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Cardioangiology  
“Theory and Practice  
of Interventional  
Cardioangiology”

Moscow, November 11-13, 2009



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# Abstracts of the Annual meeting of Russian Society of Interventional Cardioangiology “Theory and Practice of Interventional Cardioangiology”

Moscow, November 11-13, 2009

## **TRANSRADIAL APPROACH IS UNREASONABLY RARELY USED IN INTERVENTIONS**

Artemyev V.N., Chevyrov A.Yu.

Center of Heart Surgery “CorAll”, Nizhny Novgorod, Russia

Since the year 2006 98.7% of therapeutic and diagnostic interventions in our center are being performed from transradial approach. During this period the interventions were performed in 2157 patients, including 308 treatment procedures.

The coronary, internal carotid, vertebral, and internal thoracic arteries were successfully catheterized. The stenting of coronary arteries was performed, including the stenting of the main left coronary artery (LCA) with the use of “kissing” method, recanalization of chronic occlusions, stenting of autovenous bypass grafts, and stenting of the celiac trunk.

The total duration of standard coronary angiography through the radial approach was 11.4 minutes compared to 14.2 minutes with femoral access. The working time of the X-ray tube was 2.1 minutes compared to 2.0 minutes, respectively.

The notorious technical difficulties of this method can be overcome with gaining experience. Puncture and catheterization of the radial artery are easier to perform than the catheterization of the femoral artery, particularly in obese patients. The high-quality instruments are the keystone of success. The special set consisting of the needle and 0.018 inch guide, introducer with a thin dilator provide the possibility of minimally traumatic intervention with low risk of complications. To perform the routine coronary angiography we use 4F catheters, in coronary procedures – catheters of 5F to 7F. In three patients 8F catheter was used without radial artery occlusion following the introducer removal.

Thrombosis of the radial artery thrombosis was seen in 26 patients (1.2%). All these cases were asymptomatic and were mostly due to a small diameter of the artery and to its spasm during catheterization.

Occlusion, spasm and abnormal structure (scattered type, diameter less than 1 mm, etc.) of the radial artery are not necessary limitations for the performance of the procedure, as the radial artery on the contralateral arm may be available for standard catheterization. This was a cause of manipulations on the left arm, which were successful in most cases.

The attractive feature of this method consists in the possibility of bilateral cannulation of both coronary arteries with the use of the same catheter (63% of the total number of coronarographies). This makes the procedure much more easy to perform and less expensive.

Easier hemostasis at the arterial puncture site and reduced duration of the procedure make it less expensive and increase the convenience of the method for both physician and patient.

## **CLINICAL CASE OF DELAYED THROMBOSIS OF A STENT WITH ANTI-PROLIFERATIVE COATING**

Artemyev V.N.

Center of Heart Surgery “CorAll”, Nizhny Novgorod, Russia

Patient A., 43 years old, was admitted to our clinic for examination on March 02, 2007 with the diagnosis: Coronary heart disease, angina of functional class III, arterial hypertension, stage 3 obesity (body weight 140 kg), type 2 diabetes mellitus.

During the coronarography grade 3 stenoses of the proximal segments of the anterior descending artery (ADA) and of the circumflex artery (CxA) were revealed.

The results of stenting of the ADA and the CxA performed in Armenia on March 14, 2007 with the use of two stents with antiproliferative coating were estimated as good. The patient was in a good condition until April 09, 2008 (for 13 months after the stenting), when angina recurred. Coronarography showed: parastent opacification in the ADA with numerous small aneurysms (signs of the artery ulceration), intact stent in the CxA. The intervention was considered inappropriate. The dose of Clopidogrel was increased up to 150 mg daily, the weekly course of Prednisolone was carried out. The patient was discharged to his place of residence.

On June 23, 2009 (15 months later), after a 2-day interruption of antiplatelet therapy, the patient's condition aggravated. He was hospitalized at the department of intensive care with the diagnosis of acute coronary syndrome (ACS) with ST elevation. The systemic thrombolysis with the use of Actilyse 100 mg was ineffective. In 4.5 hours after clinical symptoms onset the coronarography was performed. ADA occlusion in the place of stenting (stent thrombosis) was revealed. ADA recanalization in the place of stenting was immediately performed with balloon

angioplasty without stenting. The artery lumen was completely restored, no signs of parastent blood flow were observed.

On day 2 the patient was transferred to the department of cardiology for rehabilitation and subsequent treatment. He was discharged from the hospital with minimally decreased contractile function.

Thus, the implantation of the stents with antiproliferative coating may provoke the vasculitis type injury of the coronary artery wall with the appearance of parastent blood flow. This injury results in the delayed stent thrombosis with subsequent severe complications. Probably, the administration of dual antiplatelet therapy and control coronary angiography can prevent occurrence of this potentially fatal complication.

### **EFFECTIVENESS OF THE INTERVENTIONS ON THE LEFT MAIN CORONARY ARTERY USING DRUG-ELUTING STENTS**

Babunashvili A.M., Dundua D.P., Kartashov D.S., Travin G.Yu., Kavteladze Artamonova Yu.V.  
Center of Endosurgery and Lithotripsy, Moscow, Russia

**Purpose of study:** to evaluate immediate and long-term results of the repair of the left main coronary artery (LMCA) lesions using drug-eluting stents (DES).

**Material and methods:** from November 2004 through November 2006, the stenting of LMCA with DES was performed in 158 patients aged from 47 to 72 years (mean age  $55 \pm 2,4$  years). The lesions were located in: the ostium of the LMCA – in 15 patients (9,5%), in the middle segment – in 21 (13,3%), at the bifurcation – in 91 (57,6%), in the ostium of the LAD or the CxB – in 31 patients (19,6%). Chronic stable angina of CCS func. class III-IV was noted in 143 patients, unstable angina – in 15. 32 patients (20,2%) had associated diabetes mellitus. The decrease of LV contractile function was noted in 23 cases (14,5%). One stent was implanted in 68 patients (43,1%), two and more stents – in 90 patients (57,0%). Bifurcation stenting was performed with “Cullotte” technique in 80 patients (50,6%) and “crush” technique in 78 (49,4%). In all cases of bifurcation and/or ostial lesions of the LAD and the CxB the interventions were ended by “kissing balloons” technique. The IIb/IIIa receptors inhibitors were used in 25 patients (15,8%).

**Results:** immediate clinical and angiographic success was achieved in all patients. In the long-term follow-up (6 to 34 months) restenosis (angina recurrence) was noted in 19 patients (12,1%). 15 of 19 patients with restenosis (78,9%) had bifurcation stenting, while 4 had 1 stent implanted with additional dilatation with “kissing” balloons. All these patients underwent repeated myocardial revascularization (RMR) with balloon dilatation (10 patients) or additional DES implantation (4 patients). Another 5 patients were referred to CABG. Three-years sur-

vival in angina-free and cardiovascular events-free patients with isolated lesions of the LMCA was 94,9%, in LCMA + 1 vessel involvement – 92,5% ( $p=0,76$ ), in LMCA + 2 vessels involvement – 88,7% ( $p=0,24$ ) and in LMCA + 3 vessels involvement – 70,4% ( $p<0,0012$ ). The comparison of the long-term results in the groups of “Cullotte” and “crush” techniques did not reveal any significant difference.

**Conclusion:** the stenting of the lesions of the LMCA with DES is an effective procedure from the viewpoint of long-term outcomes and low rate of angina recurrence and RMR. Our results show that the use of DES can be considered as an alternative to surgical myocardial revascularization in patients with isolated lesions of the LMCA. Provided appropriate intraoperative conditions, the implantation of one stent is the best strategy for the repair of LMCA lesions for the improvement of the long-term outcome of stenting.

### **COMPARATIVE EVALUATION OF THE RESULTS OF CATHLAB WORK IN THE ERA OF “METAL” AND “DRUG-ELUTING” STENTS (WHAT IS THE CONTRIBUTION OF LARGE-SCALE USE OF DRUG-ELUTING STENTS IN EVERYDAY CLINICAL PRACTICE)**

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Faculty of Health Care Management of Sechenov 1<sup>st</sup>  
Moscow Medical Academy, Moscow, Russia

**Introduction:** Drug-eluting stents (DES) decrease the rate of restenoses, but, according to numerous data, increase the risk of late thromboses in comparison with bare metal stents (BMS). We conducted this study with the aim to evaluate the influence of DES characteristics on the work of the cathlab as well as on early and late results of coronary atherosclerosis treatment.

**Material and methods:** we performed the analysis of two groups of patients treated in the era of BMS (1999-2003, 562 patients, Group1) and DES (2005-2008, 617 patients, Group 2). The known long-term outcome of stenting was used as the inclusion criterion. After comparative evaluation of the characteristics in two groups of patients we have selected for the analysis several subgroups with comparable parameters for both groups: a) with diabetes mellitus (65 patients in Group1 and 92 patients in Group 2); b) with decreased LV function (52 and 93 patients, respectively); c) with multivessel disease (190 and 215 patients); d) with arterial lesion longer than  $>25$  mm (183 and 321 patients) and e) with AMI (15 and 22 patients).

General evaluation revealed the prevalence of patients with high functional class of the lesion (III-IV class CCS) (242 and 401 patients, respectively), unstable angina and AMI (85 and 117 patients) in Group 2. Morphological picture of atherosclerotic lesions in Group 2 also was more severe: 1. left main lesion (42 and 71 patients); 2. occlusions (57 and 91 patients); 3.

arteries of <2,5 mm in diameter (67 and 101 patients ); 4. type C lesions (227 and 346 patients ).

The number of implanted stents was 847 and 961 in Groups 1 and 2, respectively (on the average 1.5 and 1.55 stents per patient). Mean diameter of the stents was 2,8±1,2 mm and 2,65±0,87 mm, mean length of the stented segments 22±2,45 mm and 31,3±5,5 mm, respectively .

Long-term results were studied using repeated angiography and multispiral computed angiography (438 and 499 patients), as well as on the base of repeated visits and non-invasive methods of examination (52 and 54 patients).

Statistical processing of the material and the analysis of the results of comparative study of both groups were performed using software SPSS version 14.0.

**Results:** The rate of restenoses was 28,3% and 11,02% in Groups 1 and 2, respectively (p=0,0021). The difference was especially clearly seen in the subgroups with diabetes (35,4% and 11,2%, p=0,0014), with arteries' diameter ≤ 2,5 mm (38,4% and 16,7%, p=0,001), with lesion's length ≥35 mm (45,8 and 17,4%, p<0,001) and with arterial occlusions (27,6% and 9,5%, p<0,025). In other subgroups (EF <0,5, arterial diameter ≥ 3,2 mm, stenoses of A and B1 types, unstable angina and/or AMI, multivessel disease) no significant differences were found.

The rate of late thromboses was 1,4% and 1,9% in Groups 1 and 2, respectively (p=0,024). Two-years survival was 98,2 and 97,8% (p=ns), while the rate of MACE (death, AMI) – 6,04% and 5,7% (p=0,78). Repeated myocardial revascularization (RMR) was performed significantly more often (p<0,025) in Group1 (34,4%), than in Group 2 (15,8%), which partially can be explained by the development of new lesions after 3 years and more in Group 1.

**Conclusion:** despite the decrease of the rate of restenoses and RMR in the group of DES in whole, this advantage was not seen in several subgroups of patients, amounting to 47,5% and 38,4% from the general population in Groups 1 and 2. Besides, the survival and the rate of MACE were not significantly different in both groups. The rate of late thromboses has a tendency to increase in the group of DES starting from the 14th month after stenting. However DES have clear advantages in the subgroups with diabetes, with CA occlusions, as well as with long lesions and arteries' diameter ≤2,5 mm.

#### **PATOMORPHOLOGICAL VALIDATION OF RETROGRADE CORONARY RECANALIZATION (LIFE-TIME STUDY OF THE STRUCTURE OF THE CORONARY ARTERIES USING 64-SLICE COMPUTED TOMOGRAPHY)**

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Center of Endosurgery and Lithotripsy, Moscow, Russia

**Basement:** multislice computed tomography (MSCT) is the only method for life-time study of the

structure and composition of the tissues in the occlusive material of the coronary arteries (CA).

**Material and methods:** we analyzed MSCT data in 68 patients (66 men) aged from 44 to 72 years (on the average 52±4,3 years) with the occlusions of one or several coronary arteries (in total - 73 arteries). CCS functional class of angina: I – 8 (11,7%), II – 44(64,7%), III – 16 (23,5%). 58 (85,3%) patients had history of MI, in 12 (20,7%) of them LV function was decreased (<0.5). No cases of renal dysfunction were noted. The age of occlusion, as assessed by history data, ranged from 6 to 36 months (11,8±2,4 months). The occlusions were distributed as follows: the LAD – 31 (42,4%), the CxB – 8 (11,0%), the RCA – 34 (46,6%).

The study was carried out on the 64-slice CT (GE Light speed). The data were analyzed in off-line regimen using the software TeraRecon Inc. version 3.7.0.12. We assessed the following parameters: the length of occlusion, the density, the degree of vessel remodeling, the structure of tissues and their volume and percent content in the occlusive material. We studied proximal and distal stumps of the occlusion, and the occlusive material itself in segments (the length of each segment – 5 mm).

**Results:** among 68 patients the recanalization was successful in 54 (79,4%), among 22 patients with retrograde recanalization – in 17 (77,3%).

Moderately dense (100-300HU) fibrous tissue prevailed in all analyzed occlusions – 68% of cases. Calcified tissue (>800HU) was found in 22%, and low dense tissue (fat inclusions) – in 8%. The analysis of the data of 2D reconstruction showed that the success of recanalization did not correlate with the reference diameter of the proximal or distal stump, as well as with the cross-sectional area of the middle segment. The length of occlusion was the sole predictor of failed recanalization. The evaluation of the data of 3D reconstruction revealed the presence of more dense tissue in the proximal stump and in the first proximal segments of the occlusion as compared with the distal stump(p<0.024). However the average index of tissue density as well as the density of individual segments did not correlate with the age of occlusion(p=0,78). Low density in the proximal stump, low volume of local high density in the proximal stump were the predictors of successful recanalization(p<0,04). High local density of the tissue in the proximal and/or middle segments of the occlusion did not contribute to the antegrade recanalization performance, and in 78% of these cases retrograde recanalization was applied.

**Conclusion:** MSCT is a useful preliminary study before the procedure of recanalization and can be recommended for the use prior to all PCI procedures. Our study contributes to the determination of the prognosis and the correction of the tactics of recanalization (selection of instruments, technique and method of recanalization).

#### 4-YEAR EXPERIENCE OF ENDOVASCULAR CLOSURE OF SEPTAL HEART DEFECTS AND PATENT DUCTUS ARTERIOSUS WITH THE USE OF AMPLATZER OCCLUDERS

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**Purpose:** To represent our 4-year experience with the use of AMPLATZER occluder in the treatment of patients with septal heart defects and with patent ductus arteriosus.

**Material and methods:** During the period from November, 2005 till August, 2009 the AMPLATZER occluders were used in 117 patients; 138 patients were included in the analysis. All interventions were performed under intravenous anaesthesia or sedation. Atrial septal defects (ASD) were closed in 112 patients. Mean age was  $12 \pm 12.15$  years (from 1 year to 54 years). Patent ductus arteriosus (PDA) was closed in 26 patients. Mean age was  $14.59 \pm 17.28$  years (2 to 52 years). The diameter of ASD varied from 5 mm to 32 mm ( $14.24 \pm 5.0$  mm), the diameter of PDA varied from 4 mm to 10 mm ( $6.41 \pm 1.23$ ). According to the echocardiography data, the central ASD with well-defined edges was present in 73 patients (65.2%), in 11 (9.8%) the width of the anterior edge was 2.5 mm, in 19 patients (16.9%) the defect was located within the aneurism of the interatrial septum, in 8 (7.1%) the fenestrated defect was revealed, in 1 child (0.9%) ASD was combined with the pulmonary valve stenosis, in 3 patients (2.7%) – with PDA. AMPLATZER occluder implantation was successful in all patients with PDA. In one case (3.8%) PDA occlusion with the use of AMPLATZER system was performed following the duct recanalization. The following immediate results were assessed: success of the procedure (optimal occluder implantation without shunting) and the complications, such as death, dislocation of the device, the need for open surgery. The long-term results ( $14.5 \pm 5.7$  months) were followed up in 39 patients (28.3%). The following criteria were evaluated: death, the need for open surgery to correct the defect, shunting degree and signs of right heart dilatation, according to echocardiography data.

**Results:** ASDs were successfully closed in 107 patients (95.5%), in 5 patients (4.5%) the closure was impossible due to elastic and too small edges (less than 4 mm). In two cases (1.8%) the in hospital complication (dislocation of AMPLATZER device) was revealed. In both patients the open surgery consisting of successful removal of the device and patch closure of the defect was performed under cardiopulmonary bypass. No deaths were recorded (0%). In 100% patients with PDA the defect was closed immediately in the operating room. Following

the endovascular intervention in patients with ASD a small residual shunting persisted in 8 patients (6.4%). During follow-up ( $14.5 \pm 5.7$ ) no deaths and no indications for the open surgery were observed. According to the follow-up echocardiography, in 1 patient (0.9%) the shunting persisted at the level of the superior edge. In 49 patients (35.5%) the dilatation of the right heart was present.

**Conclusions:** Strict adherence to the stages of the procedure, the use of modern materials and reasonable selection of patients provide the safe and effective use of the AMPLATZER occluders in patients with septal heart defects and patent ductus arteriosus.

#### GLUCOSE / LEUKOCYTE INDEX IN THE PROGNOSIS OF ACUTE MYOCARDIAL INFARCTION

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Glucose / leukocyte index (GLI) represents the ratio of the product of absolute blood glucose and leukocyte count values and 100.  $GLI = (\text{Leukocyte} \times \text{Glucose}) / 100$  (in conventional units - CU).

**Objective and purposes of the study.** To evaluate the course of acute myocardial infarction (AMI), its complications and mortality depending on GLI value on admission.

**Material and methods:** 164 patients with AMI were assessed on the first day of the disease. Mean age was  $55 \pm 0.95$  years; 130 patients were males, 34 – females. The diagnosis was verified clinically, with the use of electrocardiogram and through assessing the early and late myocardial necrosis markers (troponin T, CC, MB-CC, LDG). In 51 patients (30%) the initial percutaneous coronary interventions were performed (coronarography, percutaneous transluminal coronary angioplasty [PCTA], and stenting), the fibrinolytic therapy was applied in 41 patients (25%). The overall mortality rate in the sample was 17%. The blood sampling to assess blood glucose and the total blood count was performed immediately on admission.

**Results and discussion:** The analysis of the variance of the mean GLI values in case of AMI complications revealed the higher values in patients who died ( $1.3 \pm 0.18$  CU versus  $0.85 \pm 0.04$  CU in survived patients,  $p < 0.001$ ). In patients with cardiogenic shock, ventricular fibrillation, ventricular tachycardia, and pulmonary oedema GLI variance was much more significant ( $p < 0.0001$ ). In patients with no-reflow phenomenon during angioplasty, GLI variance was statistically significant ( $1.3 \pm 0.31$  CU in patients with no-reflow versus  $0.97 \pm 0.06$  CU in those with restored blood flow in the distal,  $p < 0.05$ ). Moreover, the contingency between the variance of the mean GLI values in patients with initially high grade of coronary artery stenosis ( $p < 0.05$ ) and with higher degree of residual stenosis following coronary intervention ( $p < 0.05$ ) was observed.

The variance of the mean GLI values depending on ST segment elevation on ECG ( $p < 0.05$ ), coagulation parameters ( $p < 0.05$ ), creatine phosphokinase (CC) level ( $p < 0.05$ ), systolic and diastolic blood pressure ( $p < 0.05$ ) was derived from the clinical and laboratory data.

Correlation analysis of GLI and MI complications revealed its moderate correlation with mortality ( $r = 0.29$ ,  $p < 0.001$ ), cardiogenic shock ( $r = 0.42$ ,  $p < 0.0001$ ), pulmonary oedema ( $r = 0.33$ ,  $p < 0.001$ ), ventricular tachycardia ( $r = 0.42$ ,  $p < 0.0001$ ), and ventricular fibrillation ( $r = 0.41$ ,  $p < 0.0001$ ). No-reflow phenomenon following revascularization procedure and GLI demonstrated moderate correlation ( $r = 0.29$ ,  $p < 0.05$ ) with predominant left coronary artery lesion ( $r = 0.34$ ,  $p < 0.05$ ).

#### **Conclusions:**

1. Glucose / leukocyte index, blood glucose level and WBC count may be included in the risk stratification scales for AMI. Their ability to predict the unfavourable course of the disease is more precise than haemoglobin level and blood creatinine used in several scales.
2. GLI value calculated within 20 minutes upon admission, along with medical history, physical examination and ECG may become the earliest criterion of risk stratification factor in patients with acute coronary syndrome.
3. The value exceeding 0.9 CU predicts with high probability the complications of AMI such as cardiogenic shock, pulmonary oedema, fatal cardiac arrhythmias, and death, thus motivating physicians to a more active and more aggressive strategy in the management and treatment of such patients.
4. High GLI values on admission correlate with more extended and severe lesion of a symptom-related artery in AMI and with unfavourable outcome of thrombolytic therapy and revascularization procedures with the use of interventional methods.

