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Jahrestagung der Österreichischen Kardiologischen Gesellschaft 30. Mai bis 2. Juni 2007, Salzburg

Abstracts

VORTRÄGE

Donnerstag, 31. Mai 2007, 16–17.30 Uhr

Best Abstracts: Basic Science

Role of PI3Kg in Myocardial Ischemia/Reperfusion 018

J. Schwaighofer, G. Neely, K. Kuba, E. Conci, M. C. Stühlinger, H. Alber,
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Introduction Phosphoinositide 3-Kinase gamma (PI3Kg) is a well-known proinflammatory enzyme that plays a crucial role in chemotaxis and neutrophil migration. The role of PI3Kg in the pathology of myocardial ischemia/reperfusion injury has been unclear. We therefore studied the effects of temporary myocardial ischemia followed by reperfusion on cardiomyocyte injury, fibrosis, and contractility in PI3Kg-deficient mice.

Methods In an in vivo model of myocardial ischemia/reperfusion, C57-B16 wild-type (WT) mice and PI3Kg-knock-out (KO) mice were divided into three groups undergoing different durations of reperfusion (30 minutes of ischemia followed by 3 hours, 1 week, and 3 weeks of reperfusion). Mice underwent a surgical procedure of left anterior descending artery (LAD) ligation. After the defined time of reperfusion, mice were sacrificed and heart sections were stained with H & E and Masson's Trichrome to measure the area of infarction and the amount of myocardial fibrosis. Additionally, troponin T levels in the serum were measured and differences in myocardial contractility were detected by transthoracic echocardiography.

Results We found significantly decreased elevations of troponin T serum levels in PI3Kg-KO mice compared with WT mice (0.77 ± 0.28 vs 1.28 ± 0.48 ng/ml; $p < 0.001$) in the 3-hour reperfusion group. Infarction area and scar size were markedly smaller in the PI3Kg-mutant cohort in all three reperfusion groups (3 hours: 1.18 ± 0.31 vs 1.78 ± 0.45 mm²; $p = 0.001$; 1 week: 0.88 ± 0.32 vs 1.29 ± 0.34 mm²; $p = 0.001$; 3 weeks: 0.62 ± 0.18 vs 1.87 ± 0.59 mm²; $p < 0.001$). Moreover, the extent of myocardial fibrosis was significantly reduced in PI3Kg-KO mice in comparison to WT mice (1 week: score 1.23 ± 0.6 vs 2.13 ± 0.74 ; $p = 0.005$; 3 weeks: score 1.08 ± 0.79 vs 2 ± 0.71 ; $p = 0.014$). Echocardiographic analysis of fractional shortening (FS) showed significantly enhanced contractility in KO mice following ischemia/reperfusion (1 week: 37.85 ± 7.71 vs 23.75 ± 8.78 % FS; $p = 0.007$; 3 weeks: 30.67 ± 4.87 vs 23.7 ± 7.47 % FS; $p = 0.043$).

Conclusions Our data provide the first evidence for the crucial role of PI3Kg signalling in myocardial ischemia/reperfusion injury: PI3Kg-deficient mice show a significantly better outcome concern-

ing infarction area, troponin T elevation, scar size, fibrosis, and contractility at all stages of reperfusion (3 hours to 3 weeks).

In Human Macrophages, the Complement Component C-Five-A Induces the Expression of Oncostatin M via AP-One Activation 025

S. P. Kastl, W. S. Speidl, C. Kaun, K. M. Katsaros, G. Rega, P. Valent,
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Macrophages are major producers of the cytokine oncostatin M (OSM), which, besides other functions, is also involved in inflammation. The complement component C5a mobilizes and activates these cells at inflammatory sites. We examined the effect of C5a on OSM production in human monocytes and in human monocyte-derived macrophages. Peripheral blood monocytes were isolated using Ficoll-Paque and magnetically labelled CD14 MicroBeads. For macrophage transformation, peripheral blood monocytes were cultivated for 8–10 days in the presence of human serum. C5a significantly increased OSM antigen in these cells as determined by specific ELISA and mRNA, as quantitated by RealTime-PCR. This effect was blocked by antibodies against the receptor C5aR/CD88 and by pertussis toxin. The C5a-induced increase in OSM production in macrophages was abolished by a P38 inhibitor and by a JNK inhibitor. Furthermore, C5a increased the nuclear translocation of c-fos and c-jun. Using a series of different OSM-promoter deletion mutant constructs we show that the putative AP-1 element is responsible for activation of OSM promoter activity by rhC5a. We conclude that C5a induces the expression of OSM in human macrophages through interaction with its receptor and via activation of AP-1. Our data establish a link between the complement system and the gp130-receptor cytokine family with possible implications for the pathology of inflammatory diseases.

Local Complement Activation at the Site of "Plaque Rupture" 041

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Vienna

Purpose Myocardial infarction causes significant morbidity and mortality. We tested our hypothesis that the complement system is locally activated at the culprit lesion, attracting inflammatory cells to contribute to plaque destabilization and thrombosis.

Methods We harvested coronary blood from the infarct-related artery (IRA) via aspiration catheters in patients undergoing primary PCI. We determined the differential blood count of coronary and peripheral blood by FACS. Coronary and peripheral plasma samples were analyzed by 1D- and 2D-PAGE, and protein identities were assessed by LC-MS analysis. Immunohistochemistry (IHC) of thrombus material was performed using antibodies directed against early complement components and neutrophil epitopes.

Results Leukocyte counts (14.8 ± 5 in coronary vs 10.7 ± 3 G/l in peripheral blood; $p = 0.032$), especially neutrophils (10.7 ± 3.8 in coronary vs 7.7 ± 2.2 G/l in peripheral blood; $p = 0.04$), were increased in IRA coronary thrombus aspirates. MS analyses of depleted plasma demonstrated that early complement components, e. g., C1s, C3, and C5, were selectively down-regulated in coronary plasma, compared with blood from the arterial sheath. IHC revealed the enrichment of neutrophils and early complement factors within particulate thrombus material.

Conclusion The complement system is locally activated in the IRA. Down-regulation of C1s or C3 is most likely caused by cleavage. Cleaved complement components like c3a and c5a may attract neutrophils and initiate and propagate thrombosis by inducing local platelet activation.

In Vivo Tracking of Intramyocardially Injected Mesenchymal Stem Cells, Modified for Transgene Expression of Positron Emission Tomography Reporter Gene in Porcine Myocardial Infarction 051

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Purpose The aim of the present study was in vivo tracking of intramyocardially injected mesenchymal stem cells (MSCs), modified for transgene expression of positron emission tomography (PET) reporter gene in porcine myocardial infarction, using a special tracer of (9-(4-[¹⁸F]fluoro-3-hydroxymethylbutyl)-guanine ([¹⁸F]-FHBG)).

Methods Mesenchymal stem cells were selected by Ficoll-Paque gradients and cultivated from porcine bone marrow. Lentiviral vector LV-RL-RFP-tTK, containing genes for renilla luciferase (RL), red fluoroscein protein (RFP) and herpes simplex-truncated thymidine kinase (tTK, PET-reporter gene), were inoculated into pig MSCs under control of the cytomegalovirus promoter. After characterization of the MSCs, in vitro [¹⁸F]FHBG uptakes of modified MSCs were 10 times higher than control JY human B-lymphoblast cells and T-lymphocytes. Domestic pigs underwent percutaneous balloon occlusion of the mid-part of the left anterior descending coronary artery for 60 min followed by reperfusion under general anesthesia. Ten days after myocardial infarction, magnetic resonance imaging

(MRI) of the heart revealed a mean global ejection fraction of 47 ± 3.5 %. MSCs (modified for PET reporter gene expression) were injected using NOGA-guided direct intramyocardial injections in 10–12 selected points of the infarct border zone, containing at least 2 mio MSCs in total. PET imaging was performed 30 hours and 7 days after intramyocardial injection of modified MSCs using [¹⁸F]-sensitive energy window PET camera after intravenous injection of 6 mCi [¹⁸F]-FHBG in the anesthetized pigs. The location of the injected MSCs were correlated with histology.

Results PET imaging displayed successful injections of pig MSCs containing PET reporter gene into the border zone of myocardial infarction.

Conclusion In vivo tracking of gene-modified MSCs by PET imaging is feasible and allows a noninvasive investigation of MSCs homing and propagation in experimental myocardial infarction (Figure 1).

Expression of Bone Regulatory Proteins in Heart Cells after Inflammation in Vitro and Their Possible Impact on Myocardial Calcification 093

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Objective The osteoprotegerin (OPG) receptor activator of nuclear factor kappa-B ligand (RANKL)/receptor activator of nuclear factor kappa-B (RANK) system has been identified to play a key role in bone metabolism and in particular as mediator of osteoclastogenesis, for example enhancing osteoporosis if being imbalanced. OPG binds as soluble decoy receptor with high affinity to RANKL, thereby inhibiting the interaction between RANKL and its receptor RANK on cell surfaces. It has also been shown that OPG/RANK/RANKL interaction does not only take place in skeletal metabolism but can also be found in processes of the immune and vascular systems. These findings suggest a complex link in mediation of bone, vascular, and immune physiology via the OPG/RANK/RANKL system. Our focus of interest was to perform an in vitro study towards the effect of inflammatory processes on the OPG/RANKL/RANK system in heart cells. We hypothesized that it is regulated by inflammatory cytokines and that it may correlate with matrix degradation and thus calcification of heart tissue.

Results The presence of calcification of scarred heart tissue was shown in histology using the Van-Kossa-Staining method. The existence of RANK on human adult cardiac fibroblasts (HACF) and human adult cardiac myocytes (HACM) was confirmed through FACS and Western Blot. While a significant increase of RANK expression was evaluated through FACS on HACF after 48 h of in vitro stimulation with TNF-alpha, adverse response was found in HACM after the same treatment. Up-regulation of RANK was also detected on specific mRNA levels of expression after incubation of HACF with TNF-alpha after 24 h. Three-fold higher OPG-mRNA levels were assessed in HACF after stimulation compared to untreated HACF. Based on a specific ELISA, significantly higher levels of OPG in HACF were determined after 12, 24, 36 and 48 hours of stimulation with TNF-alpha, while no response was found in HACM. Increase of RANKL protein expression in a 24-h and 48-h timeframe in HACF was observed through Western Blot.

Conclusion Our results show that calcification takes place in myocardial tissue. Furthermore, we can state that HACF and HACM both express RANK and that their expression is regulated by inflammatory activation. If also operative in vivo, our data imply that under inflammatory conditions, cardiac fibroblasts but not cardiac myocytes are actively involved in the increased production and secretion of RANK and OPG, with the latter being reported to be significantly elevated in patients with heart failure. Also, it implicates that in contrast to cardiac myocytes, cardiac fibroblasts as major scar-forming cell unit and at the same time actively involved in expressing RANK/OPG/RANKL are taking in the presupposing role of matrix degradation, i. e. fibrosis and scar formation followed by tissue mineralization.

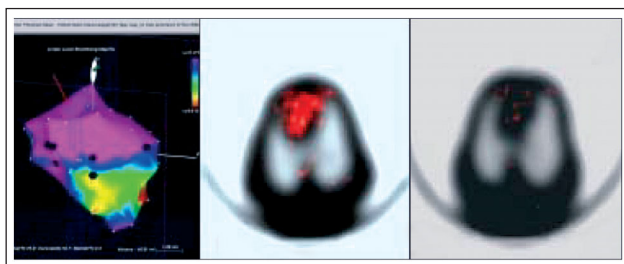


Figure 1: M. Gyöngyösi et al. **Left:** NOGA mapping with the location of injections black. Serial PET investigations have demonstrated successful PET tracking in treated animals. **Middle:** PET in pigs (supine position) red: distribution of labeled MSCs in the heart, white: lungs. PET imaging did not show [¹⁸F]-FHBG accumulation in the infarcted heart of control animals (**Right**). Fluorescent confocal microscopy confirmed the distribution of the injected MSCs around the injected area.

Misguided Thrombus Resolution and Bacterial Infection in Chronic Thromboembolic Pulmonary Hypertension

054

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Background Acute pulmonary emboli usually resolve within 6 months. However, a proportion of 0.5–3.8 % undergo organization with permanent obstruction of the pulmonary vascular bed. The resulting condition is chronic thromboembolic pulmonary hypertension (CTEPH). Based on the observation that CTEPH lacks traditional risk factors for venous thromboembolism, we hypothesized that thrombus persistence in CTEPH is due to delayed resolution rather than abnormal plasmatonic thrombosis. Furthermore, because CTEPH occurs in association with staphylococcus aureus-infected intravenous lines, we tested whether bacterial infection may be involved in the vascular remodelling of delayed thrombus resolution.

Methods In a first step, CTEPH thromboemboli were sterily harvested during pulmonary endarterectomy (PEA) and subjected to histological analyses and staphylococcus-specific PCR. Secondly, a murine model of thrombus resolution was utilized to examine the effects of bacterial infection on thrombus organization.

Results Staphylococcal DNA was detected in 7 of 26 PEA specimens. In the mouse model, staphylococcal infection delayed resolution of thrombi parallel with an up-regulation of the profibrotic genes transforming growth factor beta and connective tissue growth factor expressions.

Conclusions Bacterial infection enhances fibrotic vascular remodelling after thrombosis, resulting in misguided thrombus resolution. Thrombus infection may be a key pathogenetic event in the evolution of CTEPH.

Leptin, Leptin-Soluble Receptor and Coronary Atherosclerosis

080

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Background The adipose tissue-related hormone leptin plays an important role in the regulation of body weight and is associated with metabolic syndrome risk factors. However, the associations of leptin and leptin-soluble receptor (sOb-R) with coronary artery disease (CAD) are not clear.

Methods We therefore measured leptin and sOb-R in 543 consecutive patients undergoing coronary angiography for the evaluation of CAD. Coronary stenoses with lumen narrowing > 50 % were considered significant.

Results Serum leptin correlated significantly with body mass index (BMI; $r_s = 0.443$), with insulin resistance (HOMA-IR, $r_s = 0.339$), with serum triglycerides ($r_s = 0.181$), with systolic as well as with diastolic blood pressures ($r_s = 0.170$ and $r_s = 0.133$, respectively) and, inversely, with sOb-R ($r_s = -0.346$; $p < 0.01$ for all correlations). While serum concentrations of sOb-R were similar in patients with significant stenoses ($n = 331$) and in those who did not have significant stenoses at angiography (22.4 ± 8.3 vs 23.1 ± 12.1 ng/ml; $p = 0.655$), serum concentrations of leptin were significantly lower in patients with significant stenoses than in those without such lesions (8.5 ± 7.8 vs 13.2 ± 12.2 ng/ml; $p < 0.001$). Multivariate logistic regression analysis adjusting for age, gender, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, triglycerides, BMI, hypertension, smoking and type 2 diabetes confirmed a significant and independent inverse association between serum leptin and the presence of significant coronary stenoses, with a standardized, adjusted odds ratio of 0.746 (95 %-CI 0.566–0.983); $p = 0.038$.

Conclusions We conclude that serum leptin but not sOb-R is significantly decreased in patients with angiographically determined CAD.

Best Abstracts: Clinical Science

Long-Term Results of Stenting of In-Stent Restenosis With Drug-Eluting Stents: CYPHER® vs TAXUS®

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Purpose The implantation of drug-eluting stents for in-stent restenosis (ISR) led to promising results in the past years. The aim of this 3-center prospective Austrian Registry of Treatment of in-stent restenosis with DES was to compare the long-term clinical and angiographic outcomes after CYPHER® vs TAXUS® stent implantation in “real-world” practice.

Methods From January 2003 to June 2006, 142 consecutive patients with significant ISR were treated by implantation of either CYPHER® (group ISR-CYPHER®, $n = 67$, 74.63 % male, mean age 63.2 ± 11.5 years) or TAXUS® stent (group ISR-TAXUS®, $n = 75$, 80 % male, mean age 63.0 ± 10.7 years). All patients were clinically controlled 9 ± 2 months after stent implantation. Non-fatal myocardial infarction, cerebral insult, cardiac death and additional target vessel revascularization (TVR) were considered as major adverse cardiac and cerebral events (MACCE). Clinically driven diagnostic coronary angiography was performed in 37 of 67 patients in the CYPHER® group, and in 57 of 75 patients in the TAXUS® group between 6 and 9 months after the stenting procedure. Quantitative angiographic parameters of baseline (pre- and post-stenting) and follow-up (FUP) as in-stent (IS) and proximal and distal in-lesion (IL, defined as lesion axially 5 mm proximal or distal to the stent edge) were measured. Minimal lumen diameter (MLD), reference segment diameter (RD) and percentage diameter stenosis (% DS) were calculated for each segment. In-stent (IS), proximal and distal IL acute lumen gain (ALG, defined as the difference between post- and pre-angiographic MLD) and late lumen loss (LLL, defined as post-procedure MLD minus follow-up MLD) were also analyzed.

Results No significant differences were found between the two stent groups as regards the baseline clinical (including age, gender, coronary risk factors), qualitative (location and type of lesion) and quantitative angiographic (pre- and post-stent MLD, RD and % DS) parameters. The implanted stent size (3.0 ± 0.3 vs 3.1 ± 0.4 mm, in CYPHER® vs TAXUS® stents) and length (21.0 ± 6.8 vs 19.6 ± 6.7 mm, respectively) were similar in the groups. An ALG of 1.22 ± 0.67 vs 1.20 ± 0.83 mm in ISR-CYPHER® vs ISR-TAXUS® groups (non-significant, $n. s.$) could be achieved. No intervention complication or short-term (within 30 days after stenting) MACCE occurred. During FUP, 2 patients died in the ISR-TAXUS® group (2.67 %), clinically driven target vessel re-intervention was performed in 7.46 % vs 13.33 % of patients in ISR-CYPHER® vs ISR-TAXUS® groups ($p = 0.287$). No acute myocardial infarction was recorded during FUP. Both groups had 2 patients with cerebral insult ($p = 0.498$). The composite MACCE was 10.45 % vs 18.67 % in groups ISR-CYPHER® vs ISR-TAXUS® ($p = 0.237$). No differences were found between the groups as regards the FUP IS, distal and proximal IL MLD, RD and % DS. IS LLL was also similar in the groups (0.26 ± 0.76 vs 0.28 ± 0.99 mm in ISR-CYPHER® vs ISR-TAXUS®) as well as the distal IL LLL (0.08 ± 1.05 vs -0.04 ± 0.68 mm, respectively) and proximal IL LLL (-0.03 ± 0.90 vs 0.11 ± 0.71 mm, respectively).

Conclusion This on-going study highlights the successful treatment of ISR with DES, regardless of the use of CYPHER® or TAXUS® stents. Slightly better clinical FUP results were observed in the CYPHER® stent group without reaching significance.

New Insights into Long-Term Follow-Up of Atrial Fibrillation – Full Disclosure by an Implantable Pace-maker Device

004

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Objectives Long-term outcome of radiofrequency ablation (RFA) of atrial fibrillation (AF) is difficult to assess. This study sought to

evaluate various aspects of very long-term follow-up (FU) by the properties of an implantable device with extensive monitoring capabilities.

Methods 14 patients with an implanted pacemaker device (Medtronic AT 500) were selected for RFA due to drug-refractory and highly symptomatic AF despite antibradycardic pacing.

Results With a mean FU of 41.4 ± 15.1 months per patient, we could achieve continuous monitoring of more than 400,000 hours after RFA. Based on symptomatic episodes, simulated 24-hour, 48-hour or 7-day Holter, 57 to 71 % of patients were classified as RFA responders. With permanent FU provided by the implanted device, 43 % of patients exhibited a positive treatment effect and only 21 % had no tachyarrhythmic episodes at all in long-term FU ($p = 0.03$ vs 24 or 48-hour Holter, $p = 0.06$ vs 7-day Holter). By a mean of 1.7 ± 0.7 RFA per subject atrial tachyarrhythmia burden (ATB) was significantly reduced from a median of 3.6 to 0.3 hours per day ($p < 0.001$). 2 out of 14 patients developed AF recurrences after a tachyarrhythmia-free period of more than 12 months.

Conclusion ATB decreased significantly by (repeated) RFA over a very long-term FU. Continuous monitoring provided by an implantable device is able to detect more AF episodes than routine FU. AF may reoccur very late after long-lasting (> 1 year) episode-free intervals. Tachyarrhythmia cycle-length and episode duration prior to ablation remained unchanged in early and late recurrences implicating the same pathogenetic mechanisms.

Coexistence of Atrioventricular Nodal Reentrant Tachycardia With Other Forms of Arrhythmias in Patients Undergoing Electrophysiologic Study 029

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Background The consecutive or simultaneous occurrence of different tachycardias in the same patient during electrophysiological study (EPS) usually poses a major challenge in the EP lab. The aim of this study was to investigate the association of atrioventricular nodal reentrant tachycardia (AVNRT) with other forms of inducible arrhythmias in a single patient (pt) and the consequences for treatment.

Methods The retrospective study comprised 204 consecutive pts (mean age 58 ± 15 yrs; 121 women, 83 men) who were diagnosed with a form of AVNRT. EPS was performed as four-catheter study after discontinuation of all antiarrhythmic medications in a fasting state. Sedation was achieved with midazolam and fentanyl. If tachycardia could not be induced in the baseline state, orciprenaline and/or atropine were administered to facilitate induction of tachycardia.

Results Based on standard electrophysiological criteria, 181 pts (89 %) had typical (slow-fast), 15 pts (7 %) had atypical (fast-slow or slow-slow) and 8 pts (4 %) had both types of AVNRT. In 104 (51 %) pts, AVNRT was the only form of inducible arrhythmia. Combinations of AVNRT with other forms of tachycardias were observed in 100 pts (49 %). AVNRT coexisted with paroxysmal atrial fibrillation (AF, $n = 39$), typical or atypical flutter (AFL, $n = 38$), focal atrial tachycardia (AT, $n = 31$) or AV-reciprocating tachycardia (AVRT, $n = 11$). Simultaneous occurrence of AVNRT with ventricular arrhythmias appeared to be less common, such as the combination with right ventricular outflow tract extrasystole and/or tachycardia (RVOT, $n = 6$) and with ventricular tachycardia (VT, $n = 4$), three of them ICD recipients. Concomitance of arrhythmias in form of double tachycardia was more frequent than the combination of AVNRT with more than two different types of tachycardia (77 vs 23 pts, respectively). Tachycardia-induced tachycardia occurred in 12 pts with transitions between supraventricular tachycardias in 11 pts and between AVNRT and RVOT in one pt. All AVNRT were successfully treated with modification or elimination of the slow pathway. Two or more tachycardias existing in the same pt were treated with radiofrequency ablation in a total of 23 pts (23 %): AVRT ($n = 10$), typical AFL ($n = 6$), AT ($n = 4$), AF ($n = 2$), and idiopathic VT ($n = 1$). Electroanatomical mapping was used in four cases to reveal the exact mechanism and to guide ablation.

Conclusions Coexistence of AVNRT with other types of inducible arrhythmias is a common finding during EPS. Double tachycardia may help establish the correct diagnosis and treatment of the clinically relevant arrhythmias. Additional ablation of tachycardias other than AVNRT was performed in about a quarter of these pts. Furthermore, palpitations occurring after successful ablation of AVNRT during follow-up might be related to other types of arrhythmias which were not amenable to catheter ablation.

One-Year Prognosis in Patients with Significantly Reduced Left-Ventricular Function: Association with Results of Endomyocardial Biopsy 005

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Background It has been suggested that a significant proportion of patients with dilative cardiomyopathy (CMP) have viral persistence or inflammation in endomyocardial biopsy (EMB) specimen. However, EMB is still not routinely used in the evaluation of heart failure patients. The aim of this study was to examine the proportion of viral persistence or inflammation and one-year prognosis in all patients admitted for EMB at the Clinical Division of Cardiology, Medical University of Innsbruck.

Methods and Results All 74 patients (age 45 ± 12 years) who underwent coronary angiography and left- or right-ventricular biopsy were included. EMB specimens underwent immunohistological assessment and polymerase chain reaction for detection of all typical cardiotropic viruses as well as chlamydia pneumonia. In 35 %, viral genome was detected (parvovirus $n = 25$, chlamydia pneumonia $n = 1$), inflammation (> 14 lymphocytes or macrophages/mm²) was observed in 19 patients. Patients had significantly reduced left-ventricular ejection fraction (25 ± 7 %), increased NT-proBNP values (2369 ± 2638 pg/ml) and high NYHA class (2.9 ± 0.9). According to the results of the evaluation of EMB specimens, patients were divided into 4 groups: group 1 included patients with virus-negative CMP ($n = 35$), patients with autoreactive myocarditis formed group 2 ($n = 13$), group 3 consisted of patients with virus-positive CMP ($n = 20$) and patients with virus-positive myocarditis were in group 4 ($n = 6$). All cardiovascular events ($n = 10$) during one year were recorded, including cardiovascular death, assist device implantation, heart transplantation and rehospitalisation due to cardiac decompensation. Kaplan-Meier curve demonstrated an increased amount of cardiovascular events in group 4 compared to the other groups (6 vs 0 vs 10 vs 33 %; $p = 0.055$). When patients were divided according to virus status, patients without virus detection tended to have fewer cardiovascular events compared to patients with virus persistence (4 vs 15 %; $p = 0.089$).

Conclusion In this study, viral persistence was associated with increased proportion of cardiovascular events. Especially patients with viral-positive myocarditis had a worse short-term prognosis. Our data support the use of endomyocardial biopsy in the evaluation of patients with significantly reduced left ventricular function.

Key Role of Postprandial Hyperglycemia for the Presence and Extent of Coronary Atherosclerosis 079

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Background The coronary angiographic state of patients with abnormal glucose tolerance is unclear.

Methods We enrolled 1040 consecutive patients undergoing coronary angiography for the evaluation of coronary artery disease (CAD). An oral glucose tolerance test was performed in patients without established diabetes.

Results Of our patients, 394 had normal glucose tolerance (NGT), 190 impaired glucose tolerance (IGT), 90 isolated postprandial diabetes (postprandial glucose > 200 mg/dl), and 366 type 2 diabetes previously established or newly diagnosed on the basis of fasting glucose (conventional diabetes). Angiographically detectable CAD was more frequent in patients with IGT, isolated postprandial diabetes or conventional diabetes when compared to NGT subjects (87.9 %, 95.6 %, 89.1 % vs 80.7 %; $p = 0.030, 0.001, 0.043$, respectively). The prevalence of significant coronary stenoses > 50 %, compared to NGT subjects (57.4 %), was similar in IGT patients (59.5 %; $p = 0.628$) but significantly higher in patients with isolated postprandial diabetes (77.8 %; $p = 0.001$) or conventional diabetes (68.0 %; $p = 0.002$). Also, the number of significant stenoses compared to NGT subjects was similar in IGT patients but significantly higher in those with isolated postprandial or conventional diabetes. As a continuous variable, postprandial glucose proved independently associated with CAD (standardized adjusted odds ratio [OR] 1.624 [95 %-CI 1.163–2.269]; $p = 0.004$) and with significant stenoses (OR 1.345 [1.061–1.704]; $p = 0.014$).

Conclusions Postprandial hyperglycemia is strongly and independently associated with angiographically characterized CAD. In IGT, non-significant CAD is more frequent than in NGT; the prevalence and number of significant stenoses increase when postprandial diabetes evolves.

Are There Gender Differences in Clinical Presentation and Surgical Outcome of Aortic Stenosis? 087

C. Fuchs, R. Rosenhek, J. Mascherbauer, F. Rader, U. Klaar, C. Scholten, M. Heger, G. Maurer, H. Baumgartner

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Background Aortic stenosis (AS) has become the most frequent valve disease and has been extensively studied in recent years. Although gender differences have gained increasing attention in cardiology, little is known about gender differences in presentation and surgical outcome of AS so far.

Methods In 408 consecutive patients (pts) referred to surgery because of symptomatic AS baseline, clinical and echocardiographic data as well as outcome data were analyzed with regard to potential gender differences.

Results Pts were almost equally distributed between men ($n = 193$) and women ($n = 215$). At presentation, female pts were significantly older (73.7 ± 9.3 vs 66.5 ± 11.5 years; $p < 0.00001$) and more symptomatic (NYHA class 2.3 ± 0.7 vs 2.0 ± 0.7 ; $p < 0.0001$). They also had smaller valve areas and after adjusting for body surface area, this difference still remained statistically significant (0.32 ± 0.09 vs 0.34 ± 0.08 cm²/m²; $p = 0.03$). Nevertheless, mean gradients were significantly higher in females (67.2 ± 19.1 vs 62.1 ± 20.2 mmHg, $p = 0.02$). Despite the higher risk profile, there was a trend towards better survival in women (in-hospital mortality 7.3 vs 8.6 %; $p = 0.7$ and long-term mortality 14.4 vs 15.6 %; $p = 0.2$). Overall survival as estimated by Kaplan-Meier analysis tended to be slightly better in women (89.1 %, 86.6 %, 76.3 % vs 92.8 %, 89.8 %, 81.4 % at 1, 2 and 5 years) but this difference did not reach statistical sig-

nificance ($p = 0.3$). Despite improvement in both groups after surgery, women remained more symptomatic than men (NYHA class 1.3 ± 0.5 vs 1.1 ± 0.4 ; $p = 0.00002$).

Conclusion Although women with AS are older and more symptomatic than men when referred to surgery, operative and long-term mortality values are not different. However, women remain more symptomatic. Further research must address whether differences in baseline characteristics are due to differences in disease onset and progression or whether female pts get delayed medical attention for some reasons.

Moderate Patient-Prosthesis Mismatch After Valve Replacement for Isolated Severe Aortic Stenosis Has No Impact on Short- and Long-Term Mortality 102

J. Mascherbauer¹, R. Rosenhek¹, C. Fuchs¹, E. Pernicka², F. Rader¹, U. Klaar¹, C. Scholten¹, M. Heger¹, G. Maurer¹, H. Baumgartner¹

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Background The importance of moderate and even severe patient-prosthesis mismatch (PPM) for the prognosis of patients who undergo aortic valve replacement is a controversial issue. In addition, patient groups in previous studies were poorly defined.

Methods The presence of PPM was assessed in 361 consecutive patients undergoing valve replacement for isolated severe aortic stenosis and related to perioperative and postoperative mortality. As previously proposed, prosthetic valve-effective orifice areas (EOA) were obtained from data currently available in the literature specifying valve type and size and were related to the patients' body surface area.

Results Using the previously proposed cut-off of EOA ≤ 0.8 cm²/m², PPM was present in 54 % of patients. Patients were followed for 4.1 ± 2.0 years (up to 8 years). Survival as estimated by Kaplan-Meier analysis tended to be slightly worse in the group with PPM (1-, 3- and 5-year survival 89 %, 86 %, and 76 % vs 92 %, 88 %, and 82 %; $p = 0.21$). However, patients with PPM were also older (73 vs 66 years; $p < 0.0001$), more often female (64 vs 42 %; $p < 0.0001$), preoperatively more symptomatic (NYHA class 2.4 vs 2.2; $p < 0.006$) as well as postoperatively (NYHA class 1.7 vs 1.5; $p < 0.006$), suffered more often from coronary artery disease (42 vs 30 %; $p < 0.02$), 3-vessel disease (10 vs 4 %; $p < 0.04$) and hypertension (75 vs 60 %; $p < 0.03$) and presented with a higher EUROscore (6.7 ± 2.2 vs 5.4 ± 2.6 ; $p < 0.0001$). By multivariate analysis including PPM, age, sex, EUROscore, reduced left ventricular function, coronary artery disease, additional bypass grafting, hypertension, and diabetes, only diabetes, coronary artery disease and EUROscore but not PPM were independent predictors of survival.

Conclusions Moderate PPM, as currently defined, is a frequent finding in patients with aortic valve prostheses. From the present data, it has no impact on perioperative and long-term survival after valve replacement for isolated severe aortic stenosis. A recommendation of more complex surgical interventions such as aortic root enlargement to avoid moderate PPM may therefore not be justified. Furthermore, it may be a major limitation of this concept to rely fully on Doppler estimates of EOA, which have been shown to markedly underestimate EOA in bileaflet prostheses.

