the vascular media and neointima (for time-point 28). A total of 145 ECM and ECM-associated proteins were identified by mass spectrometry. A comparison of the media versus neointima revealed an increase of collagens and regulatory proteins, such as small leucine rich proteins in the media, while basement membrane proteins were predominantly found in the neointima. Only by day 28, the neointima in DES compared to BMS showed increased expression of proteins involved in the regulation of calcification.

Conclusions: Early healing events in first week after stent implantation involve less neointimal volume in DES and initially similar proteomic profiles for DES and BMS. It suggest the high biocompatibility of permanent fluorinated polymer coated DES in the acute phase after implantation.

3-P

Impact of chronic total occlusion of the coronary artery on long-term prognosis in patients with ischemic systolic heart failure – insights from COnteMporary Modalities In Treatment of Heart Failure (COMMIT-HF) registry

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Background: The presence of concomitant chronic total occlusion (CTO) in a non-culprit lesion in acute coronary syndromes is associated with worse prognosis. Coronary artery disease is a main cause of heart failure (HF) and in many cases at least one CTO is observed. Therefore this study sought to assess the impact of the CTO on long-term prognosis in patients with ischemic cardiomyopathy.

Methods: The study included all patients with systolic HF who underwent elective coronary angiography and were registered from January 2009 to December 2014 in the ongoing single-center COnteMporary Modalities In Treatment of Heart Failure (COMMIT-HF) registry. The patients were divided into two groups with regard to CTO presence. All of the analyzed patients were followed up for at least 12 months with all-cause mortality defined as primary endpoint.

Results: Of the 675 patients fulfilling the inclusion and exclusion criteria, 278 (41.2%) patients had 1 or more CTO of a major coronary artery (+CTO), and in 397 (58.8%) patients the presence of the CTO was not observed (–CTO). The 12-month mortality for the +CTO and –CTO patients was 19.4% and 10.3%, respectively ($p < 0.001$), evident also after 24 months (26.6% vs. 17.6%, $p = 0.01$). After multivariate adjustment for differences in the baseline characteristics, the presence of CTO remained significantly associated with higher 12-month mortality (relative risk = 1.99, 95% CI: 1.31–3.02, $p = 0.001$).

Conclusions: Our analysis showed that in patients with ischemic heart failure the presence of the chronic total occlusion of a coronary artery is related to worse long-term prognosis.

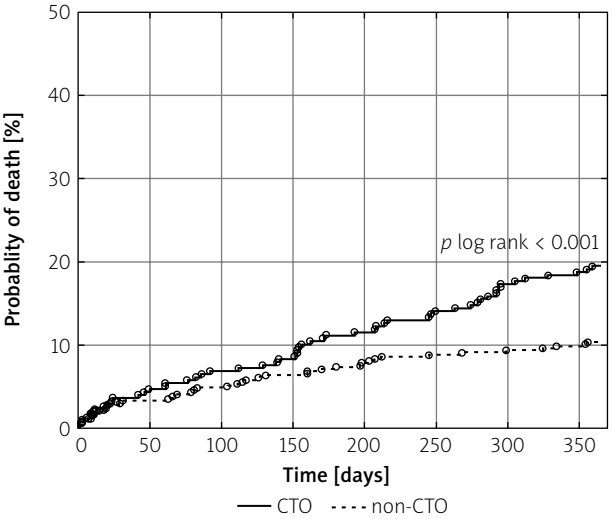

Figure 1. Twelve-month mortality of the study groups

4-P

Predictors and biomarkers of nonobstructive coronary artery disease in patients presenting with acute myocardial infarction

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Background: Growing sensitivity of myocardial necrosis biomarkers enables the diagnosis of myocardial infarction (MI) in patients with minimal amount of myocardium at risk. The other side of the coin is that more patients with nonobstructive coronary artery disease (CAD) may be diagnosed with MI. In previous studies correlation between inflammatory biomarkers and extent of CAD was shown.

Aim: To assess the predicting factors and biomarkers of nonobstructive CAD in patients presenting with MI.

Materials and methods: We prospectively evaluated clinical and laboratory data of 283 consecutive patients who underwent coronary angiography due to MI diagnosed according to the third universal definition of myocardial infarction.

Results: Nonobstructive CAD was diagnosed in 39 (14%) of patients. Above-mentioned patients were more often female, diagnosed with NSTEMI, had higher left ventricle ejection fraction and lower levels of troponin I, white blood count, C-reactive protein, interleukin 6 (IL-6) and CD 40 ligand. Multivariable logistic regression model revealed female sex, diagnosis of NSTEMI and low IL-6 level (< 1.0 pg/ml) as independent predictors of nonobstructive CAD in patients with MI.

Conclusions: Nonobstructive CAD is present in every seventh patient diagnosed with MI. Female sex, diagnosis of NSTEMI and low IL-6 level are predicting factors of nonobstructive CAD in patients presenting with MI. Predicting significant stenoses (or lack of thereof) in patients with myocardial infarction may further increase the accuracy of early risk stratification in patients with MI.

5-P

First and second generation drug eluting stents versus bare metal stents in all comer population of patients undergoing PCI of saphenous vein graft in 1-year follow-up

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Aim: The aim of this study was to assess device-specific outcomes after implantation bare-metal stents (BMS), first- (paclitaxel, sirolimus) or second-generation (everolimus, zotarolimus, biolimus A9) DES in all-comer population of patients undergoing PCI of saphenous vein graft (SVG).

Methods: The Registry included 378 consecutive patients after coronary artery bypass graft (CABG) undergoing PCI on SVG. Primary efficacy end-point was major adverse cardiac and cerebrovascular event (MACCE) defined as death, stroke or repeat-revascularization at 1-year follow-up.

Results: Registry included stable CAD and ACS (SA 79 (20.8%), UA 166 (43.9%), NSTEMI 108 (28.5%), STEMI 25 (6.6%)) treated with BMS (n = 195 (51.5%)) and DES (n = 183 (48.4%)). The baseline and procedural characteristics of patients receiving BMS and BES were comparable including use of embolic protection devices. Use of BMS group was comparable to DES in terms of risk of death (15 vs. 7; HR = 1.1 (95% CI: 0.48–2.79), p = 0.720), myocardial infarction (13.8% vs. 7.6%; HR = 1.0 (95% CI: 0.49–2.08), p = 0.97), target vessel revascularization (34.8% vs. 25.6%; HR = 0.72 (95% CI: 0.48–1.09), p = 0.09), stroke (1.5% vs. 2.1%; HR = 3.3 (95% CI: 0.45–23.18), p = 0.90) and MACCE (43.5% vs. 32.2%; HR = 0.7 (95% CI: 0.54–1.14), p = 0.191) at 1-year follow-up. There were no differences between first and second generation of DES.