#### **RESULTS OF SIROLIMUS-ELUTING STENT IMPLANTATION IN PATIENTS WITH CHD WITH PACLITAXEL-ELUTING STENT RESTENOSIS**

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**Introduction:** An enormous number of drug-eluting stents are annually implanted in patients with

coronary heart disease all over the world. While drug-eluting stents (DES) implantation resulted in a significant decrease in restenosis rate, compared to bare metal stents, the problem of restenosis is still a challenge for interventional cardiologists. At the same time, no optimal method of treatment in case of restenosis of paclitaxel-eluting stents is now available. This warranted the conduct of the present research.

**Purpose:** To assess 1-year results of treatment of patients with CHD and DES restenosis by the way of multiple percutaneous coronary interventions with sirolimus-eluting stents implantation.

**Methods:** From January, 2005 to December, 2006, 112 patients were enrolled in the study. These patients underwent multiple percutaneous coronary interventions with sirolimus-eluting stent implantation due to restenosis in the previously implanted DES. The immediate and 1-year results were assessed through clinical evaluation and telephone contact with the patients.

Mean age of the patients was  $61 \pm 13$  years. In 30 patients (26.8%) the multivessel coronary disease was present; 32.1% of patients suffered from diabetes mellitus.

Hypercholesterolaemia was observed in 33 patients (29.5%). All patients (100%) underwent clinical examination at 1 year. Mean duration of the follow-up was  $14.2 \pm 1.9$  months. The rate of immediate success of the intervention was 100%. In-hospital MACE (cardiac death, non-lethal myocardial infarction [MI] or recurrent revascularization) were observed in 8 patients (7.1%), mostly due to the non-lethal non-Q wave MI. By the end of the year the rate of revascularization of the target lesion was 17.8%. The coronary bypass surgery was performed in all these cases. The combined rate of MACE, including death, MI, stent thrombosis or revascularization of the target lesion within 12 months following percutaneous coronary intervention, was 19.6%. It should be noted that in 1 case (0.9%) the patient's death was due to non-cardiac cause.

**Conclusion:** Percutaneous coronary interventions with implantation of sirolimus-eluting stents in patients with CHD and DES restenosis are effective and provide a good clinical and angiographic result for at least 12 months following the recurrent intervention.

#### **UTERINE ARTERY EMBOLIZATION IN PATIENTS INTERESTED IN PREGNANCY**

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**Purpose:** To assess the efficacy of the uterine artery embolization (UAE) in patients interested in preg-

nancy; to assess the technical features of the intervention, and to develop the algorithm for determining indications for UAE in this group of patients.

**Material and methods:** Over a period from 2002 to 2009, 2330 patients with uterine myoma underwent UAE. Among them there were 833 patients (35.8%) interested in pregnancy. In all these patients the performance of uterus-preserving myomectomy was problematical.

**Results:** the techniques allowing to minimize the duration of X-ray exposure, the risk of inadvertent embolization of the ovarian arteries and the risk of ischemic endometrial lesions were developed. The prognostic criteria to ensure the maximum probability of childbirth in the long-term period were developed.

Eighty five pregnancies occurred in patients following UAE; which corresponds to 24% of 345 patients who underwent UAE more than 1 year ago, had a sexual partner and did not use contraception. Fifteen patients are now on various stages of gestation, in 12 patients the pregnancy was terminated, 19 patients were lost for follow-up. Currently, the information on 39 deliveries in 38 patients is available. Forty children were born, including one case of dichorionic twins.

**Conclusions:** UAE can be used in patients with uterine myoma who are interested in pregnancy. The technique of UAE in such patients has its particular features.

#### **ENDOVASCULAR METHODS IN TREATMENT OF OBSTETRIC PATHOLOGY**

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**Purpose:** To assess the effectiveness of endovascular embolization in the treatment of various obstetric diseases.

**Material and methods:** In the period from 2005 to 2009 endovascular interventions were used in 111 obstetric patients. In nine patients with placenta increta the catheterization of the uterine arteries was performed immediately before the caesarean section; in six patients the intraoperative embolization of the uterine arteries was performed, in one case the occlusion of the internal iliac arteries with the balloon catheter was carried out, in two cases the endovascular intervention was not performed as no significant intraoperative bleeding was present. In 22 patients with postpartum bleeding the embolization of the uterine arteries was carried out. In 10 patients with ectopic pregnancy (nine cervical and one abdominal pregnancy) the embolization was used along with local and intraarterial administration of methotrexate.

**Results:** Appropriate haemostasis was achieved in all cases. There was no case of hysterectomy or internal iliac arteries ligation. Three patients with cervical pregnancy required the repeated embolization.

**Conclusions:** Endovascular methods, especially the embolization of the uterine arteries can ensure rapid and effective haemostasis in patients with obstetric pathology leading to bleeding.

#### **EXPERIENCE WITH THE USE OF TRANSLUMBAR ACCESS FOR THE INSERTION OF LONG TERM CATHETERS IN PATIENTS WITH TERMINAL RENAL FAILURE**

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Patients with terminal chronic renal failure need vascular access with an adequate blood flow for hemodialysis performance. Current possibilities of programmed hemodialysis allow to prolong such patients' life for more than 10 years. Quite often during this time the resources for the use of such vascular accesses as arteriovenous fistulae and long term catheters, inserted in the central veins, come to the end. Translumbar catheter implantation through the IVC can be one of the methods for the creation of dialysis access. This procedure is technically demanding, associated with high risk of complications due to the instability of hemostasis systems and the changes in venous anatomy resulting from multiple previous thromboses. However it does not significantly change the quality of life of such patients.

**Purpose:** to determine the feasibility of X-ray-guided long term catheters insertion from translumbar access for hemodialysis performance in patients with terminal chronic renal failure.

**Material and methods:** we have 4 patients who receive programmed hemodialysis through the catheters inserted from translumbar access. As a result of multiple thromboses in the territory of the SVC and iliac veins occurring in these patients during 5 to 12 years it became impossible to use arteriovenous fistulae and long term catheters inserted through the subclavian, jugular and femoral veins for vascular access. The attempts of recanalization of these occlusions were unsuccessful. All patients received Medcomp (USA) catheters inserted as follows: a discontinuous introducer was inserted in the IVC at L I-II level via translumbar puncture under local anesthesia and X-ray guidance. A dual-lumen catheter, previously inserted through the channel in the subcutaneous fat from the anterior abdominal wall, was advanced through this introducer. The "venous" end of the catheter was inserted into the right atrium at a 2 to 3 cm depth. The skin wounds were sutured. The patients received dialysis through the obtained access from the next day after the operation.

**Results:** catheter insertion through translumbar access was successful in all cases. Control ultrasound

examination performed on the next day after the implantation revealed retroperitoneal space hematomas in 2 patients; the hematomas' volume was 150 to 200 ml and they did not require special treatment. Other complications were not recorded. To date the catheters are being functioning for over 8 to 11 months and provide sufficient blood flow for hemodialysis. In 1 case the signs of dysfunction appeared in 3 months after catheter insertion; angiography revealed a thrombus at the "venous" end of the catheter. The treatment with Clexane for 2 weeks led to the restoration of the adequate catheter's function.

**Conclusion:** X-ray guided insertion of dual lumen long term catheters from translumbar access allows to provide permanent vascular access for the patients receiving programmed hemodialysis while preserving their quality of life.

### **ENDOVASCULAR RESTORATION OF HEPATIC ARTERY PATENCY AFTER ORTHOTOPIC LIVER TRANSPLANTATION**

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Thrombosis of donor hepatic artery is one of the complications occurring after orthotopic liver transplantation. This complication can lead to liver necrosis or to ischemic disorders of bile ducts' walls. The complication can be treated by surgical reconstruction of the anastomosis or with the use of endovascular method.

**Material and methods:** 21 orthotopic liver transplantations have been performed in the State regional Hospital N1. Early after the operation the hepatic artery thrombosis was revealed in 3 patients (2 men, 1 woman). The complication was revealed within the 1st day after surgery in 2 patients and in 5 days in 1 patient. The diagnosis was made on the base of ultrasound examination and CT. The patients were brought to the cathlab, where abdominal aortography confirmed the diagnosis. The occlusion of the hepatic artery was located at the site of anastomosis between the donor's and the recipient's hepatic arteries. A single loading dose of Clopidogrel was administered (Plavix 300 mg).

The celiac trunk was cannulated with the guiding catheter JR 4. A hydrofile guide 0,035" (Radiofocus. Terumo) was advanced through the occlusion. Then the guide was exchanged for a hydrophile coronary guidewire (Rinato, Asahi). Angioplasty with a balloon measuring 3,5 x 20 mm was performed at the site of occlusion, the hepatic arterial blood flow was partially restored. Residual stenosis up to 40-50% of the diameter was found. It was decided to stent the artery.

Two patients had 1 Xience V stent (4,0x18 mm and 3,5x18 mm) implanted, the third patient received 2 stents - Xience V 4,0x18 mm distally and overlapping

Palmaz stent 6,0x18 mm proximally. Control angiography revealed TIMI 3 blood flow in all patients.

The patients had satisfactory postoperative course. Control ultrasound examination and CT showed that the stents in the hepatic artery were patent, without signs of thrombosis, with opacification of the lobar, segmental and subsegmental branches. The patients were discharged with the recommendation to add Plavix for 6 months to their standard pharmacological therapy. Control CT performed in 3 and 6 months showed preserved blood flow in the hepatic arteries.

**Conclusion:** endovascular intervention on the occluded hepatic artery after orthotopic liver transplantation allowed to restore adequate blood flow and avoid reoperation for the reconstruction of donor hepatic artery.

### **IMPLANTATION OF BIFURCATION STENT-GRAFT AS ONE OF THE METHODS FOR THE TREATMENT OF INFRARENAL ABDOMINAL AORTIC ANEURYSMS, EVENTUAL COMPLICATIONS**

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Abdominal aortic aneurysm is a life-threatening condition leading to the rupture within 1 year after the diagnosis in 40% of patients. There are no conservative methods for the treatment of abdominal aortic aneurysms, and for 40 years this entity has been treated only surgically.

**Purpose of the work:** to demonstrate the effectiveness of the use of bifurcation stent-grafts for the treatment of infrarenal abdominal aortic aneurysms.

**Material and methods:** from September 2005 through August 2009 we performed 17 endograftings for infrarenal abdominal aortic aneurysm using bifurcation stent-grafts. The age of patients ranged from 57 to 78 years, on the average -  $63 \pm 13,2$  years. There were 14 men and 3 women. All aneurysms were detected during abdominal ultrasound examination and confirmed by angiography and spiral CT. The following types of the aneurysms (classification of A.V. Pokrovsky) were found: Type 2 – 10 patients; Type 3 – in 5 patients. Concomitant diseases included: ischemic heart disease, angina of func. class 2-3 in 11 patients, arrhythmogenous variant of IHD in 2 patients, arterial hypertension of 2-3 degree in 11 patients, obesity of 3-4 degree in 1 patient.

Endovascular stent-grafts were selected on the base of spiral CT data. In total 12 stent-grafts EXCLUDER (W.L.Gore), 1 stent-graft TALENT (Medtronic), and 3 stents AORFIX (Lombard Medical) were implanted. Spinal anesthesia was used. In all cases the stent-grafts were inserted through the femoral arteries after their exposure made by vascular surgeons. Patients with Type 2 aneurysms had the main (ipsilateral) and contralateral arms of the

stent-graft implanted. Three patients with Type 3 of the aneurysm underwent coil embolization of one internal iliac artery, one patient had bilateral arterial embolization; the exclusion of the internal iliac arteries did not lead to pelvic disorders. In one case the catheterization and embolization of the internal iliac artery proved unfeasible.

Control aortography performed at the end of the procedure revealed periprosthetic blood leakage in 4 patients. In cases with proximal leakage 2 additional aortic stents were implanted, distal leakage required additional angioplasty of the distal end of the stent-graft with good immediate result in both cases. In one case the opacified blood entered the aneurysmatic cavity from the lumbar arteries. CT performed in 1 week after the operation did not reveal blood entry into the aneurysmatic cavity, the latter was completely thrombotic.

We met one complication – the thrombosis of the contralateral stent-graft arm immediately during stent-graft implantation. Balloon angioplasty was performed and a balloon deployable stent was inserted. The blood flow was restored.

Postoperative course was without complications. The access sites healed with primary intention. The patients were followed for 1 month to 1,5 years. Control CT showed that the aneurysms were excluded from the circulation, no periprosthetic leakage was detected.

**Conclusions:** the procedure of endovascular stent-grafting of the aneurysms of infrarenal abdominal aorta is an effective and safe method of treatment. It allows to exclude the aneurysms from the circulation with minimal complications, especially in high-risk patients.

#### **ROLE OF INTERVENTIONAL CARDIOANGIOLOGY IN THE DIAGNOSTICS AND TREATMENT OF CORONARY ARTERY DISEASE OF THE TRANSPLANTED HEART**

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**Introduction:** Coronary artery disease of the allotransplant is the main cause of late mortality of patients after heart transplantation. Due to the absence of afferent innervation this disease runs without pain symptoms and is characterized by the development of acute myocardial infarction, heart failure or sudden death.

**Material and methods:** We present the results of follow-up in 49 patients (40 men and 9 women aged from 16 to 65 years), in whom coronarography was performed in 9 days to 15 years after heart transplantation.

**Results:** Angiographic signs of coronary artery disease of the transplanted heart (CADTH) were revealed in 23 patients. In most cases (12 patients) CADTH was manifested by local single- or multi-

vessel stenosis (type A), which was corrected by coronary angioplasty (in total 28 procedures were performed). The progressing of CADTH of the C type, with typical diffuse obliterating lesion of predominantly distal segments of the coronary bed, was seen in 11 patients. Adequate revascularization in such settings seems barely real, and in one case CADTH of type C served as the indication for repeated heart transplantation. PTCA was performed in 42 arteries, and 18 stents (mostly – DES) were implanted. The analysis of the results of PCI revealed two groups of patients different in age and in the character of coronary arteries' response to the intervention and stenting. The first group included 7 patients (5 men and 2 women), with "de novo": lesions in whom 9 PTCA were performed in 12 segments of the coronary bed. Balloon dilatation gave positive angiographic results, 2 metal stents have been implanted. In all cases stable angiographic results persisted for the whole length of the follow-up (from 2 to 6 years). The age of patients at the time of orthotopic heart transplantation (OTHT) was 45,6 years (from 19 to 57 years).

The second group included 5 patients (3 men and 2 women), in whom 19 PTCA have been performed. The age of patients at the time of OTHT was 30,2 years (from 19 to 38 years). All of them had the history of dilatational cardiomyopathy. Time interval between OTHT and PTCA was 4,18 years (from 1 to 10 years). Each patient from this group underwent on the average 4 (from 3 to 5) PTCAs. The necessity of repeated interventions was determined by the development of in-stent restenosis. In total 11 stents have been implanted, among them - 9 DES. Repeated PTCA was performed within the time interval from 4 to 12 months. All patients from this group had their lesions located in the proximal segment of the LAD; it was associated with the stenosis of the circumflex branch (CxB, 3 cases) and of the right coronary artery (RCA, 2 cases). In one case the character of ostial lesions of the LAD and the CxB necessitated stenting of the left main coronary artery.

**Conclusion:** Most patients aged over 40 years had high rate of stable effect after balloon dilatation, while the dissections complicating the angioplasty are practically absent. In young patients (22-29 years) recurrent restenoses are seen even after DES implantation.

#### **PTCA IN PATIENTS WITH CORONARY HEART DISEASE AFTER KIDNEY TRANSPLANTATION**

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Coronary heart disease (CHD) is one of the most common and sometimes lethal cardiovascular complications seen after kidney transplantation (KT). Its rate in allogeneous kidney recipients is 3-to-5-fold higher than in general population and reaches 14-20%. CHD-related mortality in patients after kid-



ney transplantation varies, according to different authors, from 35 to 50%. However, the number of myocardial revascularization procedures in such patients is rather small, which is related to high mortality after CABG, to technical challenges met with endovascular revascularization, as well as to the fear for the function of the renal transplant submitted to the influence of contrast medium.

**Purpose of study:** to analyze the results and the particularities of coronary angioplasty in patients with coronary heart disease after kidney transplantation and to evaluate the function of the transplant after the intervention.

**Methods:** we performed prospective and retrospective analysis of the results of coronary interventions in 37 patients (30 men) after KT. All patients underwent ECF, EchoCG, exercise testing; laboratory blood indices were studied. Mean age of patients was  $37,3 \pm 11,0$  years. Mean time interval after KT was  $81,1 \pm 44,3$  months. From 1999 through 2008, 51 coronary stentings (CS) were performed. All patients had maximally complete endovascular myocardial revascularization. The contrast medium «Vizipaque -350» was used. Mean duration of the follow-up was 52 months.

**Results:** In total 99 stents have been implanted, among them – 19 DES. The procedural success was 100%. Intraaortic balloon counterpulsation was used in 3 cases. Hospital mortality was 0%. After CS almost all patients had stable (at least for 12 months) positive clinical effect. Certain difficulties met during endovascular myocardial revascularization in this category of patients are due to great extension and multivessel character of stenotic lesions, pronounced calcification and tortuosity of the coronary arteries. Probably, due to these particularities of the coronary bed in these patients the following complications occurred: in 14% - the dissection of the coronary artery, requiring additional stenting, in 11% - acute stent thrombosis requiring the administration of the inhibitors of IIb/IIIa platelet receptors, in 26% - complications at the site of puncture in the form of large hematomas and pseudoaneurysms. Within the first 48 hours and in 1 month after CS significant increase of creatinin level and kidney transplant dysfunction were not seen.

**Conclusion:** coronary angioplasty with stenting is an effective and safe method for the treatment of CHD in patients after KT. Herewith the function of the renal transplant is not disturbed neither in the early, nor in the long-term follow-up.

#### **EXPERIMENTAL VALIDATION OF THE USE OF ENDOVASCULAR BYPASS OPERATIONS (EBO) IN PEDIATRIC PRACTICE**

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**Introduction:** The work was aimed at the creation of extraorgan intervascluar anastomoses, providing

leak resistance and safety of the procedure, in particular in congenital heart diseases with poor pulmonary circulation, using endovascular methods.

**Material and methods:** Experimental intervascular anastomoses have been created using endovascular technique in 6 dogs (body weight from 3,5 to 12 kg). All procedures were carried out under intravenous anesthesia (Kalipsol + Thiopental) in the cathlab equipped with angiographic device PHILIPS INTEGRIS. The following types of procedures have been performed: SVC – right pulmonary artery (2), right atrium – right pulmonary artery (1), descending aorta – left pulmonary artery ЛА (2), ascending aorta – pulmonary trunk (1).

The stage of EBO procedure are described on the example of “SVC – right pulmonary artery” communication. The 7F and 10F introducers were inserted in the femoral and the jugular veins, as well as in the femoral artery according to Seldinger technique. Special guides with magnet tips were advanced through guiding catheters. The force of magnetic coupling sufficient for self-guidance was observed already at a distance of 28 mm between these elements. The intervascular axe was formed under X-ray filming guidance: after the bit shot, the kinematic needle was gripped and carried over as an axis from the SVC to the right pulmonary artery, the right ventricle, right atrium, IVC and then – outward through the introducer placed in the femoral vein. After that selective angiography from the SVC and the right pulmonary artery was performed through the catheters, re-advanced to the area of the formed anastomosis. Further anastomosis formation was carried out by the insertion of a coaxial catheter (8F) from the SVC side along the created axis through the SVC wall, intervascular space and the right pulmonary artery wall into its lumen. After the removal of the internal catheter of the coaxial system, a special bobbin-like stent with an original detachment system was inserted along the axis. The detachment system allowed to hold out the stent being inserted into the pulmonary artery lumen for up to 80% of its length until the start the of the opening of the proximal stent's branches in the lument, and to safely detach its distal parts in the SVC lumen; during this manipulation the nitinol stent acquired its bobbin-like form.

**Results:** Five out of 6 experimental procedures have been successful. During the procedure of the “descending aorta – left pulmonary artery” type there was stent's dislocation from the aortic lumen, followed by the development of marked tachycardia and fibrillation in the dog. Selective simultaneous angiography revealed contrast medium leakage into the pulmonary tissue from the aorta. In two minutes after the angiography dyspnea and heart arrest developed. At autopsy we found massive pulmonary tissue imbibition with blood and a hematoma located between the descending aorta and the pulmonary artery. The pulmonary artery branch immediately adjacent to the aorta, laid posteriorly. Thus, the error in spatial orientation led to the lung injury (i.e., the axis passed through the pulmonary tissue), which

was further worsened by the damaging action of the dislocated stent, causing fatal complication.