POSTERDISKUSSION A

Donnerstag, 31. Mai 2007, 17.30–18.30 Uhr

Sitzung I – Basic Science

I-1

023

Inflammatory Cytokines, Interleukin-6 and Oncostatin M Increase Vascular Endothelial Growth Factor in Adipose Tissue in vitro and in vivo

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Department of Internal Medicine II, Medical University of Vienna

Background Obesity is characterised by an increased adipose tissue mass with increased size and number of mature adipocytes. Recent studies suggest that angiogenesis influences differentiation of preadipocytes into adipocytes and thus affects adipose tissue mass. Vascular endothelial growth factor (VEGF), a key agonist of angiogenesis, is expressed and secreted by adipose tissue but its regulation has been poorly examined. Elevated levels of the glycoprotein 130- (gp130-) ligand interleukin-6 (IL-6) are found in obese patients. The aim of our study was to investigate whether the gp130 ligands IL-6 and oncostatin M (OSM) regulate VEGF expression in human visceral and subcutaneous adipose tissue in vitro and in mice in vivo.

Methods Primary human preadipocytes were prepared from visceral and subcutaneous adipose tissue. Differentiation to adipocytes was induced by hormone supplementation. Explants of human adipose tissue, preadipocytes, and adipocytes were treated with IL-6 and OSM, respectively. VEGF antigen in supernatants was quantified by ELISA, mRNA levels were determined by RealTime-PCR. Male C57/Bl6 mice were injected i. p. with IL-6 or OSM and blood samples and visceral and epididymal adipose tissues were collected after 24 h. In a separate experiment, mice were injected with IL-6 and OSM for 18 days and adipose tissue was embedded for immunohistochemistry and CD 31 antigen, a specific marker for endothelial cells, was visualized in cryosections.

Results IL-6 and OSM significantly up-regulate VEGF production in human visceral and subcutaneous adipose tissue explants, preadipocytes and adipocytes. These results were confirmed on the level of mRNA expression. When mice were injected with IL-6 and OSM i. p., VEGF serum levels and VEGF mRNA in epididymal and visceral adipose tissues were significantly up-regulated. Immunohistochemistry revealed a significant increase of CD 31-positive cells in retroperitoneal adipose tissue, when mice were injected with OSM or IL-6 i. p. over a period of 18 days.

Conclusion We could show that VEGF expression is up-regulated by IL-6 and OSM in human adipose tissue in vitro and also by in vivo administration in murine adipose tissue. We postulate that gp130 ligands participate in the modulation of VEGF synthesis in adipose tissue and we hypothesize that high levels of circulating gp130 ligands, such as IL-6, found in obese patients could promote angiogenesis in adipose tissue and thus could contribute to the increased cardiovascular risk associated with obesity.

I-2

042

PECAM Deficiency Enhances Venous Thrombosis

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Purpose Platelet endothelial cell adhesion molecule-1 (PECAM-1, CD31) is a 130-kDa membrane glycoprotein that is expressed on

a range of blood cells including platelets, monocytes, neutrophils, B-lymphocytes, some T-lymphocyte subsets, and also on vascular endothelial cells. This member of the immunoglobulin superfamily has been reported to be associated with a wide range of functions, including transendothelial migration of leukocytes, integrin regulation, modulation of T- and B-lymphocyte antigen receptor signaling, B-lymphocyte development, vasculogenesis, apoptosis, and protection against endotoxic shock. Recently, it has been shown that platelet PECAM-1 acutely inhibits arterial thrombus formation in vivo. The aim of our experiment was to investigate whether PECAM-1 plays a role in venous thrombosis.

Methods Thrombosis was induced in the infrarenal vena cava of adult C57/Bl6 and isogenic CD31^{-/-} mice by creating a venous stenosis with a silk suture. Thrombi were harvested on days 1 and 28. Tissues were immediately fixed in 7.5 % buffered formaldehyde solution and 3 mm paraffin sections were prepared for histochemical analysis.

Results Thrombus cross-sectional area analysis over time demonstrated a significant increase in thrombus on days 1 and 28 in CD31^{-/-} animals compared with controls (day 1: median cross-sectional area [CSA] 0.715 vs 0.220 mm²; day 28: median CSA 0.107 vs 0.018 mm², n = 8; p < 0.05).

Conclusion In PECAM-1-deficient mice, larger venous thrombi than in control mice were formed under standardized conditions. These data provide evidence that PECAM-1 is involved in the control of venous thrombosis. Further studies will clarify which PECAM-1 function is critical.

I-3

060

Monitoring Aspirin and Clopidogrel for Secondary Prevention in Coronary Artery Disease: Studies with the Cone and Platelet Analyzer, Impact®

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Background Antiplatelet therapy effectively reduces the risk of cardiovascular episodes after coronary events and stenting but some patients still have recurrent events. Monitoring the efficacy of platelet inhibition may improve therapy.

Patients and Methods We studied aspirin- and clopidogrel-induced inhibition of platelet response to arachidonic acid (ARA) and ADP, respectively, in 12 patients (♀/♂ 7/5, median age 62 years, range 41–83 years) with proven significant coronary artery disease and suspected clopidogrel resistance. Patients received aspirin 100 mg/d, clopidogrel 75 mg/d (n = 5), and 150 mg/d (n = 5); 2 patients were treated with these drugs but with unknown dosages. 200 µl of citrated blood was drawn for the analysis with the cone and platelet analyzer Impact R to assess platelet function.

Results Complete inhibition of ARA-inducible adhesion was seen in 10/12 patients; one patient had 65 % inhibition, the other one no inhibition. Only 4/12 patients had an inhibitory activity to ADP exceeding 66 %, indicating clopidogrel efficacy; 3 patients had an inhibition 33–66 % indicating moderate drug effects, and 5 patients had an inhibition < 33 %, which indicates no drug effects. One patient, who was on 150 mg clopidogrel (no inhibition), received 600 mg and became a full responder on the following day. He was maintained on clopidogrel 150 mg/d and ADP inhibition sustained for the next 10 days.

Conclusions The effects of antiplatelet therapy can be monitored in clinical routine and may thus govern treatment of suspected non-responders.

I-4

083

Splenectomy Is Associated With Misguided Thrombus Resolution

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Purpose Chronic thromboembolic pulmonary hypertension (CTEPH) is a vascular disorder characterized by organizing venous thromboembolies obstructing major pulmonary arteries. Previous studies have demonstrated that prior splenectomy is associated with an increased risk of CTEPH. However, pathomechanisms of altered thrombus formation and resolution after splenectomy are still unclear.

Methods We utilized a mouse model of venous thrombosis to compare venous thrombus formation and resolution. Vena cava ligation was performed one to three months after splenectomy. At fixed time points (days 3, 7, 14 and 28 after vena cava ligation), thrombus and blood cells were harvested for histology and FACS analysis.

Results Thrombus areas of splenectomised mice were significantly larger than those of control thrombi at all time points (cross sectional analysis, day 28: 0.083 ± 0.017 vs 0.025 ± 0.017 mm², $n = 8$; $p < 0.03$). Thrombi of splenectomised mice have a higher cell density (day 28: $21,416 \pm 1299$ vs $11,173 \pm 1040$ cells/mm², $n = 8$; $p < 0.03$) and more collagen than control thrombi (day 28: 29.22 ± 3.14 vs 12.26 ± 1.53 % of thrombus area, $n = 8$; $p < 0.03$). Smooth muscle cells and macrophages accumulated in thrombi of splenectomised mice by day 28. FACS analysis revealed a higher amount of CD41-positive platelet microparticles (day 28: $16,013 \pm 5484$ vs 4738 ± 401 cells/ μ l, $n = 8$; $p < 0.03$) and leukocyte/platelet aggregates with an increased proportion of activated platelets (CD11b/CD41, day 28: 65.11 ± 4.41 vs 49.37 ± 5.81 %, $n = 8$; $p < 0.03$ and CD11b/CD62P, day 28: 7.45 ± 1.37 vs 5.2 ± 0.86 %, $n = 8$; $n. s.$).

Conclusion Our data provide evidence that alterations of coagulation and immune systems occur after splenectomy. We could demonstrate that splenectomy leads to altered thrombus resolution in a mouse model. Further studies will clarify the detailed pathomechanisms which mediate delayed thrombus resolution after splenectomy.

I-5

082

Involvement of Nitric Oxide in the Cardioprotective Effect of Early Ischemic Preconditioning in the Reperfusion Phase in Pigs

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Background We investigated the involvement of myocardial tissue iNOS and cNOS release in the cardioprotective effect of early ischemic preconditioning (IP) in closed-chest pigs subjected to percutaneous balloon coronary occlusion/reperfusion.

Methods Catheter-based 90-min occlusion followed by 60-min reperfusion of the LAD coronary artery was performed in 8 pigs (group AMI). IP was applied in 9 pigs (group IP) through 2 cycles of 5-min occlusion and 5-min reperfusion of the LAD before a 90-min occlusion and 60-min reperfusion. Infarct size was expressed as a percentage of the area at risk. Coronary pressure was measured with pressure wire (PW) placed distally to the occluding balloon. Tissue iNOS/cNOS activities were measured in the infarcted area (iNOSi/cNOSi) and in the border zone (iNOSb/cNOSb) by use of citrullin assay.

Results Infarct size was smaller in group IP compared with group AMI (21.7 ± 4.4 vs 27 ± 3.4 %; $p = 0.014$). IP did not influence the tissue iNOSi/iNOSb activities. A trend towards higher cNOSb ac-

tivity (49.2 ± 23.2 vs 31 ± 25.1 pmol min/mg/protein; $p = 0.142$) was measured in group IP vs AMI, whereas cNOSi did not differ between the groups. PW measurements distally to occlusion revealed that IP induced incipient collateralization, which was independent from iNOS or cNOS activities. In the IP group, significant correlations were observed between cNOSi and PW values ($r = 0.726$; $p = 0.027$), and between cNOSb and PW values ($r = 0.832$; $p = 0.005$) after 60-min reperfusion.

Discussion Beneficial effect of cNOS in ischemia/reperfusion injury after IP results from the improved reperfusion after release of coronary occlusion and not from mediation of the incipient collateralization during coronary occlusion.

I-6

104

Ischemic Preconditioning Inhibits Mobilization of Bone-Marrow Mesenchymal Stem Cells via Increase in Plasma Levels of Tumor Necrosis Factor Alpha in Porcine Ischemia Reperfusion Model

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Background Acute ischemia of the myocardium triggers mobilization of stem cells (SCs) from the bone marrow (BM). In our previous study, we showed that, besides the increase in mobilization of BM haematopoietic stem cells, ischemic preconditioning (IP) inhibits the mobilization of BM-origin mesenchymal stem cells (MSCs). The aim of the present study was to reveal, which factor might play a role in the blocking effect of IP on the mobilization of BM-MSCs in porcine coronary occlusion/reperfusion.

Methods Seventeen pigs underwent percutaneous occlusion of the mid-LAD for 90 min followed by 60-min reperfusion (group AMI). IP was obtained in an additional 18 pigs (group IP) by 2 cycles of 5 min of balloon occlusion of LAD with 2 cycles of 5-min intervals of reperfusion before the 90-min occlusion and 60-min reperfusion. The global left ventricular ejection fraction (EF) was measured from the end-diastolic and end-systolic volumes calculated from the area-length method of echocardiography. The size of myocardial infarction in relation to area at risk (expressed as %) was determined by blue-dye injection and triphenyl tetrazolium chloride staining. BM-MSCs were characterized by CD44⁺ and CD90⁺ co-expression, after gating of CD45-negative events, measured by whole blood-flow cytometry from venous blood taken at baseline and at the end of final reperfusion. Plasma levels of stromal-derived factor 1 (SDF-1), vascular endothelial growth factor (VEGF), tumor necrosis factor-alpha (TNF-alpha) and interleukin-8 (IL-8) were measured at baseline, after preconditioning, after coronary occlusion and final reperfusion.

Results Myocardial infarct size, expressed as % of area-at-risk, was larger in group AMI (21 ± 6.6 % vs 17.2 ± 6.1 %; $p < 0.041$) as compared with group IP. The global left ventricular EF was decreased in group AMI comparing group IP (34 ± 12 % vs 41 ± 12 %; $p < 0.076$). Relative decrease (ratio of post-final reperfusion and baseline values) in BM-MSCs was observed in group IP as compared with group AMI (0.8 ± 0.22 % vs 1.26 ± 0.29 %; $p < 0.001$). Plasma levels of SDF-1 and VEGF increased moderately in both groups, without significance between the groups at each time point. TNF-alpha level increased significantly after IP, and was significantly higher after final reperfusion (115.4 ± 55.6 vs 71.2 ± 29.9 pg/ml; $p = 0.007$) as compared with group AMI. Similarly, IL-8 increased after IP, and remained non-significantly higher in group IP. A weak but significant negative correlation between TNF-alpha level and ratio of MSCs at final reperfusion could be demonstrated ($r = -0.524$; $p = 0.001$).

Conclusions IP inhibits mobilization of BM-derived MSCs during ischemia reperfusion, which might be partially explained by the increased release of pro-inflammatory cytokine TNF-alpha by IP.

I-7

098

Ischemic Preconditioning Increases Platelet Activation in a Porcine Myocardial Infarction/Reperfusion Model

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Introduction Platelet activation parameters are useful means of identifying larger platelets, which are hemostatically more active and are a risk factor for inducing coronary thrombosis. Little is known about the effect of ischemic preconditioning (IP) on the change in platelet activation.

Methods Thirty-five pigs underwent 90-min coronary occlusion followed by 60-min reperfusion. IP was obtained in 18 of 35 pigs by 2 cycles of 5 min of percutaneous balloon occlusion of the left anterior descending coronary artery with 2 cycles of 5-min intervals of reperfusion before 90-min occlusions (group IP), while constant coronary occlusion with reperfusion was performed in the remaining 17 pigs (group AMI). Blood samples for the measurement of platelet activation, mean platelet volume (MPV), platelet large-cell ratio (LCR) and platelet distribution width (PDW) were sampled at baseline, at the end of occlusion and at the end of reperfusion time. In group IP, an additional blood sample was obtained at the end of preconditioning.

Results IP resulted in a decrease of myocardial infarction size ($17.2 \pm 6.1\%$ vs $21 \pm 6.6\%$; $p < 0.05$). A trend towards higher global left ventricular ejection fraction was observed in group IP ($41 \pm 12\%$ vs $34 \pm 12\%$; $p = 0.07$). IP activated the platelets, as MPV increased from 9.2 ± 0.6 fl to 9.3 ± 0.4 fl and LCR from $19.6 \pm 4.8\%$ to $20.7 \pm 3.2\%$. Platelet activation parameters increased continuously during occlusion/reperfusion to reach MPV 9.5 ± 0.6 fl, LCR $22.7 \pm 4.6\%$ and PDW 11 ± 1.3 fl in the IP group. In the AMI group, there was also a slight increase in MPV from 8.8 ± 1 fl to 9 ± 0.9 fl, LCR from $17.1 \pm 7\%$ to $18.3 \pm 5.1\%$ and PDW from 9.9 ± 1.4 fl to 10.2 ± 1.4 fl. When comparing IP to AMI group at the end of the reperfusion period, there was a significantly higher degree of platelet activation in the IP group (MPV $p = 0.029$ and LCR $p = 0.019$).

Conclusion Ischemic preconditioning induces higher degrees of platelet activation as compared with myocardial infarction. The clinical relevance of this finding should be established in further investigations.

I-8

105

Oncostatin M Induces Vascular Endothelial Growth Factor in Human Vascular Smooth Muscle Cells In Vitro

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Background Recently, it has been shown that vascular endothelial growth factor (VEGF) is expressed strongly in smooth muscle cells (SMC) in atherosclerotic plaques. It is believed that VEGF present in lesions is involved in blood vessel growth and in the regulation of the expression of prothrombotic and proinflammatory mediators in monocytes and endothelial cells at these sites. A particular member of the glycoprotein 130 (gp130) receptor cytokine family, namely oncostatin M (OSM), which is produced by activated T-cells and macrophages, up-regulates VEGF in various cells such as airway smooth muscle cells, adipocytes and cardiac myocytes and fibroblasts. Therefore, it was the aim of this study to investigate whether OSM also induces the expression of VEGF in vascular smooth muscle cells.

Methods Human coronary artery SMC (HCASMC) and human aortic SMC (HASMC) were isolated from pieces of coronary arter-

ies and aorta, respectively, obtained from patients undergoing heart transplantation. The cells were treated with the gp130 ligands OSM, cardiotrophin-1 (CT-1), interleukin-6 (IL-6) or leukemia-inhibitory factor (LIF). VEGF-A was determined by a specific ELISA. Lactate dehydrogenase (LDH) leakage was measured in treated cultures in order to exclude possible cytotoxic effects of gp130 ligands. mRNA specific for gp130, OSM receptor (OSMR), IL-6 receptor (IL-6R) and LIF receptor (LIFR) was detected by reverse transcriptase-PCR (RT-PCR).

Results OSM, but not CT-1, IL-6 or LIF increased VEGF production significantly in both HCASMC and HASMC up to 4.6-fold. The effect of OSM on VEGF production was reproducible in each preparation of HCASMC and HASMC derived from three different donors. When cells were treated with OSM at concentrations of 0.01, 0.1, 1, 10 or 100 ng/ml for time periods of 24 hours (h), 48 h and 72 h a dose- and time-dependent effect on VEGF production was observed. HCASMC and HASMC were shown to express gp130, OSMR, IL-6R, and LIFR.

Conclusion We show here that the proinflammatory cytokine OSM induces VEGF production in vascular smooth muscle cells. Since activated T-cells and macrophages have been found in atherosclerotic lesions, we hypothesize that OSM produced by these cells could induce VEGF production, thereby contributing to plaque angiogenesis and destabilization.

Sitzung II – Chirurgie

II-1

024

Die mitrale Reduktionsanuloplastie – die Ringlösung für ein ventrikuläres Problem

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Einleitung Die sekundäre Mitralklappeninsuffizienz ist eine häufige Komplikation bei Patienten mit einer terminalen Herzinsuffizienz. Die rein medikamentöse Therapie ist mit einem suboptimalen Outcome behaftet, die Herztransplantation scheidet oft wegen des fortgeschrittenen Alters, einer hohen Komorbidität und des Mangels an Spenderorganen aus.

Methode und Ergebnisse Bei 52 Patienten (ischämische CMP [n = 35]; dilatative CMP [n = 17]; mittleres Alter 63,3 Jahre [30–81 Jahre]) mit einer Ejektionsfraktion (EF) unter 35 % (15–25 %) wurde aufgrund einer terminalen Herzinsuffizienz mit einer sekundären Mitralklappeninsuffizienz III–IV eine Reduktionsanuloplastie durch die Implantation eines unterdimensionierten Mitralklappenrings durchgeführt (Edwards Physio 26–28). Die 30-Tages-Mortalität betrug 9,6 % (n = 5). Sieben Patienten starben im Nachbeobachtungszeitraum mit einem mittleren Follow-up von 63,1 Monaten (15,5–150,1 Monate). Postoperativ kam es zu einer Verbesserung der präoperativen EF von im Mittel 27 % (15–35 %) auf im Mittel 39 % (20–56 %). Die NYHA-Klassen verbesserten sich von im Mittel 3,4 auf 1,7. Die aktualisierte Überlebensrate betrug nach einem, zwei und fünf Jahren 78 %, 76 % und 54 % bei einem Follow-up von 100 %.

Schlussfolgerung Die Reduktionsanuloplastie verfolgt ein anderes Therapiekonzept als die klassische Mitralklappenrekonstruktion und ist eine effektive Operationsmethode, um die linksventrikuläre Funktion bei einer sekundären Mitralklappeninsuffizienz zu verbessern.

II-2

047

Standardisierter Zugang zur Behandlung von thorako-abdominellen Aneurysmen mit Linksherz-Bypass, selektiver Organperfusion und Spinalprotektion

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Hintergrund Die chirurgische Behandlung von thorako-abdominellen Aortenaneurysmen bleibt – trotz aller Fortschritte – eine He-

rausforderung an das interdisziplinäre Team. Durch die Berücksichtigung der chirurgischen Erfahrungen und der experimentellen Ergebnisse der vergangenen Jahre gelang es uns, eine standardisierte Strategie zu entwickeln, die wir hier vorstellen möchten.

Methodik Zwischen 1. Jänner 2005 und 31. Dezember 2006 wurden 12 Patienten mit thorako-abdominellen Aortenaneurysmen an unserer Abteilung behandelt. Die Eckpunkte des standardisierten Zugangs sind: Liquordruckmessung und Liquordrainage zur Spinalprotektion, Reimplantation von Interkostal- und Lumbalarterien, Linksherzbypass mittels eines modifizierten, minimierten extrakorporalen Systems sowie selektive Organperfusion von Niere und Leber zur Organprotektion. Bei einem Patienten wurde dieses Verfahren nicht gewählt, alle anderen wurden wie angegeben operiert.

Ergebnisse Bei neun Patienten wurde die Operation unter geplanten und stabilen Bedingungen, bei drei Patienten im Stadium der Ruptur unter Notfallbedingungen durchgeführt. Die mittlere Dauer der extrakorporalen Perfusion war 95 ± 71 min (Median 75 min), die mittlere postoperative Intubationszeit betrug 35 ± 39 h (Median 17 h) und der mittlere postoperative Intensivaufenthalt betrug $4,5 \pm 2,8$ Tage (Median 3,9 d). Neun Patienten waren weiblich, das mittlere Alter der Patienten betrug 65 ± 16 Jahre. Innerhalb des ersten postoperativen Monats verstarb ein Patient (Notfall und St. p.-Reanimation), im Laufe des ersten FU-Jahres verstarb ein weiterer Patient an einer Pneumonie.

Schlußfolgerung Der standardisierte chirurgische Zugang zur komplexen Pathologie von thorako-abdominellen Aortenaneurysmen polymorbider Patienten kann mit ausgezeichneten mittelfristigen Ergebnissen angewandt werden.

II-3

048

Standardisierter Zugang zur Behandlung der akuten Typ-A-Dissektion: Moderat hypothermer Kreislaufstillstand mit axillärer Kanülierung und selektiver, antegrader Hirnperfusion

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Hintergrund In der chirurgischen Behandlung der akuten Typ-A-Dissektion konnten in den vergangenen Jahren durch eine Adaptation der interdisziplinären Herangehensweise deutliche Fortschritte im Outcome der Patienten erzielt werden. Wir stellen die Erfahrungen dieses anspruchsvollen und herausfordernden Patienten-gutes an unserer Abteilung vor.

Methodik Zwischen 1. Jänner 2000 und 31. Dezember 2006 wurden 57 Patienten mit Typ-A-Dissektionen mit axillärer Kanülierung und mit selektiver antegrader Hirnperfusion während des moderat hypothermen Kreislaufstillstandes operiert. Zur Überwachung der Hirnperfusion setzten wir bei den letzten 10 Patienten die Messung der zerebralen Oxygenierung mittels Nahe-Infrarot-Spektroskopie ein, die zu einer weiteren physiologischen Adaptation unserer Technik führte (unilaterale vs. bilaterale antegrade Hirnperfusion).

Ergebnisse Drei Viertel der Patienten wurden mit einer aortenklappenhaltenden Technik operiert, die restlichen 25 % erhielten ein klappentragendes Konduit. Bei 40 % der Patienten wurde der Aortenbogen ganz oder teilweise ersetzt, bei 8 Patienten wurde ein neues Hybridverfahren mit Verwendung einer stenttragenden Prothese eingesetzt. Die 30-Tages-Mortalitätsrate war 8 %.

Schlußfolgerung Moderater hypothermer Kreislaufstillstand in Kombination mit selektiver antegrader Hirnperfusion erlaubt es, Patienten mit akuter Typ-A-Dissektion mit niedriger postoperativer Mortalität sowie neurologischer Komplikationsrate zu behandeln, vor allem wenn die Patienten ohne vorangegangene Reanimation operiert werden. Zudem erhält man durch die nichtinvasive Messung der zerebralen Oxygenierung mittels Nahe-Infrarot-Spektroskopie wichtige Informationen zur individuellen zerebralen Protektion.

II-4

049

Der Einsatz der thorakalen Hybridprothese als alternativer chirurgischer Zugang zu Typ-A-Dissektionen

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Hintergrund Durch die übliche operative Behandlung einer akuten Typ-A-Dissektion wird die Aortenpathologie in eine Typ-B-Dissektion umgewandelt. Die Langzeitergebnisse hängen vom Durchmesser und von der Durchgängigkeit des falschen Lumens ab. Die chirurgische Therapie der Dissektionen im Bereich der thorakalen Aorta birgt ein großes Risiko in bezug auf bedeutende neurologische Komplikationen. Dieser Hintergrund brachte uns zum Zugang der „kompletten“ Therapie des thorakalen Anteils einer Typ-A-Dissektion durch Vereinigung der Erkenntnisse aus der „Elephant trunc“-Technik und der Stentgraft-Implantation. Die Ergebnisse der ersten Patienten mit der Methode der „Frozen elephant trunc“-Technik für eine einzeitige Behandlung der Typ-A-Dissektion mittels einer „Hybrid“-Prothese stellen wir vor.

Methodik Acht Patienten wurden zwischen 1. Jänner 2005 und 31. Dezember 2006 mit der Hybridprothese operiert, drei Patienten hatten eine Typ-A-Dissektion. Die standardisierten Bestandteile unseres Zugangs sind: arterielle Kanülierung über die Axillärarterie, moderat hypothermer Kreislaufstillstand, selektiv antegrade Hirnperfusion mittels Messung der zerebralen Oxygenierung durch Nahe-Infrarot-Spektroskopie. Der gestentete Anteil der Hybridprothese wurde in der Aorta descendens durch den geöffneten Aortenbogen im Kreislaufstillstand implantiert. Der Ersatz des Aortenbogens und der Aorta ascendens wurde mit der integrierten Standard-Gefäßprothese im Anschluß durchgeführt.

Ergebnisse Alle Patienten überlebten den Eingriff und konnten in zufriedenstellendem Allgemeinzustand entlassen werden. Die Follow-up-CT-Untersuchungen zeigten im Bereich des gestenteten Anteils der thorakalen Aorta bei allen Patienten eine Thrombosierung des falschen Lumens, die sich teilweise noch nach distal fortsetzte. Bei keinem Patienten traten neurologische Komplikationen (v. a. Paraplegie) auf.

Schlußfolgerung Dieses neue kombinierte Verfahren zeigt in den Ersterfahrungswerten vielversprechende Resultate. Das einzeitige Verfahren reduziert die Risiken des zweizeitigen chirurgischen Vorgehens bei komplexen Typ-A-Dissektionen im speziellen sowie komplexen aortalen Pathologien im allgemeinen.

II-5

065

Minimally Invasive Atrio-Ventricular Valve Surgery: Program Development and Learning Curve Issues

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Background Minimally invasive AV valve surgery is an increasingly popular procedure in cardiac surgery but due to its complexity still reserved to a few selected centers. Aim of this study was to present learning curve issues for program introduction.

Material and Methods A total of 76 minimally invasive AV valve procedures were performed by a single surgeon and 75 (98.7 %) were successful. Seventy-one patients (94.7 %) underwent AV valve repair, 4 (5.3 %) received mitral valve replacement. In 10 patients (13.3 %), concomitant ASD closure and/or tricuspid valve repair had to be performed. One intraoperative conversion to valve replacement had to be performed due to residual mitral regurgitation. For calculation of learning curves, regression models with logarithmic curve fit for operating time (OT), aortic cross-clamp (AXT) and cardio-pulmonary bypass time (CPBT) for all patients and for patients with posterior mitral leaflet prolapse were applied.

Results Within approximately 30 consecutive minimally invasive procedures, a steady decline of either OT, AXT and CPBT could be observed for the overall surgical population despite the increasing

number of concomitant procedures and was similar in patients with posterior mitral leaflet prolapse. After overcoming this steep learning curve, a mean AXT of 116 ± 45 min, a CBP time of 165 ± 46 min and a total OT of 285 ± 45 min is required to treat isolated posterior leaflet prolapse.

Conclusion Minimally invasive AV valve surgery can be safely introduced into a heart surgery program. However, a sufficient number of cases per year are required per surgeon to overcome this learning curve.

II-6

109

State-of-the-Art 2007: Mitral Valve Repair – Minimally Invasive or Median Sternotomy?

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Background More than ten years have passed since minimally invasive mitral valve surgery employing different access and different techniques was introduced. In spite of obvious advantages, acceptance by cardiac surgeons is generally low. To define its current position in clinical practice, the development of our program, actual indications, and results are presented.

Material and Methods Minimally invasive and conventional mitral valve procedures from 2001 to 2006 were prospectively documented. Indications for the minimally invasive vs conventional approach through median sternotomy are compared.

Results 75 patients had minimally invasive mitral valve surgery through a 5 cm minithoracotomy. Carpentier type-I, -II and -IIIa lesions involving the posterior, anterior or both mitral leaflets were treated using Carpentier repair techniques. Combined procedures of the tricuspid valve, ASD and modified maze operations were performed in 23 % of cases, 4 patients had prosthetic mitral valve replacement. One patient died at home on postoperative day 26 from unknown causes. Functional results: residual MI grade 0: 89 %, grade I: 8 %, grade I-II: 1.3 %, grade II: 1.3 %, grade III or IV: 0. Reoperations after 21 months: 0. In 2006, 62 % of all mitral valve repairs in our department needing no concomitant CABG or aortic valve operations were performed minimally invasive.

Conclusion More than 60 % of mitral valve repairs can be performed minimally invasive with excellent results. As the procedure is superior concerning cosmesis, the procedure is favoured by patients and referring cardiologists. At this time, disadvantages are neither proven nor suspected, advantages concerning surgical complications and rehabilitation are assumed.

Sitzung III – Diverse

III-1

012

Electrocardiographic Abnormalities in Opiate Addicts

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Aims To determine in a cross-sectional study the prevalence of electrocardiographic (ECG) abnormalities in drug addicts seeking therapy and its association with demographic, clinical, and drug-specific parameters.

Methods In consecutive opiate-addicted patients seeking therapy between October 2004 and August 2006, a 12-lead ECG was registered within 24 hours after admission and evaluated according to a preset protocol. Additionally, demographic, clinical, and drug-specific parameters were recorded.

Results Included were 511 patients, 25 % female, with a mean age of 29 ranging from 17–59 years. One or more ECG abnormalities were found in 314 patients (61 %), most commonly ST abnormalities (19 %), QTc prolongation (13 %), left ventricular hypertrophy (11 %), and missing R progression (10 %). ECG abnormalities were

more common in males than in females (64 vs 54 %; $p < 0.05$), and in patients whose urine findings for cannabinoids were positive (68 vs 57 %; $p < 0.05$). Patients with ST abnormalities were more often male (21 vs 11 %; $p < 0.05$), had less often a history of seizures (16 vs 27 %; $p < 0.05$), more often urine findings positive for cannabinoids (26 vs 15 %; $p < 0.05$) and negative for methadone (21 vs 11 %; $p < 0.05$). QTc prolongation was more frequent in patients with high dosages of substitution drugs than in patients with medium or low doses (27 vs 12 vs 10 %; $p < 0.05$) and in patients whose urine findings were positive for methadone (23 vs 11 %; $p < 0.001$) and benzodiazepines (17 vs 9 %; $p < 0.05$).

Conclusion ECG abnormalities are frequent in opiate addicts. ST abnormalities seem to be associated with cannabinoids and QTc prolongation with methadone and benzodiazepines.

III-2

022

Medikamentöse Reduktion des Pulsdrucks bei arterieller Hypertonie – die CORIPULS-Studie

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Einleitung Ein Pulsdruck (Blutdruckamplitude) von > 65 mmHg stellt bei älteren Patienten mit arterieller Hypertonie einen unabhängigen kardiovaskulären Risikofaktor dar. Nicht alle antihypertensiven Medikamente sind gleichermaßen in der Lage, den Pulsdruck entsprechend zu reduzieren. In der CORIPULS-Studie wurde der Einfluß der antihypertensiven Kombination Carvedilol plus Hydrochlorothiazid auf den Pulsdruck untersucht.

Patienten und Methodik In dieser Praxisstudie wurden 8566 Hypertoniker (RR $> 140/90$ mmHg) mit einem Alter von $63,3 \pm 11,7$ Jahren auf 25 mg Carvedilol + 12,5 mg Hydrochlorothiazid eingestellt und nach $26,8 \pm 19,9$ sowie $59,5 \pm 33,6$ Tagen nachkontrolliert. Neben Pulsdruck, systolischem und diastolischem Blutdruck, wurden auch die Auswirkungen auf den Fett- und Glukosestoffwechsel untersucht.