Conclusions: Our study shows that use of DES did not attenuate the higher risk of MACCE in SVG. Moreover there is no difference in terms of survival between first or second generation stent in SVG.

6-P

Comparable vascular response of a new generation sirolimus eluting stents when compared to everolimus eluting stents in the porcine coronary restenosis model

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Background: Early sirolimus eluting stents (SES) showed inferior healing and clinical outcomes when compared to everolimus eluting stents (EES). Therefore, we report vascular response of a novel generation biodegradable polymer SES (nSES: Alex Plus, Balton) and the fluoropolymer EES (Xience V, Abbott) in the porcine coronary restenosis model.

Methods: A total of 40 stents were implanted with 120% overstretch in coronaries of 14 domestic pigs: 16 nSES, 16 EES and 8 bare metal controls (BMS). Following 28 and 90 days, coronary angiography and intravascular optical coherence tomography (OCT) was performed. Subsequently animals were sacrificed and stented segments harvested for independent histopathological evaluation.

Results: At 28 days the neointimal thickness in OCT was lowest in the nSES (0.18 ±0.1 mm vs. 0.39 ±0.1 mm vs. 0.34 ±0.2 mm respectively; p = 0.04). The analysis of stent coverage showed no difference in the occurrence of malaposition (nSES: 0.1% vs. EES: 0.1% vs. BMS 0%; p = 0.79), however the rate of uncovered struts was marginally higher in nSES (nSES: 5.8% vs. 1% vs. 0.1%; p < 0.01). The percent area stenosis in pathology was lowest in nSES (nSES: 14.1 ±7% vs. EES: 21.7% vs. BMS:

31.4 ±7%; p = 0.01). The inflammation was significantly lower in nSES and EES when compared to BMS (0.24 ±0.1 vs. 0.4 ±0.1 vs. 0.77 ±0.4; p < 0.01) whereas the endothelialisation similar (2.2 ±1 vs. 2.2 ±1 vs. 1.8 ±0.3; p = 0.4). EES and nSES had higher fibrin scores than BMS (1.2 ±0.4 vs. 1.3 ±0.3 vs. 0.17 ±0.2; p < 0.01). The 90-day results are pending.

Conclusions: New generation SES show similar healing and biocompatibility profile when compared to fluoropolymer EES.

7-P

Relation of dual antiplatelet therapy to bleeding episodes, thromboembolism, and occluder-associated thrombi in patients after transcatheter left atrial appendage occlusion

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Background: Dual antiplatelet therapy (DAPT) after transcatheter left atrial appendage occlusion (LAAC) is advised for a period ranging from 30 to 180 days to prevent occluder-associated thrombus formation. However, role of DAPT in the device healing, which includes thrombotic processes, is unclear. Optimal DAPT duration remains unknown.

Methods: As part of the prospective, single center Anin-LAAC Registry 75 patients (mean age: 74.0 ±9.4, 40% females, mean CHA2DS2-VASc score: 4.2 ±1.7, mean HAS-BLED score: 2.5 ±1.4) underwent structured follow-up visits at target 45, 180, and 360 days following LAAC with ACP (n = 48) or WATCHMAN device (n = 27). The visits included imaging of the appendage with transesophageal echocardiography or computed tomography. Duration of DAPT after LAAC was not centrally guided but advised to fall within the range of 30 to 180 days and depended on the routines and preference of the attending team of physicians.

Results: During 58.6 patient-years of follow-up, there were no thromboembolic complications in the studied cohort. Nine patients had bleeding episodes, out of which 6 (67%) were on DAPT at the time of bleeding. There were no occluder-associated thrombi during DAPT therapy. Three patients presented with occluder-associated thrombus while on single antiplatelet therapy. DAPT duration (mean: 120.2 ±114.2 days) was not associated with thrombi formation by Cox regression analysis (HR = 1.0, p = 0.52).

Conclusions: Occluder-associated thrombi were not associated with DAPT duration after LAAC. Most bleeding episodes occurred on DAPT therapy. These results support short-term rather than extended DAPT course following LAAC.

8-P

Impact of multiple stents implantation in the infarct-related artery on one-year clinical outcomes of patients with ST-elevation myocardial infarction undergoing primary percutaneous coronary intervention. Data from Polish NRDES Registry

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Aim: We sought to evaluate the impact of multiple stents implantation in the infarct-related artery (IRA) on 1-year clinical outcomes of patients with ST-segment elevation myocardial infarction (STEMI) undergoing primary percutaneous coronary intervention (PCI).

Methods and results: Data on 1,741 consecutive patients with STEMI who underwent immediate PCI with implantation of ≥ 1 stent enrolled the National Registry of Drug Eluting Stents (NRDES) were assessed. Patients were stratified based on the number of implanted stents in IRA: 1 vs. ≥ 2 stents. At the discretion of operators, ≥ 2 stents in IRA were implanted in 247 (14.2%) patients. Remaining 1,494 patients were treated with a single stent. Patients treated with multiple stents were less likely to achieve TIMI grade 3 flow after primary PCI. Overall mortality at 1 year was 8.3% in the single stent group and 10.3% in the ≥ 2 stents group (p = 0.37; adjusted for propensity score p = 0.13). After propensity score matching patients treated with ≥ 2 stents were at higher risk of

definite or probable stent thrombosis and urgent revascularization at 1 year.

Conclusions: In patients with STEMI undergoing primary PCI, a need for implantation of ≥ 2 stents in IRA carries an increased risk of stent thrombosis and urgent revascularization at 1 year.

9-P

Tough decisions regarding triple anticoagulation therapy in patients with atrial fibrillation undergoing percutaneous coronary intervention

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Background: Anticoagulation therapy is essential to reduce the risk of ischemic stroke in patients with atrial fibrillation (AF). However, patients who underwent percutaneous coronary intervention (PCI) have highly increased risk of bleeding complications due to P2Y inhibitors and acetylsalicylic acid (DAPT) intake. Currently, 3 different types of anticoagulants are used: acenocumarol/warfin (VKA), novel oral anticoagulants (NOAC) and low molecular weight heparin (LMWH).

Aim: To determine prevalence of patients requiring triple therapy (DAPT plus VKA, NOAC or LMWH), assess bleeding complications and determine why particular anticoagulant was used for each patient.

Methods: Consecutive subjects with AF who underwent PCI were evaluated for in-hospital bleeding complications and the anticoagulation regimens.