The analysis of this failure showed that the performance of such operations is impossible without meticulous preliminary quantitative calculation and the evaluation of the concrete spatial relations between the vascular pools (on the base of endovascular magnetic navigation and multiposition rotational angiography), as well as of the anatomy of the organs adjacent to the area of eventual intervascular anastomosis.

**Conclusion:** Our work shows the perspectives for the development of a new trend of endovascular surgery, aimed at the elaboration of bypass-forming procedures for the treatment of congenital and acquired cardiovascular pathology on the base of new technologies, suggested by the authors. The absence of data on the feasibility of EBO caused the staged character of experiments for the confirmation of the possibility to create, in principle, a leak-safe endovascular anastomosis.

### **ENDOVASCULAR TREATMENT OF PATIENTS WITH STENOTIC LESIONS OF TWO AND MORE BRACHIOCEPHALIC ARTERIES**

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**Purpose of study:** The analysis of the results of endovascular treatment of two and more arteries in patients with multifocal stenotic lesions of brachiocephalic arteries. Evaluation of the risk of eventual complications in simultaneous stenting of brachiocephalic arteries.

**Material and methods:** From 2006 through August 2009 a total of 605 interventions were performed in 537 patients with stenotic lesions of brachiocephalic arteries in the department of endovascular methods of diagnostics and treatment; stenting was performed in 593 of these interventions (98%), while balloon angioplasty – in 12 (2%).

Endovascular interventions with the stenting of two and more brachiocephalic arteries were performed in 64 (12%) patients, in total 103 stents were implanted. In 100% of interventions on the internal carotid arteries, common carotid arteries, subclavian arteries and brachiocephalic trunk we have implanted self-deployable stents – Precise (Cordis), AccuLink (Abbot Vascular), Protégé (EV3), Wallstent (Boston Scientific) – measuring 7-12 mm in diameter and from 30 to 60 mm in length. The stenting of the vertebral arteries was carried out with coronary balloon-deployable stents – Cypher (Cordis), Zeta, Ultra (Abbot Vascular), Taxus (Boston Scientific) - measuring 3-5 mm in diameter and from 8 to 28 mm in length. All interventions on the internal carotid arteries were performed with the use of distal protection devices – Angioguard (Cordis), Accunet

(Abbot Vascular), Spider (EV3), Filter Wire (Boston Scientific). Recanalizations of the carotid arteries were carried out with the use of proximal protection devices – MOMA (Invatec). Endovascular treatment in all patients who needed stenting of more than two arteries, as well as in cases of bilateral lesions of the carotid arteries, was carried out in two stages, in order to decrease the risk of hypoperfusion syndrome development. After the procedure all patients received therapeutic doses of Plavix for 4-8 months.

**Results:** Good angiographic results were obtained in all patients. Early postoperative complications were seen in 6 (6.3%) patients: 1 (1.6%) patient with self-deployable stent implanted in the ostium of the left internal carotid artery had stable hypotensive syndrome with bradycardia, necessitating the stay in the intensive care unit and the use of cardiotonics for 1 day; 1 (1.6%) patient had transitory cerebral circulation disorders which regressed within one day, 1 (1.6%) patient with simultaneous stenting of both internal carotid arteries developed the acute in-stent thrombosis without neurological sequelae; 1 (1.5%) patient had ischemic stroke in the territory of the perforating arteries of the left internal carotid artery. No lethal cases were observed (0% mortality).

The long-term follow-up (over 6 months) was obtained in 45 patients. One patient (1.6%) had significant restenoses (>60%) in the site of stenting necessitating balloon angioplasty.

**Conclusion:** Endovascular treatment of patients with stenotic lesions of two and more brachiocephalic arteries is a safe and effective method, which is caused by low rate of trauma and complications and short rehabilitation period.

### **ENDOVASCULAR SURGERY OF INTRACRANIAL CEREBROVASCULAR ANEURYSMS**

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**Purpose of study:** Evaluation of the effectiveness of endovascular treatment of intracranial cerebrovascular aneurysms.

**Material and methods:** From 2006 through August 2009 cerebrovascular aneurysms have been revealed in 503 patients undergoing treatment in the department of endovascular methods of diagnostics and treatment; in 128 of these patients endovascular exclusion of the aneurysm was performed. In 30 (23.4 %) patients the aneurysms were without ruptures, while 98 (76.6%) patients had non-traumatic intracranial hemorrhage.

In 59 (46.1 %) cases the operation was performed for emergency indications in acute hemorrhagic period (within 21 days after hemorrhage).

In 120 (93.8%) cases the aneurysms were embolized with detachable microcoils: mechanically detach-

able microcoils MDS (Balt), Axiom (EV3), and electrolytically detachable Matrix, GDC (Boston Scientific). In 47 (36.7%) cases the embolization of intracranial aneurysms was carried out according the technique of supplying vessel remodelling: stent-assistance in 28 (21.9%) cases, balloon-assistance in 19 (14.8%) cases. Giant aneurysms of the internal carotid arteries found in 4 (3.1%) patients were excluded with the help of balloon occlusion of the supplying vessel using GOLDBAL (Balt) balloons. Three patients (2.3%) had sequential implantation of 2 Leo stents (Balt) using «stent-in-stent» technique in aneurysm projection, which caused spontaneous thrombosis of the aneurysm with the preservation of supplying vessel's lumen. The use of this technique (stent-in-stent) in 1 (0.8%) patient with fusiform dissecting aneurysm of V4 segment of the left subclavian artery led to the decrease of the size of aneurysm by over two-fold in 2 months after stenting.

**Results:** 125 (97,7%) patients had no repeated postoperative hemorrhages. Mortality was 17.2% (22 patients). All dead patients underwent urgent operation in acute hemorrhagic period, 12 of them were admitted in severe condition (consciousness level – Hunt-Hess grade IV-V). In 2 (1.6%) cases repeated hemorrhage developed within the first 24 hours after embolization, and both died. Intraoperative aneurysm rupture occurred in 4 (3.1%) patients, all of whom died. Two patients 2 (1.6%) died from acute stent thrombosis. One women (0.8%) with ruptured giant aneurysm of the internal carotid artery died from ischemic disorders after balloon occlusion of the internal carotid artery.

Mortality in the group of patients who were operated on for selective indications (in “cold” period, over 21 days after hemorrhage) and among patients with unruptured aneurysms, was 0%.

**Conclusion:** Endovascular surgery of intracranial cerebrovascular aneurysms is an alternative to open surgery, which is caused by low rate of trauma and complications. Endovascular embolization is the method of choice for patients with consciousness level of Hunt-Hess grade IV and V, with aneurysms in the vertebral arteries' territory, with low located aneurysms of the internal carotid arteries (clinoid segment, ophthalmic segment, sometimes – communicant segment).

#### **PREDICTORS OF MASSIVE PCI-RELATED BLEEDING FROM THE FEMORAL ARTERY**

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**Introduction:** Femoral artery still is considered the main access artery for percutaneous coronary inter-

ventions (PCI). However massive bleeding from the access artery lead to the prolongation of in-hospital stay and, hence, to the increase of the cost of treatment. In this relation it is important to determine the predictors of bleeding and eventual measures for their prevention in order to decrease the expenses for PCI performance.

**Purpose:** to determine the predictors of massive bleeding from the femoral artery serving as access artery for PCI.

**Methods:** from January 2001 through February 2002 we have enrolled in our study 1457 patients who underwent PCI through transfemoral approach in Sani Konukoglu Medical Center (Gaziantep, Turkey).

After PCI patients remained in the hospital for at least 24 hours. Blood accumulation of over 10 cm in diameter in the site of puncture was regarded as hematoma. Retroperitoneal hematoma was determined as any amount of blood within retroperitoneal space, diagnosed with ultrasound or CT. Bleeding from the femoral artery resulting from PCI (femoral bleeding, femoral and retroperitoneal hematoma) was considered as the primary endpoint of the study. All patients received standard dual antiplatelet therapy with Aspirin and Clopidogrel, during the intervention heparin was administered, in case of necessity the inhibitors of the platelet receptor glycoprotein IIb-IIIa were administered. PCI were performed with the use of 6 to 8F introducers. After the intervention the introducer was immediately removed and manual hemostasis was performed. Bed rest was prescribed for 6 to 12 hours.

**Results:** Mean age of the studied patients was 63,4±11,2 years. 70,9% of them were men. Diabetes mellitus was present in 24,0%. Arterial hypertension was present in 59,0% of patients, while confirmed peripheral arterial disease – in 11,6%. 20,9% of patients had a history of angiographic examination or PCI.

Post-PCI femoral hematoma developed in 2,6% of patients. In 0,62% of cases massive femoral bleeding was noted. Herewith retroperitoneal hemorrhage occurred only in 0,34% of patients.

The following factors were predictors of bleeding from the femoral artery: age > 65 years (odds ratio (OR)=2,57, CI 95%, 1,94 - 4,08; p<0,05), female gender (OR=1,51, CI 95%, 1,25 - 2,12; p<0,05), use of the inhibitors of the platelet receptor glycoprotein IIb-IIIa (OR=1,35, CI 95%, 1,21 - 1,89; p<0,05). Meanwhile patients with peripheral arterial disease had a tendency for lower risk of femoral arterial bleeding (OR=0,75, CI 95%, 0,61 - 0,96; p<0,05).

**Conclusion:** Hence, the patients' age over 65 years, the use of the inhibitors of the platelet receptor glycoprotein IIb-IIIa, and the female gender are the predictors of massive PCI-related bleeding from the femoral artery. At the same time the presence of peripheral arterial diseases minimizes the risk of bleeding associated with transfemoral access.

## COMPARATIVE ANALYSIS OF THE TREATMENT RESULTS IN PATIENTS WITH ACUTE CORONARY SYNDROME IN KEMEROVO AND IN EUROPEAN CENTERS

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**Purpose of study:** To compare the treatment approaches and in-hospital results in patients with acute coronary syndrome (ACS) in the Research Institute for the Complex Problems of Cardiovascular Diseases of the Siberian Branch of the Russian Academy of Medical Sciences and in the European centers (EC), according to the data of the local registry and of the study EHS ACS II (n = 6067).

**Material and methods:** During the year 2008, 529 patients with ACS were included in the local registry of the Research Institute. Patients were allocated to two groups as follows: ACS patients with ST segment elevation (n = 389) and without ST segment elevation (n = 140). The main demographic and clinical data were taken into consideration, as well as the treatment carried out and the use of reperfusion: primary percutaneous coronary intervention (PCI), thrombolytic therapy (TLT), their time parameters, use of high-technological methods of revascularization and hemodynamic support (PCI, coronary bypass [CB], intra-aortic balloon pump [IABP], implantation of electric cardiac pacemaker [ECP]). The in-hospital mortality was assessed as well. All data were compared to the results of European study EHS-ACS-II, 2004.

**Results:** The main demographic and clinical data of the patients in the registry of the Research Institute and in the EC were comparable. No differences were observed in the number of ACS patients with ST segment elevation, who underwent primary reperfusion (76.1% in the Research Institute vs. 64% patients in the EC [p > 0.05]). The "door-to-balloon" (D2B) time was similar (69 minutes [10 to 390] versus 70 minutes [40 to 125], respectively [p > 0.05]). In ACS patients in the Research Institute the higher rate of CB was observed (11.31% versus 2.9% in the EC) – in patients with ST segment elevation, and 20.7% versus 7.4%, respectively, in patients without ST segment elevation. The rate of in-hospital mortality in patients following primary PCI in the Research Institute and in the EC was similar (3.75% versus 6.4%, respectively [p > 0.05]).

### Conclusion:

1. The results obtained with ACS treatment in the Research Institute and in the EC were comparable in what concerns the rate of coronarography and primary reperfusion, IABP, ECP, "door-to-balloon" time and in-hospital mortality (p > 0.05).

2. The results of the Research Institute were better in terms of the rate of primary PCI (81.1% versus 59% in the EC [p < 0.05]), TLT (18.9% versus 41%, respectively [p < 0.05]).

3. In the EC, the IIb/IIIa platelet receptor blockers were extensively used (up to 30.7% in patients with ST segment elevation), while in the Research Institute these drugs were not administered. The rate of CB in ACS patients in the EC was significantly lower compared to the Research Institute (2.9% versus 11.3% in patients with ST segment elevation and 7.4% versus 20.7% in patients without ST segment elevation, respectively [p < 0.05]).

## ANALYSIS OF THE RESULTS OF CORONARY ANGIOPLASTY COMPLICATED BY "NO-REFLOW" SYNDROME

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**Purpose:** To assess the immediate and long-term results of percutaneous coronary interventions (PCI) associated with "no-reflow" syndrome.

**Material and methods:** 7 cases of PCI associated with "no-reflow" syndrome were analyzed. Mean age of patients was 55.4 ± 10.3 years, they were predominantly males (85.7%). All patients had acute Q-wave myocardial infarction (AMI), in 2 patients (28.6%) AMI was complicated by early postinfarction angina. According to echocardiography data, mean ejection fraction was 43.9 ± 8.4%. In 6 patients (85.7%) infarction was related with acute thrombotic occlusion of the anterior descending artery, in one case (14.3%) – with an acute occlusion of the right coronary artery (infarct-related arteries). In 71.4% patients the one-vessel lesion was revealed, two- and three-vessel lesions were revealed each in 1 case (14.3%). Mean diameter of the target artery was 3.25 ± 0.5 mm. In 2 cases (28.6%) the balloon angioplasty of the coronary arteries was performed, in 5 patients (71.4%) the percutaneous coronary intervention with stenting was carried out. A total of 7 stents were implanted with mean diameter of 3.2 ± 0.4 mm, and mean length of 28 ± 4.8 mm. All patients received the loading dose of Plavix (300 mg) immediately before the procedure (85.7%) or just after PCI (1 patient, 14.3%). The dose of Heparin administered during PCI was on average 21.7 ± 1.3 thousand units. In 2 cases (28.6%) intracoronary thrombolysis was performed. The in-hospital stage as well as the long-term results were assessed. Clinical success was assessed based on the clinical picture of the disease (decrease in the angina functional class by 2 or its absence), favourable changes in ECG and cardiospecific enzyme levels over time and the absence of the complications.

**Results:** No cases of immediate angiographic success, based on the blood flow level following PCI, as judged by TIMI score ( $0.8 \pm 0.7$ ), were observed. There were no intra-procedural complications. Mean diameter of the target vessel following PCI was  $3.25 \pm 0.38$  mm. The residual stenosis following endovascular intervention did not exceed 5% in all patients. In spite of the “no-reflow” syndrome, the clinical success was observed in all patients during the in-hospital stage. In 3 patients echocardiography performed during in-hospital stay revealed the ejection fraction decrease by 14% on the average in 2 patients and the ejection fraction increase by 15% in one patient. The long-term results were followed in 5 patients. In 2 patients (40%) the unstable angina developed. In 3 patients (60%) the clinical effect of PCI persisted. The follow-up coronarography was performed in 4 (80%) patients. In 2 cases (40%) thrombosis of the target artery was revealed. This finding was observed in patients with gradual decrease of echocardiographic ejection fraction. In 2 patients (40%) angiographic restenosis was absent, TIMI 3 antegrade blood flow was observed. The repeated revascularization (CABG) was performed in 2 patients (40%).

**Conclusions:**

1. Males with acute thrombotic occlusion in the infarction-related anterior descendent artery prevailed among patients with “no-reflow” syndrome as a complication of the percutaneous coronary intervention.
2. Gradual echocardiographic ejection fraction decrease over time following development of “no reflow” syndrome is probably due to the persisting occlusion of the infarction-related artery.
3. “No-reflow” syndrome does not impair the clinical success of the procedure, the antegrade blood flow is restored quite often (in 50% cases) during in-hospital stay.

**IMMEDIATE RESULTS OF IMPLANTATION OF THE FIRST RUSSIAN STENT IN ACUTE CORONARY SYNDROME**

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**Purpose of study:** To assess the immediate clinical and angiographic efficacy and safety of the first Russian SINUS stent in patients with acute coronary syndrome (ACS).

**Material and methods:** 20 patients with clinical pattern of ACS and hemodynamically significant impairment of the coronary vessels underwent simultaneous coronarography and percutaneous coronary intervention (PCI) and stenting of the infarct-related artery (IRA). The following angiographic parameters

were used to assess the immediate results of stenting: residual stenosis in the site of stenting and blood flow in the IRA according to TIMI scale. The following complications during in-hospital stay were considered: death, recurrent myocardial infarction and coronary artery bypass grafting (CABG). The mean age of patients in this sample was  $55.31 \pm 7.1$  years. The males prevailed: 18 patients (90%). In 14 patients (70%) the acute myocardial infarction (AMI) with ST segment elevation was diagnosed, four patients (20%) had AMI without ST segment elevation, while 2 patients (10%) had unstable angina. One-vessel coronary disease was observed in 30% cases ( $n = 6$  patients), two-vessel disease – in 45% ( $n = 9$  patients), three-vessel disease – in 25% ( $n = 5$  patients). IRA occlusion was diagnosed in 9 patients (45%). The infarct-related artery was the anterior descending artery in 55% of cases, the right coronary artery - in 30%, the circumflex artery - in 15%. Mean length of the stented segments was  $16.7 \pm 2.24$  mm, mean stent diameter was  $3.26 \pm 0.25$  mm.

**Results:** The immediate success of the combined PCI with stenting was observed in 100% of cases (successful revascularization of the IRA in 100% of cases with persisting TIMI 3 blood flow). Mean degree of residual stenosis in the site of stent implantation was  $8.8 \pm 9.15\%$ . There were no complications such as death, myocardial infarction or coronary artery bypass grafting during in-hospital stay. The following peculiarities of PCI were observed: in two patients (10%) there were difficulties with the removal of the stent delivery system balloon following its implantation, in one case (5%) intracoronary thrombosis in the site of stenting associated with the substantial impairment in the hemostasis system was observed. Vessel dissection seen in two cases (10%) following IRA stenting required the additional SINUS stents implantation.

**Conclusion:** The use of the first Russian SINUS stents in percutaneous coronary interventions associated with the acute coronary syndrome is a safe and effective method of myocardial revascularization.

**IN-HOSPITAL RESULTS OF THE SEQUENTIAL PROCEDURES OF CORONARY STENTING AND CAROTID ENDARTERECTOMY**

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**Introduction:** The sequence of the surgical treatment in case of the combined involvement of coronary and carotid arteries, as well as the safe timing of the intervention, is not determined so far.

**Objective:** To assess the in-hospital results of sequential coronary stenting (CS) and carotid endarterectomy (CAE).

**Material and methods:** 10 patients with coronary and brachiocephalic disease were evaluated retrospectively. All patients were subject to endovascular treatment of the coronary arteries and CAE. Due to hemodynamically significant impairment of both vascular territories the decision was made to perform both interventions during the same hospital stay. Due to the critical stenosis of the coronary arteries (mean percent of the target stenosis in the coronary artery was  $81 \pm 8.4\%$ , while the mean percent of stenosis of the internal carotid artery, according to NASCET, was  $74 \pm 5.2\%$ ), CS was performed as the first step, followed by CAE that was accomplished within  $3.0 \pm 1.5$  days. Mean age of patients was  $61.3 \pm 12.3$  years. Postinfarction atherosclerosis was revealed in 3 patients (30%). Asymptomatic course of the internal carotid artery stenosis (ICA) was observed in 60% of cases. According to the coronarography data, three-vessel lesion was observed in 1 patient (10%), two-vessel lesion - in 2 patients (20%), and single-vessel lesion - in 7 patients (70%), respectively. In 8 patients (80%) the target stenosis for coronary stenting was located in the anterior descending artery. The patients included in the study were randomized into 2 groups: the patients of the 1st group ( $n = 7$  patients; 70%) received standard doses of direct anticoagulants before and following the coronary arteries stenting; the 2nd group ( $n = 3$  patients; 30%) received the standard doses of Clopidogrel before and following CS. The following in-hospital endpoints were evaluated: death, stent thrombosis, myocardial infarction, recurrent cerebrovascular accident (CVA), and hemorrhagic complications during CAE.

**Results:** No deaths or cerebrovascular accidents were observed in either group. Stent thrombosis and myocardial infarction occurred in 2 patients (28.6%) who did not receive Clopidogrel (1st group). They underwent urgent recurrent percutaneous coronary intervention. In these patients CAE was performed 3 months later. In one patient (33%) of the second group the hemorrhage in the area of the surgery wound occurred and resolved without interventions.

**Conclusions:** The limited experience with the treatment of multifocal atherosclerosis using sequential coronary stenting and carotid endarterectomy within the same hospital stay demonstrated the safety of this strategy. To reduce the risk of atherothrombotic complications in such patients the standards of dual antiplatelet therapy should be followed.