Ergebnisse Systolischer und diastolischer Blutdruck sowie Pulsdruck wurden von 167 ± 16 mmHg, 96 ± 10 mmHg bzw. 71 ± 15 mmHg auf 133 ± 12 mmHg, 78 ± 7 mmHg bzw. 55 ± 11 mmHg gesenkt. Das entsprach einer Reduktion von -20 %, -18 % bzw. -23 %. Die Reduktion des Pulsdrucks war bei Patienten mit initial sehr hohen Werten (> 80 mmHg) oder mit isolierter systolischer Hypertonie mit bis zu -30 % am stärksten ausgeprägt. Die Parameter des Fett- und Glukosestoffwechsels wurden in > 90 % als gebessert oder unverändert angegeben.

Schlußfolgerung Die antihypertensive Kombination Carvedilol plus Hydrochlorothiazid ist in der Lage, neben dem systolischen und diastolischen Blutdruck auch den Pulsdruck ausreichend zu senken und weist eine Stoffwechselneutralität auf.

III-3

033

Chronic Renal Failure Is Not Associated With the Prevalence and Severity of Coronary Artery Disease: Analysis of 5641 Consecutive Patients

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Background Chronic renal failure (CRF) is associated with an increased incidence of cardiovascular events. However, few data exist on the relation between CRF and the prevalence and severity of coronary artery disease (CAD).

Methods 5641 consecutive patients undergoing coronary angiography for the evaluation of chest pain were analyzed. Cardiovascular risk factors were assessed by standardized questionnaire and routine blood chemistry. Severity of CAD was graded by visual estimation of lumen diameter stenosis. Significant stenosis was de-

defined as lumen diameter reduction $\geq 70\%$ in at least one major coronary artery. Coronary angiograms were graded as non-significant CAD, as 1-, 2- or 3-vessel disease (VD) or as non-CAD. Renal function was assessed by estimation of the glomerular filtration rate (GFR) using the abbreviated Modification of Diet in Renal Disease Equation (MDRD2). The GFR was then corrected for body surface area (Dubois formula).

Results Overall, GFR was lower in CAD ($n = 4124$) than in non-CAD patients ($n = 1517$) (68.7 ± 19.7 vs 72.8 ± 20.0 ml/min; $p < 0.001$) but was not different between 1-VD, 2-VD, 3-VD and non-significant CAD. CAD patients had lower HDL levels (51.9 ± 15.3 vs 60.3 ± 18.5 mg/dl), were older (65.2 ± 10.5 vs 59.9 ± 11.4 y), more often smokers (18.7 vs 16.5%), diabetics (19.9 vs 10.8%) and hypertensives (85.6 vs 69.6%) (all $p < 0.005$), had similar LDL levels (124.5 ± 38.3 vs 126.0 ± 36.3 mg/dl; $p = n. s.$) and were more frequently on chronic statin therapy (43.4 vs 27.9% ; $p < 0.001$). However, in multinomial logistic regression analysis (see **Table 1**), GFR was not independently associated with the presence and severity of CAD.

Table 1: H. F. Alber et al.

	Odds ratio	95 %-CI	Wald	p-value
Age	1.061	(1.053–1.068)	259.116	$p < 0.001$
Gender	2.728	(2.352–3.165)	175.636	$p < 0.001$
HDL	0.977	(0.973–0.982)	103.296	$p < 0.001$
Hypertension	1.657	(0.795–1.434)	30.187	$p < 0.001$
Diabetes	1.665	(1.355–2.047)	23.439	$p < 0.001$
Smoking habit	1.795	(1.459–2.210)	30.526	$p < 0.001$
GFR	1.001	(1.005–1.099)	0.512	$p = n. s.$

Conclusion In this large consecutive patient cohort, CRF is not independently correlated with the angiographically documented prevalence and severity of CAD.

III-4

043

Geschlechtsunterschiede von Hypertonikern in Österreich – Ergebnisse des LIIFE-IN-LIFE-Projekts

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Einleitung Im LIIFE-IN-LIFE-Projekt wurden seit Mai 2004 20.615 Hypertoniker eingeschlossen und seitdem im Rahmen einer Anwendungsbeobachtung (AWB) in über 900 Zentren beobachtet. Nachdem in der LIFE-Studie Losartan und Atenolol verglichen wurden, war in dieser AWB das Ziel, epidemiologische Daten zu österreichischen Bluthochdruckpatienten zu sammeln, das kardiovaskuläre Risikoprofil von österreichischen Hypertonikern sowie das intensiviertere antihypertensive Management mittels Losartan in Hinblick auf Endpunktdaten zu evaluieren.

Ergebnisse Die Patienten waren zum Zeitpunkt der Dokumentation durchschnittlich 65,6 Jahre alt. Frauen waren älter (+4,6 Jahre), hatten einen höheren systolischen Blutdruck (+1,0 mmHg) und Herzfrequenz (+1,2/min) und auch eine längere Anamnese von Bluthochdruckerkrankung. Männer hatten nach dem ESC-Score eine mehr als doppelt so hohe Wahrscheinlichkeit, nach dem ESC-Score innerhalb von 10 Jahren nach Einschluß an einem kardiovaskulären Ereignis zu versterben (13,3 vs. 6,3 %). Frauen hingegen, getriggert durch das höhere Alter bei Aufnahme in das Projekt, hatten eine 24 % höhere Wahrscheinlichkeit, innerhalb der kommenden 10 Jahre einen Schlaganfall zu erleiden. Bis auf den Gesamtcholesterinwert hatten Frauen sowohl weniger kardiovaskuläre Risikofaktoren als auch weniger kardiovaskuläre Erkrankungen als Männer.

Schlußfolgerung Frauen und Männer in Österreich unterscheiden sich in diesem Projekt signifikant sowohl hinsichtlich ihres kardiovaskulären Risikoprofils als auch hinsichtlich ihrer bestehenden kardiovaskulären Erkrankungen. Insgesamt bestätigte das Projekt das ausgeprägte kardiovaskuläre Risikoprofil und eine inadäquate antihypertensive Therapie der österreichischen Bluthochdruckpatienten.

III-5

044

Unterschiede zwischen den Patienten der LIFE-Studie und des LIIFE-IN-LIFE-Projekts

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Ziel Das LIIFE-IN-LIFE-Projekt wurde auf der Basis der Ergebnisse der LIFE-Studie im Mai 2004 von einem österreichischen Expertenteam initiiert, um im niedergelassenen Bereich Erkenntnisse aus der LIFE-Studie in die klinische Praxis umzusetzen. An über 20.615 Hypertonikern wurden epidemiologische und klinische Daten zum österreichischen Hypertoniker erfaßt und ein intensiviertes Risikomanagement initiiert. Ein Vergleich der Population gibt wichtige Hinweise bezüglich des Behandlungsstandes in Österreich.

Ergebnisse Im LIL-Projekt wurden 20.615 und in der LIFE-Studie 9193 Patienten eingeschlossen. Das Alter war im LIL-Projekt mit 65,6 Jahren um 1,4 Jahre geringer als in der LIFE-Studie. Der Blutdruck bei Einschluß war im LIL-Projekt mit 158/91 mmHg signifikant geringer (LIFE: 174/98 mmHg), die Herzfrequenz unterschied sich mit 76/min vs. 74/min nicht signifikant. Die Prävalenz von Diabetes, Vorhofflimmern und zerebrovaskulären Erkrankungen (TIA/Stroke) war im LIL-Projekt jeweils signifikant höher: Diabetes 24 % vs. 13 %, Vorhofflimmern 9 % vs. 4 % und zerebrovaskuläre Erkrankungen 13 % vs. 8 %.

Schlußfolgerung Die im LIL-Projekt eingeschlossenen Patienten in Österreich haben zwar einen besser eingestellten Blutdruck als die Patienten der LIFE-Studie, aber die Prävalenz von Diabetes, Vorhofflimmern und zerebrovaskulären Erkrankungen ist im LIL-Projekt signifikant höher, sodaß auch der Zielbereich bei diesen Patienten entsprechend niedriger anzusetzen ist. Die Einstellung eines Großteils der österreichischen Hypertoniker ist somit derzeit noch unzureichend.

III-6

076

The Applicability of Guidelines for the Treatment of Acute Coronary Syndromes Particularly in the Elderly

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Background Evidence for the treatment of acute coronary syndromes (ACS) in the very elderly (> 75 years) is rare. Most of the studies guidelines are based on list an age above 65 or 75 years among their exclusion criteria and report the results of ACS patients with a mean age < 65 years. The question is raised whether recent guidelines are applicable to patients older than 75 years.

Methods We analyzed gender, comorbidities, cardiovascular risk factors as well as potential coronary revascularization of 232 consecutive patients with ACS admitted from 2005 to 2006. The mean age was 73.17 ± 14.32 years and 50.43 % were females (f). Group I: < 75 years ($n = 107$; f: 38.32 %) and group II: > 75 years ($n = 125$; f: 60.80 %).

Results The distribution of STEMI (32.71 %/20 %), NSTEMI (53.27 %/65.60 %) and unstable angina (14.02 %/14.40 %) does not show any significant age-dependent difference. Patients aged 75 years or above appear more often with anemia ($Hb < 12$ g/dl, I: $n = 14$, II: $n = 47$; $p < 0.001$), higher creatinine levels ($SCr > 1.5$ mg/dl, I: $n = 19$, II: $n = 55$; $p < 0.001$), history of neoplasma (I: $n = 3$, II: $n = 13$; $p < 0.025$) and reduced mobility (I: $n = 12$, II: $n = 50$; $p < 0.001$) whereas the prevalence of previous coronary events (I: $n = 30$; II: $n = 47$) and other comorbidities like diabetes (I: $n = 37$; II: $n = 50$), hypertension (I: $n = 69$; II: $n = 92$), hyperlipidemia (I: $n = 39$; II: $n = 31$) and cerebrovascular ischemic disease (I: $n = 8$; II: $n = 19$) was not significantly different. Patients > 75 years sustain more often an ACS without any typical chest pain (39.20 vs 21.50 %; $p < 0.001$). The majority of symptomatic patients come to hospital with pain delay of more than 6 hours (< 75 y: 54.76 %; > 75 y: 61.33 %). Invasive therapeutic strategy ($n = 108$) was significantly more often used in the younger group ($n = 65$; $p < 0.001$), while there was no significant difference in applying thrombolysis ($n = 7$ vs $n = 4$). Although reduced mobility at admission occurs

significantly more frequently in patients > 75 years, invasively treated patients of this group show an improvement in mobility of 16.28 % at discharge. Overall in-hospital mortality was 16.38 % (7.48 % in pts < 75 y vs 24 % in pts > 75 y; $p < 0.001$). The difference of in-hospital mortality between invasively or conservatively treated patients is significant in both groups (< 75 y: 3.08 % in the invasive vs 14.29 % in the conservative treatment group; $p < 0.05$; > 75 y: 13.95 % vs 30.49 %; $p < 0.001$).

Conclusions Increasing age is paralleled by an extensive amount of exclusion criteria in those studies that represent the base of recent guidelines. However, invasive treatment of ACS patients shows a significant benefit of quality of life and survival compared with conservative therapy, in particular in the very elderly.

III-7

092

Klinische und bakteriologische Charakteristika von Endokarditispatienten in einem Schwerpunktspital

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Hintergrund Immer mehr Endokarditispatienten haben Drogenmißbrauch (IVDU) als prädisponierenden Faktor, auch in Europa wird die Rate an multiresistenten Erregern bei infektiöser Endokarditis mit bis zu 22 % angegeben.

Patienten und Methoden Wir untersuchten in den Jahren 2000–2007 retrospektiv Risikofaktoren, Erreger und Verlauf von 30 konsekutiven Patienten (Pat.) mit gesicherter infektiöser Endokarditis (IE) im Alter zwischen 26 und 87 a ($n = 57$), 20 davon Männer. An Risikofaktoren hatten 8 Pat. ein vorbestehendes erworbenes Klappen-vitium, 7 Pat. hatten IVDU als Risikofaktor, 6 Pat. waren bereits einmal an IE erkrankt. Leitsymptom war Fieber (18 Pat. [60 %]). Der häufigste Erreger war *S. aureus* (alle MSSA), gefolgt von *E. faecalis*. *S. lugdunensis* war bei einem Pat. nachweisbar. 11 Pat. (36 %) erlitten eine embolische Komplikation, bei immerhin 10 % wurde ein Milzabszeß diagnostiziert. 2 Pat. (6,7 %) verstarben während des Aufenthalts, insgesamt mußten 19 Pat. (63 %) klappenoperiert werden, IVDU-Patienten wurden zu 50 % operiert.

Ergebnisse IVDU als Risikofaktor für IE trat praktisch gleich häufig auf wie ein Vitium. 63 % der Pat. mußten operativ saniert werden, von den IVDU-Patienten waren es 50 %. Multiresistente Keime spielen bei uns als Erreger von IE (noch) keine Rolle. Die relativ häufigen Wechsel im Antibiotikaregime wurden überwiegend aus Praktikabilitätsgründen durchgeführt.

Sitzung IV – Herzinsuffizienz I

IV-1

009

Asymmetric Dimethylarginine Enhances Cardiovascular Risk Prediction in Patients With Chronic Heart Failure

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Background Circulating concentrations of asymmetric dimethylarginine (ADMA), an endogenous inhibitor of nitric oxide synthesis, are increased in some patients with chronic heart failure (HF). We investigated if elevated ADMA concentrations are associated with increased cardiovascular risk in these patients.

Methods and Results 253 patients with symptomatic chronic HF and impaired left ventricular function (median age 70 years, 202 males) were followed for a median of 9 months (interquartile range 4–14). The occurrence of cardiac decompensation, major adverse

cardiovascular events (MACE) or all-cause mortality was evaluated. ADMA and N-terminal pro brain natriuretic peptide (NT-proBNP) were assessed at baseline by high-performance liquid chromatography and by an enzyme-linked immunosorbent assay, respectively. A clinical endpoint occurred in 73 patients (28 %). Subjects with ADMA concentrations in the highest tertile had a significantly higher adjusted hazard ratio (HR; 1.97; 95 % confidence interval [CI] 1.05–3.70) for occurrence of an end-point compared with patients in the lowest tertile ($p = 0.034$). NT-proBNP also identified subjects at risk, with an HR of 2.61 (CI 1.31–5.21) versus patients in the lowest tertile. There was no relationship between ADMA and NT-proBNP. Consequently, HR for patients with ADMA and NT-proBNP in the highest tertile was enhanced to 4.02 (CI 2.01–8.02) compared to patients without ADMA and NT-proBNP in the highest tertile ($p < 0.001$).

Conclusions Elevated ADMA plasma concentrations are associated with adverse cardiovascular outcome in patients with HF. Quantification of ADMA with NT-proBNP improves risk stratification in this cohort.

IV-2

013

Positive Troponin T in Noncompaction Is Associated With Neuromuscular Disorders

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Objectives Although cardiac troponin T may be positive in hypertrophic and dilative cardiomyopathy, it is not known how often troponin T is positive in left ventricular hypertrabeculation/noncompaction (LVHT), an unclassified cardiomyopathy. This retrospective study aimed to assess how often troponin T is positive in LVHT, is associated with elevated CK, is attributable to cardiac or extra-cardiac causes, in particular neuromuscular disorders (NMDs) or if it is a predictor of poor survival.

Results Among 100 patients, detected over a period of 11 years, troponin T was determined at least once in 71 (71 %) of them. Troponin T was determined once in 36 patients, twice in 8 cases, three times in 11 patients, and more than three times in 16 cases. Troponin T was positive at least once in 12 patients (17 %). Forty-five of the 71 patients suffered from an NMD (63 %). Troponin T positivity was associated with elevated CK in 6 cases. Troponin T positivity was attributable to acute myocardial ischemia in a single case, to chronic renal failure in 5 cases, to dilative cardiomyopathy in 4 cases, to atrial fibrillation in 3 cases, to heart failure in 4 cases, and to NMD in 10 cases. Troponin T positivity in LVHT patients with NMD was assumed to be due to cardiac involvement in the disease. Among the 22 patients who died during the observational period troponin was determined in 16 and was positive in 4 (25 %).

Conclusions Troponin T is positive in 17 % of the patients with LVHT. Most of these patients suffer from an NMD. Troponin T positivity in LVHT predicts the presence of NMD and poor survival.

IV-3

014

Cardiac Resynchronization Therapy in Left Ventricular Hypertrabeculation/Noncompaction and Myopathy

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Objectives Little is known about how patients with left ventricular hypertrabeculation/noncompaction (LVHT) and heart failure respond to cardiac resynchronization therapy (CRT).

Methods and Results Included in this retrospective study were 8/102 patients (3 female, age range 43–78 years), in whom LVHT was diagnosed and in whom a CRT system was implanted. All 8 patients were investigated neurologically and in 7 of them a myopathy was found. Follow-up after CRT implantation ranged from 4–68 months. All patients improved by at least 1 New York Heart Association

(NYHA) class, and 2 by 2 NYHA classes. The left ventricular end-diastolic diameter decreased by 5 % in 2 patients, by 6–10 % in 3 patients, by 12 % in one patient and by > 30 % in 2 patients. Left ventricular systolic function, as assessed by fractional shortening, did not change in 2 patients, increased by 10 % in 2 patients, by 59 % in one patient, by 100 % in 2 patients and by 550 % in one patient. Two patients died during follow-up.

Conclusion Only half of the patients with LVHT, heart failure and myopathy profit from CRT. The weak response of LVHT patients to CRT may be due to inappropriate selection or comorbidities, in particular neuromuscular disorders.

IV-4

015

Gender Differences in Noncompaction

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Background Left ventricular hypertrabeculation/noncompaction (LVHT) in adults is more prevalent in males than females. The study aimed to find gender differences regarding location and extension of LVHT, left ventricular function, cardiac symptoms, electrocardiographic findings, prevalence of neuromuscular disorders (NMD), and mortality.

Results In 100 patients, LVHT was diagnosed between June 1995 and September 2006 (29 female, age 53 ± 15). All patients underwent cardiologic investigation and were invited to undergo neurological investigation. A specific NMD was diagnosed in 21, an NMD of unknown aetiology in 44; the neurological investigation was normal in 14, and 21 patients refused. Females had more often LVHT affecting the anterior (10 vs 0 %; $p < 0.05$), posterior (28 vs 10 %; $p < 0.05$), lateral wall (72 vs 31 %; $p < 0.05$), and LVHT affecting 2.0 vs 1.4 ventricular walls ($p < 0.05$), whereas males had more often apical LVHT (97 vs 86 %; $p = 0.057$). No differences were detected regarding age, indication for echocardiography, symptoms, prevalence of neuromuscular disorders, electrocardiographic findings and mortality (5.3 %/year).

Conclusions LVHT differs between females and males concerning location and extension without affecting clinical, neurological, echocardiographic or electrocardiographic parameters. Gender dependency of LVHT location and extension has no therapeutic or prognostic impact. The higher prevalence of LVHT in males remains unexplained.

IV-5

074

Mortality of Ischemic vs Non-Ischemic Chronic Heart Failure in Patients with Cardiac Resynchronization Therapy Including Cardioverter Defibrillator Function

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Background Cardiac resynchronisation therapy (CRT) has been shown to improve symptoms and quality of life as well as survival in patients with severe chronic heart failure (CHF), i. e., NYHA class III/IV. The use of implantable cardioverter defibrillators (ICD) resulted in a significant reduction of sudden cardiac death in this patient collective. The aim of this study was to investigate whether there is a difference in mortality between ischemic and non-ischemic CHF in patients with CRT including ICD function.

Methods Between January 1999 and November 2006, overall 246 CRT systems were implanted in our institution, of which 74 included ICD function. In this collective, 43 patients suffered from ischemic CHF (58 %) and 31 from non-ischemic CHF (42 %). Eleven patients were sudden-death survivors (15 %), ventricular arrhythmias were documented in 10 patients (14 %) and inducible in further 14 patients (19 %).

Results Overall, 7 patients (9.5 %) with CRT with ICD died within a follow-up period of 1.7 ± 1.4 years. Mortality of patients

with ischemic CHF was 5/43 (11.6 %), while it was 2/31 (6.5 %) in patients with non-ischemic CHF ($p = n. s.$). Appropriate defibrillation of hemodynamically relevant ventricular arrhythmias was recorded for 23 patients (31 %): 17 defibrillations were recorded in 43 patients with ischemic CHF, whereas only 6 defibrillations were found in 31 patients with non-ischemic CHF (39.5 vs 19.5 %; $p = 0.057$).

Conclusions Although there was no significant difference in mortality between patients with ischemic and non-ischemic CHF, a trend towards a higher rate of appropriate defibrillation was found in case of ischemic CHF in patients with CRT including ICD function.

IV-6

084

Relevance of Serial Measurements of N-Terminal-Pro-Brain Natriuretic Peptide (NT-proBNP) in an Out-patient Ward for Heart Failure

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Background and Aim Changes in N-terminal-pro-brain natriuretic peptide (NT-proBNP) have been identified as important and independent determinant of outcome in patients with decompensated heart failure. However, the prognostic relevance of NT-proBNP has been less intensely investigated in patients with chronic stable heart failure (CHF). Therefore, we aimed to examine whether serial measurements of NT-proBNP could provide prognostic information beyond that provided by the absolute values of NT-proBNP concentrations.

Methods The present study is a sub-study of an ongoing prospective registry investigating the relevance of serial measurements of NT-proBNP levels in patients with stable CHF. This analysis included 343 consecutive patients on their regular visits every three months at our outpatient ward. NT-proBNP levels (Roche Diagnostics, Austria) were determined routinely in all patients at each visit. During the follow-up period, patients remained clinically stable. Patients were followed up for 489 ± 221 (range: 2–1098) days for mortality.

Results All-cause mortality increased significantly along higher quartiles of baseline NT-proBNP levels ($p < 0.0001$ for trend). However, among the 132 stable patients with at least 3 consecutive visits at our clinic, NT-proBNP of the last visit ($p < 0.0001$) and increase of NT-proBNP during regular controls ($p < 0.0001$), but not baseline NT-proBNP levels obtained at first visit ($p = 0.10$) were independent predictors of mortality. Patients with highest NT-proBNP levels at last visit with an increase of NT-proBNP to > 180 pg/ml had a markedly impaired outcome, whereas patients with lower NT-proBNP or decreasing values had significantly better survival (**Figure 2**). An increase of NT-proBNP over time despite intensification of heart failure therapy was strongly related to mortality ($p < 0.0001$).

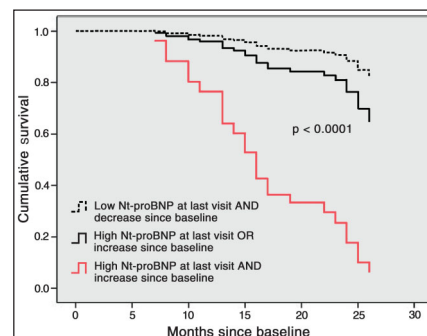


Figure 2: D. Cilesiz et al.

Conclusions Serial measurement of NT-proBNP in an outpatient ward is of major importance in stable CHF patients. An increase in NT-proBNP levels is a marker of worse outcome even in the absence of clinical signs of disease progression. Interestingly, intensification of evidence-based heart failure therapy did not help to improve the outcome of these patients, who might be candidates for other therapeutic measures including early decision for transplantation.

Sitzung V – Interventionelle Kardiologie I

V-1

019

Percutaneous Coronary Intervention of Unprotected Left Main Stenosis: Safety and Long-Term Efficacy in Stable Patients

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Background Percutaneous coronary intervention (PCI) of unprotected left main (LM) stenosis still remains controversial. This retrospective analysis evaluated the clinical and angiographic outcome of this patient cohort in a single high-volume PCI center.

Methods Between August 2001 and July 2006, 42 consecutive patients with LM stenosis and acute coronary syndrome (ACS) not eligible for acute coronary artery bypass surgery and 50 selected patients with stable coronary artery disease (CAD) were treated by PCI using either bare-metal stent (BMS, 44 %) or drug-eluting stent (DES, 56 %) implantation.

Results The cumulative survival rate up to one year (median 81 days, range 0–365) of selected elective patients with LM stenosis was 94 %, compared to 65.2 % in hemodynamically stable ACS patients with LM stenosis and 36.8 % in ACS patients with cardiogenic shock and LM stenosis ($p < 0.00001$). Angiographic follow-up (median 194 days, range 1–1310 days) was performed in 39 % of all patients, with a restenosis rate of 2.8 % after DES compared to 11.1 % after BMS implantation ($p = n. s.$).

Conclusion Whereas ACS patients with LM stenosis are still a highest-risk patient cohort, especially in hemodynamically unstable conditions, LM PCI can be safely and efficaciously performed in selected stable patients, preferably with DES implantation in an experienced center.

V-2

027

Der Einfluß des Patientenalters auf die Mortalität und den Sechs-Monats-Outcome bei akuter Koronarintervention bei akutem Myokardinfarkt

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Ein höheres Patientenalter gilt als Risikofaktor für den Outcome von Patienten mit akutem Myokardinfarkt (AMI). Wir haben in einer retrospektiven Analyse untersucht, inwiefern dies auch für Patienten mit interventioneller Therapie bei AMI gilt.

Patienten und Methodik Insgesamt wurden an unserer Abteilung 463 Patienten (P) in einer konsekutiven Serie einer notfallmäßigen Koronarintervention (Akut-PCI) wegen eines akuten Myokardinfarkts unterzogen. Ein Follow-up wurde 6 Monate nach erfolgter PCI durchgeführt.

Ergebnisse Von 463 P waren 253 (55 %) unter 65 Jahre alt (Gruppe 1), 210 P waren älter (Gruppe 2). 39 P (15 %) der Gruppe 1 sowie 81 (39 %) der Gruppe 2 waren weiblich. Als Risikofaktoren bestanden arterielle Hypertonie (43 vs. 60 %; $p < 0.0001$) sowie Diabetes mellitus (13 vs. 18 %; $p = 0.034$) häufiger bei den älteren P. Nikotinabusus (42 vs. 16 %; $p < 0.0001$) und Hypercholesterinämie (56 vs. 47 %; $p < 0.014$) waren bei den jüngeren P signifikant häufiger. Die Schmerzdauer war mit 256 ± 471 Minuten vs. 331 ± 577 Minuten statistisch nicht signifikant unterschiedlich. Die Anzahl der Patienten mit kardiogenem Schock war ebenso vergleichbar (29 P [12 %] der Gruppe 1 bzw. 27 P [13 %] der Gruppe 2) wie die der prähospital intravenös lysierten (16 P [6 %] vs. 12 P [6 %]). Die Verteilung der infarktbezogenen Gefäße war in beiden Gruppen annähernd gleich. So waren der Ramus interventricularis anterior mit 43 vs. 48 %, der Ramus circumflexus mit 18 vs. 13 %, die rechte

Koronararterie mit 36 vs. 35 %, Venengrafts mit 2 vs. 3 % sowie die Hauptstämme der linken Koronararterie mit 1 vs. 1 % ähnlich häufig betroffen. Ältere Patienten wiesen deutlich häufiger eine Mehrgefäßerkrankung auf (20 vs. 8 %; $p < 0.0001$) und hatten eine schlechtere linksventrikuläre Auswurfraction (48 ± 14 % vs. 52 ± 11 %; $p = 0.002$). 19 P (8 %) der Gruppe 1 verstarben im Rahmen des stationären Aufenthalts, hingegen 28 P (13 %) der Gruppe 2 ($p = 0.014$). Die Ergebnisse des 6-Monats-Follow-ups waren in den beiden Gruppen statistisch signifikant unterschiedlich: 234 P der Gruppe 1 (92 %) vs. 201 P der Gruppe 2 (96 %) konnten nachkontrolliert werden. Der klinische Verdacht auf eine Restenose lag mit 37 % (77 P) der kontrollierten P in der Gruppe 1 ($n = 209$) gegenüber 27 % (44 P) der kontrollierten P der Gruppe 2 ($n = 201$) ebenso höher ($p = 0.0003$) wie die angiographische Instant-Restenoserate (18 vs. 6 %; $p = 0.0002$). Eine Intervention in einem anderen als dem akuten Zielgefäß der Primärintervention erfolgte bei 8 vs. 6 % ($p = n. s.$).

Schlußfolgerung Patienten über dem 65. Lebensjahr, die sich wegen eines akuten Myokardinfarkts einer Akutintervention unterziehen müssen, haben eine signifikant höhere Mortalität im Rahmen der Indexhospitalisation. Im 6-Monats-Follow-up zeigten sich für ältere Patienten niedrigere Reangiographie- sowie -interventionsraten als in der Gruppe der unter 65jährigen.

V-3

034

Long-Term Mortality After Drug-Eluting Stent Implantation in Comparison With Bare-Metal Stents: a Single-Centre Experience

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Background Percutaneous coronary intervention (PCI) and stent implantation with bare-metal stents (BMS) or drug-eluting stents (DES) have been shown to decrease mortality compared with simple balloon angioplasty. Recently, long-term clinical outcome after implantation of DES has been associated with an increased total mortality rate [1]. Aim of our study was to evaluate the effect of DES on all-cause mortality and clinical in-stent restenosis compared with BMS in a routine “real-world” clinical setting.

Methods 507 consecutive patients who underwent PCI were included in this prospective registry from June 2003 until December 2004. All-cause death was evaluated over a follow-up period of 20.24 (± 6.397) months (range 12–30 months).

Results At PCI and stent implantation, mean age of the patients was 64.68 (± 12.25) years, 366 (72.2 %) patients being male and 141 (27.8 %) female. About one third of the interventions ($n = 166$, 32.7 %) were defined as acute PCI and more frequently performed with BMS compared to DES ($p = 0.016$). In total, 667 stents were implanted in 610 lesions (ACX: 153, LAD: 263, RCA: 194). 392 patients (77.3 %) received BMS ($n = 534$; 1.5 stents per patient), while 115 patients (22.7 %) received DES ($n = 133$; 1.3 stents per patient). 20 patients (5.1 %) in the BMS group but only 1 patient (0.9 %) in the DES group died during follow-up ($p = 0.045$).

Conclusion In contrast to recent findings [1], these results observed from a “real-world” clinical setting showed that long-term mortality was significantly lower after DES implantation compared with BMS, which can be in part explained by the increased number of acute interventions treated with BMS.

Reference

1. Nordmann AJ, Briel M, Bucher HC. Mortality in randomized controlled trials comparing drug-eluting vs bare metal stents in coronary artery disease: a meta-analysis. Eur Heart J 2006; 27: 2784–814.

V-4

036

Perkutane Koronarintervention bei über 80jährigen Patienten

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Hintergrund Aufgrund der steigenden Lebenserwartung nimmt der Anteil von alten Patienten zu, die einer perkutanen Koronarintervention (PCI) zugeführt werden. Da ältere Patienten in Studien unterrepräsentiert sind, ist fraglich, ob deren Ergebnisse auf ältere Patienten übertragen werden können.

Methode Wir untersuchten 544 Patienten ≥ 80 Jahre, bei denen zwischen Jänner 2003 und Dezember 2005 eine Koronarangiographie und/oder eine PCI durchgeführt wurde. Diese Daten wurden mit 180 Patienten ≤ 65 Jahre verglichen. Analysiert wurden Patientencharakteristika, Indikationen zur Koronarangiographie, angiographisches Ergebnis, Komplikationen sowie intrahospitale und Langzeitmortalität.