Results: 163 (5.1%) patients required triple anticoagulation therapy among 3171 consecutive patients admitted to our Department between 1/10/2014 and 30/09/2015. A total of 137 patients (73.0 ±8.4, range: 51–88 y.o., 90 M; 66%) were included into the study (21 patients were excluded due to participation in blinded anticoagulant drug trials, 5 due to valve prosthesis). Periprocedurally, a significant haemoglobin drop (Hb > 2 g/l, range: 2–6.2 g/l) was observed in 26 (19%) out of 137 patients, 4 (15.4%) required blood transfusion. Access-site hematoma, haematuria, URT or GI bleeding occurred in 8 (5.8%), 7 (5.1%), 4 (2.9%) and 1 (0.7%) subjects, respectively. In 2 (1.4%) patients major bleeds (1 ICH, 1 GI) were reported on NOAC previously. On discharge, VKA + DAPT, NOAC + DAPT, LMWH + DAPT were prescribed in 70 (51%), 53 (39%), and 12 (8.7%) patients, respectively. Two (1.3%) subjects, as a consequence of major complications and high bleeding risk were given DAPT only (HAS-BLED: 4.5 ±0.7), as compared to groups on LMWH + DAPT (HAS-BLED: 2.83 ±1.03), VKA + DAPT (2.5 ±0.8) and NOAC + DAPT (2.41 ±0.99), p = 0.010. Patients receiving DAPT only had higher CHA_2DS_2-VASc score (6.5 ±0.7), as compared to LMWH + DAPT (5.33 ±1.67), VKA + DAPT (4.34 ±1.31) and NOAC + DAPT (4.34 ±1.88), p = 0.058. Patients with Hb drop > 2 g/l and/or bleeding were more likely to receive NOAC or LMWH than VKA (32.1% or 28.6% vs. 18.6%, respectively, p = 0.084).

Conclusions: Five perect of our patient cohort required triple anticoagulant therapy, which was associated with relatively high risk of complications, e.g. bleeding. Patients with greater HAS-BLED score were likely to receive LMWH + DAPT or DAPT only, while bleeding complication occurrence favoured NOAC as a part of triple therapy.

10-P

Multi-territory atherosclerotic occlusive disease and carotid intima-media thickness as cardiovascular risk predictors after percutaneous angioplasty of symptomatic subclavian artery obstruction

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Background: Although subclavian artery stenosis (SAS) is considered a benign disorder, there is evidence that patients who underwent SAS revascularization still have a high rate of cardiovascular events (CVE).

Aim: This study aimed to identify the independent predictors of CVE including co-existent atherosclerosis and carotid intima-media thickness (CIMT) among the patients with SAS.

Methods: 218 consecutive patients (116 M) aged 62.1 ±8.4 y.o. with SAS referred to angioplasty were examined for any co-existent coronary, renal or lower extremity artery stenosis ≥ 50%. The initial CIMT and internal carotid artery stenosis (ICAS) were assessed. CIMT was re-assessed in 108 randomly chosen patients, to evaluate CIMT change over time. The incidence of cardiovascular death

(CVD), myocardial infarction (MI), ischemic stroke (IS) and symptomatic lesion progression (LP) was recorded.

Results: Isolated SAS, 1, 2 or more territories with stenosis ≥ 50% was found 46 (21%), 83 (38.1%), 55 (25.2%) and 34 (15.6%) patients, respectively. Presence of ICAS ≥ 50% (RR = 1.54, CI = 1.39–1.7, $p < 0.001$) and the initial CIMT (RR = 1.16, CI = 1.05–1.28, $p = 0.005$) occurred independent markers of multi-territory atherosclerosis. The optimal CIMT cut-off for atherosclerotic involvements occurred: 1.3 mm (sensitivity: 75.6%, specificity: 76.1%). During the follow-up of 56.7 ±35 mo., CVD/IM/IS occurred in 29 (13.3%) subjects. The patients who experienced CVD/IM/IS had a significantly higher CIMT progression (ΔCIMT: +0.199 ±0.57 mm vs. +0.008 ±0.26 mm, $p = 0.039$) and initially more widespread atherosclerosis (mean number of territories: 1.8 ±1.1 vs. 1.3 ±1.1, $p = 0.042$). Independent predictors of CVD/MI/IS/LP occurred coronary artery disease (RR = 1.32; CI = 1.1–1.58, $p = 0.003$) and CIMT progression (RR = 1.22; CI = 1.02–1.46, $p = 0.033$; sensitivity: 75% and specificity: 61.8%).

Conclusions: In patients with symptomatic SAS, the baseline CIMT and ICAS ≥ 50% are independently associated with multi-territory atherosclerosis, while CIMT progression with the risk of CVE.

11-P

Patients with carotid artery stenosis and recent cerebral ischemic event are less likely to have a well-developed cerebral collateral pathways, which should prompt early carotid intervention

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Background: Cerebral collateral pathways are of utmost importance in the occurrence of the first cerebral ischemic event (CIE), as well as CIE recurrence in patients with internal carotid artery stenosis (CAS).

Aim: To assess collateral pathways in the cerebral arteries associated with severe internal carotid artery stenosis (ICAS) in patients who suffered from cerebral ischemic event (CIE) within 1 month, 3 months, distant (over 3 months), and no history of CIE.

Methods: Study group included 316 subjects in mean age 65.8 ±8.9 y, 224 (71%) men, who were referred to carotid artery stenting, including 54 subjects who had CIE during last 1 month, 33 with CIE between 1 and 3 months, 149 with distant CIE (over 3 months) and 80 patients who had no history of CIE. Transcranial color-coded Doppler ultrasound (TCCD) was performed prior to carotid artery stenting in the test groups. The prevalence of collateral pathways via the anterior communicating artery (ACoA) and posterior communicating arteries (PCoAs) was evaluated.

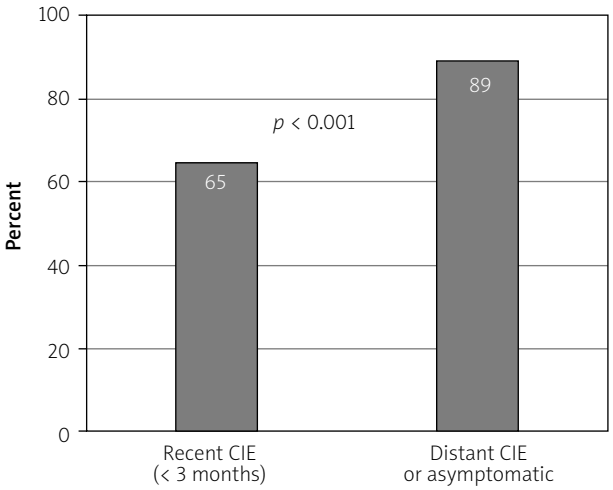

Figure 1. Frequency of cerebral collateral circulation in patients with recent cerebral ischemic event (< 3 months) compared to asymptomatic patients and those with remote CIE