## OPEN ISSUES OF PRIMARY PERCUTANEOUS CORONARY INTERVENTION

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**Introduction:** The open issues of primary percutaneous coronary interventions (PCI) can be divided into two groups: scientific and organizational. While the

first ones are associated with the lack of objective scientific analyses, the objectives of the organizational issues are definite, but the method to resolve these problems is unclear, particularly under conditions of single national or even regional healthcare system.

**Literature data:** The efficacy and safety of drug-eluting stents (DES) in patients with acute myocardial infarction (AMI) represent one of the main subjects of discussions at the international conferences. Although the indications for use of DES in patients with the thrombus in the target stenosis site belongs to the "off-label" indications, several randomized studies have tested the first generation DES and came to a conclusion on the safety and efficacy of DES in patients with AMI. However, the selective nature of the inclusion/exclusion criteria for the randomized trials, the absence of data concerning the use of the latest generations of DES in AMI and alerting results of histopathologic studies result in the fact that the question about the use of DES in patients with AMI is still unresolved.

The researches of optimal antothrombotic therapy combined with PCI in AMI patients continue. There is a lack of objective evidence of efficacy, but the loading dose of Clopidogrel 600 mg is adopted by the expert consensus. The new antiplatelet drug belonging to the class of thienopyridines (Prasugrel) is attractive due to its proven efficacy as compared to Clopidogrel; however, the safety issues are still open because of increased risk of significant hemorrhagic complications. The results of evaluation of Bivalirudin are very interesting, emphasizing the important role of hemorrhagic complications as one of the causes of adverse outcome of PCI in AMI patients. Finally, in addition to the proven efficacy of Abciximab, other GPIIb/IIIa platelet receptor blockers as effective adjuvant method during AMI-related interventions are under investigation.

Are the attempts to remove the thrombus from the infarction-related artery promising? Most studies of the use of thrombus-extraction devices and systems of distal embolic protection demonstrated their efficacy only with respect to the parameters reflecting the degree of myocardial perfusion. The only randomized analysis that proved the positive clinical benefit of thrombectomy (including the influence on mortality) was performed in the TAPAS study, although its data have to be reproduced.

In the report at PCR2009, Petr Widimsky, co-chairman of the European program for the primary PCI "Stent for Life" defined the target values, reflecting the quality of care organization in AMI patients that should be achieved in the European countries: 1) number of the primary PCI > 600 per 1 million of population per year; 2) primary PCI as a reperfusion method should be used in > 70% of AMI patients with ST segment elevation; 3) the center performing the primary PCI must provide services in the territory with 0.3 to 1 million of population; 4) all the centers that perform the primary PCI must work for 24 hours and 7 days a week.

**Conclusion:** The absence or limited number of randomized studies and registries along with the histopathologic findings do not allow for the solution of the issue of DES use during the primary PCI. The optimal antithrombotic strategy during the primary PCI is not yet developed, the same is true for the effective devices aimed to prevent and to treat the acute coronary artery thrombosis. Due to the diversity of the national healthcare systems there are no unified algorithms to achieve the target organizational parameters of the primary PCI, specified by the European program "Stent for Life".

### **IS THERE A SCIENTIFICALLY SOUND TREATMENT ALGORITHM IN OSTIAL LESION OF THE ANTERIOR DESCENDENT ARTERY?**

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**Introduction:** The prognosis in patients with coronary heart disease (CHD) with a significant ostial stenosis of the anterior descending artery (ADA), is less favourable in comparison with patients without ADA involvement. PCI on the ADA ostium is an independent predictor of restenosis, even with the use of drug-eluting stents (DES). The main features of the ostial stenosis of ADA consist in the ostial position of the stenosis and its bifurcation pattern with frequent partial involvement of the left main coronary artery (LMCA).

**Literature data:** When the stents without drug coating (bare-metal stents - BMS) are used, the coronary artery bypass grafting in patients with proximal ADA stenosis has advantages in the number of recurrent revascularization in comparison to the PCI. The best results of coronary artery bypass grafting were reported from the randomized studies. This advantage is levelled down when DES are used, but the evidence of this hypothesis was demonstrated in a limited number of well-designed analyses.

The theoretical advisability of the decrease of atheromatous plaque volume, resulting in the reduced probability of stenosis in the ostium of the circumflex artery, reduction of the risk of restenosis and of adverse events was not evaluated in the randomized trials. However, the authors agree that the debulking methods will become useful in cases of ostial ADA lesions as a pre-stenting stage of procedure in patients with significant calcification or recoil.

The comparison of DES and BMS implantation revealed the significant advantages of DES in the number of restenosis, recurrent revascularization of the target vessel and severe adverse events in the long-term period following PCI on the ostium of ADA.

The use of the cutting balloon during PCI in patients with ostial stenosis of ADA during the DES era could be reasonable, as this device "prepares" the plaque for stent implantation or may be a step before BMS implan-

tion, when DES use is contraindicated. In a non-randomized study the comparable long-term angiographic and clinical outcomes of DES use or of sequential use of the cutting balloon and BMS were obtained.

The higher rate of restenosis in the ostial lesion can be due to the technical problems of accurate stent positioning. Sporadic non-randomized comparative reports on comparison of implantation of DES from the trunk of the left coronary artery into the ADA and accurate DES positioning in the ADA orifice did not reveal any significant advantages of either method as evaluated by angiography or IVUS. The evaluation of stent implantation in the ADA ostium with the use of "V stent-balloon" method with slight dislocation of the stent into the distal part of the LMCA was not performed. Similarly, randomized trial did not assess the effect of ADA/CA angle or of the ratio of LMCA run, ADA and CA diameters on the advantages of one of the PCI strategies in patients with ostial stenosis of ADA.

The use of IVUS examination during PCI on the ostial ADA stenosis is indicated for the assessment of the true diameter of the target artery, the evaluation of the degree of calcification and the measurement of stenosis extent in the ostium of the LMCA. In his reports on the meetings of the European Bifurcation Club 2008 and PCR 2009 Alfonso Medina emphasized the critical role of the carina and "eyebrow sign" in predicting the risk of ADA ostial stenosis during the precision stenting of ADA. The method developed by Alfonso Medina forms the basis for the determination (with the use of the intravascular ultrasound) of indications for the use of the technique of DES positioning in the ADA ostium. However, no randomized trials demonstrating the advantage of PCI on the ADA ostium under the control of intravascular ultrasound were performed.

**Conclusion:** The use of DES during the PCI in the ADA ostium is scientifically sound and its results are comparable with the coronary artery bypass grafting. The use of the cutting balloon, debulking methods and intravascular ultrasound can improve the results of the intervention, but no data demonstrating the advantages of the routine use of these methods, are available. Three methods of stenting of ADA ostium may be considered as fundamental: 1) DES implantation from the LMCA to the ADA; 2) accurate DES positioning into the orifice of ADA; 3) "V stent balloon". There is no scientific evidence in favour of any of these methods.

### **ENDOVASCULAR TREATMENT OF THE ANEURISMS OF INFRARENAL AORTA: FIRST EXPERIENCE**

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**Purpose:** To assess the technical aspects and immediate clinical results of infrarenal aortic aneurism (IAA) endografting.

**Material and methods:** In the period from May, 2007 to March, 2009, 48 men (83%) and 10 women (17%) with IAA were assessed; their mean age was 68.4 years. The feasibility of stent-graft implantation was assessed; necessary modules were selected on the base of spiral computed tomography findings with subsequent 3D-reconstruction. The commercially available bifurcation stent-grafts were used. The surgery was performed under general anaesthesia in the cathlab equipped with angiographic complex Angiostar (Siemens, Germany).

**Results:** In 11 out of 58 patients the slight increase in the aortic diameter (less than 35 mm) was observed, requiring only follow-up. In one case no pathology was revealed. In other 46 patients IAA with external diameter of 41 to 84 mm ( $55.4 \pm 3.6$  mm) and the parietal thrombus were revealed. In 27 patients (59%) had asymptomatic course of IAA, 19 patients (41%) presented with intermittent abdominal pain and round-shaped pulsatile mass in the abdomen.

According to the IAA classification by localization (A.V. Pokrovsky et al., 1978), Type II was revealed in 32 patients (70%), Type III - in 13 patients (28%) and Type IV - in one patient (2%).

The stent-graft deployment was feasible in 29 (63%) out of 46 patients. The remaining 17 patients (37%) underwent open surgery. The choice of treatment method was based on the presence of concomitant diseases, contributing to the risk of complications in the postoperative period.

Endovascular IAA repair was performed in 15 patients. The following stent-grafts were used: Aorfix (Lombard Medical, United Kingdom) ( $n = 7$ ), Excluder (W.L.Gore & Associates, USA) ( $n = 5$ ), Talent (Medtronic Corp., USA) ( $n = 3$ ). In 12 patients (92%) bifurcation repair was performed. In one patient with the occlusion of the common iliac artery, aortic unilateral IAA repair with femoral-femoral bypass was performed.

The procedure was uncomplicated in all patients. The postoperative period was eventless; the patients were discharged in 5 to 7 days. According to the data of the spiral computed tomography, the grafts were patent, no signs of aneurysm were revealed.

Currently, at 4 to 24 ( $11.6 \pm 2.3$ ) months following surgery, 14 patients (93%) are alive. One patient died from acute myocardial infarction at 3 months following the endovascular procedure.

**Conclusion:** The use of bifurcation stent-grafts extends treatment feasibility in patients with IAA.

#### **SINGLE-STAGE STENTING OF THE RIGHT CORONARY ARTERY AND OF MAJOR BRANCHES OF THE LEFT CORONARY ARTERY IN PATIENTS WITH CORONARY HEART DISEASE**

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**Purpose of study:** To assess the efficacy and safety of single-stage multivessel stenting of the coronary arteries in patients with coronary heart disease.

**Material and methods:** In the period from April, 2004 to 2009, the stenting of the right coronary artery and major branches of the left coronary artery was performed in 67 patients with coronary heart disease and effort angina of III-IV functional class. The patients' age varied from 38 to 78 years ( $57 \pm 5.4$  years). The patients were assigned to 2 Groups. Group 1 ( $n = 42$ ) included patients who underwent the single-stage complete endovascular myocardial revascularization. Group 2 ( $n = 25$ ) included patients who underwent the staged (with 2 to 5 months intervals) complete endovascular myocardial revascularization. A total of 249 stents were implanted: 219 drug-eluting stents with antiproliferative coating and 17 bare metal stents. The bare metal stents were used in patients with coronary artery diameter exceeding 3.5 mm. Three stents were implanted in 36 patients, 4 stents - in 9 patients, 5 stents - in 4 patients, 6 stents - in 3 patients, and 8 stents - in 2 patients. The results were assessed by angiographic and clinical outcomes and by the data of follow-up coronarography performed in 1 year after stenting.

**Results:** Endovascular myocardial revascularization was successful in all patients. No complications were observed. Good quality of life was observed in all patients. The duration of hospital stay did not exceed 3-4 days following surgery. Optimal angiographic result - TIMI 3 blood flow in the stented segments of the coronary arteries - was obtained in all patients. The long-term clinical efficacy was 100%, the overall survival was 90.9%. In Group B the resolving of angina symptoms could be achieved only after the complete myocardial revascularization. In 3 patients (7.1%) restenosis in the area of drug-eluting stents implantation occurred (1.3%). The repeated stenting was performed with satisfactory clinical and angiographic result.

**Conclusions:** Single-stage multivessel stenting is an effective and safe method of treatment for patients with coronary heart disease.

#### **REDUCTION OF POST-EMBOLIZATION SYNDROME FOLLOWING UTERINE ARTERY EMBOLIZATION IN PATIENTS WITH UTERINE MYOMA**

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Uterine artery embolization (UAE) induces the ischemia of uterine myoma with subsequent acute hypoxia and tissue necrosis. This results in the development of pain syndrome of various intensity, spotting, fever, weakness, malaise, urinary bladder and intestinal dysfunction, changes in the blood counts, i.e. the post-embolization syndrome.

**Purpose of study:** To reduce the post-embolization syndrome following UAE in patients with uterine myoma.



**Material and methods:** In the period from 2003 to 2009, 154 patients with uterine myoma underwent UAE. Mean age of patients was  $44.2 \pm 6.3$  years. Myoma size corresponded to 9-10 weeks of pregnancy. The standard UAE was performed in 98 patients (Group A). In order to reduce the post-embolization syndrome Actovegin (100 mg / 2.5 ml) was injected in both uterine arteries before UAE in 56 patients (Group B), resulting in the increase of the uterine parenchyma blood flow and in more effective myoma vessels embolization due to the penetration of embolizate particles into the previously constricted capillaries. This method was developed in the Clinical Hospital No. 119 (patent No. 2289415 dated February 16, 2006). The results were assessed on the base of the intensity and duration of post-embolization syndrome and on the efficacy of embolization.

**Results:** UAE was successfully performed in all patients without complications. The shrinking of the myoma was similar in both groups of patients. In Group A, the post-embolization period continued for 1 to 3 days and was manifested by intense pain, fever up to  $38^{\circ}\text{C} - 39.0^{\circ}\text{C}$ , nausea, vomiting and WBC count increased. The patients were discharged on day 4 to 5 following the procedure. In all patients of Group B, the signs of post-embolization syndrome were mild or absent and persisted for 1 day maximum (non-intense abdominal pain, fever up to  $37.0^{\circ}\text{C}$ , WBC -  $8.0-11.0 \times 10^9/\text{L}$ ). The patients were discharged on day 1 to 2 following the procedure.

**Conclusion:** The use of the novel modified method of UAE provides the subtle course of the post-embolization syndrome and improves the quality of life without adverse influence on the efficacy of the procedure, in terms of the reduction of myoma size and its symptoms.

#### **ENDOVASCULAR SURGERY IN COMPLEX TREATMENT OF PATIENTS WITH ACUTE MYOCARDIAL INFARCTION AND MULTIPLE CORONARY ATHEROSCLEROSIS**

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**Purpose:** To assess the efficacy and safety of single-stage multivessel stenting of the coronary arteries in patients with acute myocardial infarction.

**Material and methods:** From January, 2008 through April, 2009, 154 patients with coronary heart disease and acute myocardial infarction, associated with atherosclerosis of the right coronary artery and large branches of the left coronary artery, revealed during coronarography, underwent endovascular myocardial revascularization in the Department of interventional radiology of Mytishi City Clinical Hospital. The age of patients was  $48 \pm 4.2$  years (30 to 92 years). Systemic preoperative thrombolysis

with Streptokinase was performed in 45 patients. All patients underwent urgent coronarography, recanalization, PTCA and stenting of the infarct-related artery(ies). In 16 patients the single-stage complete anatomical myocardial revascularization was performed. Other patients were referred to the federal medical centers in order to perform the second step of surgical treatment of coronary heart disease.

**Results:** According to the data of clinical examination and ECG, systemic thrombolysis was effective in 44% (22 patients), while according to coronarography data - on 29% (14 patients). The results of early PTCA and stenting of infarct-related coronary artery demonstrated the high efficacy of endovascular surgery. TIMI 3 blood flow in the IRA was achieved in 100% patients; the immediate clinical effect was 97.4%. No periprocedural complications were seen. Six patients died in the early postoperative period. The causes of death were: acute hemorrhagic stroke, acute left ventricular failure, and rupture of LV myocardium. The freedom from angina (based on the data of clinical evaluation and treadmill test) in the early postoperative period was observed only in patients who had the complete anatomic myocardial revascularization. In the remaining patients exertional angina of different functional classes persisted.

**Conclusions:** Treatment results demonstrated the high efficacy of endovascular interventions in the complex treatment of patients with acute myocardial infarction and multiple coronary atherosclerosis, while the complete anatomic endovascular myocardial revascularization provided the possibility of angina symptoms elimination.

#### **LONG-TERM RESULTS OF THE REGIONAL INTRAARTERIAL IMMUNE-CHEMOTHERAPY IN THE COMPLEX TREATMENT OF PRIMARILY ADVANCED COLON CANCER**

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**Objective:** To assess the long-term results of the regional intraarterial immune chemotherapy in the complex treatment of primarily advanced colon cancer.

**Material and methods:** In the period from 2000 to 2009 radical surgical removal of the primary tumour was performed in 78 patients with generalized colon cancer. Mean age of patients was  $67.7 \pm 6.3$  years (from 45 to 70 years). Synchronous and metachronous liver metastases were revealed in all patients. In 52 patients (Group A) liver resection (from segmentectomy to hemihepatectomy) was performed for metastases removal. In 26 patients liver resection was not performed because of total metastatic involvement. In Group A patients regional intraarterial immune chemotherapy with recombinant interleukin 2 (Roncoleukin) was carried out

for 1 to 2 months following the liver resection. This method was developed in the A.V. Vishnevsky Institute of Surgery of Rosmedtechnologies (patent No. 2241459 dated December 10, 2004). During one year patients had five to nine cycles of the regional treatment with 1-month intervals. In Group B patients systemic intravenous 5-fluorouracyl infusion (2.0 g daily) was carried out 1 month following the removal of the primary tumour, with subsequent intravenous administration of Roncoleukin (2 millions IU). Seven to ten cycles of systemic immune-chemotherapy with 1 to 2 month intervals were carried out during one year.

**Results:** The tolerance of the regional immune chemotherapy was acceptable in all patients. The signs of postembolization syndrome (fever up to 38.0°C and moderate pain in the right hypochondrium) spontaneously resolved within 2 to 3 days following the treatment completion. In Group A, mean survival time after the removal of the primary tumour was  $39.2 \pm 6.3$  months, and  $34.3 \pm 6.4$  months - after of the start of endovascular treatment. During the X-ray surgery all patients were in fair condition and continued the active life. In Group B, the mean survival time after the initiation of conservative treatment was  $15.2 \pm 6.3$  months.

**Conclusions:** Thus, the regional intraarterterial immune chemotherapy with the use of recombinant interleukin 2 (Roncoleukin) is an effective and safe method of complex treatment of primary generalized colon cancer, which extends life expectancy and improves the quality of life.

#### **EMBOLIZATION OF THE INTERNAL THORACIC ARTERY BRANCHES IN PATIENTS WITH EARLY POSTOPERATIVE ANGINA FOLLOWING MAMMARY CORONARY BYPASS GRAFTING**

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**Purpose of study:** To assess the effect of embolization of the internal thoracic artery branches in patients with early postoperative angina following aortocoronary and mammarocoronary bypass grafting.

**Material and methods:** In 2008, 5 patients (4 males and one female) with early postoperative exertional angina of II III functional class following aortocoronary and mammarocoronary bypass grafting underwent the embolization of ITA branches, that were not ligated during bypass grafting, in Mytishi City Clinical Hospital and in Russian Cardiology Scientific-Production Complex. Patients' age was  $56 \pm 4.5$  years. Angina and its functional class were diagnosed based on the clinical evaluation and on the data of non-invasive methods (ECG, daily ECG-monitoring, ultrasound heart examination and treadmill-test). The branch of ITA that was not ligated

during the bypass grafting was revealed by mammary angiography. The time from bypass surgery to patients' presentation with retrosternal pain was 3 to 8 months. The effect of endovascular embolization of the ITA branches was assessed in 3 days after the procedure on the base of clinical evaluation and of non-invasive findings (echocardiography and treadmill test).

**Results:** Internal mammary angiography revealed only one functioning branch of the internal thoracic artery in all patients. The embolization was successful in all cases. Early postoperative evaluation demonstrated the effect of embolization (disappearance or reduction of functional class of angina).

**Conclusion:** The branches of the internal thoracic artery that were not ligated during the coronary bypass surgery play an important hemodynamic role in myocardial blood supply, resulting in the steal syndrome. Embolization of the non-ligated branches of the ITA leads to an effective improvement of heart blood supply, elimination of the symptoms of early postoperative angina in patients following the aortocoronary and mammarocoronary bypass grafting, thus improving the quality of life.

#### **ASSESSMENT OF THE EFFICACY OF CORONARY ARTERY STENTING WITH THE USE OF VARIOUS STENTS IN PATIENTS WITH CHD**

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**Purpose of study:** To assess the efficacy of percutaneous transluminal balloon angioplasty and coronary stenting in patients with CHD.

**Materials and methods:** In 2008, in A.V. Vishnevsky Institute of Surgery 107 coronary stents were implanted in 63 patients (the number of stents per patient was 1.7). The age of operated patients ranged from 43 to 75 years (mean age – 59 years). Forty three patients were males, 20 – females, corresponding to 68% and 32%, respectively. In total 87 arteries were stented (1.2 stents per artery). In 38 patients one coronary artery was stented 38 (60%), in 23 (37%) – two arteries, and in 2 patients (3%) three arteries were stented. In 9 out of these patients the recanalization of the chronic coronary occlusion was performed. Bifurcation angioplasty of the arterial branch originating from the stented segment of the artery was performed in 11 cases. The ratio of the drug-eluting and bare stents was 1:1 (53 and 54 stents, respectively). Among the stents with antiproliferative coating 45 stents were coated with Everolymus, and 8 – with Paclitaxel.