Ergebnisse Bei 50 % der ≥ 80 jährigen und 33,9 % der ≤ 65 jährigen wurde nach der Koronarangiographie eine PCI angeschlossen ($p < 0,001$). Indikationen zur PCI waren bei Patienten ≥ 80 Jahre ein STEMI in 27,6 %, ein NSTEMI in 33,1 %, eine instabile AP in 18,0 % und eine stabile AP in 16,2 %. Patienten ≤ 65 Jahre hatten in 26,2 % einen akuten STEMI, in 27,9 % einen NSTEMI, in 13,1 % eine instabile AP und in 23,0 % eine stabile AP. Interveniente Patienten ≥ 80 waren häufiger Frauen (51,5 vs. 21,3 %; $p < 0,001$), wiesen häufiger eine Niereninsuffizienz auf (24,0 vs. 3,3 %; $p < 0,001$). Nikotinabusus (41,0 vs. 3,7 %; $p < 0,001$) und Hypercholesterinämie (86,9 vs. 56,8 %; $p < 0,001$) lagen häufiger bei jungen Patienten vor. Alte Patienten hatten häufiger eine Dreifachgefäßerkrankung (33,5 vs. 13,1 %; $p = 0,002$) und wurden häufiger einer PCI (65,5 vs. 34,5 %; $p = 0,005$), jedoch seltener einer Bypassoperation (CABG) (6,5 vs. 39,1 %; $p < 0,001$) zugeführt. Stents erhielten 90,4 % der ≥ 80 jährigen und 91,8 % der ≤ 65 jährigen ($p = n. s.$), junge Patienten wurden häufiger mit einem Drug-eluting Stent (36,1 vs. 14,7 %; $p < 0,001$) versorgt. Perinterventionelle Komplikationen traten bei 18 % der ≥ 80 jährigen und bei 6,6 % der ≤ 65 jährigen auf ($p = 0,027$). Die Krankenhausaufenthaltsdauer betrug bei den ≥ 80 jährigen $8,5 \pm 7,3$ Tage und bei den ≤ 65 jährigen $5,2 \pm 4,8$ Tage ($p < 0,001$). Ältere Patienten hatten eine höhere intrahospitale Mortalität (5,5 vs. 1,6 %; $p = n. s.$) und Langzeitmortalität (16,2 vs. 1,6 %; $p = 0,003$).

Konklusion Das häufige Vorliegen eines akuten Koronarsyndroms und die meist ausgeprägten Koronarveränderungen bei ≥ 80 jährigen Patienten erklären die höhere Komplikationsrate nach PCI sowie die höhere intrahospitale Mortalität. Das Langzeitüberleben von Patienten ≥ 80 Jahren nach PCI unterschied sich jedoch nicht vom prognostizierten Überleben in der altersentsprechenden Allgemeinbevölkerung.

V-5

037

Langzeit-Follow-up nach Implantation von Sirolimus- und Paclitaxel-beschichteten Stents – ein Singlecenter-Bericht

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Hintergrund Medikamentös beschichtete Stents haben durch ihre bewiesene Effektivität in der Reduktion von Restenosen die Praxis der interventionellen Kardiologie revolutioniert. Zuletzt traten in Betracht mehrerer Berichte über späte Stentthrombosen (ST) jedoch Zweifel an der Sicherheit dieser Stents auf. Zur Klärung dieser Frage führten wir ein Langzeit-Follow-up aller Patienten (P) durch, bei denen an unserer Institution vor mehr als zwei Jahren Sirolimus- oder Paclitaxel-beschichtete Stents (SBS oder PBS) implantiert worden waren.

Methodik Die Nachuntersuchung betraf alle P, bei denen zwischen 2002 (Markteinführung der SBS) und Ende 2004 SBS oder PBS implantiert wurden. Neben einer Durchsicht aller weiteren stationären Aufenthalte der P an unserer Abteilung wurde in einem Telefoninterview der derzeitige Gesundheitsstatus sämtlicher P erfragt. Falls zwischenzeitlich Myokardinfarkte oder Koronarinterventionen die Aufnahme in einem anderen Krankenhaus erforderlich gemacht hatten, wurden die entsprechenden Krankengeschichten angefordert und ausgewertet. Todesfälle wurden ebenso in Hinblick auf die genauen Umstände und eventuell durchgeführte Obduktionen analysiert. Zur Definition einer ST wurde die Klassifikation des Academic Research Consortiums (ARC) unter Federführung der „Food and Drug Administration“ verwendet. Allfällige ST wurde demgemäß in definitiv (Kombination eines akuten Koronarsyndroms mit angiographischer oder pathologischer Bestätigung einer ST), wahrscheinlich (ungeklärter plötzlicher Todesfall innerhalb von 30 Tagen) oder möglich (nach mehr als 30 Tagen) eingeteilt. Definitive ST wurden je nach zeitlichem Auftreten als früh (0–30 Tage nach Stentimplantation), spät (31 Tage bis ein Jahr) und sehr spät (mehr als ein Jahr) bezeichnet.

Ergebnisse Zwischen Mai 2002 und Dezember 2004 wurde bei 1038 P zumindest ein SBS oder PBS implantiert. Clopidogrel wurde zusätzlich zu Aspirin für 3 (bei SBS) oder 6 (bei PBS) Monate verordnet. Eine längere kombinierte Gabe (6–12 Monate) erfolgte nur in Ausnahmefällen (Hauptstamminterventionen, Crush-Stenting). Da bei 26 P (2,5 %) eine Kontaktaufnahme nicht möglich war, bestand die nachgesorgte Population aus 1012 P (75 % männlich, Alter 68 ± 11 Jahre). Bei diesen wurden insgesamt 1440 Stents (876 SBS und 564 PBS) in 1392 Läsionen (1080 neue Läsionen, 312 Instent-Restenosen) in 1116 Gefäßen implantiert. Die mittlere Anzahl der implantierten Stents pro P betrug $1,4 \pm 0,8$, der Durchmesser $2,8 \pm 0,3$ mm und die insgesamt gestentete Länge 27 ± 16 mm. Die klinische Präsentation vor Stentimplantation waren eine stabile Angina pectoris bei 734 P (73 %), ein akutes Koronarsyndrom/Nicht-ST-Hebungsinfarkt bei 230 P (23 %) und ein ST-Hebungsinfarkt bei 48 P (4 %). Der mittlere Nachbeobachtungszeitraum erstreckte sich über $2,6 \pm 0,6$ Jahre. Insgesamt traten 14 definitive ST (2 Todesfälle) bei 13 P (7 frühe [nach 5–9 Tagen], 3 späte [nach 95–210 Tagen], 4 sehr späte [nach 395–712 Tagen] ST) auf. Die späten oder sehr späten ST entstanden unter einer Therapie mit Aspirin ($n = 2$), oraler Antikoagulation ($n = 2$) oder ohne spezifische Medikation ($n = 3$). Die Mortalität der gesamten Population betrug im Nachbeobachtungszeitraum 5 % ($n = 52$), wobei 10 Fälle von plötzlichem Herztod als durch eine mögliche ST bedingt definiert wurden. Todesfälle durch eine wahrscheinliche ST traten nicht auf. Neben den beiden letalen ST wurden 40 weitere Todesfälle sicher anderer Ursache (20 P wurden obduziert) registriert. Gemäß den ARC-Kriterien konnten daher insgesamt 14 definitive, keine wahrscheinlichen und 10 mögliche ST bei 1012 P (1,4 %, 0 %, 1 %) dokumentiert werden. Der Anteil an definitiven späten oder sehr späten ST ($n = 7$) an der gesamten Population betrug 0,7 %.

Schlußfolgerung Eine zumindest zweijährige Nachbeobachtung erbrachte bei typischem Patientengut und kurzer Kombination der thrombozytenaggregationshemmenden Therapie eine mit zahlreichen anderen publizierten Studien vergleichbare Rate an ST von medikamentös beschichteten Stents.

V-6

091

Age-Related Survival in Patients with ST-Elevation Myocardial Infarction (STEMI) Undergoing Either Primary PCI or Thrombolytic Therapy

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Purpose Patients older than 75 years are often excluded from studies evaluating therapy strategies for STEMI. The aim was to investigate characteristics of age cohorts of patients (pts) diagnosed with STEMI treated with thrombolytic therapy (TT) or primary PCI (PPCI) with impact on in-hospital mortality.

Methods Between 3/03 and 12/04, 1053 consecutive STEMI pts were registered and treated with TT (281/26.7 %) or PPCI (631/59.9 %). 141/13.4 % pts did not receive any reperfusion therapy mainly due to advanced age, multiple comorbidities or patient denial. Female pts accounted for 299/28.4 %, mean age was 61.8 ± 13.5 years (yrs). Pts were divided into 4 age cohorts (< 60 yrs: 483/45.9 %, 60–69 yrs: 236/22.4 %, 70–79 yrs: 217/20.6 % and > 80 yrs: 117/11.1 %) and characteristics were analyzed with special interest on in-hospital mortality.

Results The majority of patients (54.1 %) was > 60 yrs, 11.1 % of the total cohort was older than 80 yrs. In the age cohorts < 70 yrs, women accounted for less than 28.4 %, but increased up to 71/60.7 % in the octogenarian group. PPCI rate was highest in the < 60 cohort (312/64.6 %) and lowest in the > 80 group (54/46.2 %), TT was used to a similar extent in all 4 age groups (< 60: 132/27.3 %, 60–69: 66/28.0 %, 70–79: 51/23.5 %, > 80: 32/27.4 %). Percentage of pts without reperfusion therapy was lowest in the < 60 group (39/8.1 %) and highest in the > 80 cohort (31/26.5 %). Pain-to-reperfusion time (hours, mean $\pm$ SD) was shortest in the > 80 cohort (< 60: 3.4 ± 2.8 , 60–69: 3.4 ± 2.7 , 70–79: 3.6 ± 2.9 , > 80: 2.7 ± 2.2). Cardiogenic shock (CS) at presentation occurred most frequently in the > 80 group (25/22.1 %) and was rarest in the < 60 cohort (41/8.6 %). In-hospital mortality increased with age (< 60: 13/2.7 %, 60–69: 21/8.9 %, 70–79: 30/13.8 %, > 80: 36/30.1 %), irrespective of reperfusion therapy. Comparing mortality of female and male patients within the different age cohorts, no significant differences could be found in the younger groups. In octogenarians, women were associated with significantly higher mortality compared to their male counterparts (F 26/36.6 %, M 10/21.7 %). In patients with CS at presentation, mortality was highest in the > 80 cohort (< 60: 9/22.0 %, 60–69: 18/52.9 %, 70–79: 15/62.5 %, > 80: 21/84.0 %). After excluding cardiogenic shock, mortality significantly dropped in all cohorts but was still highest in “very old” patients (15/14.1 %) and lowest in the < 60 group (4/0.9 %).

Conclusion Compared to younger cohorts, the octogenarian STEMI patient was less likely to undergo PPCI but showed similar rates of TT. Furthermore, the “very old” patient was associated with the shortest pain-to-reperfusion time and the highest incidence of cardiogenic shock. As expected, in-hospital mortality increased with age. The „very old“ patient had highest in-hospital mortality independent of reperfusion therapy, mainly due to high incidence of CS.

Sitzung VI – Akutes Koronarsyndrom

VI-1

001

Long-Term Outcome After Thrombectomy in ST-Elevation Myocardial Infarction (STEMI): A Prospective Follow-Up Study

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Background Currently available studies on outcomes of thrombectomy in acute myocardial infarction are limited to follow-up periods of 6–12 months. The data presented in these short-term studies regarding the effect of thrombectomy are conflicting.

Aim We hypothesized that unprotected distal embolization may lead to increased 5-year-mortality due to a higher incidence of congestive heart failure (CHF).

Methods STEMI patients with initial TIMI 0–1 were assigned to standard PCI or PCI with thrombectomy within a randomized trial. Primary study endpoint of the follow-up study was NT-pro B-natriuretic peptide (NT-proBNP). Secondary endpoints were left ventricular function as assessed by transthoracic echocardiography, NYHA and CCS classes, cumulative hospital days, and death.

Results Sixty-nine consecutive STEMI patients were included in the study and followed for 4.2 ± 1.4 years. NT-proBNP at follow-up

was 163.5 ± 104.7 pg/mL in the thrombectomy group and 272.8 ± 246.9 pg/mL in the control group ($p = 0.04$). This difference remained statistically significant in multiple logistic regression analysis including age, sex, and medical therapy ($p = 0.03$). Furthermore, thrombectomy patients spent 7.5 ± 8.9 days in hospital compared to 21.8 ± 36.5 days ($p = 0.03$). Two patients of the thrombectomy group died within the observation period, compared to five patients in the control group ($p > 0.05$).

Conclusion Long-term data show that thrombectomy leads to lower NT-proBNP levels and reduces cumulative hospital days compared to standard PCI in STEMI patients with initial TIMI 0–1 flow.

VI-2

002

Elevated Levels of Interleukin-1 β -Converting Enzyme and Caspase-Cleaved Cytokeratin-18 in Acute Myocardial Infarction

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Background Systemic inflammation and apoptosis-specific immune activation play a major role in acute coronary syndromes (ACS) including acute myocardial infarction (AMI). The roles of systemic and coronary-obtained inflammatory serum protein interleukin-1 β precursor (IL-1 β p), IL-1 β -converting enzyme (ICE) and the apoptosis-specific caspase-cleaved cytokeratin-18 (ccCK-18) are not known in ACS.

Materials and Methods Serum samples were obtained from stable angina (SA, $n = 34$), unstable angina (UA, $n = 37$) and patients with AMI ($n = 39$). Coronary blood was acquired by means of thrombectomy devices (X-sizer) in AMI patients. IL-1 β p, ICE and ccCK-18 were determined by enzyme-linked immunosorbent assay (ELISA). Group comparisons were evaluated by parametric Tukey test. Multivariate logistic regression analysis was performed to determine predictive values of IL-1 β p, ICE and ccCK-18 as compared to creatine kinase (CK) and troponin T (TnT) in order to relate these markers to the occurrence of myocardial damage.

Results IL-1 β p, ICE and ccCK-18 were identified to be significantly altered in the peripheral blood of patients suffering from AMI as compared to SA and UA. ROC curves were plotted and revealed that ccCK-18 is a novel sensitive marker for the detection of myocardial damage as compared to TnT or CK (AUC ccCK-18 0.925, TnT AUC 0.62 and CK AUC 0.858). Moreover, ICE and ccCK-18 were significantly increased at the site of coronary occlusion as compared to peripheral blood samples in AMI patients (both, $p < 0.001$).

Conclusion Our data suggest that ACS is related to increased concentration of systemic soluble ICE and ccCK-18. Moreover, soluble ccCK-18 was identified to be a superior marker as compared to TnT or CK, for detection of myocardial damage.

VI-3

050

Implementation of New Guidelines Improves Clinical Outcome in Patients with Non-ST-Segment Elevation Acute Coronary Syndrome (NSTEMI-ACS)

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Background and Aim The updated ACC/AHA Guidelines for the Management of Patients with Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction recommend an early invasive and pharmacologically more aggressive therapy in patients with NSTEMI-ACS. We aimed to compare the clinical outcome in consecu-

tive patients admitted to our department before implementation of the new guidelines (2001–2002) and thereafter (2003–2004).

Methods In a systematic retrospective review, clinical record data of 813 patients admitted to our cardiology department for either unstable angina (UA) or non-ST-segment elevation myocardial infarction (NSTEMI) between January 2001 and December 2004 were analyzed.

Results Compared to 2001/2002, TIMI risk scores in general increased in NSTEMI-ACS patients admitted to our hospital. In patients with unstable angina, the percentage of interventions increased from 26.4 % before to 55.8 % after implementation of the guidelines ($p < 0.001$). While 25.8 % of patients admitted 2001/2002 received early invasive therapy within 48 hours, it was 51.4 % of patients admitted 2003/2004 ($p = 0.002$). The administration of LMWH on admission increased from 61.2 % to 72.1 % ($p = 0.051$), the percentage of clopidogrel use from 34.1 % to 67.2 % ($p < 0.001$). In-hospital mortality rate was not different between the treatment periods (1.6 vs 1.6 %; $p = 1.0$), while 1-year mortality decreased from 11.0 % to 7.0 % ($p = 0.159$), respectively. In patients with non-ST-segment myocardial infarction, the rate of interventions increased from 30.5 % to 43.9 % ($p = 0.006$). In 2001/2002, 29.8 % of the interventions were performed within 48 hours, while it was 52.8 % in 2003/2004 ($p = 0.007$). Both, the administration of LMWH (68.6 vs 85.6 %) and clopidogrel (44.2 vs 66.2 %) on admission increased ($p < 0.001$). The in-hospital death rate was reduced from 17.5 % to 9.3 % ($p = 0.012$) and 1-year mortality decreased from 33.3 % to 24.4 % ($p = 0.049$) due to a more aggressive and early invasive approach.

Conclusion Despite more aggressive treatment (including early PCI within 48 hours) in patients with NSTEMI-ACS after implementation of new guidelines this therapeutic option is still withheld in a significant number (44–56 %) of high-risk patients due to expected higher side effects (e. g., elderly patients, individuals with comorbidities). In our hands, a more aggressive, early invasive treatment strategy led to a reduction of early and late mortality especially in these high-risk patients. Because benefits seem to exceed possible complications more patients of the high-risk group should receive early invasive and pharmacologically more aggressive management.

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057

Long-Term Mortality of Patients with ST-Elevation Myocardial Infarction (STEMI): Primary PCI versus Thrombolytic Therapy in the VIENNA-STEMI Registry

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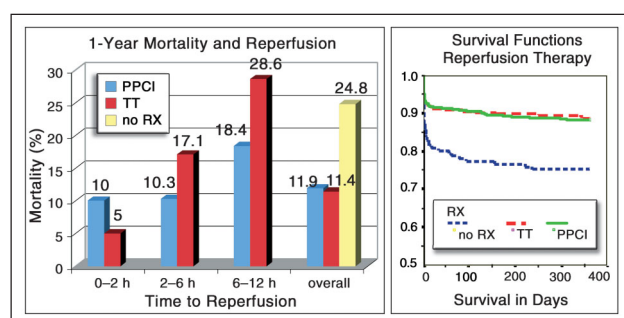
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Background and Aim In several trials and large registries, the impact of reperfusion strategy, either primary PCI (PPCI) or thrombolytic therapy (TT), and time to treatment in patients (pts) with acute STEMI on late clinical outcome have been controversially discussed. The aim of this study was to compare one-year mortality rates of pts treated either with PPCI or TT and the influence of time from onset of symptoms to treatment on late mortality.

Patients and Methods All consecutive pts with an acute STEMI of < 12 hours (h) duration presenting at the participating PCI centers between March 2003 and December 2004 were included ($n = 1053$). Impact of time-to-treatment (onset of pain to 1st balloon inflation or injection of the thrombolytic agent) on one-year mortality was investigated according to different time delays at presentation: ≤ 2 h from onset of pain, 2 to 6 h, or > 6 h, respectively. Long-term outcome in terms of all-cause mortality was evaluated, whereby none of the patients were lost to follow-up.

Results Of the 1053 consecutive pts (61.8 ± 13.5 yrs; $\delta/\eta = 71.6/28.4$ %) presenting with acute STEMI, 59.9 % ($n = 631$) underwent PPCI. If PPCI could not be offered within 90 min of 1st medical contact (time of diagnosis by clinical means and a 12-lead ECG) TT was performed ($n = 281$, 26.7 %), in 12.1 % of patients in the pre-hospital setting. Twenty-five percent of initially thrombolysed patients received rescue PCI, while in 27 % of pts PCI was performed immediately after the pts arrived in the PCI hospital (facilitated PCI). In the remaining pts, subsequent elective angiography $\pm$ PCI was performed between days 1 and 7. The mean total ischemic time (time from onset of symptoms to treatment) was 4.3 ± 2.5 h in the PPCI group and 2.0 ± 1.8 h in the TT group. In 141 pts (13.4 %), no reperfusion therapy (RX) was offered due to long presentation delays or contraindication against either reperfusion strategy. One-year mortality was 24.8 % in this group. **Figures 3 and 4** present one-year mortality rates for the different time delays until initiation of the respective reperfusion strategy (left panel) and the cumulative survival rate for the different treatment strategies after 12–18 months (right panel).



Figures 3 and 4: K. Kalla et al.

Conclusion One-year mortality in both treatment groups, PPCI and TT, was time-dependent and lowest when treatment was offered within 2 hrs of onset of symptoms without significant differences between PPCI and TT (trend in favour of TT) in the early-treated patient cohort. With increasing delay of treatment, mortality increased significantly in both treatment groups, whereby this increase was more pronounced in pts treated with TT. Accordingly, pts presenting with acute STEMI of ≤ 2 hrs duration should be treated with the earliest available reperfusion method while PPCI should be the preferred method in all other pts.

VI-5

058

Gender Differences in Independent Predictors of Long-Term Mortality in Patients with NSTEMI-ACS

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Background and Aim In large multi-center trials, women are often underrepresented, so clinical outcome based on risk stratification is better evaluated for the male gender. The study aimed to investigate whether women have different independent predictors for 1-year mortality than men.

Methods and Results We studied 813 consecutive NSTEMI-ACS patients admitted to our department between January 2001 and December 2004. **Table 2** shows differences in demographics, treatment strategies and mortality rates between women and men. In all patients with NSTEMI-ACS the following factors were found to be significant independent predictors of death in the adjusted Cox proportional Hazard Model: age (hazard ratio [HR] 1.03; 95 %-CI: 1.015–1.060), blood pressure on admission (HR 0.998; 95 %-CI: 0.981–0.994), heart rate on admission (HR 1.011; 95 %-CI: 1.001–1.004), positive troponin (HR 1.883; 95 %-CI: 1.228–2.888), patients showing a TIMI risk score > 3 (HR 1.673; 95 %-CI: 1.124–2.489), conservative treatment strategy (HR 2.993; 95 %-CI: 1.923–4.472), creatinine clearance < 60 ml/min (HR 2.207; 95 %-CI: 1.229–3.963), but

Table 2: S. Hahne et al.

Demographics	Males (n = 455)	Females (n = 358)	p-values
Age (years) [mean ± SD]	67 ± 14	75 ± 12	p < 0.001
Systolic blood pressure on admission (mmHg) [mean ± SD]	144 ± 27	150 ± 30	p = 0.002
Heart rate on admission (bpm) [mean ± SD]	79.9 ± 21	83.2 ± 20.6	p = 0.021
Creatinine clearance < 60 ml/min [(n) %]	(136) 32.1	(210) 64	p < 0.001
Positive troponin [(n) %]	(238) 52.3	(196) 54.7	p = 0.489
TIMI risk score > 3 [(n) %]	(227) 49.9	(194) 54.2	p = 0.223
Mortality			
In-hospital mortality [(n) %]	(31) 6.8	(27) 7.5	p = 0.689
One-year mortality [(n) %]	(76) 16.9	(80) 22.4	p = 0.047
Treatment strategies			
Conservative	(191) 42	(187) 52.2	p = 0.004
Diagnostic angiography	(76) 16.7	(51) 14.2	p = 0.338
PCI	(155) 34.1	(96) 26.8	p = 0.026
CABG	(33) 7.3	(24) 6.7	p = 0.761

not female gender (HR 0.812; 95 %-CI: 0.57–1.158). Multivariate analysis for significant predictors of mortality was performed separately for men and women. In male patients, age (HR 1.074; 95 %-CI: 1.048–1.1), conservative treatment strategy (HR 3.312; 95 %-CI: 1.884–5.82), TIMI risk score > 3 (HR 1.953; 95 %-CI: 1.135–3.297) and heart rate on admission (HR 1.023; 95 %-CI: 1.013–1.033) were significant predictors, whereas in females elevated troponin (HR 2.46; 95 %-CI: 1.309–4.623), blood pressure on admission (HR 0.968; 95 %-CI: 0.976–0.995), TIMI risk score > 3 (HR 1.982; 95 %-CI: 1.126–3.487), conservative treatment strategy (HR 3.276; 95 %-CI: 1.820–5.859) and creatinine clearance < 60 ml/min (HR 6.285; 95 %-CI: 1.904–20.747) were independent predictors of death.

Conclusions Significant differences between males and females concerning 1-year mortality after NSTEMI-ACS are no more existent when adjusted for confounders. Interestingly, females exhibit different predictors (positive troponin, blood pressure on admission, reduced renal function) for long-term mortality compared to male patients (age, heart rate on admission) besides predictors common for both genders (conservative management, TIMI risk score > 3).

VI-6

059

Renal Dysfunction as Predictor of Clinical Outcome in Patients with NSTEMI-ACS According to Treatment Strategies

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Background and Aim Decreased glomerular filtration rate (GFR) has been identified as a strong risk factor for cardiac events. Studies have shown increased mortality on one hand and use of less aggressive therapy on the other in ACS patients with chronic renal insufficiency. The study aimed to investigate the clinical outcome (1-year mortality) in patients with non-ST-segment elevation acute coronary syndromes (NSTEMI-ACS) and decreased GFR according to different treatment strategies.

Methods We studied 699 consecutive NSTEMI-ACS patients who were admitted to our department between January 2001 and December 2004. GFR was calculated from Cockcroft Gault equation. Patients were classified into 4 GFR groups: normal renal function (GFR ≥ 80 ml/min), mild (GFR 60–80 ml/min), moderate (GFR 30–60 ml/min) and severe (GFR < 30 ml/min) chronic renal insufficiency, respectively.

Results Among 699 patients, 235 (33.6 %) had normal renal function, 140 (20.0 %) had mild, 256 (36.6 %) had moderate and 68 (9.7 %) had severe chronic renal insufficiency. Decreased GFR was associated with female gender (20.9 vs 44.3 vs 61.7 vs 58.8 %; p < 0.001*), advanced age (57.7 ± 10.5 vs 69.0 ± 10.1 vs 79.2 ± 7.3 vs 84.0 ± 9.2 years; p < 0.001*), lower systolic blood pressure on admission (147.2 ± 26 vs 150.0 ± 29.5 vs 147.4 ± 29.9 vs 137.3 ± 28.2 mmHg; p = 0.025*), lower diastolic blood pressure on admission (88.0 ± 15 vs 85.5 ± 14.2 vs 82.7 ± 17 vs 77.7 ± 14.2; p < 0.001*), higher heart rate on admission (77 ± 18.2 vs 80 ± 21 vs 84.3 ± 23.4 vs 84.8 ± 20.1 bpm; p = 0.001*), a higher incidence of positive troponin (45.1 vs 44.3 vs 64.1 vs 75 %; p < 0.001*) and a higher proportion of patients with a TIMI risk score of ≥ 4 (38.7 vs 50 vs 67.2 vs 64.7 %; p < 0.001*), respectively. Fewer patients in the lower GFR classes received coronary angiography (17 vs 19.3 vs 18 vs 7.4 %; p = 0.158*) and PCI (48.5 vs 40 vs 22.7 vs 2.9 %; p < 0.001*). One-year mortality was 3.9 vs 7.1 vs 28.5 vs 59.7 % (p < 0.001*) for the respective GFR classes. **Table 3** further depicts 1-year mortality rates for the different treatment options (moderate to severe renal dysfunction combined).

*p for trends

Table 3: S. Hahne et al.

1-year mortality by treatment	GFR ≥ 80	GFR 60–80	GFR < 60
Total %	3.9	7.1	35.0
Early conservative			
Conservative management %	7.6 [#]	16.3 [#]	46.3 [#]
Diagnostic angiography %	2.5	3.7	15.7
Early invasive			
PCI %	1.8 [#]	1.8 [#]	15.0 [#]
CABG %	6.7	7.1	36.4
	p = 0.057	p = 0.009	p < 0.001

[#]p-value is calculated between conservative management and PCI

Conclusion Despite worse outcome compared to normal or mildly decreased renal function, patients with moderately to severely reduced GFR significantly benefit from early invasive strategy as compared to conservative treatment.

VI-7

068

Begrenzter klinischer Nutzen von neueren Risikofaktoren im Vergleich zu klassischen Risikofaktoren zur Vorhersage von angiographisch wirksamer stabiler koronarer Herzkrankheit

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Die Assoziation von N-terminalem pro-B-Typ natriuretischem Peptid (NT-proBNP), hoch sensitivem C-reaktivem Protein (hsCRP) und Gamma-Glutamyl-Transferase- (GGT-) Serumkonzentrationen mit dem Vorhandensein einer koronaren Herzkrankheit (KHK) wurde bereits beschrieben. Wir untersuchten den prädiktiven Wert dieser neuen Risikomarker im Vergleich zu den klassischen Risikofaktoren bei 848 konsekutiven Patienten ohne bisherigen Myokardinfarkt (561 Männer, 287 Frauen; Alter 20–86, Median 65 Jahre), bei denen aufgrund eines klinischen Verdachts auf das Vorhandensein einer KHK eine Koronarangiographie (CAG) durchgeführt wurde. Als hämodynamisch wirksame KHK wurde eine > 70 % Stenose in mindestens einem der drei Hauptgefäße definiert. Die Blutproben wurden jeweils am Vortag der CAG routinemäßig abgenommen. Die NT-proBNP-Bestimmung erfolgte mit dem Elecsys®-Test und hsCRP wurde mit dem Tina-quant®-Test (beide Roche Diagnostics) bestimmt. Zusätzlich wurden Glukose, Leberenzyme, Kreatinin, Harnstoff, Harnsäure, Triglyzeride, Gesamtcholesterin,

HDL- und LDL-Cholesterin mit enzymatischen Tests (Roche Diagnostics) bestimmt. In einem multiplen logistischen Regressionsmodell waren nur das Alter ($p < 0,001$), das Geschlecht ($p < 0,001$), HDL ($p = 0,001$), arterielle Hypertonie ($p = 0,003$), Harnsäure ($p = 0,015$) und Triglyzeride ($p = 0,029$) signifikante Vorhersagemarker für eine angiographisch gesicherte, hämodynamisch wirksame KHK. Alle anderen neueren Marker waren nicht signifikant. Überraschenderweise war Rauchen in diesem Modell nicht signifikant, vermutlich weil bei einem beträchtlichen Anteil der Patienten die Rauchgewohnheiten retrospektiv als nicht bekannt klassifiziert werden mußten. Zusammenfassend bringen NT-proBNP, hs-CRP und GGT keinen zusätzlichen Nutzen zu den klassischen Risikofaktoren in der Vorhersage einer angiographisch signifikanten Stenose bei stabiler KHK.

VI-8

070

Die Assoziation des löslichen CD40-Liganden mit akutem Myokardinfarkt oder ischämischem Schlaganfall in der Notfallaufnahme ist schwach

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Der lösliche CD40-Ligand (sCD40L) steigt im Plasma bei Plättchenaktivierung und entzündlichen Prozessen an. Er wurde als neuer Risikomarker für kardiovaskuläre Erkrankungen vorgeschlagen. Wir untersuchten den Nutzen der sCD40L-Bestimmung für die Diagnose eines akuten Myokardinfarkts (AMI) oder ischämischen Infarkts in der Notfallaufnahme bei 1089 konsekutiven Patienten (525 Männer, 564 Frauen; Alter: 17–98 Jahre, Median 56 Jahre), die in einer Zeitspanne von 24 Tagen in die Notfallaufnahme aufgenommen wurden. Aus organisatorischen Gründen werden in dieser Notfallaufnahme hauptsächlich internistische und neurologische Notfälle behandelt, pädiatrische, traumatische oder chirurgische Notfälle werden in separaten Einrichtungen aufgenommen. Der sCD40L wurde in routinemäßig abgenommenem Heparinplasma mit einem Forschungstest (Roche Diagnostics) ermittelt. In unserem Labor reichte der Intra-Assay-Variationskoeffizient von 1,6–4,2 % bzw. der Inter-Assay-Variationskoeffizient von 4,4–4,9 %. In einer multiplen linearen Regressionsanalyse fanden wir einen signifikanten Einfluß sowohl des CRP ($p = 0,02$) als auch der Thrombozytenzahl ($p < 0,0001$) auf die sCD40L-Konzentrationen. Alle anderen getesteten Variablen einschließlich Erkrankungsgruppen, des Alters und des Geschlechts sowie weiterer laborchemischer Parameter wiesen keinen signifikanten Einfluß auf. In einer Subgruppenanalyse erwies sich auch der Raucherstatus als signifikanter ($p = 0,006$) Einflußparameter auf sCD40L. Zusammenfassend fanden wir nur eine schwache Assoziation des sCD40L mit akuten kardialen oder zerebrovaskulären ischämischen Ereignissen. Als Screeningtest für AMI oder Schlaganfall in der Notfallaufnahme ist sCD40L nicht von zusätzlichem Nutzen.