Results: Any cerebral collateral pathway (through the ACoA or PCoA) was identified in 39 (72%) out of 54 subjects with CIE below 1 month, 18 (54%) with CIE between 1 and 3 months, 131 (88%) with distant CIE and 72 (90%) with asymptomatic ICAS. The ACoA was found in 53%, 36%, 80% and 86% of subjects with CIE below 1 month, between 1 and 3 months, over 3 months and asymptomatic, respectively. While PCoA was found in 46%, 39%, 50% and 35% of cases in respective groups. Functioning collateral pathways were more often encountered in asymptomatic subjects as compared to subjects with CIE below 1 month ($p = 0.007$) and between 1 and 3 months (< 0.001). Similarly, collateral pathways were more prevalent in subjects with distant CIE as compared to patients with CIE below 1 month (0.007) and between 1 and 3 months (< 0.001), respectively. Interestingly, there was no statistical difference in the frequency of collateral cerebral circulation between asymptomatic and distant symptomatic patients (90% vs. 88%; $p = 0.636$). Analyses revealed that subjects with recent (below 3 months) CIE were less likely to develop cerebral collateral flow (57 out of 87 subjects, 66%), as compared to subjects with CIE more distant than 3 months ($p < 0.001$) and asymptomatic ICAS (< 0.001).

Conclusions: There is lower prevalence of collateral flow in patients with recently symptomatic ICAS. Thus, when timing for carotid artery stenting, the assessment of collateral flow status should be strongly recommended, prompting early carotid intervention.

12-P

Association of carotid plaque morphology and heart and brain-related miRNAs expression in patients with ischemic stroke related to internal carotid artery stenosis

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Background: The origin and concentration of circulating miRNAs may depend on both organ damage, as well as pathways driving athero-thrombotic event.

Aim: The study was aimed to assess the potential relationship between carotid plaque morphology and the expression of heart and brain derived circulating miRNAs in subjects with recent cerebral ischemic event due to carotid artery stenosis (CAS).

Methods: Circulating small RNAs (miR-1, miR-133a, miR-133b, miR-208b, miR-499, miR-34a, miR-124, miR-134, miR-16), metalloproteinase-9 (MPP-9), and TGF-β were analyzed in 96 consecutive patients (58 M; mean age: 69 ±9.1 years) with significant CAS (mean: 84 ±15%), in the period between 1 and 12 weeks after ischemic stroke (IS) or TIA. Color Doppler ultrasonography was used to assess plaque morphology and it echogenicity.

Results: Carotid plaque morphology was assessed as soft in 35 (36.4%), thrombotic in 10 (10.4%), calcified in 29 (30%), fibrotic in 13 (13.5%), heterogenic in 9 (9.4%) patients. Furthermore plaque ulcerations were observed in 26 (27.1%) of plaques. In comparison to soft and thrombotic plaques, the fibrotic plaques showed a significant increase in the expression of miR-122 (p = 0.045), miR-1 (p = 0.056), miR-375 (p = 0.089) and MMP-9 (p = 0.065), while heterogenic showed higher levels of miR-122 (p = 0.082), endoglin (p = 0.083) and TGF-β (p = 0.039). There were no difference between soft and calcified plaques and miRs expression. The ulcerated plaques were characterized with high expression of MMP-9 (p = 0.033), miR-1 (p = 0.011), miR-16 (p = 0.043) and mir-122 (p = 0.017). Furthermore, there was a significantly higher expression of miR-124 (p = 0.014), miR-133a (p = 0.029) and miR-133b (p = 0.024) in subjects with less than 4 week of ischemic brain injury as compared to more distant ischemia. A correlation between time since ischemia and miR-122 (r = –0.232, p = 0.071) and miR-375 (r = –0.270, p = 0.035) was observed. There was no correlations between degree of CAS on ultrasonography and miRs expression.

Conclusions: The up-regulation of both cardiac and brain circulating miRNAs in stroke and TIA patients differs with regard to plaque composition. The higher expression of some miRs is observed particularly in fibrotic and ulcerated plaques as compared to other. There is also the relationship between time passed since cerebral ischemia and expression of miR-122 and miR-375. We did not find the relationship between degree of CAS and miRs expression.

13-P

Long term outcomes of percutaneous lower – extremity arterial interventions with balloon angioplasty versus atherectomy – propensity score matched registry

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Background: The atherosclerosis plaques have different morphology from soft neointimal plaques to heavily calcified lesions. This may require different treatment approaches.

Aim: Therefore, we sought to evaluate the efficacy of percutaneous balloon angioplasty (PTA) versus atherectomy (AT) endovascular revascularization which type was attuned by operator.

Methods: Between 2008 and 2013 a total of 419 endovascular revascularizations were performed on arteries of lower extremities. Patients with claudication as well as with critical limb ischemia (CLI) were included in this registry. The endpoints were considered as target lesion revascularization (TLR), amputation, major adverse

cardiovascular events (MACE) and bailout stenting (BS). MACE was defined as death, myocardial infarction and stroke. The type of atherectomy (excisional- soft plaque, orbital- calcified plaque, with active aspiration- with a thrombous) was left to the operator's discretion.

Results: The PTA was performed on 215 patients, whereas AT was used in 204 cases (Silver Hawk™, EV3-MN, USA-125; CSI360° MN, USA-66 Pathway Medical Technologies-13). The mean follow up time was 500 ±454 days. There were no significant differences in baseline characteristics between groups with the exception of increased coronary artery disease, dialysis and CLI for PTA group. There were significant differences in TVR (PTA: 32% vs. AT: 21%; $p = 0.01$), death (PTA: 8% vs. AT: 2%; $p = 0.009$) and BS (PTA: 9% vs. AT: 1% $p < 0.001$). Kaplan-Mayer analysis showed no significant differences between groups in time to TLR, amputation, death. After adjustment this was sustained.

Conclusions: In this observational analysis, atherectomy endovascular revascularization offered better long term outcomes than balloon angioplasty.

14-P

Twelve months follow-up after retrograde recanalization of SFA chronic total occlusion

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Background: Chronic total occlusion (CTO) of the lower extremities can occur in 40% of patients with symptomatic peripheral artery disease (PAD). Retrograde approach for superficial femoral arteries (SFA) recanalization can increase the success rate of recanalization in CTO of SFA.

Aim: The aim of this study was to assess the efficacy and the clinical outcomes during long-term follow-up after retrograde recanalization of SFA.

Methods: The study included a total of 17 patients (7 females, 10 males), who underwent percutaneous retrograde recanalization of SFA from June 2011 to June 2015. Major adverse cardiac and cerebrovascular events (MACCE) during follow-up were defined as combination of death (cardiac and non-cardiac), myocardial infarction, revascularization, stroke/TIA.