**Results:** Optimal immediate angiographic result of coronary stenting was obtained in 97% of cases. The immediate clinical success of revascularization was manifested in the absence of objective signs of ischemia, absence of unstable angina, disappearance of angina or reduction of its functional class by 2 or more, stabilization of angina in patients with ini-

tially unstable angina during the in-hospital stage. All patients were discharged from the hospital in stable condition within 2 to 7 days following endovascular intervention with recommendations concerning the subsequent medical treatment. During the 3-month follow-up no cases of death, myocardial infarction or urgent coronary bypass surgery occurred.

**Conclusion:** Based on our experience, we can conclude that the coronary stent implantation is a minimally traumatic and effective method of treatment in patients with CHD.

### MULTIPLE CORONARY LESIONS: ENDOVASCULAR OR SURGICAL MYOCARDIAL REVASCULARIZATION IN CHRONIC CORONARY HEART DISEASE?

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**Purpose:** Comparative evaluation of early and mid-term clinical and angiographic results of direct and endovascular myocardial revascularization in patients with CHD with multiple coronary lesions.

**Material and methods:** We studied the data of 529 patients. From 2001 through 2006, 280 of them underwent 280 operations of direct myocardial revascularization (Group 1), while the remaining 249 patients had in total 589 procedures of coronary stenting (Group 2). The groups did not differ in main baseline indices. The number of distal anastomoses in Group 1 was  $2,87 \pm 0,8$  per patient. In 75 (26,8%) patients only arterial grafts were used, in 202 (72,1%) – arterial and venous, and in 3 (1,1%) – only venous grafts. The number of implanted stents in Group 2 was  $2,4 \pm 0,7$  per patient. 123 stents with antiproliferative coating were implanted in 76 (30,5%) patients. Complete myocardial revascularization was achieved in 171 (61,1%) patients in Group 1 and in 171 (68,6%) in Group 2 ( $p > 0,05$ ). In the mid-term follow-up (in  $8,1 \pm 4,6$  months in Group 1 and in  $8,6 \pm 5,5$  months in Group 2) we studied 185 (66,1%) and 180 (72,3%) patients, respectively.

**Results:** The rate of MACE was not significantly different in both groups, irrespective of revascularization method. There was 1 early death in Group 1 (0,35%) and 1 in Group 2 (0,4%); Q-wave MI (including fatal) developed in 2 (0,7%) and 3 (1,2%) patients, respectively ( $p > 0,05$ ). In the mid-term no death occurred in Group 1, while in Group 2 there were 3 (1,7%) deaths (in all cases – from cardiac causes); Q-wave MI (including fatal) developed in 3 (1,6%) and 5 (2,8%) patients, respectively ( $p > 0,05$ ).

Angina recurrence was observed in 45 (24%) patients from Group 1 and in 66 (37%) from Group 2 ( $p < 0,05$ ); repeated myocardial revasculariza-

tion was performed in 25 (13,5%) and 74 (41,1%) patients, respectively ( $p < 0,05$ ). CABG was performed in 7 patients (3,9%) from Group 1. Repeated myocardial revascularization was associated with unsatisfactory angiographic results of previous interventions in 14 (7,6%) patients from Group 1 and in 52 (28,9%) from Group 2 ( $p < 0,05$ ). Stenosis at the site of intervention was revealed more frequently in the group of endovascular treatment: 32 cases (6%) vs. 65 cases (16%) ( $p < 0,05$ ). The rate of occlusions was not significantly different: 26 (5%) and 14 (3,4%), respectively ( $p > 0,05$ ). Among the factors associated with unfavorable results of PCI as compared with CABG, we can note: age  $\geq 65$  years, diabetes mellitus, low myocardial contractility, as well as: stenosis of the left main coronary artery, of the proximal LAD, lesions of B2/C type (AHA/ACC). The rate of unsatisfactory angiographic results after the implantation of stents with antiproliferative coating in the subgroups with the above risk factors was comparable (table).

Groups	Group 1		Group 2 (DES)	
Age > 65 years	142	12 (8,5%)	19	0
Diabetes mellitus	39	3 (7,7%)	18	2 (11,1%)
LV EF < 50%	59	4 (6,8%)	14	1 (7,1%)
Stenosis of proximal/3 of the LAD	82	3 (3,7%)	21	1 (4,8%)
B2/C type of lesion	336	35 (10,4%)	42	5 (11,9%)

$p > 0,05$ . n – number of distal anastomoses (Group 1) or stents (Group 2).

Significant advantage of PCI over CABG was obtained only in the subgroups with baseline coronary stenosis  $\leq 70\%$ .

**Conclusion.** The effectiveness of the methods of direct and endovascular myocardial revascularization in the mid-term follow-up is comparable in the majority of patients with multiple coronary lesions (including the patients with coronary heart disease with risk factors for eventual unfavorable results of PCI – provided the use of stents with antiproliferative coating).

### COMPARATIVE EVALUATION OF THE RESULTS OF PCI IN AMI PATIENTS WITH AND WITHOUT PRE-HOSPITAL THROMBOLYSIS

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**Purpose of study:** To conduct comparative analysis of clinical and angiographic results of PCI in patients with AMI after effective thrombolytic therapy (TLT) at pre-hospital stage and without TLT with occluded IRA.

**Material and methods:** We have studied the results of examination and treatment of 218 patients with acute Q-wave anterior myocardial infarction. The exclusion criteria were: history of anterior MI, occlusion of the LAD and/or RCA found at CAG.

Pre-hospital systemic TLT was applied in 108 of 218 patients (in the majority of cases – 74,1% - with Streptokinase solution), in the remaining 110 patients TLT was not conducted. Within 6 hours after the onset of angina attack all 218 patients underwent CAG and therapeutic endovascular procedure on the infarct-related coronary artery (IRA) – the LAD. According to CAG data, the effectiveness of TLT (antegrade blood flow in the LAD TIMI 2-3) was 58,3% (63 patients), the rate of spontaneous recanalization of the IRA – 31,8% (35 patients).

For this study we enrolled 138 out of 218 patients. Group 1 included 63 patients with effective pre-hospital TLT (antegrade blood flow in the LAD TIMI II-III), Group 2 – 75 patients without pre-hospital TLT and with occluded IRA (as judged on the base of CAG) – antegrade blood flow in the LAD TIMI 0-I. The main clinical and history characteristics were not statistically different in both groups. The time interval from the onset of the angina attack to the admission was  $3,8 \pm 1,6$  hours in Group 1 and  $3,5 \pm 1,6$  hours in Group 2. The “door-to-balloon” time did not exceed 30 minutes in either of the groups. CAG revealed the lesion of the proximal segment of the LAD in the majority of patients. The patients in the TLT group had 32 PTCA procedures and 30 procedures of IRA stenting; in the group without TLT – 30 and 45 procedures, respectively. All PCI were conducted in accordance with generally adopted technique.

**Results:** PCI could be performed in all patients in both groups. Optimal immediate result (residual stenosis < 30%, no signs of dissection and embolization, antegrade blood flow TIMI 3) was obtained in 67% of cases in Group 1 and in 64% in Group 2. Suboptimal results of PCI (slow reflow) was seen in 25,4% of cases in Group 1 and in 30,7% in Group 2; «no reflow» syndrome – in 1,6% and 1,3% of cases, respectively. The signs of IRA embolization after PCI were seen in 11,1% of cases in Group 1 and in 16% in Group 2, no clear signs of dissection were revealed in any of the groups. Acute IRA thrombosis after PCI was seen in 3 (4,7%) cases in Group 1 and in 1 (1,3%) case in Group 2. All 4 patients with ORA thrombosis had successful repeated PCI.

Hospital mortality (cardiac in all cases) was: 3,2% (2 patients) in Group 1 and 1,3% (1 patient) in Group 2. Recurrent MI developed only in 2 patients from Group 1 (3,2%). Bleeding requiring emergency surgical intervention developed only in 2 patients from Group 1 (3,2%). No cases of acute cerebrovascular accidents were seen in any of the groups.

The decrease of ST segment by over 50% in comparison with the baseline ECG was seen after PCI in 33,3% of cases in Group 1 and in 54,6% in Group 2, no changes of ST - in 17,5% and 21,3%; ST segment elevation – in 17,5% and 2,7% of cases, respectively.

In the mid-term follow-up (in  $7,1 \pm 2,7$  months) we have examined 23 patients in Group 1 and 27 patients in Group 2. The survival was 100% in both

groups. No cases of repeated MI were seen in Group 1, in Group 2 repeated MI developed in 1 patient (4,3%). Clinical signs of angina recurred in 6 (26,1%) patients in Group 1 and in 6 (22%) in Group 2.

According to the control CAG, the rate of restenosis was higher in Group 2 patients (with initially occluded IRA). Restenosis  $\geq 75\%$  was found in 21,7% in Group 1 and in 37% in Group 2 ( $p < 0,05$ ); no cases of reocclusion were seen in group 1, in Group 2 reocclusion was revealed in 2 (7,4%) cases.

The changes of the EDV, ESV and total LV EF during the period of the follow-up in both groups are shown in the table.

Comparative analysis of segmental contractility of the LV significant differences were revealed between the groups for the EF of anterolateral and apical segments.

**Conclusion:** Our data show that in patients with AMI after pre-hospital TLT the rate of early myocardial reperfusion in the territory of the IRA is by 26% higher than in patients without TLT. For example, in 29 of 110 our patients without TLT the IRA could be open at pre-hospital stage provided the administration of a thrombolytic agent by the emergency team.

The rate of clinical and angiographic complications in the studied groups was not statistically different in early, as well as in mid-term period. However in comparison with the control group (without TLT, with occluded IRA) the patients with effective TLT had a tendency for the increased rate of acute IRA thrombosis, repeated MI and bleeding early after PCI. Significant decrease of ST segment was also seen significantly less often than in the control group: in one out of three patients after TLT and in one out of two without TLT.

During the follow-up we noted the increase of total LV EF in the majority of patients, predominantly due to the myocardial segments in the territory of the IRA. However in Group 1 patients (with effective TLT) the increase of total LV EF was significantly higher than in control (without TLT, with occluded IRA): on the average by 7%. Meanwhile the majority of patients in both groups had a tendency for the increase of LV EDV, which, most probably, was related to the processes of postinfarction myocardial remodeling.

#### **SIMULTANEOUS HYBRID ARTERIAL INGRAINGUINAL RECONSTRUCTION IN CHRONIC CRITICAL ISCHEMIA OF THE LOWER LIMB**

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The prognosis in patients with chronic critical ischemia of the lower limb (CCILL) is similar to this one in

patients with malignant tumors. After the diagnosis is made, about 50% of patients have high leg amputation within the first year, and 30% of patients die by the end of the first year. The restoration of direct arterial blood flow to the foot in these patients is an undeniable priority for the limb salvage, as well as for the salvage of patient's life. Despite evident success of vascular surgery, the amount of arterial infrainguinal reconstructions, performed in patients with CCILL in Russia, is still insufficient.

**Purpose.** The study of immediate and long-term results of simultaneous femoro-tibial bypass grafting with endovascular correction of tibial-foot segments in multi-level occlusive lesions in patients with CCILL.

**Material and methods:** During 2007-2008 we performed 12 simultaneous hybrid operations of femoro-tibial bypass grafting with endovascular correction of the outflow tract in patients with CCILL. Mean age of patients was  $63 \pm 5,5$  years, disease duration  $6 \pm 2,5$  years, the majority of patients (83,3%) had the 4th stage of the disease (Pokrovsky-Fontaine classification). The majority of patients were males, in 90% of cases multifocal atherosclerosis with the involvement of coronary, carotid and renal arteries was revealed. At the stages of diagnostics and examination the patients underwent ultrasonic dopplerography, MR angiography, MSCT angiography, contrast angiography of the lower limb. Extensive occlusions of the superficial femoral and popliteal arteries were revealed in all patients and could be categorized as Rutherford class over 8. Surgical stage of the operation was performed under combined spinal and peridural anesthesia. In eight patients the distal anastomosis of the femoro-tibial shunt was formed with the crural arteries, with the preservation of fragmentary blood flow through the collaterals from the deep femoral artery pool. In four cases the distal anastomosis was formed with the occluded crural arteries, with contralateral opacification of post-occlusion segments in the distal thirds of the crux, with subsequent mechanical recanalization and balloon angioplasty. The endovascular stage was performed through the shunt from the open wound, antegrade shunt puncture was performed, 0,014" coronary guides «over-the-wire» and balloon catheters with minimal length of 100 mm were used. The restoration of direct arterial blood flow to the foot was considered as operation success criterion. Mean follow-up duration was 15 months.

**Results:** In six patients the distal anastomosis was formed with tibio-peroneal trunk, in three – with one of the crural arteries, in three cases we performed femoro-bitibial bypass grafting. An «in-situ» autovein was used as a graft in six cases, a xenoprosthesis – in four, and a reversed autovein – in one case. Immediate success of the surgical stage was obtained in all patients, mean duration of this stage was 120 minutes. Mean duration of the endovascular stage of the procedure was 50 min-

utes. In nine cases only angioplasty was performed, three patients needed stenting of the tibial arteries. Immediate success of endovascular stage in patients with three occluded arteries was 50%. No early complications were observed in the group of patients with preserved fragmentary blood flow in one of the crural arteries, while two patients with occluded crural arteries had early shunt thrombosis and underwent leg amputation. Eight patients were followed for 15 months in average, their long-term results were evaluated with magnetic resonance angiography. Shunt patency was observed in 100% of cases, the leg was preserved in all patients.

**Conclusion:** Simultaneous hybrid arterial reconstruction in multi-level occlusive lesion in patients with CCILL is a safe, feasible and effective procedure for the salvation of the leg with the preservation of its support function.

## PRINCIPLES OF VENOUS SYSTEM'S RESPONSE TO THE CHANGE OF CEREBRAL OUTFLOW

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**Purpose of study:** to investigate coupled responses of arterial, venous and liquor systems of the brain to the changes of cerebral blood inflow conditions.

**Material and methods:** Ultrasound investigation (USI) of the blood flow in brain and neck arteries and veins, pressure measurements in jugular veins (JV), sinus, liquor pressure at all stages of the procedure were performed in 30 patients during intravascular embolizations of arteriovenous malformations (AVM) with histoacryl. Cross-section area of the JV was measured with the use of ultrasound before and after anesthesia and operation. All patients gave their informed consent for the study

**Results:** Before the operation mean velocity of venous blood flow in the JV was  $70,85 \pm 28,35$  cm/s at the side of AVM and  $65,65 \pm 29,73$  cm/s at the contralateral side. According to USI data, only in 13 cases there was a predominant venous drainage into the jugular vein at the side of AVM, in 9 cases – in contralateral vein, and in 8 cases venous shunting was virtually symmetric. Such lack of lateralization of predominant venous drainage is suggestive of blood flows mixing in the sagittal sinus.

After AVM embolization the volume of cerebral blood inflow decreased by 10-17%, while the velocity of the blood flow in the dominant jugular vein did not decrease, and even had a small tendency for growth from 70,85 to  $85,23 \pm 46,65$  cm/s. Cross-section area of the dominant jugular vein significantly decreased – from  $83,59 \pm 39,42$  to  $65,13 \pm 37,97$  mm<sup>2</sup>, which led to the decrease of blood drainage in the jugular veins, by approximately the same percent as the decrease of cerebral blood inflow.

Hence, the decrease of venous inflow occurred at the expense of the decrease of cross-section area of the jugular veins, and not of the linear blood flow velocity. We saw an inverse correlation between the blood flow velocity and cross-section area of the jugular vein, which is suggestive of the elements of active blood flow regulation. The pressure in the dominant JV was  $6,64 \pm 2,37$  mm Hg and remained unchanged during the whole procedure, independently of the outflow variations (given the calm, unhampered breathing).

Mean pressure in the sinus was  $18,27 \pm 7,6$  mm Hg, which is almost twice over the norm, and could be explained by increased blood drainage from brain arteriovenous malformations. Mean liquor pressure was  $19,8 \pm 7,1$  mm Hg, there was a very strong correlation between sinus and liquor pressures. The pressure in the sinuses was always higher than the pressure in the jugular vein, its increase was accompanied by simultaneous increase of venous pressure, thus, the pressure gradient was always preserved.

Deduction. Taking into account permanent level of jugular venous pressure independently of cerebral outflow decrease one can suggest the presence of the elements of pressure autoregulation in the veins. Fixed inverse correlation between the cross-section area and the velocity of blood flow confirms an active role of the jugular veins' tone in the processes of pressure and blood flow regulation.

Conclusions:

1. Pressure variations in the jugular veins do not depend on the volume of venous brain drainage.
2. Cross-section area of the jugular veins is inversely dependent on the blood flow velocity, which is suggestive of jugular veins' tone participation in blood flow and pressure regulation.
3. Venous drainage from the AVM occurs predominantly into the ipsilateral jugular vein only in 1/3 of cases.

## **PERSPECTIVES AND PROBLEMS WITH THE USE OF REMOVABLE CAVA-FILTERS**

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During 2007-2008 removable cava-filters were implanted in 283 patients in surgical clinic of Russian State Medical University.

The age of 154 (54,41 %) men and 129 (45,59%) women varied from 17 to 86 years (mean 48,15 years). At admission 42,719% of patients were in satisfactory condition, in 33,01% the state was evaluated as moderately severe and in 24,271% as severe. Complex instrumental examination revealed thrombotic lesions in the IVC system in 100% of patients, pulmonary artery thromboembolism of different severity – in 29,43%. In 100% of cases there was a combined pathology.

The following models of removable cava-filters were used: «Herringbone» 135 (47,7%), «Umbrella»

103 (36,39%), OptEase 26 (9,18 %), «Crown» 12 (4,29%), «FIST» 7 (2,47%).

After complex treatment aimed at the restoration of deep veins permeability and the liquidation of pulmonary embolism, in 149 (52.82%) cases continuous filtration of the blood flow in the IVC was not necessary, so the removal of the cava-filter was indicated. Besides, primary technically inadequate implantation of the cava-filter in 17 (6%) patients necessitated the correction of its position.

Endovascular prevention PATE with removable cava-filters gave the following Results: In 18 cases (6,36%) the cava-filters were removed in 12 to 183 (mean 42) days after endovascular intervention. In 11 out of these cases (61,11%) the removal was accompanied by technical difficulties related to the deviation of the cava-filter from the longitudinal axis of the vessel (3), tight adhesion of the filter's hook to the IVC wall (1), neointima growth on the filter's raylets within the fixation area (2), the penetration of the CF hook into the renal veins (2), the embolism in the CF (3), the perforation of the vascular wall with the filter's raylets (1).

In order to solve these problems we have used to following technical maneuvers: CF centering in the vessel's lumen using a monorail loop, balloon dilatation of the IVC in the area of neointima growth, throwing of the extractor loop on the guiding modulated catheter from two approaches, etc.

The attempts of CF removal were unsuccessful only in 4 cases (1,41%), in the remaining patients all CF have been removed. The complications of filter removal, related to technical difficulties were encountered only in 2 patients (11%) (retroperitoneal hematoma) and did not require surgical intervention.

The long-term (6 to 24 months, mean 12 months) follow-up revealed the relapse of pulmonary arterial thromboembolism in only 0.35% of cases.

Thus, the use of removable cava-filters is a highly effective mean for the prevention of pulmonary embolism, and the feasibility of their endovascular removal from the IVC in the long-term follow-up allows for the minimization of negative consequences of this widely used endovascular intervention.

## **USE OF ENDOVASCULAR ATHERECTOMY WITH "SILVERHAWK" DEVICE IN THE TREATMENT OF OBLITERATING ATHEROSCLEROSIS**

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For the first time in Russian practice of endovascular surgery a unique technology of endovascular atherectomy was used in 8 patients with obliterating atherosclerosis of the lower limb arteries in surgical clinic of Russian State Medical University.

The age of 7 men and 1 woman varied from 47 to 69 years (mean – 56,3 yrs). At admission 75% of patients were in moderately severe condition, while

2 patients were in severe condition which, besides pronounced symptoms of the main disease, was predominantly caused by the presence of associated combined therapeutic pathology. Complex instrumental examination revealed "multistoried" lesion of pelvic and lower limb arteries in 50% of patients and chronic arterial insufficiency of IIB – IIIA degree in all patients.

In 2 patients chronic lower limb ischemia (CLLI) was caused by combined occlusive-stenotic lesion of different segments of the iliac and superficial femoral arteries, in another 2 – of the common and the superficial femoral arteries, and in 4 – of only superficial femoral arteries. In two of these patients the "clinically significant" plaque was located at the bifurcation.

In 3 cases (37,5%) the character and the volume of arterial lesion practically excluded the feasibility of isolated endovascular procedure, while in the remaining patients the use of traditional vascular stenting was judged as undesirable.