Sitzung VII – Rhythmologie I

VII-1

006

Voraussage eines transienten oder permanenten AV-Blocks während RF-Ablation des „slow pathways“ durch das A(H)A(Md)-Intervall

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Einführung Die Modifikation des „slow pathways“ mittels Radiofrequenz-Ablation (RF) ist derzeit die effektivste Therapie der AV-Knoten-Reentry-Tachykardie (AVNRT). Als unangenehmste Komplikation dieser Behandlung tritt in ca. 1 % der Fälle eine transiente oder permanente AV-Blockierung auf. Das Risiko des Auftretens eines ventrikulo-atrialen Blocks (VAB) während schneller junctionaler Aktivität (JA) und eines AV-Blocks (AVB) während oder nach einer Ablationsbehandlung wird durch die Bestimmung der

Entfernung zwischen dem His- und dem Ablationskatheter (X-ray distance, XR) während der Röntgendurchleuchtung ermittelt. Der XR-Abstand hängt allerdings stark von der Neigung der Basis des Koch'schen Dreiecks ab. Daher wurde der prädiktive Wert des XR-Abstandes in dieser Studie mit dem des elektrischen A(H)A(Md)-Intervalls verglichen. Dieses Intervall wurde direkt vor Beginn der Stromabgabe vom Beginn der atrialen Aktivierung im His-Katheter bis zum Beginn des atrialen Signals im Ablationskatheter gemessen.

Methodik Der Abstand zwischen dem Ablations- und dem His-Katheter (XR) im Röntgen, das A(H)A(Md)-Intervall und das Auftreten eines VAB während junctionaler Aktivität sowie transiente oder permanente AV-Blockierungen wurden retrospektiv bei 1585 RF-Ablationen in 393 Patienten (58 % ♀, 42 % ♂) analysiert, bei denen an unserer Abteilung zwischen 1999 und 2005 im Rahmen einer elektrophysiologischen Untersuchung eine AVNRT diagnostiziert wurde.

Resultate Im Mittel wurden pro Patient 2,7 RF-Stromabgaben vorgenommen. Das A(H)A(Md)-Intervall korrelierte sehr stark mit der Anzahl der abgegebenen Stromabgaben ($r = 0,144$; $p < 0,0001$) sowie mit dem XR-Abstand ($r = 0,165$; $p < 0,0001$). Während oder nach den Ablationen kam es in 348 Fällen zu VA-Blockierungen während JA, in 38 Fällen zu transienten AVB (9 AVB-I, 13 AVB-II, 16 AVB-III) und in 13 Fällen zu permanenten AVB (8 AVB-I und 5 AVB-III). In einer multivariaten Analyse war das A(H)A(Md)-Intervall der beste Prädiktor für das Auftreten eines VAB bzw. eines AVB ($p < 0,0001$). Die nächstbesten Prädiktoren waren die Anzahl der Ablationen ($p = 0,015$) und der XR-Abstand ($p = 0,05$). Das Risiko einer transienten oder permanenten AV-Blockierung nach einer Ablation war darüber hinaus bei einem A(H)A(Md)-Intervall < 20 ms signifikant höher (15,5 %) als bei einem A(H)A(Md) > 20 ms (3,7 % für 21–25 ms; 1,4 % für 25–30 ms; 2,2 % für 31–35 ms; 2,8 % für 36–40 ms).

Zusammenfassung Das A(H)A(Md)-Intervall ist ein besserer Prädiktor für das Auftreten eines AV-Blocks während der Modifikation des „slow pathways“ zur Behandlung einer AVNRT als die radiologische Distanz zwischen dem Ablationskatheter und dem kompakten AV-Knoten. Ein Intervall < 21 ms führte zu einer 5–10fachen Erhöhung des Risikos eines AV-Blocks. Daher sollten Messungen des A(H)A(Md)-Intervalls vor jeder RF-Ablation durchgeführt werden, um das Risiko einer AV-Blockierung während der Behandlung einer AVNRT zu reduzieren.

VII-2

016

Primäre Katheterablation von permanentem Vorhofflimmern mittels kompletter linearer Läsionen um die Pulmonalvenen: Neue Ergebnisse mit der „Doppel-Lasso-Technik“

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Einführung Die vollständige Isolation der Pulmonalvenen (PV) mittels zirkulärer Läsion um die ipsilateralen PV-Ostien mit der „Doppel-Lasso-Technik“ ist mittlerweile ein etabliertes Verfahren zur Therapie von paroxysmalem Vorhofflimmern. Bei permanentem Vorhofflimmern (VHF) ist der klinische Effekt noch unbekannt.

Methoden Bei insgesamt 50 Patienten (Pt) (7 weiblich, Alter 60 ± 10 Jahre) mit hochsymptomatischem, permanentem VHF wurde eine primäre Katheterablation durchgeführt. Die durchschnittliche Dauer des VHF vor Ablation betrug 84 Monate (12–360 Monate). Nach 3D-CARTO-Rekonstruktion des linken Vorhofs wurden die PV durch Anlage je einer zirkulären linearen Läsion um die jeweils ipsilateralen PV mit Hilfe der „Doppel-Lasso-Technik“ isoliert. Endpunkt war die vollständige PV-Isolation 30 Minuten nach der letzten Radiofrequenzstrom- (RFS-) Abgabe sowie nach Gabe von Adenosin.

Ergebnisse Die PV konnten bei allen Pt vollständig elektrisch isoliert werden. Dazu waren 18 ± 7 (septale PV) bzw. 18 ± 9 (laterale PV) gekühlte RFS-Applikationen notwendig. Die Durchleuchtungszeit betrug $30,1 \pm 13$ min., die Prozedurdauer 240 ± 74 min. Einen, 3, 6 sowie 12 Monate nach Ablation wurde ein 12-

Kanal-EKG und ein Langzeit-EKG durchgeführt. Ein zweiter Eingriff war bei 25/50 Pt (50 %), ein dritter Eingriff bei 4/50 Pt (8 %) erforderlich. Dabei wurde bei 20/25 Pt (80 %) mindestens eine Lücke in der Ablationslinie um die PV mit PV-atrialer Leitung festgestellt und erfolgreich geschlossen. Bei 8/25 Pt (32 %) wurden bei linksatrialen Makroreentry-Tachykardien lineare Läsionen ablatiert (4× linksatrialer Isthmus, 4× Dachlinie), bei 6/25 Pt (24 %) wurde ein extra PV-Trigger ablatiert, bei 3/25 Pt (12 %) wurde bei Vorhofflattern der kavotrikuspidale Isthmus ablatiert. Nach 1–3 Interventionen (Median 1) verblieben 40/50 Pt (80 %) während eines Nachbeobachtungszeitraums von 355 ± 132 Tagen im Sinusrhythmus.

Zusammenfassung Auch bei Patienten mit permanentem Vorhofflimmern erweist sich die vollständige Isolation der PV mittels zirkulärer Läsion um die ipsilateralen PV-Ostien mit der „Doppel-Lasso-Technik“ als sehr effektives Verfahren. Bei einem Großteil der Patienten kann mit diesem Verfahren ein stabiler Sinusrhythmus erzielt werden.

VII-3

020

Influence of Ischemic and Nonischemic Cardiomyopathies on Parameters of Ventricular Repolarization

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Background Clinical studies indicate that patients with ischemic cardiomyopathy are at higher risk for ventricular arrhythmias than patients with nonischemic cardiomyopathy. The aim of this study was to evaluate if there are differences in parameters of ventricular repolarization between both groups.

Methods In 25 patients with congestive heart failure (age 64 ± 10 yrs, LVEF < 35 %, NYHA II–III, QRS < 120 msec) due to ischemic ($n = 12$) and nonischemic ($n = 13$) cardiomyopathy, a high-resolution, 65-lead body-surface ECG recording was performed. In each patient, the total 65-lead root mean square (RMS) curve for ventricular repolarization was assessed. RMS intervals of QT- and T-wave peak to T-wave end (TpTe) were estimated and corrected for heart rate using Bazett's formula. Heart failure medication (ACE inhibitors, betablockers, diuretics, digoxin) of the patients remained unchanged during the previous 8 weeks. Each patient showed stable sinus rhythm and none of the patients was on class-I or -III antiarrhythmic drug therapy.

Results Patients with ischemic cardiomyopathy showed a significant increase in the TpTe interval (111 ± 13 vs 76 ± 7 ms; $p < 0.05$) as compared to patients with nonischemic cardiomyopathy (111 ± 13 vs 76 ± 7 ms). There were no significant differences in LVEF (26 ± 6 vs 25 ± 6 %), QRS duration (109 ± 11 vs 103 ± 12 ms), QTc duration (459 ± 41 vs 442 ± 40 ms) between both groups.

Conclusion The increase of the TpTe interval in patients with ischemic cardiomyopathy may be due to regional repolarization heterogeneities because of myocardial scar tissue. As an increase in the TpTe interval also reflects an increase of dispersion of ventricular repolarization, and therefore an increase of the arrhythmogenic substrate, this may explain the higher risk for arrhythmic events in these patients.

VII-4

021

Cardiac Resynchronization Therapy Improves Ventilatory Perfusion Coupling in Patients Undergoing All-Day Physical Activity

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Background There is still little information about the cardiorespiratory effects of cardiac resynchronization therapy (CRT) in pa-

tients undergoing all-day physical activity. Aim of this study was to assess the acute effects of left ventricular and biventricular pacing on ventilatory perfusion coupling during submaximal physical exercise.

Methods Twenty patients underwent treadmill cardiopulmonary testing after implantation of a cardiac resynchronization therapy (CRT) pacemaker. Metabolic and hemodynamic parameters were obtained during exercise as well as during the following resting period for each single-right (RV), -left (LV) and biventricular (BiV) pacing mode as well as during the intrinsic sinus rhythm (SR) in each patient.

Results LV and BiV pacing increased systolic (148 ± 25 and 144 ± 28 vs 120 ± 29 mmHg; $p < 0.05$) and mean blood pressure (109 ± 18 and 108 ± 19 vs 91 ± 25 mmHg; $p < 0.05$) as well as cardiac output (7.3 ± 1 and 7.4 ± 1 vs 6.0 ± 1 l/min; $p < 0.05$ and $p < 0.01$, respectively) during exercise as compared to intrinsic SR. Simultaneously, LV and BiV pacing decreased dead-space ventilation (Vde/VT; 17 ± 3 and 16 ± 3 vs 20 ± 4 ; $p < 0.01$) and the ventilatory equivalent for oxygen (30 ± 6 and 30 ± 4 vs 35 ± 9 ; $p < 0.05$) as compared to intrinsic SR. The beneficial hemodynamic effects of LV and BiV pacing ($\Delta CO = CO_{\text{pacing}} - CO_{\text{intrinsic SR}}$) were even more enhanced during submaximal activity (1.4 ± 0.6 l/min and 1.5 ± 0.6 l/min) than under resting conditions (0.5 ± 0.6 and 0.7 ± 0.5 l/min; $p < 0.05$).

Conclusion The improvement in ventilatory efficacy during CRT, as demonstrated by the decrease in the ventilatory equivalent for oxygen, results from an increase in cardiac output and thus from a reduction in the ventilatory perfusion mismatch as indicated by a decrease in physiological dead-space ventilation. When undergoing submaximal physical activity patients benefit even more from CRT than under resting conditions.

VII-5

031

Recurrence of Atrial Fibrillation within 48 Hours after Ablation: Impact on Long-Term Outcome

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Introduction Due to delayed structural and electrophysiological effects of radiofrequency ablation, early recurrence of atrial fibrillation (ERAF) after ablation of atrial fibrillation (AF) does not necessarily indicate long-term ablation failure. The study was intended to assess the prognostic value of ERAF within 48 h after ablation.

Methods The study included 234 patients (23–80 yrs, 71.8 % males) with symptomatic, drug-resistant paroxysmal ($n = 165$) or persistent AF ($n = 69$) who either underwent Lasso-guided segmental pulmonary vein isolation ($n = 83$) or CARTO-guided left atrial circumferential ablation ($n = 151$).

Results After a median follow-up of 12.7 months, 64 % of patients with paroxysmal and 45 % of patients with persistent AF were free of AF. ERAF occurred in 43 % of patients and was a significant predictor of long-term ablation failure in univariate Cox regression analysis (HR = 2.29; $p < 0.001$). However, 46 % of patients with ERAF were AF-free in the long-term follow-up compared to 68 % of patients without ERAF. In multivariate analysis, ERAF (HR = 2.23; $p < 0.001$) and type of AF (HR = 1.82; $p = 0.004$) independently predicted ablation outcome. The prognostic value of ERAF did not significantly differ between the two ablation techniques and was found in both patients with paroxysmal (HR = 2.05; $p = 0.005$) and persistent AF (HR = 2.35; $p = 0.013$).

Conclusions Regardless of the ablation technique and the type of AF, ERAF within 48 hours after ablation is a significant predictor of a poor long-term ablation outcome. However, as nearly half of the patients with ERAF remain free of AF on long term, ERAF should not automatically result in an early repeat procedure.

VII-6

062

Long-Term Follow-Up of Different Pacing Modes in Patients with Sick Sinus Syndrome

B. Fellner, M. Nürnberg, R. Jarai, L. Pachinger, J. Cup, G. Jakl, K. Huber
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Purpose As therapy for sick sinus syndrome (SSS), physiological stimulation seems to be superior to ventricular stimulation. Randomised studies comparing AAI and DDD stimulation are under investigation, follow-up results are awaited. Retrospectively, we analysed mortality of all consecutive patients (pts) who underwent pacemaker (PM) therapy because of SSS between 1985 and 2005 in our hospital.

Methods In 668 pts with SSS (mean age 75.9 ± 9.8 yrs; $\delta = 43\%$), a PM was implanted (10.5 % VVI, 18.7 % AAI, 70.8 % DDD). Data were analysed according to the age at the time of first implantation, ECG indication (subgroup 1: sinusarrest/sinusbradycardia, subgroup 2: brady-tachy-syndrome) and mortality during follow-up. VVI-PM were mainly implanted in the 1980s and represent only a historical group for comparison. Criteria for implantation of an AAI-PM were normal AV-conduction, intraoperative Wenckebach point of > 120 /min and absence of bundle branch or fascicular block. Mortality data were acquired by death registries or by contact with relatives/practitioners and local funeral homes.

Results Despite similar mean age at the time of first implantation the mortality rate in pts with AAI-PM was significantly lower than in pts with DDD- or VVI-PM (16.3 vs 34 vs 62.5 %; $p < 0.0001$). Concerning the two subgroups of ECG indication, survival curves showed a significantly better survival only in pts of subgroup 1 treated with AAI-PM ($p = 0.006$; see Figure 5).

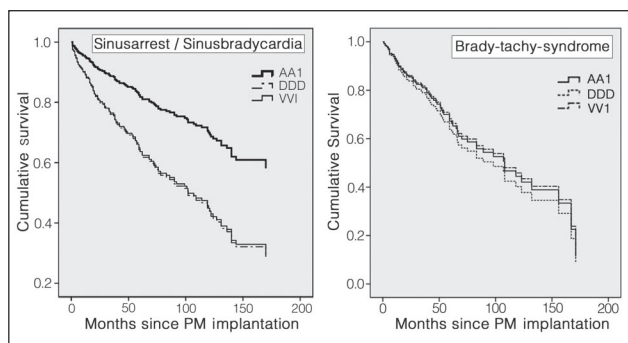


Figure 5: B. Fellner et al.

Conclusions The retrospective analysis of all our SSS pts demonstrates a significantly lower mortality in AAI-PM compared to DDD- and VVI-PM. Better survival is restricted only to pts with sinusarrest or sinusbradycardia as ECG indication. In pts with brady-tachy-syndrome, presence of atrial fibrillation and not pacing mode seems to be the prognostic marker for mortality. Consequently, AAI stimulation should be the preferred pacing mode for SSS – especially for pts with sinusbradycardia or sinusarrest as ECG indication.

VII-7

099

Atrioventricular Delay Optimization by Surface Electrocardiography in Patients with Implanted VDD Pacemaker

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Aim Cardiac function and electrical stability may be improved by programming of optimal atrioventricular (AV) delay in pacemaker

patients. There is the possibility of determination AV delay by surface ECG. So the aim of our study was to prove the hemodynamic benefit of optimization of AV delay with the non-invasive Task Force® Monitor (TFM).

Methods In a prospective study, we included 80 patients (33 female, 47 male, mean age 76 ± 11 years) with an implanted VDD pacemaker and AV conduction disease. We measured beat-to-beat stroke volume (SV) with impedance cardiography, cardiac output (CO), heart rate (HR) and blood pressure (BP) at nominal and optimized AV delay. Optimal AV delay was achieved by programming a delay of 100 ms from the end of sensed P wave to peak/nadir of the paced ventricular complex.

Results (1) SV increases significantly after optimization of AV delay (55.3 vs 69.9 ml; $p < 0.001$). (2) There was a highly significant increase in CO (3.9 vs 5.0 l; $p < 0.001$). (3) There were no differences in blood pressure (97.6 vs 97.5 mmHg; $p = 0.9$) and heart rate (72.6 vs 71.8 ; $p = 0.09$) during the measurements of SV and CO. (4) There is a hemodynamic benefit in each patient independent of the kind of cardiac disease. (5) The benefit of optimization of AV delay does not depend on the time of implantation (mean 43 months after implantation).

Conclusion Optimization of AV delay causes a significant improvement of hemodynamic parameters like SV and CO. It is not influenced by cardiac disease or duration of pacemaker stimulation.

VII-8

100

Long-Term Follow-up of Hemodynamic Benefit of Atrioventricular Delay Optimization in Patients with Implanted VDD Pacemaker

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Background Optimization of atrioventricular (AV) delay has been proven to increase stroke volume (SV) and cardiac output (CO). We focused on the stability of hemodynamic benefit in long-term follow-up, especially with respect to changes between SV and CO at baseline and in follow-up and reproduction of hemodynamic benefit by optimizing the AV delay.

Methods In a prospective study, we included 80 patients (33 female, 47 male, mean age 76 ± 11 years) with an implanted VDD pacemaker and AV conduction disease. 64 patients were available for follow-up after 3 months. With the Task Force® monitor, we measured beat-to-beat SV with impedance cardiography, CO, heart rate (HR) and blood pressure (BP) at baseline and in follow-up. We compared nominal with optimized AV delay in both cases. Optimization was done by surface electrocardiography programming a delay of 100 ms from the end of P wave to peak/nadir of the paced ventricular complex. At follow-up 3 months later, a short quality-of-life questionnaire was filled out.

Results (1) There is a highly significant increase of SV and CO by optimizing AV delay (55.3 vs 69.9 ml; $p < 0.001$). (2) During 3 months of follow-up, optimized CO remained stable (5.0 vs 4.8 l; $p = 0.09$), whereas optimized stroke volume showed a slight but significant decrease (71.3 vs 65.4 ml; $p = 0.001$). (3) The significant increase in SV and CO due to AV optimization is reproducible in follow-up (SV: 53.7 vs 65.2 ml; $p < 0.001$ CO: 3.9 vs 4.8 l; $p < 0.001$). (4) Of the 64 patients, only 3 subjects preferred nominal AV delay programming after 3 months of follow-up.

Conclusion Optimization of AV delay in patients with implanted VDD pacemaker leads to a significant increase in SV and CO. In the long run, effects of AV optimization remain stable, are reproducible and cause a better quality of life.

POSTERDISKUSSION B

Freitag, 1. Juni 2007, 17.30–18.30 Uhr

Sitzung VIII – Nichtinvasive Diagnostik

VIII-1

010

Häufigkeit der „innocent-bystander“-KHK bei Patienten mit dilatativer CMP und fehlendem ischämietypischem „late enhancement“T. Hafner, G. Strau, A. Gestaltner, R. Böck, W. Kumpan, A. Podczeczek-Schweighofer
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Die häufigste behandelbare Ursache der dilatativen Kardiomyopathie (CMP) ist die koronare Herzkrankheit (KHK). Das Konzept der „innocent-bystander“-KHK impliziert, daß Patienten mit idiopathischer dilatativer CMP gleichzeitig eine KHK haben können, die jedoch nicht die Ursache der dilatativen CMP ist. Mit Hilfe der Magnetresonanztomographie können ischämische Narben anhand eines ischämietypischen „late enhancements“ zuverlässig dargestellt werden. Wir haben im Zeitraum von September 2003 bis September 2006 bei 53 Patienten mit dem Bild einer dilatativen CMP eine Magnetresonanztomographie inklusive „late-enhancement“-Technik durchgeführt. Bei 57 % der Patienten wurde ein ischämietypisches „late enhancement“ nachgewiesen. In der Gruppe der Patienten mit fehlendem ischämietypischem „late enhancement“ wurde bei 48 % eine Koronarangiographie durchgeführt, bei 55 % der angiographierten Patienten waren die Koronargefäße bland, bei den restlichen 45 % fanden sich lediglich nichtsignifikante Koronarstenosen großer Gefäße oder signifikante Stenosen in kleinen Seitenästen, also lediglich eine „innocent-bystander“-KHK. Bei keinem Patienten mit fehlendem ischämietypischem „late enhancement“ wurde eine Koronarstenose nachgewiesen, die eine ischämische Genese der dilatativen CMP erklären hätte können. Wenn man die Zahl der Patienten mit „innocent-bystander“-KHK auf die gesamte Gruppe der Patienten mit fehlendem ischämietypischem „late enhancement“ bezieht, beträgt die Häufigkeit der „innocent-bystander“-KHK 21 %, was gut mit histopathologischen Untersuchungen an explantierten Herzen korreliert. Aufgrund dieser Daten scheint es vertretbar, bei Patienten mit dilatativer CMP mit fehlendem ischämietypischem „late enhancement“ und fehlenden klinischen Hinweisen für eine KHK primär auf eine weitere invasive Abklärung mittels Koronarangiographie zu verzichten.

VIII-2

017

Der linksventrikuläre Flow in der Magnetresonanztomographie – neue Perspektiven am Beispiel einer experimentellen StudieH. Mächler¹, G. Reiter^{2,3}, M. Perthel⁴, U. Reiter², P. Bergmann¹, A. Waltensdorfer⁵, J. Laas⁴, R. Rienmüller²

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Einleitung Verschieden ausgerichtete Mitralklappenprothesen bieten den idealen experimentellen Boden, um die Varianz des linksventrikulären Flows darzustellen.

Methode Bei fünf Schafen wurde der linksventrikuläre Blutfluß präoperativ visualisiert. Dazu wurden die zeitabhängigen dreidimensionalen Blutflüsse und Geschwindigkeiten in einem 1,5T-MR-Scanner (Magnetom Sonata, Siemens) als farbkodierte Vektoren mit dem 4D-Flow (Siemens) dargestellt. Bei sechs Tieren wurden Medtronic-Hall-Kippscheibenprothesen entweder anato-

misch oder antianatomisch unter Erhaltung des subvalvulären Klap-penapparates implantiert.

Ergebnisse Die präoperativen linksventrikulären Strömungsprofile zeigten vernachlässigbare individuelle Varianzen ohne räumliche Unterschiede mit homogenen Flußgeschwindigkeiten. Weder das Septum noch der Apex wurden direkt angeströmt. Im Fall der anatomischen Ausrichtung der Kippscheibenprothese strömte das Blut hauptsächlich durch die größere Öffnung, wobei die artifizielle Scheibe das native anteriore Segel imitierte, die apikale Helixbildung war der präoperativen ähnlich. Eine antianatomische Ausrichtung ließ das Blut mit hohen Geschwindigkeiten direkt auf das Septum prallen, im weiteren Verlauf kam es dadurch bis über die Aortenklappenebene zu einem unphysiologischen Flußmuster.

Schlußfolgerungen Die Studie zeigt, daß die hämodynamischen linksventrikulären Verhältnisse je nach Ausrichtung von artifiziellen Klappensubstituten im Mitralklappenring variieren. Das Bild des simplen Einstroms des Blutes über das Ventil der nativen oder artifiziellen Mitralklappe in den Ventrikel kann nicht aufrechterhalten werden. Die in der Theorie diskutierte linksventrikuläre Rotation des Myokards bildet sich im linksventrikulären Flußmuster ab und kann vierdimensional dargestellt werden.

VIII-3

071

Cardiac Troponin T Correlates with MRI Estimates of Infarct SizeM. Grabher, J. Mair, T. Trieb, M. Nocker, K. Pedarnig, A. Köhler, M. Schocke, O. Pachinger, B. Metzler
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Background Cardiac troponin T (cTnT) is frequently used for diagnosis and monitoring of acute myocardial infarction in clinical practice. However, the correlation of cTnT concentration with infarct size in patients is still uncertain because of limited available clinical data. Contrast-enhanced magnetic resonance imaging (CE-MRI) is the new criterion standard of non-invasive estimation of infarct size. The aim of the present study was to correlate cTnT concentrations on days one and two after admission with infarct size estimated by CE-MRI.

Methods We investigated 48 patients with STEMI (31 inferior wall, 17 anterior wall infarctions). The mean age was 55 years (range 31–77, 7 women, 41 men). The average time from onset of symptoms to acute percutaneous coronary angioplasty (PCI) was 10 hours. CK activities and cTnT concentrations were measured on admission, on the first day (mean 22 hours), and on the second day (mean 45 hours) after admission. CE-MRI was conducted on average on the third day after admission.

Results In all patients, acute PCI resulted in TIMI-3 flow of the infarct-related coronary vessel. CE-MRI revealed an average absolute infarct size of 22.5 g (range: 2.2–50.4) with a mean ejection fraction of 44 % (range: 11.1–64.4). The correlations of CK activities with infarct size were $r = 0.59$ ($p < 0.01$) on day one and $r = 0.46$ ($p < 0.01$) on day two, respectively. The correlations of cTnT were closer, $r = 0.70$ ($p < 0.01$; infarct size [g] = $3.75 \times \text{cTnT} + 8.37$) on day one, and $r = 0.75$ ($p < 0.01$; infarct size [g] = $4.82 \times \text{cTnT} + 7.82$) on day two, respectively. The correlations with left ventricular ejection fraction were less close: CK $r = -0.36$ ($p = 0.01$) on day one, and $r = -0.28$ ($p = 0.07$) on day two; cTnT $r = -0.47$ ($p < 0.01$) on day one and $r = -0.43$ ($p < 0.01$) on day two, respectively.

Conclusions Single cTnT measurements on days one and two are better estimates of infarct size than CK activities and are useful non-invasive estimates of infarct size in clinical practice.

VIII-4

089

Impaired Arterial Elastic Properties in Patients with Diastolic Dysfunction

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Objective We previously found increased arterial wave reflections and a prolonged duration of ejection in patients with diastolic dysfunction. The aim of our recent study was to evaluate arterial function in these patients in more detail.

Design and Methods We prospectively assessed pulse wave velocity (PWV), arterial wave reflections (Augmentation Index [AIx]), and characteristic impedance (Zc) in patients with normal systolic function (ejection fraction > 50 %) undergoing heart catheterization for suspected coronary artery disease (CAD). PWV was measured invasively during catheter pullback, and AIx was measured non-invasively using radial applanation tonometry and a validated transfer function for generation of the ascending aortic pressure curve (SphygmoCor system). Zc was estimated in the time domain, relating the change of flow velocity in the left ventricular outflow tract, and the change of pressure from end-diastole to the inflection point in early systole, using brachial blood pressure and the transfer function to generate aortic pressure. Patients were divided based on their left ventricular end-diastolic pressures (LVEDP) and blood levels of aminoterminal pro-brain natriuretic peptide (NT-proBNP) into a diastolic dysfunction (DD) group (LVEDP > 16 mmHg and NT-proBNP > 125 pg/ml) and controls (LVEDP < 16 mmHg and NT-proBNP < 125 pg/ml). Statistics used were unpaired t-test and logistic regression analysis for prediction of DD.

Results 97 patients fulfilled the criteria for DD, 108 served as controls. Compared to controls, DD patients were older (67.9 vs 58.8 years, $p < 0.0001$), more often women, hypertensives and had CAD. DD patients had higher systolic blood pressures than controls at the level of the brachial artery (143 vs 132 mmHg; $p = 0.0002$) and at the level of the ascending aorta (134 vs 122 mmHg; $p < 0.0001$), whereas diastolic blood pressures did not differ significantly (79 vs 80 mmHg; $p = 0.58$). Left ventricular ejection duration, indexed to heart rate (LVETI), was longer in DD patients than in controls (437 vs 416 msec; $p < 0.0001$). DD patients had higher AIx (32.4 vs 26.4; $p < 0.0001$) and heart rate corrected AIx@75 (25.1 vs 20.9; $p = 0.003$), higher PWV (10.3 vs 7.9 m/sec; $p < 0.0001$), and higher Zc (504 vs 418 dyne $\times$ sec $\times$ cm⁻³; $p = 0.01$), as compared to controls. In logistic regression analysis, PWV, LVETI, and the extent of coronary artery disease were independent predictors of DD.

Conclusions Impaired arterial elastic properties are commonly and consistently found in patients with DD. Their pathogenetic role as well as therapeutic implications should be further explored.

VIII-5

090

Impact of the Delay of Infarcted Myocardium on Regional Functional Improvement after Primary PTCA by Contrast-Enhanced Magnetic Resonance Imaging

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¹Clinical Division of Cardiology, Department of Internal Medicine; ²Department of Radiology I, Medical University of Innsbruck

Background This study sought to assess the relationship between treatment delay and improvement of regional left ventricular function after primary angioplasty (p-PTCA) for acute myocardial infarction (AMI) with cardiac magnetic resonance imaging (CMR).

Methods We performed cine-CMR and phase-sensitive inversion recovery (PSIR) single-shot TrueFISP late-enhancement (LE) sequences in 40 patients with first AMI shortly after restoring TIMI-3 flow with p-PTCA and four months thereafter. Infarcted segments were determined from LE short-axis images. Regional left ventricular function was quantified from short-axis cine-CMR images. Segmentation followed for the AHA-17 segment model. Patients were

divided into groups with delay < 3 h (group 1), delay 3–6 h (group 2), delay 6–12 h (group 3) and a group with a delay > 12 hours (group 4).

Results Out of 640 evaluated segments, 335 (52 %) showed LE (infarcted) and consecutively impaired regional function in terms of systolic wall thickening (SWT, 49 ± 2 % vs 60 ± 2 % in uninfarcted; $p < 0.01$). Mean infarct transmural and baseline SWT were not significantly different between infarcted segments after reperfusion with respect to the duration of ischemia. Paired Wilcoxon rank test revealed significant improvement of SWT only in segments reperfused within 6 hours ($p < 0.001$). Follow-up SWT was significantly higher if segments were reperfused early (< 3 h: 74 ± 4 %, 3–6 h: 57 ± 4 %, 6–12 h: 48 ± 7 %, < 3 to 3–6 h: $p < 0.003$ and < 3 to 6–12 h: $p < 0.001$). The amount of improvement was higher if delay was < 3 h compared to segments with a delay of > 3 h (< 3 h: $+21 \pm 3$ %, 3–6 h: $+8 \pm 4$ %, 6–12 h: $+6 \pm 3$ %; < 3 h to 3–6 h and 6–12 h: $p < 0.02$).

Conclusion We could quantitatively demonstrate that time-to-p-PTCA treatment significantly influences regional functional recovery of infarcted myocardium after a four-month follow-up.

VIII-6

035

Short-Term Holiday in Moderate Altitude Has No Effect on Peripheral Endothelial Function in Healthy Subjects

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Clinical Division of Cardiology, Department of Internal Medicine, Medical University of Innsbruck

Background Millions of tourists spend their vacations in alpine regions, mostly residing at moderate altitudes (1500–2500 m). Exposure to moderate altitude has been shown to induce different physiological effects. Recently, we demonstrated that mid-term exposure (3 weeks) to moderate altitude leads to a prolonged but reversible impairment of peripheral endothelial function in individuals with metabolic syndrome. Whether a short-term stay in moderate altitude has an influence on peripheral endothelial function in healthy subjects is unknown.

Methods 13 healthy volunteers (6 men, 7 women) spent one week of activity holiday in moderate altitude (2000 m). On the first and the fifth day, digital pulse volume changes during reactive hyperemia as a parameter of peripheral endothelial function were measured (EndoPAT®). A third assessment was performed three weeks after returning from holiday (at 570 m). Endothelial function is expressed as PAT index, calculated as the ratio of pulse wave amplitude before and during reactive hyperemia (induced by inflating a blood-pressure cuff for 5 minutes to suprasystolic pressures).

Results No changes in PAT indices between the first and the fifth day were found (1.97 ± 0.5 vs 2.0 ± 0.4). Furthermore, no difference was found comparing endothelial function at the end of the holiday and 3 weeks after return to a lower sea level (2.0 ± 0.4 vs 2.1 ± 0.6).