Results: The mean age of patients was 63 ±7 years. The majority of patients were smokers with a history of hypercholesterolemia and arterial hypertension. Retrograde puncture of the distal SFA was successful in all cases. Retrograde procedure was performed immediately after antegrade failure in 4 (23.5%) patients and after previously failed attempt in 13 (76.5%) patients. Procedure was successful in 15 (88%) patients, and unsuccessful in 2 (12%) patient. Periprocedural complications included 1 peripheral distal embolization, which was treated successfully with aspiration thrombectomy, 1 bleeding event and 7 puncture site hematomas, without the need for blood transfusion. During follow-up all-cause mortality rate was 5% (1 patient, non-cardiac death). No myocardial infarction, cerebrovascular events or limb loss were observed. After retrograde recanalization, the primary patency rate at 12 months was 88.2%.

Conclusions: The retrograde SFA puncture seems to be a safe and successful technique for CTO recanalization and is associated with low rate of perioperative and long-term follow-up complications.

15-P

Safety and feasibility of same day early discharge after endovascular revascularization of lower extremities in elderly. SENIOR-ER registry

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Background: The increment of the peripheral artery disease is unsurprising due to fact that population is getting older in well developed countries.

Aim: Therefore, the aim of study was evaluation whether the one-day discharge after endovascular revascularization (ER) of the arteries of lower extremities in the population 70 years and older is comparably safe and feasible as in the younger cohort.

Methods: The consecutive clinical data of 477 patients after ER, which were discharged in the same day after procedure, were reviewed. Study cohort was divided into two groups – 70 years old and older and younger cohort – under 70 years old. The follow up was done in 24 h after procedure and 30 days after discharge.

Results: The results were available for 235 patients in the elderly group and 220 in the younger cohort. The elderly group had average age 79 years compared to 60.9 in the control group. The early same- day discharge was achieved in the majority of booth tested groups (99% vs. 99.5%; $p = 0.6$). The mean time of ambulation in elder

group was 287.4 ±43.4 min whereas in younger cohort was 285.8 ±45.7 min (p = 0.89). There were no deaths, target vessel revascularization, amputation or incidents of myocardial infraction or stroke within first 24 hours post intervention. Two pseudoaneurysm which needed the surgical intervention in elder group and one retroperitoneal bleeding in the younger cohort were reasons for failure of the one-day discharge. There were no deaths at 30 days follow up in either the elderly or younger group. There were 2 amputations and 1 stroke in the control group. None of these complications occurred in elderly. There were no statistical differences between the cohorts in 30 days follow up.

Conclusions: This study is hypothesis generating that the advantage of the same-day discharge could be safety extended for elderlies.

16-P

Impact of coronary artery disease presence on the long-term follow-up of carotid artery stenting

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Background: Carotid artery stenting (CAS) has become an alternative for carotid endarterectomy in the treatment of carotid arteries atherosclerosis due to limited injury and comparable periprocedural risk. The impact of coronary artery disease (CAD) on long term follow-up after CAS needs reconsidering due to the intensification of aggressive pharmacotherapy in CAD in recent years.

Aim: The aim of the study was to assess the impact of CAD presence on the long-term follow-up of patients after CAS.

Methods: Data of 130 symptomatic and asymptomatic patients undergoing CAS with cerebral protection systems from December 2002 to December 2010 were divided in two groups: with and without CAD. Major adverse cardio and cerebrovascular events (MACCE) during follow-up were defined as the combination of death (cardiac and non-cardiac), myocardial infarction and stroke or transient ischemic attack (TIA). Long-term outcomes of patients were stratified based on the history of CAD.

Results: The mean age of patients was 66 ±9 years, majority of patients were male (80.2%). Long-term follow-up data were available in 86.2% of patients. During mean follow-up of 71.9 ±31.7 months all-cause mortality rate was 19.3%. The rates of myocardial infarction, stroke/TIA, and MACCE – were 16.7%, 12.3%, and 36.3% respectively. The frequency of MACCE during long-term follow-up was higher in patients with CAD vs. without CAD (40.8% vs. 6.7%, p = 0.01) and the mortality rate in the two groups was (22.2% vs. 0%, p = 0.07), respectively.

Conclusions: Patients with symptomatic or asymptomatic carotid stenosis are a high-risk individuals. The presence of CAD increases the risk of MACCE in such patients during long-term follow-up.

17-P

Long term outcomes in diabetic patients treated with atherectomy for peripheral artery disease

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Background: Prevalence of diabetes increased significantly in well-developed countries during last decade and it is still growing. Moreover, diabetes increases risk of restenosis in patients treated percutaneously due to peripheral artery disease.

Aim: To compare outcomes of atherectomy treatment in diabetic (DM) vs. non-diabetic (nDM) patients with peripheral artery disease.

Methods: Between 2008 and 2013 a total of 204 endovascular revascularizations were performed on arteries of lower extremities. The endpoints were considered as target lesion revascularization (TLR), death, and bailout stenting (BS). The type of atherectomy (excisional-soft plaque, orbital-calcified plaque, with active aspiration-with a thrombous) was left to the operator's discretion.

Results: The registry contains 132 DM (66% male, age: 68 ±11.2 years) and 72 nDM (63% male, age: 75 ± 11.3 years). DM were younger but had higher prevalence of coronary artery disease (DM: 91% vs. nDM: 61%; p < 0.0001) and end-stage renal disease (DM: 22% vs. nDM: 2.5%; p < 0.0001). There were no differences in critical limb ischemia between groups (DM: 21% vs. nDM: 12%; p = 0.13). Three different technologies were utilized: (1) Silver HawkTM (DM: 62% vs. nDM: 50%; p = 0.65), (2) CSI360° (DM: 34% vs. nDM: 27.5%; p = 0.34) and (3)

Pathway Medical Technologies (DM: 12.5% vs. nDM: 3%; p = 0.013). The mean time follow up was 384 and 411 days in DM and nDM respectively (p = 0.43). There were no significant differences in TLR (DM: 20% vs. nDM: 25%; p = 0.37), amputations (DM: 1.5% vs. nDM: 0.7%; p = 1.0) death rates (DM: 0.7% vs. nDM: 2.5%; p = 0.9) and BS (DM: 0.7% vs. nDM: 1.5%; p = 1.0). Kaplan-Mayer analysis showed no significant differences between groups in time to TLR, amputation and death.

Conclusions: Plaque modification with adjusted atherectomy appears to have similar outcomes in diabetic as well as in non-diabetic patients. Nonetheless further prospective and randomized study is warranted to confirm the findings of the current registry.