Endovascular interventions were performed with the use of an original plaque excision device "SilverHawk" (EV-3) – diameter 7 Fr, length 110 cm – introduced through 8 Fr sheath via the 0,014' guide, equipped with the "Spider" device for the protection of peripheral vascular bed.

In total, endovascular atherectomy was performed in 15 areas: the common iliac artery (1), the external iliac artery (1), the internal iliac artery (1), the common femoral artery (2), the superficial femoral artery (9), the deep femoral artery (1). In 4 cases (50%) the intervention was performed from the contralateral retrograde approach, in 3 cases (37,5%) – from the antegrade approach. In one case a combined bilateral approach was used.

The atherectomy from the iliac arteries was successful in all cases, including the restoration of the permeability of previously occluded internal iliac artery. The intervention was also successful in cases with the plaque localization in common femoral arteries, including those involving the ostium of the deep femoral artery. Only one patient with "multistoried" occlusion of the superficial femoral artery, after a successful atherosclerotic plaque removal from the vessel's ostium, had a marked intimal dissection in the lower third of the artery leading to its total thrombosis.

In 1 case endovascular atherectomy was complicated by iatrogenic arterial wall perforation; its negative consequences have been prevented by intravascular tamponade with a balloon catheter. None of our patients needed intravascular stenting.

All patients were discharged in a satisfactory condition, with markedly decreased degree of clinical symptoms of CLLI or their total absence.

Hence, intravascular atherectomy is a new and effective method of treatment of atherosclerotic lesion of major pelvic and lower limb vessels, which allows for a significant expansion of the field of use of endovascular techniques and for the minimization of late recurrence of the disease.

## ENDOVASCULAR TREATMENT OF TOTAL CHRONIC OCCLUSIONS IN BILATERAL LESIONS OF THE RENAL ARTERIES

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**Purpose of study:** evaluation of the effectiveness and safety of percutaneous revascularization in chronic occlusions of the renal arteries, associated with the stenosis of the contralateral renal artery.

**Material and methods:** percutaneous interventions were performed in 13 patients (7 women, 6 men) aged from 46 to 79 years (mean - 60,3 ± 9,2 years) with chronic occlusions of the renal arteries. All patients had stenoses of contralateral renal arteries. According to the data of ultrasound investigations, longitudinal size of the kidneys varied from 5,0 to 9,3 cm (mean - 8,0 ± 1,4 cm). Mean level of plasma creatinine before the revascularization was 0,199 ± 0,109 (from 0,109 to 0,4) mmol/l, while mean level of systolic arterial pressure was 171,2 ± 56,7 mm Hg. The first stage of the revascularization consisted in angioplasty and stenting of the stenotic renal artery with simultaneous recanalization and balloon dilatation of the occluded vessel. Control angiography was performed as the second stage, on the average in 36 hours, and the final stage consisted in stenting.

**Results:** the procedure of renal arteries recanalization were effective in 10 out of 13 patients (76,9%). Delayed control angiography revealed patent vessels in the area of reconstruction in all cases, and residual lumen stenosis varied within the limits from 60% to 80% (mean 70 ± 7,0%). Stent implantation gave optimal result in all cases, and residual stenosis in the area of reconstruction was 13,0 ± 4,0 %. Early after the procedure one female patient underwent surgical intervention for bleeding from the puncture site on the femoral artery (7,7%). After revascularization the concentration of plasma creatinine varied from 0,098 to 0,370 mmol/l (mean - 0,172 ± 0,086 mmol/l), while mean systolic pressure in the early postprocedural period was not significantly changed. Mean duration of in-hospital stay after the procedure was 4,3 ± 0,9 days.

**Conclusion:** two-stage interventions are effective for the treatment of total chronic occlusion associated with stenotic lesions of the contralateral renal artery.

## RESULTS OF THE USE OF ELLA STENT-GRAFT FOR ENDOVASCULAR TREATMENT OF AORTIC ANEURYSMS (RESULTS OF CLINICAL TRIALS)

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**Purpose:** the study of the effectiveness and the safety of the use of ELLA stent-grafts (Czech Republic) for endovascular reconstructions in aortic aneurysms.

**Material and methods:** bifurcation stent-grafts were implanted in 8 patients with abdominal aortic aneurysms, linear stent-graft in one patient with the aneurysm of descending thoracic aorta. Mean age of the patients was 71,4±2,6 years. According to CT data, the diameter of the aneurysmatic sac varied from 51 to 62 mm (on the average - 54,3±4,2 mm). The common iliac artery were involved by aneurysmatic lesion in all cases, the external iliac arteries – in 6 patients. Five out of them underwent the embolization of one internal iliac artery 7-10 days before stent-graft implantation, while one patient had bilateral embolization.

**Results:** stent-graft implantation was successful in all cases, there were no technical complications related to the stent-graft or the delivery system. The first type leakage at distal fixation site was noted in one case and was corrected by balloon dilatation. The leakage of the fourth type was noted in five patients and did not require additional interventions. During the follow-up lasting up to 2 years no aneurysm ruptures were seen.

**Conclusion:** the implantation of ELLA stent-grafts is an effective and safe intravascular intervention for the treatment of aortic aneurysms. Larger trials are necessary for the determination of the indications for the use of this stent-graft in broad clinical practice.

## ANGIOPLASTY OF SUPERFICIAL FEMORAL ARTERY

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**Purpose:** to study immediate and long-term results of balloon angioplasty of the superficial femoral artery (SFA).

**Material and methods:** in 1993 – 2008, 1072 endovascular procedures have been performed in 986 patients with atherosclerotic lesions of the SFA. The patients' age ranged from 42 to 91 years, mean

age was 65,6 years. There were 832 men and 154 women. Associated diseases: diabetes mellitus in 22% of cases, dyslipidemia in 82%, coronary pathology in 65%. The patients were admitted with lower limb ischemia of 2nd degree in 71% of cases, 3rd degree in 18%, 4th degree – in 11%. Ankle-brachial index at admission varied from 0,25 to 0,7.

The occlusions of the SFA were noted in 54% of cases, mean length of the occlusion was 19,1 cm. Long occlusions (>10 cm) were seen in 65%. Multistoreyed lesions were revealed in 41% of patients, they underwent combined interventions or hybrid surgery.

Antegrade ipsilateral access was used in 32% of cases, retrograde contralateral access – in 65%, and in 3% of cases retrograde ipsilateral access was used – the popliteal artery and lower leg's and foot arteries.

In total 1993 stents have been implanted, 45 patients received DES.

**Results:** immediate technical success was achieved in 98% of cases. Complications: distal embolism in 10 patients, false aneurysm of the CFA in 5 patients, arteriovenous fistula in 1 patient, massive soft tissue hematoma in 15 patients. The improvement of clinical picture and the decrease of ischemia degree was noted in 100%. Long-term results were followed for 12 to 72 months.

Primary patency within the first 12 months was 74,3%, secondary patency - 85,3% in patients without DES.

Repeated interventions were performed in 95 patients, femoropopliteal bypass grafting – in 4, profundoplasty – in 2. Amputations were necessary in 8 patients.

**Conclusions:** immediate and long-term results of endovascular interventions allow to recommend angioplasty as the method of choice in patients with stenoses and short occlusive lesions of the SFA. The results of angioplasty in long lesions of the SFA comparable with those of open reconstructive operations.

## ENDOVASCULAR TREATMENT OF PATIENTS WITH VASORENAL HYPERTENSION

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**Purpose:** study of immediate and long-term results of angioplasty and stenting of the renal arteries in patients with vasorenal hypertension.

**Material and methods:** in total the procedures were performed in 211 patients with vasorenal hypertension (164 men and 47 women) aged from 18 to 81 years. The history of hypertension lasted for 4 to 25 years. On the average, systolic AP was 187,2±38,5 mm Hg, while diastolic AP was 98,6±21,4 mm Hg. The diagnosis of vasorenal hypertension was made on the base of clinical data, the data of ultrasonic duplex scanning of renal arteries and multispiral CT. Subtotal stenoses



of the renal arteries were revealed in 49 patients with compromised kidneys' function. 162 patients with normal indices of the renal function had over 70% stenoses, among them 76 patients had stenoses involving 50-70% of the diameter of the intact part of the artery. Balloon angioplasty was performed in all cases, stents were implanted in 207 patients. Control ultrasound examination was carried out in 6 and 12 months.

**Results:** the results of angioplasty and stenting were followed for 12 months in 175 patients (83%). Almost 15% of patients totally stopped to take hypotensive medications, 59% of patients had their therapeutic doses significantly decreased, marked arterial hypertension caused by kidney's function compromise at the parenchymal level (nephrosclerosis, nephropathy) persisted in 29% of patients. Ultrasound Dopplerography of the renal arteries revealed resistance index in this group of patients  $\geq 0.8$ .

Restenoses of different degree were found in 27 patients (12,8%), among them – in 9 with implanted stents. 23 patients with significant restenoses underwent repeated angioplasty and endografting with good clinical effect.

**Conclusion:** Long-term results of renal angioplasty allow to adopt it as the method of choice for the treatment of patients with renal arterial lesions and vasorenal hypertension.

However in the presence of marked nephropathy (resistance index  $>0.8$ ) the prognosis of angioplasty and endografting is unfavorable even in patients with significant stenoses of the renal arteries.

### ENDOVASCULAR REPAIR OF THORACIC AORTIC ANEURYSMS

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The repair of thoracic aortic aneurysms is a thrilling problem of endovascular surgery, attractive by low rate of trauma, good immediate and long-term results of the interventions.

**Purpose:** Evaluation of the results of endovascular repair of thoracic aortic aneurysms .

**Material and methods:** From 1995 to 2009, 38 patients with the aneurysms of the descending thoracic aorta underwent endovascular endografting in the Center of Endosurgery and Lithotripsy. Linear endografts were used for the repair. Mean age of patients – 73.2 years. The endografts made on the basis of ZA stents with thin Dacron coating were used in 18 patients. In 20 cases commercially available systems were used.

**Results:** Good immediate results (complete isolation of the aneurysmatic cavity, no leakage) were obtained in 37 patients. Endograft migration occurred in 1 patient. This patient underwent reconstructive surgery. The long-term results were followed for 2 to 9 years. Five-years survival is 82%.

**Conclusion:** The evaluation of immediate and long-term results of endografting of the descending thoracic aortic aneurysms shows the perspectives of this technique and allows to use it as an alternative to open reconstructive surgery, with the respect of strict criteria for patients' selection.

### ANGIOPLASTY OF LOWER LEGS' ARTERIES

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**Purpose:** to determine the indications for endovascular procedures in occlusive lesions of the popliteal artery and the lower leg's arteries and to evaluate immediate and long-term results of such interventions.

**Material and methods:** from 1993 to 2008 we have operated on 252 patients with atherosclerotic lesions of the lower leg's arteries. All patients had lower limb ischemia of 2B - 4 degree (Rutherford stage 3-6 The arteries of the iliofemoral and femoropopliteal segments were involved in 165 (81.7%) patients. 62% of patients had diabetes mellitus. 108 (43%) patients had critical lower limb ischemia with trophic changes in the soft tissue of the lower leg and foot.

**Results:** primary success of the intervention (antegrade or retrograde recanalization, balloon dilatation, stenting) was achieved in 248 (98.0%) patients. The stents were applied locally, in cases of blood flow limiting dissection; in total 148 have been implanted, among them 96 drug-eluting stents. Multisegmental endovascular interventions were used in 36% of patients, hybrid operations – in 4%.

Early after the procedure clinical improvement in the form of pain syndrome decrease, the improvement of the wound condition was noted in 92% of patients. Early postoperative complications occurred in 32% of cases, 3 patients died (1.5%).

Long-term results were followed for 3 months to 3 years. The occlusion of the stented artery was revealed in 26% of cases, hemodynamically significant stenosis – in 45% of cases. Primary patency rate was 31%. The amputation of the operated leg was performed in 9 patients (3.5%). Good clinical results in the form of leg preservation and wounds healing was seen in 85.3% of patients.

**Conclusion:** endovascular procedures in patients with the involvement of the lower leg's arteries are technically successful in most cases, allow to preserve the leg in most patients , can be used in elderly patients and in combination with open vascular interventions. Long-term results of angioplasty on the arteries of popliteotibial segment are better in patients receiving DES.

## ENDOGRAFTING OF THE ISOLATED ILIAC ARTERIAL ANEURYSMS

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Endografting of the aneurysms of different localization is being widely introduced into the clinical practice.

**Purpose:** evaluation of the results of clinical use of endografting technique for the repair of isolated iliac arterial aneurysms.

**Material and methods:** from 1995 to 2009 the procedure of endografting was performed in 27 patients with isolated iliac arterial aneurysms. In total 29 coated stents were implanted. In 2 cases bilateral endografting was performed. The embolization of the internal iliac arteries was carried out in 5 cases.

**Results:** good immediate results (complete aneurysm isolation, no leakage into the sac) were noted in all cases. The complication – distal embolization – was noted in 1 case. Long-term results were followed for 2 to 60 months. Late complications, including leakage, dislocation and fragmentation of the stent-grafts were not seen in any case.

**Conclusion:** percutaneous endografting of the isolated iliac arterial aneurysms is the method of choice for the treatment of this pathology.

## RETROGRADE RECANALIZATION OF THE OCCLUDED TIBIAL ARTERIES

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The last decade is marked by active development of endovascular surgery of the tibial arteries. According to different authors, the primary success of antegrade recanalization of the occluded lower leg's arteries ranges from 65 to 90%. The use of foot arteries as the access site for retrograde recanalization of the occluded tibial arteries sharply increases the effectiveness of endovascular procedures used for the repair of lower leg's arterial lesions.

**Material and methods:** from 1993 through 2008 we have performed endovascular interventions for lower leg's arterial lesions in 252 patients; among them 83 patients had occlusions of one or several tibial arteries. Antegrade recanalization of the occluded lower leg's arteries failed in 31 patients.

Retrograde recanalization was attempted in all these 31 patients. In 2 cases the puncture in the distal part of the peroneal artery failed. In one case after an unsuccessful attempt of puncture of the posterior tibial artery we have used arteriotomic access.

**Results:** of the total number of 29 patients: recanalization of the anterior tibial artery was performed in 11, of the posterior tibial artery – in 9, of the peroneal artery – in 9.

In 2 cases retrograde recanalization of the occluded arteries failed.

Successful recanalization was in all cases followed by balloon dilatation, and in 17 patients «spot» stenting in the area of the occlusive dissection was performed.

Early and long-term results were followed for 1 to 60 months.

**Conclusion:** the technique of retrograde recanalization of the occluded lower leg arteries is an effective method for the treatment of lower limb ischemia. Further elaboration of special instruments and accumulation of clinical experience will allow for a more efficient use of the retrograde (through the foot arteries) access for endovascular procedures on the legs.

## CAROTID ANGIOPLASTY

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**Purpose of study:** to evaluate immediate and long-term results of carotid angioplasty.

**Material and methods:** from 1993 through 2008, 231 patients underwent 231 procedures of angioplasty and stenting of the internal carotid arteries in the Center of Endosurgery and Lithotripsy. Mean age of patients was 66,1 years, there were 180 men and 51 women. Dyslipidemia was noted in 85% of cases, arterial hypertension – in 82%, coronary artery disease – in 72,1%, diabetes mellitus in 11% of patients.

Symptomatic arterial lesions were seen in 168 (72.7%) patients: 49 patients had the history of acute cerebrovascular incidents, 65 – of transitory cerebrovascular incidents, 54 patients had other symptoms. Asymptomatic lesions were seen in 63 (27.3%) patients. All patients underwent ultrasonic duplex scanning, neurological examination, the patients with the history of acute cerebrovascular incidents had brain CT. In 80 cases (34.6%) MSCT study of cervical and cerebral arteries was performed as pre-operative examination.

The stenoses of the internal carotid arteries were revealed in 227 patients, the degree of ICA stenosis ranged from 70 to 98%. Proximal occlusion of the ICA was revealed in 4 cases.

Stenting was performed in 231 patients (100%), brain protection from embolism was used in 230 patients (99,5%), in all cases the procedure was performed from transfemoral access.

**Results:** immediate success was achieved in 100% of cases. No focal neurological complications were seen. TIA were observed in 6 patients. 9 patients had reperfusion syndrome which regressed within 48 hours. Pulsating hematoma developed at the puncture site in 2 patients, conservative compression treatment was applied. Stable hypotension developed in 31 patients. 84 patients have been followed for up

to 48 months. Transitory cerebrovascular incidents were noted in 2 patients – control ultrasound examination revealed significant in-stent restenosis and they underwent repeated angioplasty. Deaths or acute cerebrovascular incidents were not seen nor in the immediate, neither in the long-term follow-up.

**Conclusions:** good immediate and long-term results of carotid angioplasty allow to consider it as an alternative to surgical treatment in patients with atherosclerotic lesions of the carotid arteries.

### ENDOVASCULAR REPAIR OF ABDOMINAL AORTIC ANEURYSMS

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**Purpose:** evaluation of immediate and long-term results of endovascular repair of infrarenal aortic aneurysms.

**Material and methods:** from 1995 through 2009 endovascular repair (endografting, EG) of abdominal aortic aneurysms was applied in 186 patients aged on the average 74,2 years. Men/ woken ratio was 169/17.

**The types of access:** percutaneous approach was used in 78 cases, femoral arteriotomy in 108.

The diameters of the delivery system: 14-16-22 F.

In 1995 - 1998 polyethylene and polyurethane were used as the coating, only linear and unilateral EG was performed (36 patients. Group 1).

In 1998 – 2009 only extra-thin Dacron-coated (Vascutec) and bifurcated Dacron woven prosthesis (Vascutec® USA) were used, bifurcation endografting was introduced into practice.

In total during the second stage 133 have been operated on. ZA-stent was used in 64 patients, and commercially available stents in 86 (Group 2).

**Results:** Group 1 - good immediate results (complete isolation of aneurysmatic cavity, no leakage) in 22 patients (61%), satisfactory result (distal leakage) – in 8 patients (22%), unsatisfactory results (proximal leakage) – in 6 patients (17%), that is, the results were far from optimal.

Group 2: good immediate results in 144 (96%) out of 150 patients (100,0%), satisfactory result (distal leakage) – in 6 patients (4.0%), no cases with unsatisfactory results were seen.

Long-term results (up to 12 years) were followed in 93 patients from both groups.

In 8 cases (4,3%) we saw process extension with the increase of aneurysmatic cavity (cause – different kinds of leakage). These patients underwent “traditional” surgical intervention – aortic replacement. Two of them died during in-hospital stay.

Six patients from both groups died from aneurysm rupture (3,2%), 15 – from other causes (stroke, infarction). The 12-years survival is 56.2%.

**Conclusion:** the development of the technique of intervention, the perfection of the devices allow

for the improvement of immediate as well as of long-term Results: The method can be considered as an alternative to open reconstructive surgery in patients with high surgical risk. The long-term results are comparable with those of reconstructive operations, however, more repeated interventions are needed.

### INTERVENTIONAL METHODS IN THE TREATMENT OF METASTATIC LIVER INJURY

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**Introduction:** the technique of association of selective catheterization of the hepatic artery for prolonged infusion of a chemical agent and chemoembolization and of radiofrequency ablation is one of the modern interventional methods used for the treatment of primary and metastatic liver injury in oncology patients. The first method allows to increase the concentration of a chemical agent affecting the tumor with subsequent ischemia of the affected area, while the second method produces destructive thermal action on the tumor.

**Material and methods:** the interventions were carried out with the use of angiographic machine Angioscope "Polidoros 80" with Angiotrone add-on unit (Siemens). Radiofrequency ablation was performed with the use of an universal complex for cancer tumors destruction METATOME-2 (Russia).

The choice of the tactics for the treatment of liver metastases depends on the data of ultrasound examination, CT and the results of diagnostic puncture. The treatment is planned depending on the number of tumors, their size and localization within the segments.

In cases of small single tumors measuring 1,5 to 3,5 cm in diameter monopolar thermal impact was used. The tumors measuring over 3,5 cm in diameter were treated with bipolar thermal impact, which allowed for the increase of the area of tumor impact. The exclusion was made for patients in whom the tumors were located near the pathways of the large vessels.

In multiple lesions only large foci were submitted to thermal influence, and after that intraarterial infusion of a chemical agent with subsequent chemoembolization was performed.

**Results:** From 2005 to 2008 we applied complex treatment to 49 patients with primary and metastatic liver changes. The treatment included radiofrequency ablation with subsequent intraarterial infusion during 1 to 4 days with chemoembolization of the hepatic arteries with Lipiodol Ultra-Fluid and a chemical agent.

Each patient had from 1 to 3 courses of therapy with 3 to 4 weeks intervals. Positive changes were recorded in 38 patients (77,6%). Complete tumor regression was seen in 12 (24,5%), partial – in 26

patients (53%). In 11 cases (22,5%) the expected effect was not seen due to the progress of the baseline disease.

All patients developed postembolization syndrome which could be stopped with analgetics.