Conclusion Short-term exposure to moderate altitude does not have any significant influence on peripheral endothelial function in healthy subjects. Whether long-term exposure to moderate altitude has an effect on endothelial function needs to be investigated.

VIII-7

039

Intima-Media Thickness of Brachial, Femoral and Carotid Arteries: A Sonographic Comparison

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Background Previous studies have shown that sonographically measured intima-media thickness of either carotid (CIMT), brachial (BIMT) and femoral (FIMT) arteries are correlated with coronary

artery disease (CAD). Whether there is a relation of IMT among these 3 different vessels has not been investigated.

Methods IMT was measured in 60 consecutive male patients (mean age 62 ± 9 years) undergoing coronary angiography (CAG) due to chest pain and/or positive stress test. In 40 patients (68 %), coronary artery disease was found. IMT was measured using high-resolution ultrasound (BIMT: 13 MHz; CINT: 8 MHz; FINT: 11.5 MHz) in zoom mode. BIMT was measured in the right and left cubital regions. CINT measurements were performed in the right and left common carotid arteries 1–2 cm proximal of the carotid bulb. FINT was assessed in the right and left femoral arteries 1–2 cm proximal of the bifurcation with the profound femoral artery. Measurements in the far wall of each vessel were performed off-line by an investigator blinded to the clinical diagnosis. The mean of 3 measurements, performed in close vicinity to each other, was calculated.

Results Mean IMT values in BIMT, FINT and CINT were 0.31 ± 0.05 mm, 0.56 ± 0.16 mm and 0.7 ± 0.14 mm, respectively. No differences in IMT values were found between left- and right-sided vessels. A correlation was found between BIMT and FINT ($r = 0.41$; $p = 0.003$) but not between FINT and CINT and BIMT and CINT.

Conclusion This is the first study investigating the correlation of IMT in 3 major arterial beds. A good correlation between IMTs of the arteries of the extremities was found while no relation was seen in IMT of arteries of the extremities and the carotid artery. This finding may suggest different forms of progression of atherosclerosis in the carotid versus peripheral arteries.

VIII-8

106

Nichtinvasive Diagnose der Koronaren Herzkrankheit – Korrelation von Fahrradergometrie und Multislice-Computertomographie

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Hintergrund Mit der Computertomographie (CT) der Herzkranzgefäße steht seit einiger Zeit eine robuste Methode zur nichtinvasiven Abklärung einer fraglichen koronaren Herzkrankheit (KHK) zur Verfügung. Der optimale Zeitpunkt ihres Einsatzes ist noch nicht eindeutig definiert.

Methodik 53 konsekutive Patienten mit atypischer Angina pectoris-Symptomatik und bisher blander kardialer Anamnese, die sowohl eine Ergometrie als auch eine CT-Untersuchung hatten, wurden in die Analyse inkludiert. Die Ergebnisse wurden auf Basis einer Patientenauswertung miteinander verglichen.

Resultate In 27 Fällen zeigte sich eine positive Ergometrie, wobei die Koronar-CT in nur 7 Fällen (26 %) den Verdacht bestätigte, während 17 CT-Untersuchungen (63 %) negativ und eine (4 %) inkonklusiv war. In zwei Fällen (7 %) war die CT nicht durchführbar. 20 Patienten hatten einen inkonklusiven Belastungstest (CT in 2 Fällen = 10 % positiv, 12 × [60 %] negativ, 2 × [10 %] inkonklusiv und 4 × [20 %] nicht durchgeführt). Bei den 6 Patienten mit negativer Ergometrie (CT 5 × [83 %] negativ, 1 × [17 %] inkonklusiv) gab es einen hohen Grad an Übereinstimmung. Bei 9 Patienten wurde zusätzlich ein Herzkatheter durchgeführt, in allen Fällen bestätigte sich das Ergebnis der CT.

Zusammenfassung Die Herz-CT lieferte in unserer Analyse bei positiven und inkonklusiven Ergebnissen der Ergometrie einen hohen Wert an Zusatzinformation, sodaß in diesen Fällen eine zusätzliche Herz-CT indiziert sein kann. Bei negativem Belastungstest fanden sich überwiegend übereinstimmende Ergebnisse mit der Koronar-CT.

Sitzung IX – Herzinsuffizienz II

IX-1

007

Willingness of Heart Failure Patients to Participate in a Telemonitoring Program

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Purpose It is known that telemonitoring (TM) in heart failure (HF) patients can improve compliance and outcome. A number of patients do not agree to participate in such a program. It was the aim of our study to reveal patients' willingness to participate in a TM-based care and find possible reasons for patients' refusal.

Methods On 182 consecutive HF patients from our HF outpatient unit, we performed patient information and interviews on an audio-visual TM system working via the internet. This system included possibility of obtaining blood pressure, heart rate, bodyweight and ECG. Furthermore, we performed another survey to assess NYHA functional class, evaluate the medication therapy and determine patients' awareness of prescribed drugs as well as aspects to quantify possible factors of a decision for or against TM. For the same reason, quality of life was measured using the Minnesota-Living-with-HF-Questionnaire (MLHQ). A blood sample was drawn to measure NT-BNP.

Results We assessed that only 43 % of patients agreed to use TM. Patients who refused TM were older ($p < 0.005$) and less aware of their prescribed medications ($p < 0.05$). Patients did not significantly differ in gender, history of hypertension, CAD or diabetes. The same findings apply to NYHA functional class, LVEF, MLHQ and NT-BNP as well as quality of therapy. The rate of willingness did not vary between patients with chronic care in our unit and newly admitted patients. The most common reason for refusal was that patients did not have internet (77 % of refusing patients vs 54 %; $p = 0.001$). 45 % (vs 0 %; $p < 0.0001$) of refusing patients did not want a technician to install the TM system at their home, 39 % (vs 0 %; $p < 0.0001$) did not want to be seen by doctors at home. 55 % (vs 0 %; $p < 0.0001$) did not expect any benefit, 51 % (vs 0 %; $p < 0.0001$) preferred to see the doctor personally and 29 % (vs 0 %; $p < 0.0001$) claimed not to need TM because they were getting along well with their disease. Matters of cost were announced by 17 % of patients in each group, and were therefore not a significant marker for agreement or denial.

Conclusions Patients who refuse to use a TM system are older and less aware of their therapy. The latter implicates less compliance although many patients claimed to get along well with their disease. The most important reasons to refuse TM was the non-acceptance to be seen by a doctor at home, the preference of a visit in an outpatient unit and that a benefit for the patient was not seen. Thus, patients have to be convinced to accept new models of care before implementation can be performed.

IX-2

008

Characterisation of First-Time Admitted Heart Failure Patients Compared to Patients Treated in a Specialised Heart Failure Unit

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Purpose Many studies have proven the efficiency of specialised heart failure (HF) care. The purpose of this study is to characterise the population of HF patients continually cared for in a specialised HF outpatient unit compared to HF patients admitted for the first time in a clinical setting.

Methods We compared 273 of our regular HF patients (group 1) to 111 newly admitted patients (group 2). We therefore performed

patient interviews to assess NYHA functional class, evaluate the medication therapy and determine patients' awareness of prescribed drugs. A blood sample was drawn to quantify NT-BNP. Quality of life was measured using the Minnesota-Living-with-HF-Questionnaire (MLHQ). Follow-up was performed, for 4.5 months on average, to assess the rate of unplanned cardiovascular hospitalisation and mortality.

Results Comparing the groups, we found that they did not differ in age, gender, history of hypertension and CAD. We detected significant differences in clinical markers such as NYHA functional class ($p < 0.005$), quality of life ($p < 0.005$), LVEF ($p < 0.05$) and NT-BNP (2190 ± 4610 in group 1 vs 3839 ± 5593 in group 2; $p < 0.005$). Patients of group 1 received significantly more frequently ACE-inhibitor, ARB, betablocker and aldosteron-agonist therapy ($p < 0.002$ for all). We found that only 22 % (vs group 1 73 %; $p < 0.0001$) of group 2 had a combination of betablocker and RAAS in a dosage of at least 50 % as recommended. Only 8 % (vs group 1 40 %; $p < 0.0001$) had a combination therapy of ACE-inhibitors, betablockers and ARBs as recommended by the ESC Guidelines. Moreover, we could reveal that patients in group 1 have a significantly higher awareness of their medication ($p < 0.0001$). Finally, we detected significantly better outcome in group 1: all-cause re-hospitalisation rate was 22 % compared to 33 % in group 2 ($p < 0.05$). Reason for re-admission was cardiovascular in 15 % vs 25 % ($p < 0.05$) and heart failure 10 % vs 19 % ($p < 0.05$ for group 1 vs group 2, respectively). Combined endpoints of unplanned cardiovascular hospitalisation and death as well as unplanned HF hospitalisation and death were lower in this group (11 vs 24 %; $p < 0.01$ and 9 vs 18 %; $p < 0.05$, respectively). This also held true in Kaplan-Meier analysis ($p < 0.005$; $p < 0.05$, respectively).

Conclusions Also, in a clinical setting we can show that patients cared for in a specialised HF outpatient department do have better drug therapy and compliance, which might explain their better clinical markers and short-term outcome.

IX-3

040

Chronic Neurological Disease and Medication May Predispose to Tako-Tsubo Syndrome

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Background The transient left apical ballooning syndrome ("Tako-Tsubo" cardiomyopathy) is characterized by transient wall-motion abnormalities involving the left ventricular apex and mid-ventricle in the absence of significant coronary artery disease. Clinical presentation typically includes acute chest pain, accompanied by ECG changes and elevation of cardiac markers. The pathogenesis of this syndrome is still unknown.

Methods We evaluated 16 consecutive patients (14 women, 2 men) with a mean age of 74 yrs (range 54–90) who were admitted with this syndrome in our department over the previous 3 years (July 2004–February 2007).

Results The main clinical presentation was chest pain in 13 (81 %), dyspnea in 2 (13 %), and hypotension in 1 patient (6 %). Triggering factors could be identified in six patients (38 %): emotional stress in 3 pts (18 %) and non-cardiac surgical procedures in another 3 patients (18 %). Workup of patient records revealed the presence of chronic neurological diseases in 6 patients (38 %) (Parkinson's Disease [$n = 3$], dementia [$n = 4$], depression [$n = 2$], Restless Legs Syndrome [$n = 1$]) and of chronic obstructive lung disease in 3 pts (14 %). Chronic medication included dopamine agonists in 3, antidepressant agents in 3, neuroleptic agents in 3 and benzodiazepines in 5 pts. Acute ST elevation was present in 10 pts (63 %) and ST/T wave alterations were seen in 5 pts (31 %). Four pts (25 %) initially presented with pathological Q-waves. In the sub-acute period, diffuse T-wave inversion developed in most pts (94 %). Cardiac markers were increased in all 16 pts. Left ventriculography and echocardiography demonstrated akinesia or hypokinesia of the left ven-

tricular apical and mid-ventricular segments and hypercontraction of the basal segments in all cases. Coronary angiography was completely normal in 10 pts (63 %), showed non-significant stenoses in 5 pts (31 %) and a significant midLAD lesion in 1 pt (7 %). Severe left ventricular dysfunction improved in all pts until discharge. No in-hospital death occurred.

Conclusion In our series of pts with "Tako-Tsubo" disease, we observed a high prevalence of chronic neurological disorders. Therefore, certain neurological conditions or specific neurological drugs may be involved in the pathogenesis of "Tako-Tsubo" syndrome.

IX-4

061

Is There a Relative Adrenal Insufficiency (RAI) in Patients with Cardiogenic Shock (CS)?

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Purpose It is well known that patients (pts) with septic shock exhibit RAI, and cortisol substitution has been shown to improve blood pressure and outcome. Because inflammation plays an important role in the development and outcome of CS, we investigated whether pts with CS have inadequate adrenal reserve, too.

Methods We measured serum cortisol levels before and 60 minutes after a 0.25 mg corticotropin stimulation test in 15 pts with CS following acute myocardial infarction (MI) and in a control group of 8 pts with uncomplicated MI on days 0, 1, 2, 3, 5, and 7 after onset of shock/MI. RAI was defined by an increase in serum cortisol levels in response to corticotropin of less than 9 µg/dl. Data were correlated to vasopressor need and interleukin (IL) levels (IL-1, IL-6, IL-8, IL-10).

Results Baseline cortisol levels in pts with CS were significantly higher than in control pts, especially on day 0 (35 ± 22 vs 15 ± 9 ; $p = 0.006$). In 5 CS pts, the test series were stopped on days 1 to 3 because the physician in charge started a therapy trial with hydrocortisone due to increasing vasopressor need. Three other pts died within the seven-day period. RAI was observed only on day 0 in 5 of 15 CS pts but in none of the control pts ($p = 0.06$). These CS pts with RAI had higher IL-6 and IL-10 levels at baseline (249.7 pg/ml [31.5–504.9] and 16.4 pg/ml [8.8–183.4]) than CS pts without RAI (8.4 pg/ml [2.7–43.1] and 0 [0–3.5]; $p = 0.045$ and $p = 0.007$, respectively) but the vasopressor need (average dose per hour over the first day and vasopressor need on study inclusion) was not significantly higher. In the following days, all CS pts – except one CS patient on day 3 – responded adequately to the corticotropin test. Of note, 4 of these 5 pts with RAI received cortisol substitution therapy based on clinical suspicion only.

Conclusion A subgroup of pts with CS exhibit RAI on day 0 of shock. This subgroup of pts might be identified based on higher IL-6 and IL-10 levels. Whether cortisol substitution is warranted in this subgroup of CS pts remains to be analysed.

IX-5

088

Urinary and Plasma NT-proBNP Levels Are Strong Predictors of Outcome in Patients With Chronic Heart Failure

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Background Recently, it has been shown that urinary NT-proBNP could be used in combination with plasma NT-proBNP to improve diagnosis of impaired left ventricular function. Moreover, urinary NT-proBNP levels showed accuracy for diagnosing heart failure comparable to plasma NT-proBNP levels. However, prognostic utility of urinary NT-proBNP levels has not been investigated so far.

Methods Using commercially available ELISA kits (Biomedica, Austria), we determined serum and urinary NT-proBNP levels in 75 patients with established chronic heart failure.

Results Twenty-four patients (32 %) died during a mean follow-up time of 559 ± 219 days. Both urinary and plasma NT-proBNP levels were significantly higher among patients who died compared to those who survived ($p < 0.0001$; respectively). In univariate and multivariate Cox-proportional hazard-regression analyses (adjusted for age, sex, etiology of heart failure, NYHA classes and LVEF), both urinary and plasma NT-proBNP levels were significant determinants of outcome. Stratification of our patients according to median plasma NT-proBNP and 75th percentile of urinary NT-proBNP levels revealed

that patients with elevated urinary and plasma NT-proBNP had markedly impaired survival with an overall mortality rate of 73 %. Patients with lower urinary or plasma NT-proBNP had a more benign outcome with respect to all-cause mortality (see Figure 6).

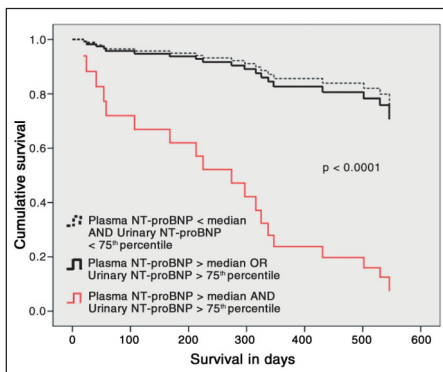


Figure 6: J. Cup et al.

Conclusion Higher levels of urinary NT-proBNP are strongly associated with survival of patients with chronic heart failure. This simple and non-invasive tool could be routinely used in combination with plasma NT-proBNP levels in order to identify patients with an unfavourable course of disease.

IX-6

107

Trends in Hospitalization Due to Congestive Heart Failure in Austria, 1990–2004

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Background and Aim Chronic Heart Failure (CHF) as a clinical syndrome represents a major public health problem in industrialized countries due to increasing costs and limited resources. Recurrent unplanned hospitalizations (hosps) are common and lead to premature death. Increasing life expectancy due to the improvement in management of coronary artery disease, acute myocardial infarction and arterial hypertension thereby have contributed to an increased number of patients (pts). Nearly 160,000 people in Austria have CHF and the incidence is increasing.

Methods Data acquired from the Austrian Department for Statistics between 1990 and 2004 from pts admitted to hospitals in Austria because of acutely decompensated heart failure (with the appropriate ICD-9 and -10 codes), frequency and in-hospital mortality were investigated. Patients below 55 years were excluded due to a low number of hosps. A total of 383,405 hospital discharges were included.

Results In 1990, a total of 22,702 hosps with the principal diagnosis of heart failure (HF) with an in-hospital mortality of 20 % were recorded. The highest number of 31,094 hosps was registered in 1999. Finally in 2004, 25,207 pts were admitted of whom 11 % died, resulting in an increase of 11 % hospital admissions and a 38 % reduction of in-hospital mortality during this 15-year period. Trends in age-specific rates of hospitalization per 100,000 population are given in Figure 7.

Conclusions Between 1990 and 2004, hospital admissions in Austria due to CHF remained high with a peak between 1997 and 2001. The increase of hosps especially in the elderly population

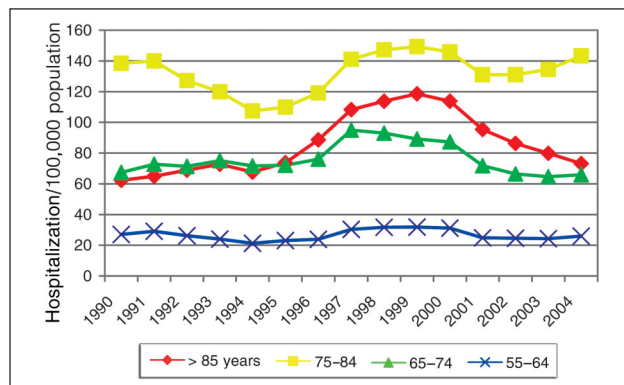


Figure 7: I. Kozanli et al.

(aged 75–84 years) and the reduction of in-hospital mortality reflects the improvement in acute cardiac care. These data support the necessity for better chronic care of HF pts. The extension of outpatient units and implementation of home-care projects will be mandatory, especially for elderly HF pts resulting in a better management of these high-risk/high-cost individuals.

IX-7

108

Long-Term Clinical Outcome in the Elderly After Hospitalisation Due to Congestive Heart Failure

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Purpose Patients with chronic heart failure (CHF) are at high risk for recurrent hospitalisations due to acute decompensated CHF with a significant reduction of quality of life, and even the mortality still remains high. Long-term outcomes concerning mortality and morbidity are often generated from large trials, where especially women and elderly patients are underrepresented.

Methods 104 consecutive patients (pts) hospitalised at our department with clinical signs and symptoms for heart failure between February and April 2002 were enrolled in the registry. There were no exclusions to participation. All patients were followed up prospectively.

Results We enrolled a rather elderly patient cohort with a mean age of 77.1 ± 11.6 years and 49 pts (47 %) were female. Forty-eight pts (46 %) were suffering from ischemic cardiomyopathy. Above two thirds of the pts had reduced renal function. In 34 %, the glomerular filtration rate (GFR), estimated with the Modification-of-Diet-in-Renal-Disease (MDRD) formulae, was < 60 ml/min and 30 % had a GFR < 45 ml/min. At discharge, 63 % received an angiotensin-converting enzyme inhibitor (ACE-I) or angiotensin receptor blocker (ARB), 41 % received digitalis, and 41 % received beta-blockers. Regularly, follow-up and adaptation of neurohumoral therapy by the general practitioner was recommended at discharge. In-hospital mortality was 7 %. All-cause mortality after a 55-month follow-up was 68 % (Figure 8).

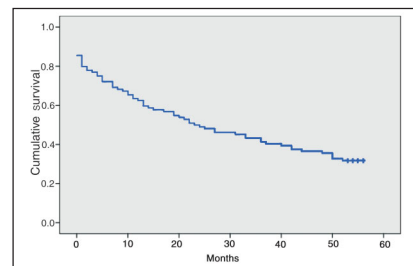


Figure 8: I. Kozanli et al.

Conclusions Long-term mortality was extremely high in this elderly pt cohort. Limiting factors for the prescription of ACE-I, ARB and BBL at discharge were advanced age of the pts and, moreover, reduced renal function. New treatments and specially trained HF nurses and new strategies of care (home nursing) are important contributions to decrease mortality and morbidity resulting in an increase of quality of life in this population.

Sitzung X – Interventionelle Kardiologie II

X-1

045

Single-Centre Analysis of a Randomized Trial Comparing PCI and CABG in Patients With Significant Three-Vessel and/or Left-Main Disease

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Background BARI and ARTS showed significant clinical improvement in patients with three-vessel disease after coronary artery bypass graft (CABG) when compared to balloon angioplasty and stenting, respectively. Thus, the aim of the SYNTAX trial is to compare the clinical outcome of PCI with drug-eluting stents and CABG in patients with three-vessel disease and/or left-main artery disease.

Methods Patients were randomized either to PCI with TAXUS[®]-Express² drug-eluting stent implantation or to CABG. From November 2005 on, 28 patients were randomized (15 allocated to PCI, 13 to CABG). Follow-up visits comprised clinical examinations, a specialized questionnaire and ECG; angiographic six-month follow-up was performed. MACE included death, myocardial infarction and re-intervention due to acute stent thrombosis or in-stent restenosis; MACCE also included cerebrovascular events.

Results Clinical six-month follow-up was available for 12 PCI and for 9 CABG patients. Severe adverse events were significantly more frequent in the PCI arm: MACE rates were 58 % (7/12) vs 0 % ($p = 0.003$) and MACCE rates were 58 % vs 11 % ($p = 0.027$). MACE contained two deaths (multiorgan failure and septic shock), two acute stent thromboses, one myocardial infarction and two in-stent restenoses. MACCE: 1 pt with intraoperative ophthalmic thrombosis (3-quadrant blindness) in the CABG group.

Conclusion Six-month follow-up in a single-centre population of patients with three-vessel and/or left-main diseases revealed significantly higher rates of severe adverse events (MACE, MACCE) in patients treated with drug-eluting stent PCI. These preliminary overall results should not make a definite statement of the SYNTAX trial: very careful selection and risk assessment of patients fulfilling the inclusion and exclusion criteria is indicated.

X-2

046

Case Report: Comparison of Optical Coherence Tomography with Intravascular Ultrasonic within a Venous Graft Stent

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Background 88-year-old man with st. p. CABG 1984 (3 venous grafts ad LAD, CX and RCA). Since September 2005, the patient suffered from CCS III and NYHA II. In February 2006, all venous grafts were totally occluded and the mid-CX had a 90 % stenosis. The LAD graft was revascularized with 4 CYPHER[®] stents. The CX was treated with a Yukon stent. Control angiography was performed in January 2007 to evidence if clopidogrel needed to be continued (knee prosthesis surgery was planned).

Methods Optical Coherence Tomography (OCT) is a novel method to image coronary arteries. With resolution of 10–15 μm it can image up to a depth of 1 mm. In contrast, Intravascular Ultrasonic (IVUS) works with a resolution of 100–150 μm within a depth of about 3 mm.

Results During follow-up angiography, OCT and IVUS examinations were performed within the LAD graft. The OCT images distinctly pictured stents that were unfortunately not butted against the vessel wall. This, however, was not clearly imaged by the IVUS.

Conclusion The resolving capacity and image quality of OCT is superior to IVUS for imaging the interventional outcome after stent placement. Because of the OCT images the cardiologist decided to continue clopidogrel. However, knee surgery is absolutely necessary and will be performed under special-care conditions.

X-3

056

Single-Centre Experience of Optical Coherence Tomography (OCT) in Coronary Arteries

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Background Optical Coherence Tomography (OCT) is used to image coronary stents during control angiography 6 months after stent implantation. This new technique allows the measurement and quantification of intimal hyperplasia in stents and the evaluation of stent strut apposition. During OCT examinations, we recognized a variety of transient ECG changes and AP symptoms.

Methods The OCT examination is started by placing the balloon catheter („over-the-wire technique“) about 10 mm distal to the stent. After wire removal, the image wire is placed distal to the balloon. Then the balloon is withdrawn to a position proximal to the stent. The distance between the balloon and the image-wire tip should be at least 45 mm. While the nurse inflates the balloon, the interventionist flushes the artery to wash the blood away. As soon as the whole vessel lumen is clear pullback can be started (30 mm with 0.5–2 mm/sec).

Results 23 patients received an OCT. In 16 cases, ECG was recorded: 11 ECG showed transient ST elevations or negative T-waves. In 17 cases, we used 2 $\times$ 20 ml ambient temperature NaCl as flush medium, 83 % showed ECG changes. In the last 6 cases, 37 °C warm Ringer Lactate was flushed, only 50 % had ECG signs of ischemia. All ECG changes were reversible within 10 seconds. Six patients out of 23 had AP symptoms.

Conclusion After changing the flushing medium from NaCl to Ringer Lactate, we had less patients with ECG changes. Transient periprocedural ischemia is reversible. The great value of this new method is the imaging of stent strut apposition and intimal healing responses.

X-4

066

Zehn Jahre Karotisintervention am AKH Linz

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Hintergrund Der Karotisstent hat sich in den vergangenen Jahren zu einer etablierten Alternative zur chirurgischen Endarterektomie entwickelt. Ein großer Vorteil liegt dabei in der Behandlung von Risikopatienten.

Methode Zwischen November 1997 und März 2007 wurde bei 779 Patienten (P) (259 weiblich, 520 männlich) eine Revaskularisation der Arteria carotis interna mittels Stentimplantation durchgeführt. Die Indikationsstellung erfolgte bei symptomatischen Patienten ab einem Stenosegrad von $> 60\%$ und bei asymptomatischen Patienten $> 80\%$. Klinisch-neurologisch symptomatisch waren 380 (48 %) P. Ein kontralateraler Verschluss lag bei 75 (10 %) vor, bei 34 (4 %) P handelte es sich um eine Restenose nach chirurgischer Endarterektomie. In 106 (14 %) P lag zusätzlich eine interventionsbedürftige koronare Herzkrankheit vor.

Ergebnisse Insgesamt konnten 786 von 803 Stenosen (98 %) erfolgreich gestenotet werden. Der mittlere Stenosegrad wurde von 85 ± 10 auf $3,5 \pm 7$ reduziert. Bei 24 (3 %) P wurde ein kombinierter Eingriff mit Intervention in beiden Karotiden durchgeführt. Schwere neurologische Komplikationen traten bei 18 P (2,3 %) auf (3 Todesfälle, 8 Major Strokes, 7 Minor Strokes). Der Nachbeobachtungs-

zeitraum betrug im Mittel 28 ± 23 Monate (1–101). Die Patienten wurden nach der Intervention klinisch, neurologisch und dopplersonographisch im Abstand von 1, 3 und 6 Monaten und dann in halbjährlichen Intervallen nachuntersucht. Im Follow-up verstarben 53 P an kardialer Ursache (6,8 %). An neurologischen Komplikationen traten 5 Minor Strokes sowie 1 Major Stroke auf (0,7 %). Dopplersonographisch wurden insgesamt 57 asymptomatische Restenosen (6 %) beobachtet, von denen 33 (4,2 %) neuerlich dilatiert bzw. gestentet wurden.

Zusammenfassung Die perkutane Stentrevaskularisation von Carotis interna-Stenosen kann in spezialisierten Zentren mit hohen Erfolgsraten (98 %) und mit der Karotischirurgie vergleichbaren Komplikationsraten (2,3 %) durchgeführt werden. Die Restenose-rate ist mit 6 % gering.

X-5

069

Die Assoziation zwischen N-terminalem pro B-Typ natriuretischem Peptid und dem koronarangiographischen Schweregrad einer stabilen koronaren Herzkrankheit ist schwach

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Wir untersuchten die Assoziation zwischen N-terminalem pro B-Typ natriuretischem Peptid (NT-proBNP) und dem Schweregrad einer stabilen koronaren Herzkrankheit (KHK) bei 848 konsekutiven Patienten ohne bisherigen Myokardinfarkt (561 Männer, 287 Frauen; Alter 20–86, Median: 65 Jahre), die aufgrund eines klinischen Verdachts auf das Vorhandensein einer KHK zur Koronarangiographie (CAG) zugewiesen wurden. Als hämodynamisch wirksame KHK wurde eine Stenose $> 70\%$ in mindestens einem der drei Hauptgefäße definiert. Je nach Anzahl der stenosierte Gefäße wurden Veränderungen als Ein-, Zwei- oder Dreifäßerkrankungen klassifiziert. Die NT-proBNP-Bestimmung wurde aus Heparinplasma mit dem Elecsys®-Test (Roche Diagnostics) durchgeführt. Die Blutproben wurden jeweils am Vortag der CAG routinemäßig abgenommen. Nur Patienten mit einer Dreifäßerkrankung zeigten verglichen mit den anderen Gruppen signifikant höhere NT-proBNP-Konzentrationen. In einem multiplen linearen Regressionsmodell zeigten nur das Alter ($p < 0,001$), erniedrigte Ejektionsfraktion ($p < 0,001$), hochsensitives C-reaktives Protein ($p = 0,001$), abnormes Ruhe-EKG ($p = 0,002$), die Hämoglobinkonzentration ($p = 0,006$) und eine errechnete glomeruläre Filtrationsrate < 60 ml/min/m² ($p = 0,016$) einen signifikanten Einfluß auf die NT-proBNP-Konzentration. Dieses Modell konnte 53 % der Variabilität der NT-proBNP-Werte vorhersagen. Der Schweregrad der KHK war kein unabhängiges Vorhersagemerkmal. Durch das hohe mittlere Alter der Studienpopulation hatte vermutlich das Geschlecht keinen signifikanten Einfluß auf die NT-proBNP-Konzentration. Zusammenfassend fanden wir eine schwache und nicht unabhängige Assoziation zwischen NT-proBNP und dem Schweregrad der KHK. NT-proBNP ist kein geeigneter Screeningtest, um das Vorliegen von wirksamen Koronararterienstenosen vorherzusagen.

X-6

072

Quantitative Evaluation of the Global and Segmental Left Ventricular Function of NOGA Mapping-Derived Ventriculography Using the Centerline Method in Patients with Cardiac Stem Cell Therapy

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Purpose The aim of our study was to validate global and segmental NOGA mapping-derived ventriculography assessed by centerline method of the usual contrast ventriculography and to compare with

99m-Tc-MIBI-gated perfusion scintigraphy in patients undergoing cardiac stem cell therapy.

Methods Patients (55 ± 20 years, 100 % male) with ischemic cardiomyopathy and moderate-to-severe left ventricular systolic dysfunction were treated with NOGA-guided intramyocardial and intracoronary injections of autologous bone marrow-derived stem cells. All patients underwent stress- and rest-gated MIBI perfusion scintigraphy and diagnostic NOGA mapping before and 6.0 ± 1.8 months after cardiac stem cell implantations. Baseline and follow-up (FUP) NOGA maps were filtered using automatic moderate and internal point filters. NOGA mapping-derived end-diastolic and end-systolic contours of the left ventricle in right and left anterior oblique projections (RAO 30° and LAO 60°) were transferred to the usual quantitative ventriculography program. End-diastolic and end-systolic volumes (EDV, ESV), global ejection fractions (EF) and the extent of the local segmental wall motion abnormalities were measured using the centerline method and were compared with the resting-gated scintigraphy-derived ventricular wall motion values.

Results Trend towards improvement of the global left ventricular EF was measured both in NOGA-derived ventriculography (from $29.6 \pm 8.0\%$ to $32.44 \pm 9.5\%$) and gated MIBI scintigraphy (from $32.7 \pm 11.0\%$ to $35.2 \pm 11.2\%$) at FUP without reaching significance. NOGA-derived ventriculography correlated significantly with gated MIBI scintigraphy as regards the global left ventricular EF at baseline ($r = 0.62$, $p = 0.03$) and at FUP ($r = 0.60$, $p = 0.04$), EDV at baseline ($r = 0.91$, $p < 0.001$) and FUP ($r = 0.79$, $p = 0.001$), the extent of the segmental wall motion abnormalities at baseline ($r = 0.55$, $p = n.s.$) and at FUP ($r = 0.80$, $p = 0.054$) did not significantly correlate.