18-P

Ultrasonographic criteria for recognition of the functionally significant renal artery stenosis differ from the usually recognised cut-off values for stenosis exceeding 50%

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Background: Current cut-off values obtained from ultrasonography for renal artery stenosis (RAS) > 50% recognition: peak-systolic (PSV), end-diastolic (EDV) velocities of 2 m/s and 0.5 m/s, respectively, as well as the renal-aortic-ratio (RAR) > 3.0 do not address the issue of functional severity of RAS.

Aim: To assess whether some of ultrasonographic criteria for RAS > 50% can identify subjects with functionally significant RAS, in whom renal stenting (PTA) can be justified. And whether, ultrasonographic criteria can be helpful in predicting PTA outcome.

Methods: Forty-five renal arteries with mean RAS of 55.8 ±6.4% (range: 50–69%) on angiography were evaluated for functional severity in 40 subjects, aged 65.4 ±8.4 y., 26 M. Ultrasonography was performed in all subjects before angiography, with the evaluation of renal PSV, EDV, RAR, kidney length, intrarenal parameters (acceleration time, AT and intrarenal resistive index, IRI). Functional significance of RAS was evaluated with: minimal lumen area (MLA) on IVUS mm^2, translesional resting pressure gradient (RPG), dopamine hyperemic pressure gradient (HPG), or dopamine renal fractional flow reserve (RFFR). RAS verified as significant were stented. The improvement of blood pressure was defined as SBP reduction of > 15 mm Hg and/or DBP of > 7 mm Hg on 24-hour ABPM at 12 months following PTA, reduction of blood lowering agents, and renal function improvement as eGFR increase by 15%.

Results: Significant correlations between MLA and RFFR (r = 0.713, p = 0.009), HPG (r = –0.567, p = 0.054), PSV (r = –0.376, p = 0.044), EDV (r = –333, p = 0.022), RAR (r = –0.279, p = 0.095), ischemic kidney length (r = 0.400, p = 0.014) and AT (r = –0.351; p = 0.033) were found. Significantly higher PSV values were observed in subjects with RFFR < 0.8 (3.99 ±0.86 vs. 2.79 ±0.86 m/s, p = 0.021) or MLA < 8 mm^2 (3.6 ±1.3 vs. 2.87 ±0.86 m/s, p = 0.06), as compared to higher RFFR and MLA. RPG > 21 mm Hg and MLA < 8 mm correlated with AT (132 ±34 vs. 89 ±26 ms, p = 0.003 and 127 ±41 vs. 99 ±28, p = 0.02), respectively. PSV > 3.3 m/s occurred best predictor of MLA < 8 mm^2 (sensitivity: 73%; specificity: 64%) and of RFFR < 0.8 (sens: 100%; spec: 75%), AT cut-off ≥ 120 ms had sensitivity of 66% and specificity of 64% for MLA < 8 mm^2. Twenty-eight subjects underwent PTA. Clinical improvement was observed in 19 (67.9%). In patients who improved, significantly lower RAR values before PTA were observed, as compared to non-responders (3.6 ±0.9 vs. 5.4 ±2.3, p = 0.004).

Conclusions: Our preliminary data suggest that functionally significant RAS is associated with higher PSV and AT values than usually used for recognition of RAS > 50%. Furthermore, high RAR value may be negatively associated with clinical improvement after PTA.

19-P

Optical coherence tomography imaging of renal arteries after radio-frequency catheter-based renal denervation in patients with resistant hypertension at long-term follow-up

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Background: Optical coherence tomography (OCT) imaging at the time of renal denervation (RND) showed that the procedure might cause spasm, intimal injury and

thrombus formation. There is no data on long-term renal vascular injury after RND.

Aim: In the presented study we assessed vessel-healing post RND by OCT and angiography at long-term follow-up.

Methods and results: It was a single center study to assess renal arteries healing after radio-frequency (RF) RND in 10 patients (20 arteries) by OCT and angiography at 19.2 ±5.6 months after procedure. There were no adverse events or complications during the long-term follow up. Nine (90%) patients achieved significant reductions of blood pressure without change of the antihypertensive medications. We demonstrated presence of 25 spots of focal intimal thickening found by OCT in 9 (90%) patients, in 13 (65%) arteries. The mean area of focal intimal thickening was 0.056 ±0.032 mm^2. No vessel dissection, thrombus, intimal tear or acute vasospasm were recorded during the OCT analysis. In addition, the quantitative angiography analysis (QCA) revealed that minimal lumen and proximal lumen diameter were smaller at follow-up, as compared to measurements obtained before RND.

Conclusions: Renal arteries present a favorable vessel healing post RND at long-term follow-up. However, focal intimal thickening and reduction of the minimal lumen diameter may persist as results of RF denervation. Further studies are needed to determine whether intravascular imaging may help to monitor the vessel healing of RF RND.

20-P

The outcome of renal artery stenting in angiographically borderline renal artery stenosis, assessed as functionally significant by IVUS and rest and hyperemic pressure gradients

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Background: Current guidelines recommend, that in patients with 50–70% renal artery stenosis (RAS) on angiography, functional RAS severity should be proved in terms of potential intervention. Some data indicate that translesional rest pressure gradient (RPG), hyperemic pressure gradients (HPG) with dopamine or papaverine, minimal lumen area (MLA) on IVUS, or renal fractional flow reserve (RFFR), may be helpful in patient selection, who are likely to respond to renal artery angioplasty with stenting (PTA).

Aim: The present study aimed to assess the prevalence of functionally significant RAS in patients with angiographically 50–70% lumen stenosis, and then to evaluate blood pressure and renal function outcome during 12 month follow-up for patients who underwent PTA for functionally significant RAS.

Methods: Forty-five renal arteries with mean RAS degree of 55.8 ±6.4% (range: 50–69%) lumen stenosis on angiography were evaluated for functional severity in 40 subjects, mean age 65.4 ±8.4 y., 26 men. Criteria for functionally significant RAS were as follows: MLA < 8.6 mm^2, or either peak RPG > 20 mm Hg, or dopamine and papaverine HPG > 21 mm Hg, or RFFR < 0.8. Patients with significant RAS were referred to renal PTA, followed by 12 month clinical assessment. The improvement of systolic (SBP) and diastolic (DBP) blood pressure (BP) control was assessed with a 24-hour ABPM and the number of blood lowering agents, as well as renal function (eGFR) on 3, 6 and 12 months following PTA. The improvement of BP was defined as SBP reduction of > 15 mm Hg and/or DBP of > 7 mm Hg, and/or a number of blood lowering agents reduction. Renal function improvement was defined as an eGFR increase by 15% of the initial value before PTA.