**Conclusions:** the association of two above-mentioned techniques – chemoembolization and radiofrequency ablation of liver tumors – allows to increase life expectancy and quality of life of our patients.

### **ENDOVASCULAR BALLOON ANGIOPLASTY IN THE TREATMENT OF STENOTIC ARTERIOVENOUS FISTULAE**

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Permanent vascular access is necessary for the conduction of programmed hemodialysis in patients with terminal chronic renal failure. Arteriovenous fistula is the most safe and convenient for use. However the increasing probability of stenoses development with the course of time inhibits the function of this access. Endovascular technologies, including balloon angioplasty are used with increasing frequency in order to correct the work of arteriovenous fistula.

**Purpose:** to evaluate the possibilities of endovascular balloon angioplasty for the treatment of arteriovenous fistulae's stenoses.

**Material and methods:** from 2007 we performed 18 balloon angioplasties of stenotic arteriovenous fistulae in 8 patients undergoing programmed hemodialysis and receiving anticoagulation therapy. The duration of dialysis treatment was from 9 months to 13 years. Before angioplasty the fistulae have been functioning for 0,5 to 11 years. Endovascular interventions were performed after the advent of the signs of vascular access' dysfunction without the signs of thrombosis. Ostial hemodynamically significant stenoses were revealed in all patients, six patients also had stenoses in the distal segment, irrespective of the fistula's type. At first, mandatory arm angiography with the use of femoral access was carried out. Subsequent angioplasties were performed through anterograde brachial arterial access. Neither common, nor local postoperative complications were seen.

A puncture of the fistula vein with subsequent balloon angioplasty of the anastomosis was performed in one female patient with Brescia-Cimino fistula. Due to technical problems related to retrograde guidewire advancement through tortuous aneurysmatically changed vessels we decided to abandon this approach.

**Results:** balloon angioplasty of stenotic arteriovenous fistulae allowed to prolong the work of the vascular access in all patients. In three cases the fistulae are functioning adequately for over 1 year after the interventions. Repeated angioplasties were performed in 4 patients after 3 to 10 months. In one case

6 angioplasties were performed in 2 years. The main difficulty in the preservation of arteriovenous fistulae functioning in such patients consists in the instability of hemostasis systems, the complexity of the selection of an appropriate anticoagulation therapy. In 1 case this problem caused fistula thrombosis in 2,5 months after the angioplasty.

We have noted an extreme rigidity of arteriovenous fistulae. For this reason in two cases we could not achieve complete balloon deployment during the first angioplasty of a fistula measuring on the average 5 mm in diameter even with the inflation pressure of 18-20 atm. However despite this fact the results of the intervention could be evaluated as satisfactory in all cases, as an adequate blood flow for hemodialysis was achieved in the fistulae. Angiographic results of repeated angioplasties performed in the long-term in these patients were better.

**Conclusion:** balloon angioplasty is an effective method of treatment for stenotic arteriovenous fistulae in patients undergoing programmed hemodialysis and allows to prolong the functioning of this permanent vascular access.

### **CORRECTION OF CRITICAL ISCHEMIA IN PATIENTS WITH INFECTED NEUROISCHEMIC FORM OF THE DIABETIC FOOT SYNDROME**

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According to statistical data, the diabetic foot syndrome, often accompanied by critical ischemia of the lower limb, is seen in 15% patients with diabetes mellitus. Today, percutaneous transluminal balloon angioplasty and stenting of the arteries is considered one of the most promising methods for the correction of vascular disturbances in such patients

**Purpose of the work:** to evaluate the effectiveness and the safety of endovascular methods of blood flow restoration in lower limbs arteries in patients with infected neuroischemic form of the diabetic foot syndrome.

**Material and methods:** from 2007 we performed endovascular treatment of the lower limbs arteries for complicated form of the diabetic foot syndrome with critical arterial ischemia in 14 patients (11 men and 3 women, mean age – 59,2±7,2 years, history of diabetes mellitus for 16,7±8,9 years). Before the intervention all patients underwent CT-angiography, ultrasonic dopplerography and subtraction angiography of the lower extremities. Three patients had isolated significant lesion of the superficial femoral artery, one patient – of the posterior tibial artery. In 11 patients two and more lower limbs arteries were injured. Endovascular interventions were performed only in the femoro-popliteal segment. Balloon angioplasty was carried out in all cases. In cases of over 50% residual stenosis or of hemodynamically significant dissection the superficial femoral artery was

stented with self-expanding stents (3), and the posterior tibial artery – with balloon-expandable stent (1). In one case a helix-like dissection of the popliteal artery was revealed after the angioplasty. In this case the correction was performed with autovenous femoro-popliteal bypass grafting. Neither common, nor local postoperative complications were seen.

**Results:** in all cases after the restoration of the blood flow we noted marked activation of reparative processes, the wounds were healed within 2-6 weeks, and the legs were preserved. The resting pain disappeared immediately after the intervention. In cases with multistoried lesions, blood flow restoration only in the femoro-popliteal segment was always sufficient for the stabilization of purulent and necrotic process in the foot, repeated interventions on the crural arteries were not necessary. Such approach allowed to decrease the intervention-related trauma and to reduce the probability of intraoperative complications with a satisfactory clinical result.

In 6 to 24 months after the intervention the patients underwent ultrasonic dopplerography of the lower limbs arteries, the limitations of everyday physical activity were evaluated using the functional scale for the lower limb (FSLL). In-stent restenosis in the superficial femoral artery necessitating repeated endovascular intervention in 11 months after the first procedure was revealed in one female patient. Mean FSLL score in the group of patients with endovascular treatment was  $45,5 \pm 25,4$ , while in the group of non-treated patients -  $32,4 \pm 17,9$ .

**Conclusion:** endovascular treatment of the lower limbs arteries in patients with infected neuroischemic form of the diabetic foot syndrome is a safe and effective method allowing for the preservation of the support extremity and for the healing of the foot wounds.

#### FIRST EXPERIENCE WITH THE USE OF MGuard STENTS WITH NET COATING

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**Purpose of study:** evaluation of the effectiveness, immediate results and safety of stenting procedure using MGuard stents (Inspire MD)

**Material and methods:** MGuard stent is a bare metallic stent coated with a special micro-net for more effective reduction of the risk of thromboembolic complications during stenting.

Twelve patients with coronary lesions underwent PCIs in the department of endovascular surgery of Samara regional clinical cardiological dispensary. Coronary stenoses (75%-90%) were present in 9 cases (75,0%), the remaining 3 cases (25%) were occlusions. Patients' age varied from 52 to 61 years. All patients were males.

Elective procedure was performed in 8 patients with stable angina of functional class III, 4 patients

were transferred to the cathlab with acute coronary syndrome with ST segment elevation. In 4 cases the intervention was conducted on the right coronary artery (RCA), in 5 cases – in the left anterior descending artery (LAD), in 2 cases – on the circumflex artery (CxA), and in 1 case simultaneously on the LAD and the CxA. In one patient asymmetric stenosis of the LAD was complicated by coronary artery aneurysm.

The technique of stenting was the same as in case of "ordinary" stents. In total 13 stents have been implanted. The main conditions for procedure performance were predilatation and the possibility to cover the lesion site with one stent. On the basis of the last condition, the length of the lesion should not exceed 25 mm. Bifurcation lesions also were excluded.

**Results:** the intervention was successful (adequate blood flow TIMI III in the major artery) in 12 cases (100%). In 3 cases (25%) angiography revealed occlusion of the small (up to 1,5 mm) side branches, in 6 cases (50%) – their marked compromise up to 75-90% related to the stent design and the presence of the net coating.

No immediate complications after endovascular interventions were seen. We did not reveal any angiographic signs of distal embolization. No difficulties with stent advancement to the site of implantation were encountered. All patients were discharged in satisfactory condition.

#### Conclusions:

1. Coronary stenting with MGuard stents is a safe and effective procedure, however one should keep in mind a high degree of side branches' compromise and, hence, the limitations for the use of these stents in cases of bifurcation stenoses.
2. No data concerning the feasibility of kissing-plasty after MGuard stents implantation are available.
3. It is necessary to study long-term results of the use of MGuard stents.

#### SAFETY AND EFFECTIVENESS OF BALLOON ATRIOSEPTOSTOMY PERFORMED IN THE SETTINGS OF INTENSIVE CARE WARD UNDER ECHOCARDIOGRAPHIC GUIDANCE

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**Purpose of study:** to evaluate the safety and the effectiveness of balloon atrioseptostomy performed in the settings of intensive care ward under echocardiographic guidance in comparison with atrioseptostomy performed in the cathlab.

**Material and methods:** from 2004 through July 2009 we have performed 35 procedures of balloon

atrioseptostomy in patients with transposition of the great arteries. Before 2007 all procedures were performed in the cathlab (Group 1) – in total 17 patients, and starting from 2007 and until this time balloon atrioseptostomy is being performed in the intensive care ward under echocardiographic guidance (Group 2) – in total 18 patients. Both groups did not significantly differ by sex, age, body weight, severity of state and nosological characteristics.

In patients from Group 1 the interventions were performed in the cathlab equipped with angiographic machines Phillips Integris 5000 and Phillips Allura FD10. In patients from Group 2 the interventions were performed in the setting of pediatric intensive care unit. Intra-procedural visualization was obtained with Acuson Cypress machine with 5 MHz transducer. Catheter movements were controlled from subcostal view. Left or right transfemoral venous access was used in both groups. Depending on the diameter of atrioseptostomic balloon, 5F or 6F introducers were used. In all cases we have used NuMed atrioseptostomic catheters (Canada) measuring 9,5 or 13,5 mm in diameter, depending on the transversal size of the atrial septum. Intravenous or intubation anesthesia was used in all cases.

**Results:** technical success of the procedure was reached in 17 (100%) patients from Group 1 and in 17 (94,4%) patients from Group 2. Mean diameter of the patent foramen ovale in Group 1 patients increased from  $3,92 \pm 0,6$  mm to  $8,2 \pm 1,3$  mm, and in Group 2 patients – from  $3,04 \pm 0,54$  mm to  $7,3 \pm 0,6$  mm. Oxygen saturation, measured with pulsoxymetric probe increased on the average from  $67,45 \pm 5,2$  % to  $82,2 \pm 7,14$  % in Group 1 patients and from  $63,23 \pm 5,02$  % to  $80,31 \pm 6,21$  % Group 2 patients. No significant differences of these parameters between the groups were seen.

Immediate intraprocedural complications or complications related to vascular access did not occur in neither of the groups.

**Conclusions:** balloon atrioseptostomy, performed in the settings of intensive care unit under echocardiographic guidance, is an effective and safe intervention, allowing to achieve the stabilization of patients with transposition of the great arteries and to prepare them for the main stage of surgical correction. In comparison with traditional atrioseptostomy performed in the cathlab, this method is more preferable, as being equally effective it allows to avoid patients' transportation associated with the probability of their state aggravation. Besides, the intervention performed within the intensive care unit allows to avoid the exposure for the patient and the staff, decreases the duration and the cost of the procedure.

## CHANGES OF INTRACARDIAC HEMODYNAMICS IN PATIENTS WITH HEART RHYTHM DISTURBANCES

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**Purpose of study:** to evaluate the parameters of intracardiac hemodynamics in patients with long-standing heart rhythm disturbances.

**Material and methods:** we have studied 10 patients with heart rhythm disturbances: manifested Wolff-Parkinson-White syndrome (WPW) (n=5), WPW phenomenon (n=2), paroxysmal atrioventricular nodal reciprocal tachycardia (PAVNRT) (n=2), 3rd degree atrioventricular block (AVB), permanent endocardial pacing (PEP) in VVI regimen from 2006 (n=1). The last patient developed signs of heart failure (2B-III degree, func. class IV) on the background of non-physiological pacing regimen.

The study was conducted in the settings of the cathlab, using digital angiographic devices Integris Allura Philips and OEC 9800 C-Arm. Hemodynamic parameters were calculated using measuring system Cardis 5000 – Coro и Cardiolab 7000.

Patients with the signs of ventricular pre-excitation and PAVNRT underwent radiofrequency ablation (RFA) of accessory atrioventricular pathway (AAVP). Before and after RFA catheterization of heart cavities with intracardiac pressure recording was performed. Intracardiac pressure in patient with 3rd degree AVB was recorded before and after the passage to the physiological pacing regimen.

**Results:** after RFA interventricular asynchrony in patients with the signs of ventricular pre-excitation returned to normal values. The patients with WPW syndrome, WPW phenomenon and 3rd degree AVB had their diastolic pressure decreased after the intervention from 14 mm Hg to 10 mm Hg; right ventricular dp/dt max increased by 54%, left ventricular dp/dt max – by 16%, which is suggestive of the improvement of ventricular myocardial contractility. The indices of central hemodynamics in patients with PAVNRT were compatible with normal values before, as well as after RFA.

**Conclusion:** RFA of AAVP leads the normalization of intracardiac hemodynamics. Catheterization of heart cavities with invasive pressure recording allows for intraoperative assessment of the parameters of heart function.

## THROMBUS ASPIRATION IN PATIENTS WITH AMI AFTER SYSTEMIC THROMBOLYTIC THERAPY COMBINED WITH EMERGENCY PCI

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The devices for vacuum, mechanical thrombus aspiration from the infarct-related artery are being used in clinical practice for over 6 years. However the evidences of the improvement of the results of emergency PCI in patients with AMI were accumulated only during the last years. Meanwhile just few works deal with the use of thrombus aspiration in emergency patients with AMI after systemic pre-hospital thrombolytic therapy. Our study was aimed at the evaluation of the safety and effectiveness of thrombus extraction procedure in AMI patients after systemic thrombolytic therapy (TLT).

In total, 34 patients were included in the study. All of them underwent emergency coronary angiography with subsequent thrombus extraction and endovascular procedure within the first 6 hours after the onset of angina attack. We have performed 17 procedures of thrombus extraction in patients from Group 1, after systemic TLT, and 17 procedures in patients from the control group. Baseline clinical and history data were similar in both groups. At pre-hospital stage 10 (58,8%) patients had TLT with Actilyse, 7 (41,2%) - with Streptokinase.

The use of the device allowed for the evacuation of a certain volume of thrombotic masses in 29 (85,3%) cases. Thrombus aspiration after TLT with Streptokinase resulted in removal of more homogenous and better formed thrombotic masses – 4 (57,1%) vs. 3 (30%) in patients after Actilyse. After thrombus aspiration all patients from both groups underwent PCI. In-hospital mortality was 0%. Всем этим пациентам также проводили системную тромболитическую терапию на догоспитальном этапе и выполняли процедуру ангиопластики ИОА. The results of two groups comparison are shown in Table.

	Group 1	Group 2	p
Blood flow: Blush grade			
0 (%)	0 (0)	27%	нд
1 (%)	4 (24)	16%	нд
2 (%)	9 (52)	17%	нд
3 (%)	4 (24)	12 %	нд
ST segment elevation			
Normalization (%)	8 (47)	9 (52)	нд
Resolution >30% (%)	7 (41)	5 (29)	нд
No resolution (%)	2 (12)	3 (18)	нд

Hence our study showed the safety of thrombus aspiration from the infarct-related artery in patients with acute myocardial infarction after systemic thrombolytic therapy. More accurate analysis of the effectiveness of this method requires the evaluation of long-term results and further accumulation of experience with this method.

## CHRONIC HEART FAILURE IN PATIENTS WITH ISCHEMIC HEART DISEASE WITH ANGINA RECURRENCE AFTER TRANSLUMINAL BALLOON CORONARY ANGIOPLASTY

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The presence of stenotic coronary atherosclerosis is one of the leading factors in the occurrence and progressing of heart failure. Meanwhile the restoration of the blood flow leads to the improvement of functional state of LV myocardium, the decrease of clinical signs of angina and of clinical manifestations of chronic heart failure (CHF) already during in-hospital period in many patients with IHD. However up to now the dynamics of morphofunctional state of the LV and of the CHF against the background of atherosclerosis evolution and angina recurrence in the long-term after PTCA are unclear.

This study was aimed at the evaluation of PTCA influence on the manifestations of CHF and the state of LV in patients with IHD in comparison with the patients receiving conservative treatment.

The study comprised 859 patients with IHD confirmed by angiography and who underwent repeated coronary angiography for either angina recurrence, or for the increase of frequency of angina attacks, including 188 patients after PTCA without restenosis (Group 1), 262 patients with restenosis of the corrected artery (Group 2) and 306 patients after conservative treatment (Group 3). The time interval between the first and the second coronary angiographies was  $14 \pm 2,5$  months,  $16 \pm 2,8$  months, and  $17 \pm 2,2$ , respectively. Optimal; angiographic results were achieved in 438 out of 450 patients who underwent PTCA (97,3%). Before the intervention 46,5% of were in angina functional class III – IV. After PTCA the angina disappeared or its degree significantly decreased in 97,6% of patients. Significant deterioration of functional class of CHF (NYHA) was seen in the follow-up of Group 3 patients. Thus, the number of patients in functional class I decreased from 30,7% to 20,9%, while the number of patients in class III increased from 7,5% to 18,3% ( $p < 0,001$ ). With this echocardiography revealed the trend for the increase of LV asynergy (from  $12,8 \pm 0,9$  to  $14,0 \pm 0,95\%$ ,  $p = 0,08$ ) and for the decrease of LV ejection fraction (from  $55,8 \pm 0,46$  to  $53,9 \pm 0,48\%$ ,  $p = 0,05$ ). Patients from Group 1 had no negative dynamics in the functional class of CHF and LV asynergy, while their LV EF significantly increased (from  $55,32 \pm 0,57$  to  $56,14 \pm 0,57\%$ ,  $p = 0,03$ ). Patients from Group 2 neither had no negative dynamics in the functional class of CHF, as well as of LV asynergy and LV ejection fraction.

Hence, the absence of negative dynamics of CHF and the improvement of functional state of the LV were typical for patients with IHD in the long-term after PTCA without restenosis. Negative dynamics of CHF and deterioration of functional state of the LV were not seen as well in cases with restenosis development. And, finally, unfavor-

able dynamics in clinical manifestations of CHF and in functional state of the LV were revealed in patients after conservative therapy, which confirms the advantages of active tactics in the treatment of patients with IHD.

### **PERCUTANEOUS CORONARY INTERVENTIONS IN OLD PATIENTS (OVER 80 YEARS) WITH STEMI**

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**Purpose of study:** to evaluate the effectiveness of percutaneous coronary interventions (PCI) in old patients (over 80 years) admitted with STEMI.

**Methods:** we conducted a retrospective analysis of clinical characteristics of patients over 80 years with STEMI admitted to the City Clinical Hospital N33 of Yekaterinburg from 2006 through 2008.

Two groups of patients (Group 1 with PCI, Group 2 with conservative therapy) were compared.

**Results:** from 2006 through 2008 we had 67 patients over 80 years with STEMI. PCI was conducted in 43 patients (64%), while 24 patients (36%) received conservative therapy. Mean age of patients (both groups) was 84,8 years, the oldest patient (PCI group) was 97 years old.

Total mortality in both groups was 26,8% (18 patients), in PCI group – 18,6% (8 patients), in conservative therapy group – 41,7% (10 patients).

Complications: cardiogenic shock – 8 (18,6) in PCI group, 11 (45,8%) in conservative therapy group. Stroke – 2 (4,6%) in PCI group, 2 (8%) in conservative therapy group.

Complications at the puncture site (postpuncture hematomas) – 9 patients(21%), hemotransfusion was necessary in 2 cases.

**Conclusion:** primary PCI in patients over 80 years of age with STEMI is effective from the viewpoint of the decrease of in-hospital mortality, despite a relatively high number of procedural complications.

### **OUR EXPERIENCE WITH PERCUTANEOUS CORONARY INTERVENTIONS AFTER PRE-HOSPITAL THROMBOLYTIC THERAPY WITH METALYSE**

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**Purpose of study:** to evaluate the effectiveness and the safety of percutaneous coronary interventions (PCI) after pre-hospital thrombolytic therapy.

**Methods:** we conducted retrospective analysis of PCI in STEMI after pre-hospital thrombolytic therapy with Metalyse during the period from March 2006 through December 2008. Patients treated during the same period with primary PCI without prelimi-

nary thrombolysis were used as control group. The interventions were performed in 6 to 24 hours after successful TLT. All patients received loading dose of Plavix from 300 to 600 mg, PCI was conducted under ACT control using «Hemochron» device, target ACT–300-350 sec.

Immediate and 30-days results were evaluated.

**Results:** from March 2006 through December 2008 we have performed 61 PCI procedures after pre-hospital thrombolysis with Metalyse; during the same period 415 procedures of primary PCI have been conducted.

Mean age of patients in both groups was 58 years (from 20 to 97 years).

Mean "symptom-needle" time in the group of pre-hospital TLT and PCI was 105 minutes. Mean "symptom-balloon" time in the group of primary PCI was 390 minutes.