Conclusions NOGA-derived ventriculography proved to be a reliable method for quantitative analysis of the segmental and global left ventricular function by using the usual centerline method, after appropriate filtering of NOGA mapping in patients undergoing cardiac stem cell therapy. No significant correlation was observed between NOGA ventriculography and gated MIBI scintigraphy as regards the extent of the segmental wall motion abnormality, probably due to the diffuse wall motion abnormalities in patients with severe ischemic cardiomyopathy.

Sitzung XI – Interventionelle Kardiologie III

XI-1

064

Influence of Age and Renal Dysfunction in Patients with NSTEMI-ACS on Short- and Long-Term Mortality According to Early Conservative vs Early Invasive Treatment

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Background and Aim Although early invasive strategy has been recommended in recent guidelines for the treatment of patients with non-ST-segment elevation acute coronary syndrome (NSTEMI-ACS) in a majority of elderly patients as well as for patients with kidney dysfunction, invasive treatment is withheld due to expected high risk of bleeding and further impairment of renal function. It was the aim of this retrospective analysis to compare clinical outcomes in these high-risk groups with respect to early conservative or early invasive treatment.

Methods In a systematic retrospective review of clinical records, data on 452 consecutive NSTEMI-ACS patients with one or both high-risk features (age > 75 , creatinine clearance < 60 ml/min) admitted to our department between January 2001 and December 2004 were analyzed. Primary endpoints were in-hospital and 1-year mortality.

Results Of all patients included, 27.2 % were treated invasively during index hospitalization. In-hospital mortality was 14.0 % in conservatively treated patients, while it was 4.9 % in the invasive

group ($p = 0.007$). The benefit of an early invasive approach was even more distinctive at one year (14.6 vs 38.0 %; $p < 0.001$). Clinical outcome of subgroups of patients > 75 years ($n = 128$; group A), patients showing a creatinine clearance < 60 ml/min ($n = 89$; group B) and patients showing both high-risk features ($n = 235$; group C) revealed the results listed in the table. Intervention rates varied between subgroups, although they did not reach significance (A: 28.1 %, B: 36 %, C: 23.4 %; $p = 0.074$) (Table 4).

Table 4: B. Vogel et al.

	A	B	C	p-value
In-hospital mortality (%)				
Conservative	13.0	14.0	14.4	0.951
Invasive	0.0	6.3	7.3	0.265
p-value	0.023	0.264	0.163	
1-year mortality (%)				
Conservative	32.6	28.1	43.9	0.043
Invasive	1.8	6.3	23.6	0.039
p-value	0.005	0.014	0.007	

Conclusion The rate of intervention is still very low in elderly patients and in patients with reduced renal function. Our data show a significant benefit of early invasive strategy in these high-risk patients at least in terms of long-term mortality. Accordingly, more of these high-risk patients should undergo early invasive treatment.

XI-2

075

Coronary In-Stent Restenosis of Drug-Eluting Stents is Associated with Serum Levels of MMP-Nine

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Background Percutaneous coronary intervention (PCI) represents the most important treatment modality of coronary artery stenosis today. Although the introduction of drug-eluting stents (DES) dramatically reduced in-stent restenosis (ISR) it still plays a significant role in the long-term outcome after PCI. This study aimed to evaluate if serum levels of matrix metalloproteinase-9 (MMP-9) are associated with the development of ISR after implantation of DES.

Methods We studied 85 patients. Blood samples were taken directly before and 24 hours after PCI with DES implantation. Serum levels of MMP-9 antigen and MMP-9 activity were measured by specific ELISA. Restenosis was evaluated at 6 to 8 months by coronary angiography.

Results During the follow-up period, 2 patients (2.7 %) died of cardiovascular causes and 12 patients (16 %) developed ISR. PCI significantly increased MMP-9 antigen and activity levels ($p < 0.0001$). Patients with ISR at follow-up showed significantly higher MMP-9 activity levels at baseline (34 ± 15 vs 23 ± 10 ng/mL; $p < 0.01$) and 24 hours after PCI (56 ± 30 vs 29 ± 15 ng/mL). Patients in the highest quartile before and after PCI showed a 7.5- (1.9–30) and 8.8- (2.1–37) fold risk for the development of restenosis, respectively. This was independent of stent diameter, stent length, type of stent, number of stents, stented vessel as well as presence of diabetes.

Conclusion The occurrence of ISR was significantly associated with MMP-9 activity before and after placement of DES. As MMP-9 may play a role in the pathogenesis of ISR, determination of MMP-9 serum levels might be helpful in the identification of patients with high risk for development of ISR after DES implantation.

XI-3

085

NT-proBNP Levels in Relation to Coronary Interventions in Patients With Cardiogenic Shock

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Introduction Early coronary revascularization significantly improves 6-month and 1-year survival of patients with cardiogenic shock. In the present study, we aimed to investigate whether extent of NT-proBNP elevation in shock is related to 30-day outcome in the era of coronary revascularization.

Methods NT-proBNP (Roche Diagnostics, Vienna, Austria) levels were measured in 82 patients with cardiogenic shock due to acute myocardial infarction. Seventy-three percent of these patients had successful coronary revascularization.

Results NT-proBNP levels at admission were predictive of 30-day mortality. Patients with successful revascularization had significantly lower 30-day mortality than patients without ($p = 0.02$). However, patients with very high admission NT-proBNP levels had impaired clinical course despite successful procedure, whereas survival of patients with lower NT-proBNP levels was substantially better (Figure 9). Moreover, further increase in NT-proBNP after revascularization denoted disease progression with significantly higher 30-day mortality.

Conclusion Early determination of NT-proBNP might help identify those patients in whom early revascularization could improve 30-day outcome.

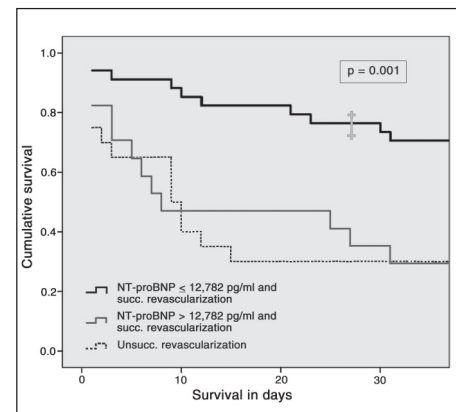


Figure 9: R. Jarai et al.

XI-4

095

Traditionelle Koronarangiographie im Vergleich zur Rotationsangiographie unter den Aspekten Sicherheit und Wirtschaftlichkeit

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Die Anzahl der röntgenbasierten Gefäßinterventionen steigt rapide. In den vergangenen zwei Jahrzehnten hat sich die perkutane Koronarintervention zur häufigsten Revaskularisationsmethode entwickelt. Die traditionelle Koronarangiographie (t-CAG) umfaßt die Gefäßanatomie mit zumindest 3 Standardprojektionen (LCA – LAO/RAO). Die Rotationsangiographie (RA) und optionale 3D-Koronarrekonstruktion sind zwei neue Technologien, die alternativ oder ergänzend eingesetzt und zur Darstellung des Stenosegrades, der Läsionslänge und der Plaquemorphologie angewandt werden.

Die Untersuchungen wurden mit der Allura Xper FD 10 (Philips) mit einer Bogengeschwindigkeit von 55 °/sec über einen Sektorwinkel von 120 Grad und einem standardisierten FD-Abstand (105 cm) aufgezeichnet.

Nachdem immer mehr nichtinvasive Techniken (Cardio-CT, MR) an Bedeutung gewinnen, wurde in einer seriellen Untersuchungsreihe des linken Kranzgefäßsystems die t-CAG mit der RA im Hinblick auf Sicherheit (Röntgenstrahlung) und Kosten (Kontrastmit-

telmenge, Zeit) verglichen. Gemessen wurde die Hautstrahlungsdosis in 60 cm Entfernung vom Röntgenfokus (Airkerma/AK in MilliGray [mGy]) mit einem 0,9 mm Kupfer-Spektralfilter unter Berücksichtigung von Körpergröße und Gewicht (BMI).

Ergebnisse Die AK-Werte in mGy sind unter der Rotationsangiographie signifikant niedriger als bei der traditionellen Koronarangiographie mit 3 Fixprojektionen (1× RAO, 2× LAO). Signifikanz: $p < 0,003$. Interessant ist auch, daß AK mit dem BMI signifikant positiv in der CAG-Gruppe korreliert, d. h. ein höherer BMI mit einem höheren AK einhergeht. In der RA-Gruppe konnte dieser Zusammenhang nicht bestätigt werden. Ein weiterer signifikanter Unterschied ergab sich auch in der verwendeten Kontrastmittelmenge zugunsten der RA. Der Faktor Zeit war in beiden Gruppen nicht wesentlich unterschiedlich.

Zusammenfassung Die Rotationsangiographie mit einer isozentrischen Rotation des C-Arms erfaßt 120 verschiedene Bilder des Kranzgefäßsystems in einem Zeitraum von ca. 4 Sekunden und zeigt einen statistisch signifikanten Vorteil bezüglich Strahlungsbelastung und der verwendeten Kontrastmittelmenge im Vergleich zur traditionellen Koronarangiographie bei einer untersucherunabhängigen Akquisition der angiographischen Daten.

XI-5

096

Cost-Effectiveness of the Percutaneous Treatment Strategy of Multivessel Disease with TAXUS® Stents in Comparison With Bypass Surgery

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Purpose The aim of the present study was to analyze the cost-effectiveness of multiple stenting with solely drug-eluting stents (TAXUS®) compared to coronary bypass surgery in patients with multivessel coronary artery disease included in the Austrian Multicenter Taxus Multivessel Registry in a real-world setting.

Methods A prospective economic evaluation was performed among consecutively included 204 patients undergoing percutaneous coronary intervention (PCI) with TAXUS® stents (n = 112) or coronary bypass surgery (CABG) (n = 92) during a predefined time interval (June 2004 to June 2005). Clinical outcomes, resource use and costs were assessed prospectively for all patients over a 1-year follow-up period. The total costs (from a societal perspective) included the primary costs of PCI or CABG, mandatory clinical and angiographic controls and treatments. The primary endpoint was cost-effectiveness after 1 year, with effectiveness defined as reduction of major adverse cardiac and cerebrovascular events (MACCE).

Results Patient demographics were comparable between the PCI and the CABG groups. The average number of treated vessels was 2.63 ± 0.49 in the PCI and 2.66 ± 1.3 in the CABG group (non-significant). An average of 3.3 ± 2.7 TAXUS® stents were implanted during index PCI. Clinically driven control coronary angiography and target vessel re-interventions were performed in 28.6 vs 8.7 % ($p < 0.001$) and 11.5 vs 4.3 % ($p = 0.064$) in the PCI vs the CABG group, respectively. A trend towards a higher rate of periprocedural myocardial infarction (0.9 vs 3.2 %; $p = 0.222$) was observed in the CABG group, while stroke (0 vs 1.1 %; $p = 0.267$) and 1-year mortality (5.3 vs 5.4 %; $p = 0.971$) were similar in the PCI vs the CABG group. The incidence of composite MACCE at one year did not differ between the groups (17.5 vs 14.0 % in patients with TAXUS® vs CABG; $p = 0.486$). The initial costs were € 11,512 ± 6369 in PCI and € 16,552 ± 10,322 in the CABG group ($p < 0.001$). Total costs at 1 year including all treatments of MACCE and clinical and angiographic controls were € 13,095 ± 6619 in PCI and € 20,952 ± 15,967 in the CABG group ($p < 0.001$).

Conclusions Multivessel treatment with TAXUS® stents in a real-world setting led to a similar reduction of the composite MACCE as CABG while the expected higher coronary re-intervention rate in the PCI group increased the 1-year costs only moderately.

XI-6

103

Anemia and Renal Insufficiency Independently Predict Adverse Events After Carotid Stenting: A Long-Term Cohort Study

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Purpose Anemia and renal insufficiency are associated with cardiovascular disease. Prior studies have shown that they are also related to increased risk after coronary interventions. We evaluated whether anemia and renal insufficiency predict long-term outcome after carotid stenting.

Methods We collected clinical and outcome data of 532 patients undergoing carotid stenting (median age: 71.0 yrs, IQR: 63.5–76.5 yrs, 67 % male). Anemia was defined on the basis of preprocedural hemoglobin (Hb) levels (g/l) as absent (> 12), mild (10–12) and severe (< 10). Renal insufficiency was defined by a preprocedural glomerular filtration rate of < 30 ml/min calculated with the Cockcroft-Gault formula. The primary combined endpoint (n = 100) including stroke, myocardial infarction and all-cause mortality was observed during a median follow-up of 28 months (IQR: 14–49 months).

Results Three-year event-free survival in patients with mild and severe anemia was 64 % and 22 %, respectively, compared to 87 % in patients without anemia. After controlling for baseline characteristics, cardiovascular risk factors and lesion-related variable event rates remained significantly higher in patients with mild (adjusted hazard ratio [HR]: 2.4, 95 %-CI: 1.4–4.1) and severe anemia (adjusted HR: 3.2, 95 %-CI: 1.4–8.2) compared to non-anemic patients ($p = 0.009$). Three-year event-free survival in patients with renal insufficiency was 79 % compared to 87 % in those without renal insufficiency. Adjusted HR in patients with renal insufficiency was 1.7 (95 %-CI: 1.0–2.8; $p = 0.03$). No interaction was found between the effects of anemia and renal insufficiency on event-free survival.

Conclusion Anemia and renal insufficiency are independently associated with an increased long-term risk of adverse events after carotid stenting with the highest risk in patients with severe anemia.

Sitzung XII – Pulmonale Hypertension/Vitien

XII-1

052

Abnormal Hemodynamic Response to Exercise in Patients After Successful Pulmonary Endarterectomy

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Background Pulmonary endarterectomy (PEA) provides potential cure for patients with chronic thromboembolic pulmonary hypertension (CTEPH). Successfully operated patients have been shown to normalize exercise capacity and hemodynamic parameters in long-term studies. The aim of the present study was to investigate whether pulmonary hypertension can be provoked by exercise in CTEPH patients at least one year after successful PEA.

Methods 13 successfully operated CTEPH patients and 6 age-matched controls without pulmonary arterial hypertension underwent right-heart catheterization at rest and after 10 minutes of submaximal supine bicycle exercise. Hemodynamic parameters and invasively measured systemic blood pressure were recorded. Between-group differences were compared utilizing an unpaired t-test. P -value < 0.05 was considered statistically significant.

Results There were no differences between patients and controls with respect to resting hemodynamic parameters. However, after 10 min-

utes of sub-maximal exercise – as a physiological reaction – mean pulmonary vascular resistance dropped in control subjects (-38.8 ± 26.4 dynes $\times$ s $\times$ cm $^{-5}$), but increased in CTEPH patients ($+4.9 \pm 32.1$ dynes $\times$ s $\times$ cm $^{-5}$; $p = 0.01$). Accordingly, a more pronounced increase in mean pulmonary arterial pressure was measured in CTEPH patients ($+11.9 \pm 5.9$ mmHg) as compared to controls ($+5.0 \pm 4.9$ mmHg; $p = 0.024$).

Conclusions CTEPH patients after successful PEA demonstrate an abnormal hemodynamic response to exercise. There is a need for studies to investigate whether symptomatic CTEPH patients would benefit from vasodilator therapies.

XII-2

053

The Value of Electrocardiography in the Diagnosis of Pulmonary Hypertension

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Background Current diagnosis guidelines for precapillary pulmonary hypertension (PH) recommend invasive hemodynamic evaluation of patients with echocardiographic systolic pulmonary pressures (sPAP) ≥ 36 mmHg. The growing awareness for PH, a high prevalence of postcapillary PH and the inability to discern between pre- and postcapillary PH by transthoracic echocardiography (TTE) have led to an excessive amount of invasive hemodynamic measurements in unaffected individuals. The aim of the present study was to test the ability of conventional 12-lead electrocardiography (ECG) to discriminate between pre- and postcapillary PH in a preselected patient population with clinical and TTE suspicion of PH.

Methods This was a retrospective study performed at a high-volume tertiary referral center for PH. Admission ECGs of 49 patients were analyzed by two cardiologists blinded to TTE and hemodynamic parameters. The diagnostic value of ECG findings compatible with precapillary PH was evaluated, such as (1) R/S ratio in V₁, (2) QRS axis, (3) QRS duration, (4) right ventricular strain (RVS) defined as negative T-wave in V₂ and V₃, (5) P-wave amplitude, (6) right-bundle branch block (RBBB) and (7) P-wave axis. Sensitivity, specificity and Youden's Index (YI) (sensitivity + specificity – 1) for measuring the performance of diagnostic tests were calculated.

Results In a multivariate analysis, only sPAP ($p < 0.0001$), RVS ($p \leq 0.0001$) and RBBB ($p = 0.006$) remained independent predictors of precapillary PH. The presence of RVS or RBBB was highly predictive for the presence of precapillary PH (96 % or 100 %, respectively). Both parameters displayed low negative predictive values (56 % and 43 %). When combining the diagnostic performance of TTE-sPAP (YI 0.65) with RVS (YI 0.61) the index improved to 0.77 (Table 5).

Table 5: A. Martischinig et al.

Parameter	Sensitivity	Specificity	Youden's Index
sPAP > 60 mmHg	0.79	0.86	0.65
Right bundle branch block (RBBB)	0.41	1.00	0.41
Right ventricular strain (RVS)	0.68	0.94	0.61
sPAP > 60 mmHg or RBBB	0.84	0.86	0.70
sPAP > 60 mmHg or RVS	0.91	0.86	0.77
sPAP > 60 mmHg or RBBB or RVS	0.91	0.86	0.77

Conclusions In contrast to the current perception that ECG is not a valuable diagnostic tool in PH, our data suggest that the synergistic use of TTE and ECG in a preselected patient population provides incremental diagnostic information compared with either method alone.

XII-3

086

Exercise Stress Echocardiography for Screening of Patients at Risk for Pulmonary Arterial Hypertension

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Background Pulmonary arterial hypertension (PAH) is frequently associated with collagen vascular diseases and portal hypertension. Unfortunately, PAH often remains unrecognized over years and may finally lead to right heart failure. In the early stage of the disease, no significant changes may be observed at rest, however, remodeling of small pulmonary arteries leads to insufficient vasodilatation and elevated pulmonary artery pressure during exercise. To assess pulmonary artery pressure non-invasively during exercise, we performed exercise stress echocardiography in patients at risk for PAH.

Patients and Methods We examined 48 patients (13 male [27 %], 35 female [73 %]; mean age 54 ± 13 years) with systemic sclerosis, CREST syndrome, systemic lupus erythematosus and liver cirrhosis, respectively. All patients underwent transthoracic echocardiography at rest and during exercise as well as cardiopulmonary exercise test. Estimated systolic pulmonary artery pressure (SPAP) was calculated from peak tricuspid regurgitant flow velocity using the simplified Bernoulli equation. In patients with an estimated SPAP > 40 mmHg at rest or exercise, right heart catheterisation (RHC) was recommended.

Results Of these 48 patients, 29 (60 %) had a normal SPAP at rest and during exercise (22 ± 2 and 28 ± 6 mmHg, respectively). In 1 patient, SPAP was already elevated at rest (54 mmHg), which could be confirmed by RHC (SPAP 44 mmHg). 18 patients (38 %) had a normal SPAP at rest (27 ± 5 mmHg) but elevated SPAP during exercise (55 ± 8 mmHg). Of these 18 patients, 8 have undergone RHC so far. These examinations revealed 1 patient with elevated SPAP already at rest (47 mmHg), while estimated SPAP by echocardiography was 29 mmHg in this particular patient. In 6 patients, exercise caused elevation of SPAP (26 ± 4 vs 56 ± 16 mmHg) as predicted by echocardiography (29 ± 5 vs 59 ± 9 mmHg). 1 patient was found with normal SPAP at rest as well as during exercise (21 and 28 mmHg, respectively), while estimated SPAP by echocardiography was 33 and 66 mmHg, respectively.

Conclusion In patients at risk for PAH, exercise stress echocardiography seems to be able to identify the disease at a very early stage. RHC confirmed exercise-induced elevation of pulmonary artery pressure in 7 of 8 patients (87.5 %). Whether these preliminary results can also be shown in a larger patient cohort is under investigation now in our ongoing screening program. Exercise stress echocardiography might become a key screening tool for early diagnosis of PAH.

XII-4

111

Asymmetric Dimethylarginine in Chronic Thromboembolic Pulmonary Hypertension

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Rationale Asymmetric dimethylarginine (ADMA), a potent endogenous nitric oxide synthase (NOS) inhibitor, is increased in idiopathic pulmonary hypertension (iPAH) and associated with unfavorable outcome.

Objectives Chronic major-vessel thromboembolic pulmonary hypertension (CTEPH), though principally amenable to surgical removal of major pulmonary arterial obstructions by pulmonary endarterectomy (PEA), may show a small-vessel pulmonary arteriopathy similar to iPAH. We hypothesized that ADMA plasma levels are increased in patients with CTEPH.

Measurements and Main Results We measured ADMA by high-performance liquid chromatography in 135 patients with CTEPH at the time of diagnosis. Operability was based on the relationship between most proximal thrombus and the magnitude of hemodynamic impairment. ADMA plasma levels were significantly elevated in patients, compared with 40 age- and sex-matched controls (0.62 [0.51–0.73] vs 0.51 [0.45–0.6 $\mu\text{mol/l}$]; $p = 0.0002$). ADMA plasma concentrations correlated with baseline mixed venous saturation ($r = -0.25$; $p = 0.005$), right atrial pressure ($r = 0.35$; $p < 0.0001$), and cardiac index ($r = -0.21$; $p = 0.01$). After 11 ± 20 months, 69 patients had undergone PEA and 66 remained unoperated. Patients who were later operated demonstrated lower ADMA levels than patients not undergoing surgery (0.60 [0.5–0.68] vs 0.63 [0.53–0.85 $\mu\text{mol/l}$]; $p = 0.02$). 12 ± 1 months after PEA, ADMA plasma levels had decreased ($p = 0.02$). Survival of patients with above-median ADMA plasma levels (0.60 $\mu\text{mol/l}$) was worse than in patients with below-median levels ($p < 0.0001$).

Conclusions ADMA plasma levels correlate with the severity of pulmonary hypertension and predict outcome in CTEPH patients. Measurement of ADMA plasma levels may be useful for estimating the degree of small-vessel arteriopathy in CTEPH.

XII-5

112

Platelet Function in Chronic Thromboembolic Pulmonary Hypertension

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Background Chronic thromboembolic pulmonary hypertension (CTEPH) is caused by thrombotic obstruction of pulmonary arteries. The role of platelets in the pathogenesis of CTEPH is unknown.

Patients and Methods Because circulating heterotypic aggregates between monocytes and platelets (MPA) and platelets and leukocytes (LPA) represent reliable markers of platelet activation in vivo, we investigated MPA by FACS in 13 patients (pts) with CTEPH (median age [interquartile range]: 59 [43–72]) at the time of diagnosis, when patients were off anticoagulation. Thirteen matched healthy volunteers served as controls (ctrls).

Results MPA formation measured by CD14⁺/CD41⁺% (CTEPH: 65.28 [39.92–90.97] vs ctrls 25.92 [2.46–36.39]; $p < 0.05$) and PLA formation assessed by co-expression of CD45⁺/CD41⁺% (median [interquartile range]; CTEPH: 12.96 [6.43–22.44] vs ctrls 6.61 [1.02–10.02]; $p < 0.05$) were significantly higher in patients with CTEPH. After activation with thrombin receptor-activating peptide-6 (TRAP) MPA (CD14⁺/CD41⁺%; 93.30 [65.72–98.79] vs ctrls 69.92 [26.18–96.95]; $p < 0.05$) and PLA (CD45⁺/CD41⁺%; 33.34 [17.40–41.86] vs ctrls 16.26 [3.02–32.42]; $p < 0.05$) were increased in CTEPH. In addition, platelet surface coverage and average size of aggregates measured by the cone and platelet analyser Impact R (CPA) were significantly higher in CTEPH pts (SC%, 12 [1.2–18]; AC μm^2 , 52 [25–125]) than in ctrls (SC%, 9 [4.8–20]; AC μm^2 , 34 [21–137]; $p < 0.05$).

Conclusion In stable pts with CTEPH, functional platelet tests revealed a state of activation. Further experiments are directed at the understanding of how activated platelets contribute to a failure of thrombus resolution.

XII-6

011

Left Atrial Appendage and Patent Foramen Ovale Closure for Prevention of Embolism: Harm or Benefit?

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Background Closure of the left atrial appendage (LAA) in atrial fibrillation and patent foramen ovale (PFO) in suspected paradoxical embolism has been suggested to prevent embolic events. These procedures are invasive and their benefits have not been proven by prospective randomized trials. The aim of this study was to summarize

potential complications of either surgical or interventional LAA and PFO closure.

Methods and Results Data of patients who had undergone LAA or PFO closure, either surgically or interventional, were collected in 2 hospitals from 2 countries. All closing procedures had been performed in highly experienced heart centers.

Hazards of surgical LAA closure comprised incomplete occlusion as assessed by TEE in 5/6 (83 %) patients, new thrombus formation despite adequate anticoagulation in 2/6 (33 %) and stroke in 1/6 (17 %) patients. Interventional LAA closure by the PLAATO device resulted in incomplete occlusion with persistent flow around and an emboligenic milieu behind the device in 1 patient. Implantation of a Watchman device in a 78-year old, previously healthy male lead to device embolization, entrapment within the aortic cusps, emergency cardiac surgery, aortic valve replacement and postoperative need for pacemaker implantation.

Surgical PFO closure showed residual shunting in 8/11 (73 %) consecutive patients when investigated prospectively by TEE. Interventional PFO closure by Amplatzer occluder in 1 patient lead to thrombosis on the left side of the occluder 61 months later with cerebral and peripheral embolism. Pericardial tamponade occurred 23 months after Amplatzer-device implantation in an additional patient necessitating emergency pericardiocentesis. The presumed mechanism was perforation of the left atrial roof or arrosion of the aortic wall by migration of the device.

Conclusion LAA and PFO closure appear to be less effective than reported in the literature. They may even be hazardous and lead to severe, life-threatening, early as well as late complications. This should be kept in mind when considering these procedures and must be included in the patient information.

XII-7

055

Is B-Type Natriuretic Peptide Superior to Contractile Reserve in Predicting Outcome in Low-Flow Aortic Stenosis? Results from the Multicenter TOPAS Study

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Background B-type natriuretic peptide (BNP) and contractile reserve (CR) have been shown to be predictors of outcome in low-flow, low-gradient aortic stenosis (AS). However, it is unknown how they compare in their prognostic value.

Methods BNP measurements and dobutamine stress echo (DSE) were performed in 69 pts with low-flow AS (indexed orifice area $< 0.6 \text{ cm}^2/\text{m}^2$, mean gradient $\leq 40 \text{ mmHg}$, LVEF $\leq 40 \%$). Presence of CR was defined by an increase of stroke volume $\geq 20 \%$ at DSE. Pts were followed for 411 ± 343 days.

Results 1-year survival was poor in pts with BNP $\geq 550 \text{ pg/ml}$ but favourable in those with BNP < 550 in the entire group (47 ± 9 vs $97 \pm 3 \%$; $p < 0.0001$), as well as in the surgically treated group (53 ± 13 vs $92 \pm 7 \%$; $p = 0.02$). Even in pts with CR, 1-year survival was significantly lower when BNP was ≥ 550 (48 ± 12 vs $93 \pm 6 \%$; $p = 0.009$, see **Figure 10**). More importantly, in the subset of pts without CR, survival was only poor when BNP was ≥ 550 ,

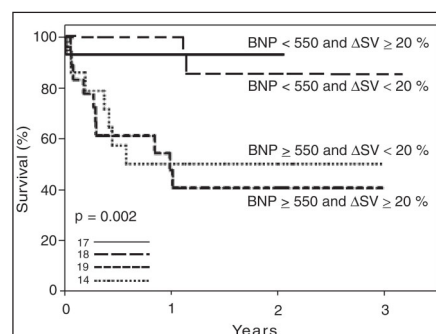


Figure 10: J. Bergler-Klein et al.

but still favourable when it was < 550 (50 ± 14 vs 100 %; $p = 0.014$). After adjusting for age, NYHA, LVEF, CR, coronary artery disease, severity of stenosis and type of treatment, $\text{BNP} \geq 550$ remained an independent predictor of outcome ($p = 0.0003$).

Conclusion BNP thus appears to add critical information beyond the CR assessment in low-flow AS. BNP may help identify those pts in the difficult subgroup without CR who are likely to benefit from valve replacement.

XII-8

101

Systemic Blood Pressure Does Not Directly Affect Pressure Gradient and Valve Area Estimates in Aortic Stenosis – An in Vitro Study

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Background Hypertension is a very frequent finding in patients with aortic stenosis. However, the effect of systemic blood pressure on the hemodynamic assessment of aortic stenosis is still a matter of controversy.

Methods Models of stenotic aortic valves (plates) and biological stenotic valves were studied in a well-controlled pulsatile in vitro circuit using Doppler ultrasound and direct-pressure and flow measurements. Anatomic valve areas ranged from 0.5 to 1.25 cm^2 , cardiac output varied from 2.0 to 5.0 l/min. Valve areas were calculated with the continuity equation using Doppler measurements and with the Gorlin formula based on catheter measurements. While maintaining constant peak and mean flow rates, systolic systemic pressures were increased in incremental steps of 20 mmHg from 80 to 200 mmHg, simulating various clinical settings from arterial hypotension to hypertension. Using these data, a computational fluid dynamics model was constructed to further test the effect of systemic pressures on pressure gradient and valve area estimates.

Results Agreement between Doppler and catheter pressure gradients as well as calculated valve areas was excellent (mean difference 3.6 ± 2.8 mmHg for pressure gradients and 0.01 ± 0.05 cm^2 for valve areas, correlation coefficients 0.98 – 0.99). When systemic systolic pressure was raised from 80 to 200 mmHg while maintaining flow constant, peak and mean pressure gradients as well as valve areas did not show clinically relevant changes (mean difference 3.4 ± 1.8 mmHg, range 0.4 – 6.8 mmHg; mean difference 0.01 ± 0.03 cm^2 , range -0.02 – 0.05 cm^2). Results were similar for stenotic bioprostheses and rigid orifices (plates). By multivariate analysis, neither valve area nor pressure gradient were significantly affected by systemic pressure. Furthermore, computational fluid dynamics analysis also showed no significant effect of systemic pressure on pressure gradient and valve area.

Conclusions Systemic blood pressure and the presence of hypertension do not directly influence invasive or noninvasive pressure gradient and valve area estimates in aortic stenosis. Variation of these measurements with changing systemic pressure, when observed in vivo, can only be due to afterload-dependent changes in ejection fraction and, therefore, flow rate.

Sitzung XIII – Rhythmologie II

XIII-1

003

Avoidance of Procedure-Related Complications of Radiofrequency Ablation of AF by the Integration of Multislice CT Imaging into Three-Dimensional Electroanatomic Mapping

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Introduction Wide-area circumferential radiofrequency (RF) catheter ablation (WACA) with confirmation of pulmonary-vein (PV) isolation is a curative therapy of atrial fibrillation (AF). Integration of multislice computed tomography (MSCT) into 3D electroanatomic mapping (EAM) to guide RF catheter ablation has been shown to be accurate, feasible and to enhance procedural success. This study investigated whether the use of such sophisticated imaging technology translates into a lower complication rate. Secondly, the impact on clinical outcome and procedural efficacy (procedure and radiation time) in comparison with a control group treated with conventional 3D EAM was tested.

Methods 161 consecutive patients (134 male, mean age 55.5 ± 9.5) with multi-drug-resistant AF (2.4 ± 1.1 failed AAD) underwent WACA with confirmation of PV isolation. Further lines (roof line, mitral isthmus line) were performed when WACA alone could not stop AF during procedure. To screen for significant PV stenosis we performed serial MSCT before and 3 months after WACA. Procedural outcome was evaluated by means of 24-hour Holter and patient questionnaires.

Results Comparison of outcome data between the conventional EAM (Carto XP, 79 patients) and the image integration technology (Carto Merge, 82 patients) resulted in a significant improvement in procedural safety with no single case of PV stenosis more than 50 % in the Carto Merge group versus 5 in the conventional group ($p = 0.021$). Severe adverse events (PV stenosis, TIA, cerebral infarction, and pericardial effusion) in total were considerably reduced (8 cases in XP, 2 in Merge group; $p = 0.043$). Overall success was furthermore drastically improved in the image integration group (71 vs 87.5 %; $p = 0.019$). Both procedure and fluoroscopy times remained unchanged.