Results: In the whole study group, mean MLA was 9.7 ±4.3 mm^2 (range: 2.4–20.9), mean reference area 27.4 ±8.3 mm (range: 15.5–45) and mean stenosis area 70 ±12.5% (range: 39.5–88.6) on IVUS, while mean dopamine RFFR was 0.84 ±0.1 (range: 0.66–0.97), mean papaverine RFFR: 0.86 ±0.1 (range: 0.64–0.98), mean peak TPG 29.3 ±15.6 mm Hg (range: 8–60), dopamine HTG 47.7 ±29.2 mm Hg (range: 6–105) and papaverine HTG 45 ±28.1 mm Hg (range: 6–100). As a result of this assessment, 32 (71%) out of 45 lesions in 28 subjects were referred to PTA, while 13 were referred to OMT. All PTA procedures were uncomplicated. During 12-month F-U, clinical improvement was observed in 19 (67.9%) subjects, including renal function improvement in 12 (42.8%), SBP and DBP decrease, or medical regiments reduction in 15 (53.5%). With respect to RF, none of the analyzed parameters occurred as predictor of the improvement. There was an insignificant trend for peak RPG (34 mm Hg vs. 22 mm Hg, $p = 0.112$), dopamine HPG (62 mm Hg vs. 30 mm Hg, $p = 0.13$), and papaverine HPG (57 mm Hg vs. 33 mm Hg, $p = 0.25$) in those patients in whom BP improvement was observed as compared to no BP improvement.

Conclusions: In 2/3 of subjects with angiographically borderline RAS, functional tests showed potentially significant stenosis, however, only about half of them showed clinical improvement after PTA. The most prom-

ising predictor of BP improvement seems to be resting and hyperemic pressure gradient.

21-P

Chronic anemia is a strong predictor of long-term outcomes in patients undergoing TAVI (POL-TAVI Registry)

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Background: POL-TAVI is an on-going all-comer registry enrolling all TAVI procedures in Poland since 2009. Within the registry baseline clinical, imaging and procedural data as well as in-hospital, early (30 days) and long-term (6 and 12 months) outcomes are prospectively registered and reported yearly.

Aim: Aim of the study was to evaluate the outcomes of TAVI patients presenting with anemia.

Methods and results: The registry enrolled 381 patients treated in 2013 (43.6% males, mean age: 78.75 ±7.4 years, logistic EuroScore: 20.2 ±14.5, STS: 8.52 ±8.3). Anemia was diagnosed based on WHO definition. There were 184 (47.5%) patients with anemia. In comparison to patients without anemia they were significantly older (79.7 ±7.2 vs. 77.9 ±7.4, $p < 0.03$). Both groups had comparable Log EuroScore (21.1 ±14.5 vs. 19.5 ±14.5, $p = 0.16$), NYHA and CCS class. Patients with anemia have more often creatinine level > 200 μmol/l (10.87% vs. 3.6%, $p < 0.01$) and lower GFR (50.3 ±19.9 ml/min vs. 59.4 ±19.2 ml/min, $p < 0.001$) on admission. The groups did not differ in the frequency of chronic dialysis prior to AV as well as acute kidney injury post TAVI (14.67% vs. 9.33%, $p = 0.11$). Patients with anemia required more blood transfusion post TAVI (49.18% vs. 27.2%, $p < 0.001$). A trend to higher mortality in a group of patients with anemia on admission could be observed at 1 month (12.20% vs. 8.9%, $p = 0.36$), 6 months (21.97% vs. 13.9%, $p = 0.11$) which became significant at 12 months (34.31% vs. 17.43%, $p < 0.01$). In logistic regression analysis presence of anemia was an independent predictor of death at 1 year (OR 95% CI 2.47 (1.32; 4.77), $p = 0.0048$) similarly to drop in Hb level during hospitalization (OR 95% CI 0.82 (0.67; 0.99), $p = 0.039$ for decrease of by 1 g/dl). The need of transfusion increased the risk of death 3.2 times (OR 95% CI 3.23 (1.70; 6.32), $p < 0.002$).

Conclusions: Anemia is present in almost 48% of patients undergoing TAVI and associated with 2.5-fold higher mortality in 12 months follow-up. Significant drop in hemoglobin levels and need of blood transfusion also significantly increase the short and long term mortality.

22-P

Paravalvular leak closure with the Occlutech PLD paravalvular leak occluder – a prospective registry

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Background: Transcatheter paravalvular leak (PVL) closure becomes a well-recognized procedure.

Aim: This registry was designed to assess safety and efficacy of the Paravalvular Leak Device (PLD).

Methods: Prospective registry of patients fulfilling clinical and morphological criteria for transcatheter PVL closure with 30 days follow-up. Procedural success rate (device implantation and reduction of PVL to no more than trivial as assessed by TEE) and net adverse clinical events (NACE: MACCE or major bleeding unrelated to cardiac surgery) were recorded.

Results: 25 patients with aortic or mitral PVL were included. Aortic PVLs were attempted via femoral artery, in 7 mitral PVLs transseptal puncture was used, 3 mitral PVLs required transapical access. Altogether we implanted 28 PLD for 16 aortic and 12 mitral PVLs. The median duration of aortic and mitral PVL closure was 90 min (quartile deviation – QD ±17.5 min) and 130 min (QD ±45 min), with median radiation dose per patient during aortic and mitral PVL closure 735 mGy (QD ±353 mGy) and 773 mGy (QD ±583 mGy) respectively. Procedural success was achieved in 23 patients. Two patients

still had a significant PVL despite placement of the PLD. There were no NACE during index hospitalization and 30 days follow-up. A significant improvement in patients' status was documented: at baseline 25% of patients were in NYHA I/II class and 75% in class III, in 30-days follow-up 75% and 25% respectively ($p < 0.001$).

Conclusions: PLD is an effective and safe device for transcatheter PVL closure, but further investigations are warranted.

23-P

Baloon aortic valvuloplasty as bridge to definitive treatment of aortic stenosis: acute and long-term outcomes

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Aim: This study aimed to evaluate the indications for short- and long-term outcome of balloon aortic valvuloplasty (BAV).

Material and methods: A cohort of 112 patients with severe aortic stenosis underwent 114 BAV procedures between October 2012 and July 2015. Clinical and follow-up mortality data were prospectively collected.