Conclusions MSCT image integration into EAM avoids severe complications and therefore significantly improves safety of WACA with confirmed isolation of the PV and additional lines. In addition, the success of RF ablation is significantly increased in comparison with a control group using conventional EAM alone.

XIII-2

026

Efficacy of Primary Prevention with Cardiac Resynchronisation Therapy Including Cardioverter Defibrillator Function

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Background Cardiac resynchronisation therapy (CRT) has been shown to improve symptoms and quality of life as well as survival in patients with severe chronic heart failure (CHF), i. e. NYHA class III/IV. The use of implantable cardioverter defibrillators (ICD) resulted in a significant reduction of sudden cardiac death in this patient collective. Thus, we aimed to evaluate the efficacy of CRT with ICD function (CRT-D) for primary prevention of sudden cardiac death in patients with severe CHF.

Methods Between January 1999 and November 2006, 242 CRT systems were overall implanted in our institution, of which 70 included ICD function. In the CRT-D collective, 41 suffered from ischemic CHF (59 %) and 29 from non-ischemic CHF (41 %), and 22 patients (31 %) had documented atrial fibrillation (9 permanent

and 13 paroxysmal). In this analysis concerning primary prevention in CHF, we excluded all sudden death survivors (11 patients). In the remaining 59 patients with CRT-D, ventricular arrhythmias were documented in 10 patients (17 %) and inducible in further 14 patients (24 %).

Results Within a follow-up period of 2.0 ± 1.3 years, 31 patients with singular CRT died, whereas only 3 patients with CRT-D died within a follow-up period of 1.7 ± 1.4 years (18 vs 5 %; $p < 0.01$). One-year mortality was 8 vs 3 % ($p = n. s.$). Ventricular arrhythmias were recorded for 25 patients (42 %). Ventricular anti-tachycardic pacing was performed in 22 patients (37 %). Appropriate defibrillation was recorded for 14 patients (23 %; of which 9 also underwent inappropriate shocks), whereas 1 patient underwent inappropriate defibrillator discharges only. Thus, inappropriate shocks were found in 10 patients (17 %).

Conclusions Patients with severe CHF benefit from CRT with cardioverter defibrillator function and, therefore, it may be considered for all patients targeted for CRT. Nevertheless, the problem of inappropriate defibrillator discharges is still of concern.

XIII-3

030

Clinical Benefit of Implantable Cardioverter Defibrillators in Patients with Brugada Syndrome

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Background Brugada syndrome is associated with an increased risk for sudden cardiac death caused by ventricular fibrillation. Thus, implantable cardioverter defibrillators (ICD) have become an important therapeutic option in patients with Brugada syndrome. We aimed to investigate the clinical benefit after ICD implantation in this patient population.

Patients In our institutions, overall 19 patients (14 male patients; age at diagnosis: 42 ± 11 years) had Brugada syndrome. Diagnosis was based on characteristic ECG pattern either at rest (17 patients, of whom one with intermittent Brugada ECG pattern) or after pharmacological testing with ajmaline (available for 11 patients). Syncope was observed in 4 patients, whereas another 3 patients were sudden-death survivors; the remaining 12 patients were asymptomatic.

Results ICD were implanted in 13 patients and implantation is planned in two further patients. Two completely asymptomatic patients received no ICD because no tachyarrhythmias were inducible on programmed stimulation (PS). Because of negative ajmaline tests no PS was performed in two asymptomatic patients with characteristic ECG patterns at rest. Mean follow-up period was 58.2 ± 28.6 months after ICD implantation. Only one patient (7.7 %) needed defibrillation therapy (overall 7 successful shocks during two episodes of electrical storm, which was finally suppressed with quinidine therapy). Four patients (30.8 %) received only inappropriate shocks (three because of oversensing caused by T-wave-alternans, one because of tachycardic atrial fibrillation).

Conclusion Patients with Brugada syndrome benefit from ICD implantation, but less frequently than previously anticipated. The problem of inappropriate ICD discharges is still of major concern.

XIII-4

028

Genauigkeit der virtuellen Anatomie und Läsionslokalisation bei der linksatrialen linearen Ablation von Vorhofflimmern unter Verwendung des Ensite-NAVX-Mappingsystems

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Einführung Durch die Erstellung linearer Läsionen im linken Vorhof kann sowohl paroxysmales als auch persistierendes/permanen-

tes Vorhofflimmern unter Schonung der Pulmonalvenenostien interventionell behandelt werden. Unerlässlich für den Ablationserfolg ist jedoch das Kreieren dichter Läsionslinien, was zuverlässig nur unter Verwendung dreidimensionaler Mappingsysteme möglich ist. In der hierbei virtuell geschaffenen Anatomie können der Ablationskatheter manövriert und die jeweiligen Ablationspunkte genau dokumentiert werden. Evidenz für die Reduktion von Durchleuchtungszeit und Prozedurdauer bei der Ablation liegt auch bereits für das neueste System am Markt (Ensite-NAVX-System [NAVX], St. Jude Medical) vor. Seit Oktober 2006 verfügen wir an unserer Abteilung über ein NAVX. Ziel unserer Untersuchung war es, die Genauigkeit dieses Systems bei der Erstellung linksatrialer linearer Läsionen für die Ablation von Vorhofflimmern zu evaluieren.

Methoden Wir schlossen prospektiv alle Patienten (P), die zur linksatrialen linearen Ablation von symptomatischem Vorhofflimmern (trotz medikamentöser Therapie) aufgenommen wurden, in unsere Studie ein. Nach transösophagealem Thrombenausschluss erfolgte eine einfache transseptale Punktion. Zur Erleichterung der Bewegungen des Ablationskatheters wurde stets eine steuerbare transseptale Schleuse (Agilis, St. Jude Medical) verwendet. Mittels NAVX wurde eine virtuelle Anatomie des linken Vorhofs (inklusive der Pulmonalvenenmündungen und des linken Herzhohls) erstellt. Standardmäßig wurde danach mit einem offen-flüssigkeitsgekühlten Ablationskatheter (Therapy-Cool, St. Jude Medical) Punkt für Punkt je eine zirkuläre Läsion rund um das linke und rechte Pulmonalvenenpaar, ergänzt durch eine Dach- und eine linksatriale Isthmuslinie, erstellt. Zur Darstellung der Größe der einzelnen Ablationspunkte wurde in der Bedienungssoftware eine 3 mm im Durchmesser haltende Markierung gewählt. Die erforderliche Genauigkeit des Mappingsystems war gegeben, falls es gelang, in der virtuellen Anatomie alle Ablationspunkte so zu setzen, daß durch ihre Überlappung eine kontinuierliche Linie zustande kam. Nach der Ablation wurde mittels Stimulationsverfahren die Dichtheit der Linien kontrolliert.

Ergebnisse Wir haben bei 10 P (8 männlich) mit einem durchschnittlichen Alter von $62,1 \pm 6,5$ Jahren bei symptomatischem Vorhofflimmern (6 P paroxysmal, 4 P persistierend) mittels NAVX-Unterstützung eine linkslineare Ablation durchgeführt. Es waren dabei an Komorbiditäten bei 2 P arterielle Hypertonie sowie bei jeweils einem P eine hypertrophe obstruktive Kardiomyopathie und bei einem P eine dilatative Kardiomyopathie auffällig. 3 P waren unter Flecainid, 3 P unter Amiodaron, jeweils 1 P unter Bisoprolol, Sotalol, Dofetilid und Propafenon. Es gelang in allen Fällen (100 %), die erforderliche Genauigkeit der virtuellen Anatomie und Läsionslokalisation und somit einen interventionellen Ablationserfolg zu erzielen. Die Durchleuchtungszeit betrug im Mittel $60,6 \pm 17,2$ min., die mittlere Prozedurdauer 223 ± 51 min. Als Komplikation trat eine punktionspflichtige Perikardtamponade nach Rückzug des Ablationskatheters in den rechten Vorhof auf.

Schlußfolgerung Die räumliche Auflösung, die das NAVX in der virtuellen Anatomie bietet, ist ausreichend, um die für die erfolgreiche Ablation von Vorhofflimmern wichtigen, elektrisch dichten linksatrialen Läsionen zu erzielen.

XIII-5

038

Intravenös verabreichtes Magnesiumsulphat erhöht die Effektivität von Ibutilid (Corvert®) in der medikamentösen Kardioversion von typischem Vorhofflattern

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Hintergrund Ibutilid (Corvert®) ist ein Klasse-III-Antiarrhythmikum, welches häufig zur medikamentösen Kardioversion von Vorhofflimmern und -flattern verwendet wird. Retrospektiv analysierte Daten geben Grund zur Annahme, daß eine intravenöse Verabreichung von Magnesiumsulphat (Cormagnesin®, MG) die Effektivität von Ibutilid in der Konversion von Vorhofflimmern erhöht. Wir führten eine prospektive randomisierte Studie durch, um den Effekt einer intravenösen Präinjektion von MG vor der Verabreichung von Ibutilid auf die QTc-Zeit und die Konversionsrate von Patienten (P)

mit persistierendem typischen Vorhofflattern (TVHF) oder anderen monomorphen atrialen Tachykardien (MAT) zu evaluieren.

Methodik P mit persistierendem TVHF oder MAT wurden randomisiert, 4 g MG in 100 ml 0,9 % Kochsalzlösung (Gruppe „Magnesium“, G-MG) oder nur 100 ml Kochsalzlösung (Gruppe „kein Magnesium“, G-KMG) unmittelbar vor der Verabreichung von bis zu 2 mg Ibutilidfumarat zu erhalten. Die QTc-Zeit wurde zum Randomisierungszeitpunkt, nach der Verabreichung von MG, von Ibutilid und nach weiteren 4 Stunden bestimmt. Während eines kontinuierlichen Rhythmusmonitorings wurde der genaue Zeitpunkt der eventuellen Konversion in Sinusrhythmus ermittelt.

Ergebnisse Wir randomisierten 115 P. Da bei 3 P eine spontane Konversion in Sinusrhythmus noch vor einer MG- oder Ibutilidgabe auftrat, erhielten 112 P Ibutilid (57 P in G-MG, 55 P in G-KMG, 62 P mit TVHF, 50 P mit MAT). Zwischen G-MG und G-KMG wurden keine signifikanten Unterschiede in Bezug auf Alter, Geschlecht, Komorbiditäten, linksventrikuläre Auswurfraction oder den Anteil von P mit TVHF und MAT gefunden. Die Präinjektion von MG hatte weder *per se* noch zu irgendeinem Zeitpunkt nach der Verabreichung von Ibutilid einen signifikanten Einfluß auf die QTc-Zeit. Die Konversionsraten von P mit TVHF waren signifikant höher als von P mit MAT (73 vs. 50 %; $p = 0,008$). Bei P mit TVHF bewirkte die Präinjektion von MG gegenüber der Placebogabe eine signifikante Steigerung der Effektivität von Ibutilid in der Konversion in Sinusrhythmus (81 vs. 57 %; $p = 0,03$). Bei P mit MAT konnte zwischen G-MG und G-KMG kein signifikanter Unterschied in der Konversionsrate nachgewiesen werden (48 vs. 52 %; $p = 0,39$).

Schlußfolgerung Die intravenöse Präinjektion von Magnesium erhöht signifikant die Effektivität von Ibutilid in der medikamentösen Kardioversion von typischem Vorhofflattern, nicht jedoch von anderen monomorphen atrialen Tachykardien.

XIII-6

067

The Influence of Ventricular Rate on Myocardial Biomarkers in Patients with Atrial Fibrillation

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Background Atrial fibrillation is associated with uncoordinated myocardial contractions of high frequency and often with an elevated ventricular heart rate. This study was performed to investigate whether this state is associated with signs of myocardial damage and to assess the influence of heart rate on the levels of myocardial biomarkers.

Study Design Prospective, open-label, observational study.

Patients and Methods In 100 consecutive pts admitted for AF, blood samples for the determination of myocardial biomarkers were taken directly at admission and six hours thereafter. Troponin I, myoglobin, CK, NT-proBNP and CRP were measured with standard assays. Patients with clinically decompensated heart failure were excluded as well as patients with reduced renal function (creatinine > 1.2 mg/dl in men, > 1.0 mg/dl in women).

Preliminary Results The data of 53 pts (22 female, 31 male, age 70 ± 14 years; mean $\pm$ SD) were available for analysis. In 45 pts (84.9 %), ventricular rate was > 100 bpm. 19 % of the pts suffered from structural heart disease, 72 % had a history of arterial hypertension. NT-proBNP levels were higher than the upper normal level (227 pg/ml) in 80 % of the pts with AF. 51 % had elevated myoglobin levels (> 70 μ g/l), 22 % had elevated troponin I levels (> 0.1 ng/ml), 13 % had elevated CK levels (> 174 U/l), and 51 % had elevated CRP levels (> 5 mg/l). Pts with ventricular rates > 100 bpm had significantly higher NT-proBNP levels (3139 ± 2884 vs 1269 ± 490 ; $p = 0.002$; mean $\pm$ SD).

Conclusion These preliminary data suggest that AF may cause mild myocardial damage, which is associated with the ventricular heart rate.

XIII-7

094

Welchen Benefit hat die Telemedizin in der ICD-Nachsorge?

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Einleitung Durch die stetig wachsende Anzahl von Patienten mit implantierbaren Kardioverter-Defibrillatoren (ICD) wird eine effektive Nachkontrolle in ICD-Kliniken aus Zeitgründen immer schwieriger zu organisieren. Mit neuen Telekommunikationstechnologien ist es nunmehr möglich, Kontrollen zum Teil von zu Hause aus durchzuführen. In den ICD-Aggregaten der neuen Generation ist die Möglichkeit einer telemedizinischen Nachsorge bereits implementiert. Ziel dieser Untersuchung war festzustellen, welche Transportkostenersparnis für den Patienten und Zeitersparnis für die nachsorgende Klinik pro Jahr mit der neuen Technologie erreicht werden könnte.

Methodik Die an der Medizinischen Universitätsklinik Graz nachzusorgenden ICD-Patienten wurden für die Berechnung herangezogen. Kosten- und Zeitersparnis wurden für ein Nachsorgejahr kalkuliert. Die Entfernung zur Klinik wurde mit einem Routenplaner berechnet, die Kosten pro km mit € 0,376 veranschlagt. Die Nachsorgen im Zentrum je nach ICD-Indikation wurden auf ein bis maximal zwei Kontrollen reduziert.

Ergebnis 388 Patienten (mittleres Alter 62 ± 15 Jahre) wurden inkludiert. Die mittlere Entfernung zum Wohnort betrug $47 \pm 37,6$ km (Range 1,2–179,2 km). Die berechnete Transportkostenreduktion betrug pro Patient € $53 \pm 42,4$, die Zeitersparnis für das Nachsorgezentrum 16,9 Ambulanztage.

Zusammenfassung Die Implementierung einer telemedizinischen ICD-Nachsorge würde in unserem Zentrum zu einer erheblichen Zeitersparnis für die nachsorgenden Ärzte führen. Patienten haben mit diesem Nachsorgeprogramm nicht nur eine Fahrtkostenersparnis, sondern auch bei gleichwertiger Qualität der Nachkontrolle einen Zeit- und Komfortgewinn.

XIII-8

110

Patientenbereitschaft zur telemedizinischen Nachkontrolle von implantierten Schrittmachern und Defibrillatoren

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Hintergrund Die stetig steigende Anzahl von implantierten Schrittmachern (SM) und Defibrillatoren (ICDs) und die zu erwartende weitere Steigerungsrate durch zunehmende Umsetzung der Indikationen, Erweiterung der Indikationsstellungen und einfach die größere Zahl an indizierten Patienten bringt logistische Herausforderungen für Ärzte und Krankenhauspersonal mit sich. Im speziellen wird die Anzahl der Nachsorgeuntersuchungen stark steigen. Der Nachsorgeuntersuchungsprozeß findet zur Zeit hauptsächlich in Krankenhausambulanzen statt und erfordert die Anreise des Patienten. Die Einführung von telemedizinischen Anwendungen zur Kontrolle von implantierten SM und ICDs würde Ärzten und Krankenhäusern dabei unterstützen, diese neuen Herausforderungen zu bewältigen.

Ziel dieser Untersuchung war es, die Bereitschaft der Patienten zur telemedizinischen Nachkontrolle und den möglichen Nutzen für diese zu erheben.

Methoden In mehreren nachsorgenden österreichischen Krankenhäusern wurden SM- und ICD-Patienten über ihre Umstände in bezug auf die Nachsorge ihres implantierten Gerätes befragt. Mit dem Einverständnis der Patienten wurden nach einer routinemäßigen Nachsorgeuntersuchung unter anderem Antworten über deren Anreise und den Ambulanztermin erhoben und ausgewertet.

Ergebnisse Insgesamt wurden bislang 110 Patienten (Durchschnittsalter 68 Jahre [26–86], 70 % Männer, 72 % ICD und 28 % SM) in 4 großen Nachsorgezentren befragt. Die durchschnittliche Anfahrtszeit der Patienten betrug 46 Minuten, die durchschnittliche Anfahrtsdistanz war 48 km. 78 % der Patienten kamen mit dem PKW und die durchschnittliche Wartezeit in der Ambulanz auf den Behandlungstermin betrug 51 Minuten. Die Hälfte der befragten Patienten mußte zum Krankenhaus begleitet werden. Nach deren Einstellung zu einer möglichen telemedizinischen Nachkontrolle ihres Gerätes befragt, gaben 73 % der Patienten an, daß sie sich eine telemedizinische Nachsorge vorstellen können, 53 % befürworteten sogar diese Alternative.

Schlußfolgerung Es zeigt sich, daß in dieser spezifischen Patientengruppe eine große Bereitschaft zur Verwendung von modernen Informations- und Kommunikationstechnologien für die Nachsorge von ICDs und SMs besteht. Auffällig ist der hohe Prozentsatz an definitiven Befürwortern einer solchen alternativen Nachsorge-möglichkeit. Als ein möglicher Nutzen für die Patienten konnte die Reduzierung des im Zusammenhang mit den laufenden Nachsorgeuntersuchungen auftretenden erheblichen Zeitaufwandes (wie Fahrzeit, Wartezeit, Begleitung durch Angehörige) identifiziert werden.

Sitzung XIV – Stoffwechsel

XIV-1

032

Strong Independent Correlation of HDL Cholesterol and C-Reactive Protein with Angiographically Documented Coronary Artery Disease: Analysis in 5641 Consecutive Patients

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Background Although high-density lipoprotein cholesterol (HDL) and C-reactive protein (CRP) are predictors for future cardiovascular events, little information is available regarding their correlation with angiographically documented coronary artery disease (CAD).

Methods 5641 consecutive patients undergoing coronary angiography for the evaluation of chest pain were analyzed. Coronary risk factors were assessed by routine blood chemistry (HDL with enzymatical color assay, CRP with immunoturbidimetric assay) and questionnaire. CAD severity was graded by visual estimation of lumen diameter stenosis with significant stenosis defined as lumen diameter reduction > 70 %. Coronary angiograms were graded as 1-, 2- or 3-vessel disease (VD), as non-significant CAD or non-CAD.

Results HDL levels (60.3 ± 18.5 vs 51.9 ± 15.3 mg/dl; $p < 0.001$) were higher and CRP levels lower (0.65 ± 1.68 vs 1.02 ± 2.38 mg/dl; $p < 0.001$) in non-CAD ($n = 1517$) compared to CAD patients ($n = 4124$). CAD patients were older (65.2 ± 10.5 vs 59.9 ± 11.4 y), suffered more frequently from diabetes (19.9 vs 10.8 %) and hypertension (85.6 vs 69.6 %) and included more smokers (18.7 vs 16.5 %) (all $p < 0.005$). LDL levels (124.5 ± 38.3 vs 126.0 ± 36.3 mg/dl; $p = n. s.$) were similar with more statin users (43.4 vs 27.9 %;

Table 6: H. F. Alber et al.

	Odds ratio	95 %-CI	Wald	p-value
Age (years)	1.059	(1.052–1.066)	260.017	$p < 0.001$
Gender	2.774	(2.391–3.218)	181.236	$p < 0.001$
HDL (mg/dl)	0.979	(0.974–0.983)	89.675	$p < 0.001$
Smoking habit	1.778	(1.447–2.185)	30.001	$p < 0.001$
Hypertension	1.626	(1.359–1.946)	28.182	$p < 0.001$
Diabetes	1.624	(1.322–1.996)	21.320	$p < 0.001$
logCRP	1.321	(1.140–1.531)	13.753	$p < 0.001$

$p < 0.001$) among CAD patients. Comparing non-CAD with different CAD severities using ANOVA results did not change substantially. In multivariate analysis, HDL and CRP remained independently associated with the prevalence and severity of CAD (see table). The Wald statistics suggests that HDL is potentially associated with CAD (Table 6).

Conclusion In this large consecutive patient cohort, HDL and CRP are independently associated with the prevalence and severity of CAD. In this analysis, HDL is an even stronger predictor for CAD than other major classical risk factors.

XIV-2

063

Metabolische und vaskuläre Effekte der Angiotensin-I-Rezeptorblocker bei Hypertonikern: Ein Vergleich von Losartan und Telmisartan

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Hintergrund Patienten mit gestörter Glukosetoleranz und Hypertonie erkranken mit hoher Wahrscheinlichkeit in weiterer Folge an Diabetes mellitus Typ II und zeigen ein erhöhtes kardiovaskuläres Risiko. Einige große Studien zeigten, daß Angiotensin-Rezeptorantagonisten neben ihrer antihypertensiven Wirkung auch präventive Eigenschaften in Hinblick auf die Entwicklung eines Diabetes mellitus besitzen.

Ziel dieser Studie war es, antihypertensive, metabolische und vaskuläre Effekte von Telmisartan (T) im Vergleich zu Losartan (L) zu prüfen.

Patienten und Methodik In eine prospektive, randomisierte, doppelblinde Studie im Cross-over-Design wurden 24 Patienten mit Hypertonie und gestörter Glukosetoleranz eingeschlossen. Die Patienten erhielten für je 12 Wochen Telmisartan 80 mg oder Losartan 40 mg einmal täglich. Zu Beginn, nach 12 Wochen und nach 24 Wochen wurde eine ambulante 24-h-Blutdruckmessung, ein oraler Glukose-Toleranztest und eine sonographische Endothelfunktionsmessung durchgeführt.

Resultate Sowohl Telmisartan als auch Losartan führten zu einer signifikanten Senkung der systolischen 24-h-Blutdruckwerte im Vergleich zur Baseline-Messung (B: $140,8 \pm 2,0$ mmHg vs. T: $136 \pm 2,9$ mmHg; $p < 0,05$; B vs. L: $137,6 \pm 3,1$ mmHg; $p < 0,05$, T vs. L n.s.). Lediglich in der Telmisartangruppe verbesserte sich die Insulinresistenz, berechnet durch den HOMA-Index (T: $2,20 \pm 0,47$ vs. B: $3,04 \pm 0,60$; $p < 0,01$; vs. L: $3,38 \pm 0,84$, T vs. L: $p < 0,05$) und den ISI 120 (T: $0,114 \pm 0,003$ vs. B: $0,092 \pm 0,002$; $p < 0,001$; vs. L: $0,090 \pm 0,006$, T vs. L: $p < 0,01$), die Glukosetoleranz ($p < 0,01$) und die Endothelfunktion signifikant (flowmedierte Dilatation: T: $7,9 \pm 0,7$ % vs. B: $6,4 \pm 0,8$; $p < 0,01$; vs. L: $6,4 \pm 0,6$; $p < 0,001$), während diese Effekte in der Losartangruppe nicht nachweisbar waren.

Schlußfolgerung Telmisartan führt, verglichen mit Losartan, bei Patienten mit Hypertonie und gestörter Glukosetoleranz zu einer signifikanten Verbesserung der Insulinresistenz, der Glukosetoleranz und der Endothelfunktion bei annähernd gleicher antihypertensiver Wirkung.

XIV-3

073

Lipidprofile bei adipösen Frauen

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Ziel und Fragestellung Adipositas ist gehäuft mit einer Dyslipidämie assoziiert. Ziel der Untersuchung war festzustellen, welche pathologischen Lipidprofile bei adipösen Frauen am häufigsten sind.

Patienten und Methode Wir untersuchten das Lipidprofil von 101 Frauen mit höhergradiger Adipositas. 84 wurden in die Unter-

suchung eingeschlossen (Patientinnen mit bestehender Lipidsenkereinnahme und/oder bekanntem Diabetes mellitus wurden ausgeschlossen). Folgende Daten der Erstuntersuchung wurden ausgewertet: Alter, Bauchumfang, Gesamtcholesterin (I), HDL-C (II), LDL-C (III), Triglyzeride (IV) sowie Cholesterin/HDL-Ratio, Non-HDL-Cholesterine, TG/HDL-Ratio, Vorerkrankungen, Medikation.

Ergebnisse Alle adipösen Patientinnen im Alter zwischen 23 a und 73 a (~ 46 a) hatten einen erhöhten Bauchumfang (89–118 cm/ ~ 114 cm). 69 Patientinnen (82 %) hatten zumindest einen Lipidparameter (I–IV) pathologisch. 15 Patientinnen (18 %) hatten alle 4 Lipidwerte im Normbereich. Von den Einzelfaktoren war erhöhtes Gesamtcholesterin bei 47 (56 %) und erhöhtes LDL-C bei 37 (44 %) der Frauen zu finden. Erhöhte TG bestanden nur bei 34 Frauen (40,5 %), 42 (50 %) hatten erniedrigtes HDL-C. Die selektive Kombination von erhöhtem Gesamtcholesterin + erhöhtem LDL-C war am häufigsten (14 Patientinnen = 16,6 %), gefolgt von erhöhten TG + erniedrigtem HDL-C (9 Patientinnen = 11 %) und einer Pathologie aller 4 Werte (8 Frauen = 9,5 %). 8 Patientinnen (9,5 %) hatten nur erniedrigte HDL-C-Spiegel. Die Chol/HDL-Ratio war bei 41 (49 %) Frauen > 4 . Die TG:HDL-Ratio war bei 49 (58,3 %) > 2 . Der Non-HDL-Wert war bei 65 (77 %) > 130 .

Zusammenfassung Der häufigste pathologische Lipidwert der adipösen Frauen waren Gesamtcholesterine. Erstaunlicherweise waren bei 18 % der adipösen Frauen alle 4 Einzelparameter (Gesamtcholesterin, Triglyzeride, HDL-C, LDL-C) im Normbereich. 60 % hatten normale TG und 50 % ein normales HDL-C. Nur bei 8 Frauen (9,5 %) waren gleichzeitig alle 4 Werte pathologisch.

XIV-4

077

Low HDL Cholesterol, High Triglycerides, and Small LDL Particles Are the Main Lipid Risk Factors in Diabetic Coronary Patients Receiving Statin Treatment

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Background Current guidelines recommend statin treatment in patients with the combination of type 2 diabetes (T2DM) and coronary artery disease (CAD), but vascular risk in these patients remains high. It is unknown which lipid parameters most strongly predict vascular risk in diabetic coronary patients receiving statins.

Methods We prospectively recorded vascular events in 432 consecutive patients with angiographically proven CAD who were on statin treatment. At baseline, lipids and lipoproteins were measured from fasting serum samples.

Results Of our patients, 142 had normal fasting glucose < 100 mg/dl, 184 had impaired fasting glucose > 100 mg/dl, and 106 had T2DM. The incidence of vascular events significantly ($p < 0.001$) increased from the group of patients with normal fasting glucose (17.6 %) over the group of patients with impaired fasting glucose (25.0 %) to the group of patients with T2DM (39.6 %). Among patients with T2DM, triglycerides (standardized adjusted hazard ratio [HR] = 1.226 [1.042–1.443]; $p = 0.014$), and, inversely, HDL cholesterol (HR = 0.638 [0.426–0.954]; $p = 0.029$) as well as the LDL peak particle diameter (HR = 0.683 [0.485–0.961]; $p = 0.029$), but not total cholesterol ($p = 0.348$), LDL cholesterol ($p = 0.682$), or apolipoprotein B ($p = 0.325$) significantly predicted vascular events.

Conclusions We conclude that high triglycerides, low HDL cholesterol, and small LDL particles are the main lipid risk factors for the incidence of vascular events in type-2 diabetic coronary patients who receive LDL-lowering statin treatment.

XIV-5

078

Metabolic Syndrome and Angiographically Diagnosed Coronary Artery Disease Are Additive Determinants of Adiponectin Serum Levels

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Background Serum adiponectin is typically decreased in patients with the metabolic syndrome (MetS) and in patients with coronary artery disease (CAD). MetS and CAD frequently coincide; individual effects of MetS and CAD on serum adiponectin are unknown.

Methods Serum adiponectin was measured in 687 consecutive patients undergoing coronary angiography for the evaluation of CAD. MetS was diagnosed according to Adult Treatment Panel III criteria. Significant CAD was diagnosed in the presence of significant coronary stenoses > 50 %.

Results Of our patients, 178 had neither MetS nor significant CAD (MetS-/CAD-), 91 had MetS but not significant CAD (MetS+/CAD-), 251 did not have MetS but had significant CAD (MetS-/CAD+), and 167 had both MetS and significant CAD (MetS+/CAD+). Serum adiponectin was highest ($12.1 \pm 8.3 \mu\text{g/ml}$) in MetS-/CAD- subjects. It was significantly lower in MetS+/CAD- ($9.5 \pm 7.3 \mu\text{g/ml}$; $p = 0.001$) and in MetS-/CAD+ patients ($9.2 \pm 5.3 \mu\text{g/ml}$; $p < 0.001$) and lowest in MetS+/CAD+ patients ($6.7 \pm 3.8 \mu\text{g/ml}$) in whom it was significantly lower than in MetS-/CAD-, MetS+/CAD-, and MetS-/CAD+ patients ($p < 0.001$ for all comparisons). In analysis of covariance, MetS and presence of significant CAD after multivariate adjustment were mutually independent significant determinants of serum adiponectin ($p < 0.001$ for both).

Conclusions We conclude that MetS and angiographically diagnosed CAD are additive determinants of adiponectin serum levels.

XIV-6

081

Presence of Type 2 Diabetes Significantly Modulates the Cardiovascular Risk Conferred by the Plasminogen Activator Inhibitor-1-675-5G/4G Polymorphism

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Background The -675 5G/4G polymorphism of the plasminogen activator inhibitor-1 (PAI-1) gene has been associated with increased plasma levels of PAI-1 and, in some studies, with increased vascular risk. Hardly any data on the vascular risk conferred by this polymorphism are available for patients with type 2 diabetes (T2DM).

Methods Genotyping was performed in 672 consecutive Caucasian patients undergoing coronary angiography for the evaluation of stable coronary artery disease (CAD). Prospectively, we recorded vascular events over 4 years.

Results The prevalence rates of the 5G/5G, the 5G/4G, and the 4G/4G genotypes were 17.6 %, 52.7 %, and 29.7 % in patients with T2DM ($n = 148$) and 23.5 %, 48.3 %, and 28.2 % in non-diabetic subjects ($n = 524$). In non-diabetic subjects, the homozygote PAI-1 4G/4G genotype was significantly associated with significant stenoses (adjusted odds ratio [OR] 1.70 [95 %-CI 1.07–2.70]; $p = 0.024$), whereas no such association was observed in patients with T2DM (OR 0.66 [0.28–1.54]; $p = 0.334$). An interaction term T2DM $\times$ 4G/4G genotype was significant ($p = 0.031$), indicating that the association of the polymorphism with CAD was significantly stronger in non-diabetic subjects than in patients with T2DM. Also prospectively, the 4G/4G genotype conferred an increased risk of vascular events in non-diabetic subjects but not in T2DM patients, with adjusted hazard ratios of 1.74 (1.1–2.74); $p = 0.018$ and 0.59 (0.27–1.28); $p = 0.181$, respectively. Again, an interaction term T2DM $\times$ 4G/4G genotype was significant ($p = 0.037$).

Conclusions We conclude that presence of T2DM significantly modulates the vascular risk conferred by the PAI-1-675 5G/4G polymorphism.

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