Results: BAV was performed as bridge for transcatheter aortic valve implantation (TAVI, 54.5%), or surgical aortic valve replacement (AVR, 6.3%), before urgent non-cardiac surgery (8%), and for symptom relief (35.7%) or cardiogenic shock (1.8%). Peri-procedural, in-hospital, 6-month, 12-month mortality were 2.7%; 8.9%; 16.9% and 22.3%, respectively. Serious periprocedural adverse events occurred in $n = 21$ (18.8%). A vascular complication occured in 11 (9.8%) patients. Post procedure, aortic valve area (AVA) increased from 0.59 ±0.18 cm^2 to 0.82 ±0.24 cm^2, peak aortic valve gradient (pAVG) decreased from 94.0 ±27.6 mm Hg to 65.4 ±20.0 mm Hg, mean aortic gradient decreased from 58.0 ±17.8 mm Hg to 40.5 ±14.6 mm Hg, right ventricular systolic pressure decreased from 53.0 ±12.1 mm Hg to 43.9 ±13.5 mm Hg, all $p < 0.05$. Left ventricular ejection fraction (LVEF) increased from 53.5 (30–64)% to 60 (45–65)% after 1 month of follow-up, $p < 0.05$. At 12 months of follow-up patients had higher AVA, pAVG and LVEF compared with baseline, $p < 0.05$. A significant reduction in New York Heart Association functional class IV was observed after 1 month (45.5% vs. 7.9%, $p < 0.05$). Within 12 months after BAV, 11 patients underwent successful AVR, 23 patients underwent TAVI.

Conclusions: BAV as a bridge to percutaneous or surgical aortic valve replacement and for symptom relief was associated with moderate risk. Hemodynamic and clinical benefits were maintained during the 12-month follow-up period.

24-P

The hemodynamic and functional outcomes of balloon pulmonary angioplasty in patients with inoperable chronic thromboembolic pulmonary hypertension

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Aim: The purpose of this prospective study was to assess benefits and safety of the balloon pulmonary angioplasty (BPA) in patients with inoperable chronic thromboembolic pulmonary hypertension (CTEPH).

Methods: From July 2013 to September 2015 we have performed 79 BPA sessions in 32 patients (aged 66.0 ±11.5; 15 females) diagnosed with CTEPH, who were disqualified from pulmonary endarterectomy (PEA) due to distal localization of thrombi. Overall 250 segmental pulmonary arteries have undergone angioplasty (7.81 per patient). For each patient, a right heart catheterization (RHC) was performed and NT-proBNP was measured at baseline and before each BPA procedure. Baseline and follow-up functional capacity (NYHA class) and hemodynamic measures including pulmonary vascular resistance (PVR), mean pulmonary artery pressure (mPAP), cardiac index (CI), and mean right atrial pressure (mRAP) were recorded.

Results: Comparisons before and after BPA showed significant decrease in mRAP (11.3 ±3.3 mm Hg vs. 7.3 ±3.2 mm Hg; $p = 0.001$) and mPAP (51.1 ±10.1 mm Hg vs. 40.0 ±9.0 mm Hg; $p = 0.001$) and PVR (10.8 ±3.7 Wood units vs. 6.7 ±2.7 Wood units), reduction of NT-proBNP (2870 ±2821 pg/ml vs. 717 ±719 pg/ml; $p = 0.001$) and improvement of at least one NYHA functional class. There were 3 deaths (4.6% of total BPA). Several complications occurred including: desaturation 34.1% ($n = 27$), hemoptysis 21.5% ($n = 17$), dyspnea 24.1% ($n = 19$), reperfusion pulmonary injury 16.4% ($n = 13$), vessel injury 18.9% ($n = 15$), arrhythmia 2.5% ($n = 2$).

Table I. Echocardiographic data before and after BAV and at 1, 6, 12-month follow-up

Variable	Baseline	After BAV	1-month follow-up	6-month follow-up	12-month follow-up
AVA [cm^2]	0.59 ±0.18	0.82 ±0.24*	0.74 ±0.21*	0.63 ±0.17*‡	0.63 ±0.17*
pAVG [mm Hg]	94.0 ±27.6	65.4 ±20.0*	69.6 ± 23.7*	85.3 ±25.2*‡	89.2 ±32.9*‡
mAVG [mm Hg]	58.0 ±17.8	40.5 ±14.6*	43.4 ±17.4*‡	53.6 ±18.1‡	51.0 ±7.7‡
LVEF < 40% (%)	25 (23–30)	25 (23–40)	41 (30.5–50)*	41.5 (30–50)*	45 (35–50)
RVSP [mm Hg]	53.0 ±12.1	43.9 ±13.5*	57.3 ±14.9	60.6 ±17.2	49.0 ±20.2

**P < 0.05 compared with baseline, ‡p < 0.05 compared after BAV; LVEF – left ventricular ejection fraction, AVA – aortic valve area, pAVG – peak aortic valve gradient, mAVG – mean aortic valve gradient, RVSP – right ventricular systolic pressure.*

Conclusions: BPA emerges as a new therapeutic for patients not suitable for PEA, known to have high morbi/mortality when left on medical treatment alone. BPA provides significant improvement of functional NYHA class, hemodynamics and NT-proBNP, but at a cost of several potentially life-threatening complications.

25-P

Balloon pulmonary angioplasty for persistent chronic thromboembolic pulmonary hypertension – a hybrid therapy of CTEPH in report of 3 cases

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Aim: The purpose of this study was to assess benefits and safety of the balloon pulmonary angioplasty (BPA) in patients with persistent chronic thromboembolic pulmonary hypertension (pCTEPH) after pulmonary endarterectomy (PEA).

Methods: From 32 patients which were suitable for BPA, 3 (9.3%) patients suffered from pCTEPH despite PEA. Those patients undergone BPA. The baseline and follow-up measurements of hemodynamics and functional outcomes were recorded. Case 1. A 33-years old male had 3 sessions of BPA without any complications. Case 2. A 57-years old male had 3 sessions of BPA without any complications. Case 3. A 55-years old female had 4 sessions of BPA complicated with vessel dissection and hemopthysis.

Results: All cases presented hemodynamical and functional improvement after BPA (Table I).

Conclusions: BPA is a promising new therapeutic option for patients with pCTEPH despite PEA. It provides improvement of functional NYHA class, hemodynamics and NT-proBNP with acceptable risk of complications.

Table I. Hemodynamical and functional outcomes of BPA treatment

Variable	Case 1		Case 2		Case 3	
	Before BPA	After BPA	Before BPA	After BPA	Before BPA	After BPA
mRAP	23	3	14	4	14	11
mPAP	49	36	57	35	50	42
CO	4.86	5.43	4.06	4.14	3.51	3.86
CI	2.54	2.90	1.90	2.00	2.32	2.59
PVR	8.02	5.52	11.08	7.49	11.68	7.77
NT-proBNP	4539	209	3683	592	2465	809
NYHA FC	III	I	III	II	III	II

mRAP – mean right atrial pressure [mm Hg], mPAP – mean pulmonary artery pressure [mm Hg], CO – cardiac output [l/min], CI – cardiac index [l/min × m^2], PVR – pulmonary vascular resistance [Wood units].