Baseline blood-flow in the infarct-related artery (IRA) TIMI 3-2 was seen in 89% (n=54) in the group of pre-hospital TLT and PCI, and in 31% (n=129) in the group of primary PCI. Immediate success of the procedure was 99% (n=60) in the group of pre-hospital TLT and PCI and 95,5% (n=396) in the group of primary PCI. Direct stenting was performed in 89% (n=54) and 35% (n=145), respectively.

**Complications:** distal embolism 3% (n=2) in the group of pre-hospital TLT and PCI, and 17% (n=70) in the group of primary PCI; «no-reflow» syndrome 1,6% (n=1) and 6% (n=25), respectively, hemorrhagic complications 7% (n=4) in the group of pre-hospital TLT and PCI and 7% (n=29) in the group of primary PCI.

Fluoroscopic time (CAG+ PCI) was 3,8 minutes in the group of pre-hospital TLT and PCI and 14,6 minutes in the group of primary PCI.

30-days mortality was 1,6% (n=1) in the group of pre-hospital TLT and PCI and 3,4% (n=14) in the group of primary PCI.

**Conclusion:** pre-hospital TLT with subsequent PCI is a more rapid mean to achieve TIMI 2-3 blood flow in the IRA in comparison with primary PCI. PCI after pre-hospital TLT is a safe procedure. The rate of distal embolism and "no-reflow" syndrome in the group of pre-hospital TLT and PCI is lower. «Technical» particularities of pre-hospital TLT and PCI are more frequent direct stenting (less consumable materials, contrast media, shorter fluoroscopic exposure).

### **OUR EXPERIENCE WITH THE USE OF CATHETER THROMBUS ASPIRATION PRIOR TO PERCUTANEOUS CORONARY INTERVENTIONS IN PATIENTS WITH STEMI**

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**Purpose of study:** to evaluate the effectiveness of thrombus aspiration using aspiration catheters



prior percutaneous coronary interventions (PCI) in patients admitted with STEMI from the viewpoint of myocardial reperfusion and micro- and macroembolization of the coronary arteries.

**Methods:** we conducted retrospective analysis of immediate and in-hospital results of PCI in patients with STEMI after prior thrombus aspiration using aspiration catheters performed during the period from May 2008 through July 2009. Immediate and in-hospital results of PCI after thrombus aspiration were evaluated.

**Results:** during the period from May 2008 through July 2009 we performed 75 primary PCI procedures using aspiration catheter (QuickCat™ System, Kensey Nash USA).

Mean age of patients was 56 years, 84% were men (63 patients) and 16% were women (12 patients).

Angiographic features: infarct-related artery (IRA): RCA in 49% (37 patients), LAD – 41% (31 patients), CX – 8% (6), DA – 2% (1 patients - aspiration through the strut of a stent in the LAD). Thrombus score according to TIMI criteria:  $\geq 3$  in 58 patients (77%).

The instrument was successfully introduced without balloon predilatation in 70 patients (93%), in the remaining five patients it was necessary to perform predilatation with a smaller balloon. All PCI procedures were completed by stenting of the IRA.

After PCI with the use of aspiration catheter final index MBG  $\geq 2$  (according to TIMI criteria) was reached in 84% (63 patients), “no-reflow” syndrome developed in 4% (3 patients), distal macroembolism - in 2 patients (2,7%). ST segment decreased by over 50% within 60 minutes after PCI in 64% (48 patients). Hospital mortality – 1,3% (1 patient with cardiogenic shock).

No complications related to the use of aspiration catheter (perforation, dissection of the target vessel) were seen.

**Conclusion:** the use of primary thrombus aspiration prior to PCI is a simple and, probably, effective method for the improvement of myocardial reperfusion and the decrease of thrombi volume in patients with STEMI.

#### **A RARE CASE OF MULTIPLE CONGENITAL CORONAROVENTRICULAR FISTULAE OF THE LEFT VENTRICLE**

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Coronary arteriovenous fistulae – a rare defect with a communication formation between the coronary artery and the right ventricle, atrium or coronary sinus – are largely described in the literature. Usually blood shunting with this pathology is small and coronary blood flow is not affected.

We met a case of an even more rare developmental defect – multiple coronary arteriovenous fistulae with the left ventricle.

ECG recorded during routine medical examination in a female patient aged 56 years, not complaining of anything, revealed the changes in the form of subepicardial ischemia of the anterolateral LV wall (elevation with inversion of T wave in leads V1-V6, flattening of T wave in leads I and II). EchoCG detected the increase of left atrial cavity (40 mm) and the disturbances of intracardiac conduction; the remaining heart cavities were within normal limits; the interventricular septum and the anterior wall of the LV were fibrously changed at the whole length, without clearly defined areas of local contractility disturbances. The aorta was not enlarged, with dense walls. Valvular pressure gradients were within normal limits, the pulmonary artery and the inferior vena cava were not enlarged. Total contractile function of the heart was preserved.

On the base of the obtained data coronary angiography was indicated. The examination was performed on December 22, 2009 without complications (case history № 17000, protocol 130386) and revealed mixed type of heart blood supply, marked shunt from the left coronary artery near the apex and the left ventricular septum. The left main coronary artery was without pathology, there was an intermuscular bridge over the LAD, narrowing its lumen by 40%, the right coronary artery was moderately stenotic in the middle segment - by 40%.

Hence, this case was diagnosed as non-specific ECG changes, masking an unusual congenital pathology – coronary anomaly with multiple coronarovenous fistulae in the LV area near the anterior wall and the apex.

We present coronarography and ventriculograms of our patient, and discuss the problem of the genesis of ischemic changes on the ECG. These changes can, in a certain measure, be influenced by a significant shunt as well as by the intermuscular bridge over the LAD and the stenosis of the right coronary artery. We also discuss the tactics of treatment and – yet again – the diagnostic possibilities of ECG.

#### **STENTING IN PATIENTS WITH ISCHEMIC HEART DISEASE WITH THE USE OF COBALT-CHROMIUM STENTS**

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**Purpose of study:** To investigate the results of coronary stenting with cobalt-chromium stents in patients with IHD.

**Material and methods:** From 2006 through 2009 we have implanted 506 stents in 315 patients

with stable angina of functional class III-IV. The class of angina in all patients with chronic IHD was confirmed with functional stress tests. Mean age of patients was 54±14,5 years. One stent was implanted to 229 patients, 75 patients received simultaneously two stents, 8 patients - 3 stents, and in 3 cases four stents were implanted in the same artery. Direct stenting technique was used in 114 cases (26,2%), PTCA + stenting - in 201 (63,8%), with pressure 14-16 atm. The distribution of stented arteries is shown in table.

	Ostium	prox/3	middle/3	dist/3	TOTAL
Left main		1	0	2	3
LAD	12	175	72	6	265
DB		8	1	0	9
CxB		27	25	6	58
OMB		16	6	0	22
AI		1	0	0	1
RCA	4	51	48	20	123
PIVA		18	3	0	21
PLB		3	0	0	3

Single-vessel lesion was revealed in 261(82,8%) patients, two-vessel – in 43 (13,8%), three-vessel – in 8 (2,5%), four-vessel – in 3 (0,9%).

In total 265 (52,4%) stents were implanted into the LAD: 12 (4,6%) – in the ostium, 175 (66,0%) – in the proximal segment, 72 (27,1%) – in the middle segment, and 6 (2,3%) in the distal segment. 123 stents were implanted into the RCA: 4 (3,2%) in the ostium, 51 (41,5%) – in the proximal segment, 48 (39,1%) – in the middle segment, and 20 (16,2%) in the distal segment.

We have stented the stenoses  $\geq 70\%$ . The diameter of the implanted stents was from 2,5 to 4,0 mm (on the average 3,0±0,7 mm), the length – from 8,0 to 28,0 mm (on the average 20,0±3,2 mm).

**Results:** The results were evaluated in 6-12-18 months after the procedures. Repeated coronary angiography was performed in 6 months in 259 (82,2%) patients, in 12 months - in 152 (48,2%), after 18 months - in 102 (32,3%) patients. The remaining patients underwent telephone questionnaire for angina recurrence. Control coronary angiography revealed restenosis in 42 (16,2%) patients. Restenotic process was located predominantly in the proximal (34,9%) and the middle (65,1%) thirds of the stented segment of the LAD.

PTCA for restenosis was performed in 12 (2,8%) patients, rotor desobliteration – in 4 (1,2%), 26 (7,9%) patients underwent CABG.

**Conclusion:** after cobalt-chromium stents implantation in the arteries measuring more than 3,0 mm in diameter in patients with stable angina the probability of restenosis is 16,2%.

The experience with the use of cobalt-chromium stents showed their safety and effectiveness in patients with ischemic heart disease.

## EXPERIENCE WITH ENDOVASCULAR TREATMENT OF PATIENTS WITH ACUTE CORONARY SYNDROME IN BELGOROD SAINT IOASAPH REGIONAL CLINICAL HOSPITAL IN 2007 – 2009

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**Purpose of study** – to determine the effectiveness of early endovascular management of patients with acute coronary syndrome (ACS).

**Material and methods:** In 2007-2009, 284 patients with ACS have been treated in Belgorod regional clinical hospital; in total 434 stents were implanted. The average «door-balloon» time was 78 minutes. PTCA was performed in 26 patients (9,1%), PTCA + coronary stenting - in 167 patients (58,8%), direct coronary stenting – in 140 patients (49,2%). According to coronary angiography data, stenotic coronary atherosclerosis was located predominantly in the LAD in 175 patients (61,6%), the lesion of the RCA was revealed in 72 patients (25,3%), of the CxB – in 43 patients (15,1%), of the DB and the OMB – in 32 patients (11,2%), of the PIVA and the PLB – in 25 patients (8,8%). Three patients (1%) underwent PCI for left main lesions (ostial localization of the atherosclerotic plaque). The distribution of atherosclerotic lesions localizations is shown in table.

	Number of patients, (%)				Total
	PROX/3	MIDDLE/3	PROX/3 + MIDDLE /3	MIDDLE /3 +DISTAL/3	
LAD	100 (57.1)	27 (15.4)	15 (8.5)	33 (18.8)	175
RCA	50 (69.4)	15 (20.8)	7 (9.7)		72
CxB	27 (62.7)	3 (6.9)	12 (27.9)	1 (2.3)	43
Total	177	45	34	34	

PTCA with stenting of the infarct-related artery in cases of multi-vessel lesion was performed in 49 patients (17,2%). Selective intracoronary thrombolysis was used in 16 patients (5,6%), thrombectomy from the coronary arteries was performed in 7 patients (2,4%). All patients received pharmacological support – loading dose of Clopidogrel 300 mg, low-molecular heparins, platelet glycoprotein IIb/IIIa blockers,  $\beta$ -blockers. Angiographic success was achieved in 276 patients (97,1%). In 11 patients (3,8%) PCI was unsuccessful due to the impossibility of recanalization of the occluded segment. Four patients died (1,4%). All of them were admitted with cardiogenic shock.

**Results:** The results were evaluated in 6 months. Repeated coronary angiography was performed in 211 (75%) patients. Restenosis was revealed in 39 patients (13,7). Early thrombosis (days 1-7) of the stented segment was found in 2 (0,7%) patients (in the group without platelet glycoprotein IIb/IIIa blockers).

Progressing of coronary atherosclerosis in previously intact arteries was seen in 56 patients (19,7%). PTCA with stenting was performed in 27 of them (9,5%). 29 patients (10,2%) underwent CABG.

**Conclusions:** Early PCI is an effective and safe method of treatment for the patients with ACS.

The number of intra- and early postoperative complications is lower in the group where platelet glycoprotein IIb/IIIa blockers are used.

#### **USE OF BALLOON ANGIOPLASTY AND STENTING OF THE LOWER LIMB ARTERIES FOR THE PREVENTION AND THE TREATMENT OF CRITICAL LOWER LIMB ISCEMIA IN PATIENTS WITH DIABETIC FOOT SYNDROME**

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**Introduction:** It is generally known that one of the main causes leading to disability of patients with diabetes mellitus is the diabetic foot syndrome (DFS). According to the definition given by G.R. Galstian (1998), DFS is a set of pathologic changes in peripheral nervous system, arterial and microcirculatory bed, which represent an immediate threat of ulcerous and necrotic processes and foot gangrene in patients with diabetes mellitus.

We have studied early and long-term results of balloon angioplasty and stenting of the lower limb arteries in a group of patients with DFS. The final aim of the treatment consisted in the healing of ulcerous and necrotic defects and prevention of high leg amputation, as well as the prophylaxis of critical lower limb ischemia (CLLI) in the future, and for this reason endovascular interventions were performed not only in patients with marked trophic changes on the foot, but also in those with compensated foot circulation at the moment of admission.

**Material and methods:** From January 2004 through January 2008 we have done 64 endovascular interventions in 49 patients with ischemic or neuroischemic variant of DFS. The age of 23 men and 26 women varied from 29 to 79 years. The duration of the 1st or 2nd type of diabetes mellitus – from 4 to 23 years. Diabetes mellitus was in sub- or decompensation stage. Blood glucose level varied from 6,8 to 19,2 mmol/l; urea level – from 7,0 to 18 mmol/l; blood serum creatinine – from 112 to 240 mmol/l.

The main indication for endovascular procedure performance was the presence of hemodynamically significant stenosis ( $\geq 60\%$ ) or occlusion of the arteries of femoro-popliteal segment and the patency of at least one tibial artery. We did not perform endovascular correction of the lesions longer than 15 cm.

The following angiographic data were obtained: occlusion of the common femoral artery (CFA) in 1 patient (2%), CFA stenosis in 3 patients (6%),

occlusion of the superficial femoral artery (SFA) in 3 patients (6%), SFA stenosis in 14 patients (28%), stenosis of the popliteal artery (PA) in 5 patients (10%), PA occlusion in 7 patients (14%), SFA and PA stenosis in 14 patients (28%), SFA and PA occlusion in 3 patients (6%). All patients had crural arterial lesions – from the diffuse one without hemodynamically significant stenoses up to the occlusion. However none of the studied patients had hemodynamically significant lesion of both tibial arteries, which was favorable for balloon angioplasty and stenting of inflow arteries. The degree of chronic leg ischemia was assessed using Fontaine-Pokrovsky-Koshkin scale. Seven patients (14%) had chronic arterial insufficiency (CAI) of the 2nd degree, 11 (22%) - 3rd A degree, 16 (33%) – 3rd B, and 15 patients (31%) – 4th degree CAI.

Due to frequent mediocalcification in this group of patients their ankle-brachial index often was overestimated, so in order to assess the results of angioplasty we used percutaneous determination of oxygen saturation in the lower limb before and after the intervention; we also studied the indices of acid-base balance in the affected leg's tissues.

**Results:** Immediate angiographic success was noted in 47 patients (96%). We have used balloon-deployable and self-deployed stents (Cordis, Medtronic, EV3). Early postoperative period was marked by the increase of oxygen saturation in the leg by 11% on the average. At repeated examinations (after 3, 6 and 12 months) oxygen saturation in 39 (83%) patients was still higher than at baseline – on the average by  $7\pm 2\%$ , in 4 (8%) patients in 6 months after the intervention this index returned to the baseline value, and in 4 (8%) patients it decreased.

During 10 days after revascularization there was a tendency for the increase of pH (acidosis decrease) by approximately 0,07, partial oxygen tension rose by  $8\pm 2$  mm Hg.

Early after the procedure leg amputation at the level of the middle third of the hip was performed in 1 patient (2%) due to the progressing of moist gangrene. Twelve (24%) patients with 4th degree of CAI underwent only necrectomies and small amputations.

In the long-term (10 – 16 months) amputation at the hip level for occlusion of the stented segment without the attempts of endovascular or open vascular interventions were performed in 7 patients (14%). Repeated balloon angioplasty with stenting for restenosis was performed in 17 (34%), thrombectomy in 2 patients (4%).

**Conclusion:** One of the causes of critical ischemia development in patients with DFS consists in the lesion of the arteries of femoropopliteal segment. Balloon angioplasty and stenting of the lower limb arteries in DFS is justified, as it allows for leg salvage during one year in 88% patients, leaves the possibility for repeated endovascular intervention, and (in case of acute occlusion of the remodeled segment) for a minimally invasive operation, namely - thrombectomy.

## CHANGES IN CEREBRAL BLOOD SUPPLY IN PATIENTS WITH ALZHEIMER DISEASE IN THE LONG-TERM AFTER ENDOVASCULAR LASER PROCEDURE

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**Purpose:** the study of the changes in cerebral blood supply developing in patients with different stages of Alzheimer disease in the long-term (from 6 months to 4 years) after endovascular laser procedure.

**Methods:** 67 patients aged from 34 to 79 years (mean age 65 years), with different stages of Alzheimer disease were divided into 2 groups: Group 1 (group of study) - 12 patients who underwent endovascular laser treatment procedures; Group 2 (control) - 12 patients who underwent treatment with traditional methods including replacement, protective and symptomatic therapy. The subgroups of 3 patients with the stages of the disease CDR-0, CDR-1, CDR-2, CDR-3 were formed in each group. The plan of study comprised scintigraphy and rheoencephalography (REG). The treatment was conducted within 1 to 12 years from the moment of disease manifestation. Patients from both groups underwent examination at 6, 12, 24, 36, and 48 months after the start of treatment.

**Results:** According to scintigraphy data, in the group of study all patients with CDR-0 stage had totally recovered blood flow velocity in brain hemispheres at 6 months after the start of treatment, at 12, 24 and 36 months this picture persisted, at 48 month a 12,5% decrease of the blood flow velocity was noted in one patient. As judged by REG data, at 6 months the normalization of pulse blood filling in the carotid arteries was noted in 2 patients, the decrease by 8 and 12% in one patient. After 12 to 24 months similar picture persisted, and in 36 and 48 months all 3 patients had restored pulse blood filling. In patients with CDR-1 stage scintigraphy revealed total restoration of blood flow velocity in the brain hemispheres at 6 months in all cases, at 12 to 48 months this picture persisted. REG revealed normalization of pulse blood filling in the carotid arteries in all 3 patients. At 12 to 48 months this picture persisted. In patients with CDR-2 stage scintigraphy revealed total restoration of blood flow velocity in the brain hemispheres at 6 months in all cases, at 12 to 48 months this picture persisted. According to REG data at 6 months normalization of pulse blood filling in the carotid arteries was seen in all 3 patients. At 12 to 48 months this picture persisted. In patients with CDR-3 stage scintigraphy revealed total restoration of blood flow velocity in the brain hemispheres at 6 months in all cases, at 12 to 48 months 2 patients had a decrease by 6-12%. According to REG data at 6 months normalization of pulse blood filling in the carotid arteries was seen in all 3 patients. At 12 - 48 months a 20% decrease was noted in 1 patient. In the control group patients with

CDR-0 stage of the disease scintigraphy performed at 24-48 months revealed a decrease of blood flow velocity by 18%. According to REG data, at 24-48 months 1 patient had pulse blood filling decreased by 25%. In 2 patients with CDR-1 stage scintigraphy revealed a decrease of blood flow velocity by 18% at 24-48 months. REG revealed pulse blood filling decrease in 1 patient by 25% at 24-48 months. In 2 patients with CDR-2 stage scintigraphy showed a decrease of blood flow velocity by 18% at 24-48 months. REG revealed pulse blood filling decrease in 2 patients by 25% at 24-48 months. In all patients with CDR-3 scintigraphy at 6-12 months revealed the increase of blood flow velocity by 10-12%, at 24-48 months blood flow velocity decreased by 14% in 2 patients and increased by 18% in 2. According to REG data, at 6-12 months the indices of pulse blood filling increased by 7-12%, at 24-48 months 1 patient had a decrease of pulse blood filling by 20%.

**Conclusions:** Hence, one can note that the treatment with endovascular laser procedures in patients with Alzheimer disease allows to normalize the velocity indices of the blood flow and the pulse blood filling.

## CORRELATION BETWEEN THE DEGREE OF SYSTEMIC INFLAMMATION RESPONSE SYNDROME AND THE TACTICS OF CARIOGENIC SHOCK TREATMENT IN PATIENTS WITH MYOCARDIAL INFARCTION

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Cardiogenic shock (CS) is a complication of myocardial infarction (MI) associated by high mortality. While urgent percutaneous coronary interventions, coronary surgery, introduction of the methods of assisted circulation into the clinical practice allowed for a decrease of the percentage of unfavorable outcomes, the mortality is still high. During the last years a significant role in CS pathogenesis is attributed to the development of systemic inflammation response syndrome (SIRS).

The **purpose** of the work consisted in the study of SIRS degree in patients with myocardial infarction complicated by cardiogenic shock and its dependence on the tactics of treatment of such patients.

**Material and methods:** The study comprised the patients with MI admitted not later than in 6 hours after CS development. After the evaluation of clinical and laboratory data, invasive assessment of the indices of central hemodynamics, 55 patients (33 men and 22 women) were included in the study. Depending on the tactics of treatment, the patients were divided into 4 groups comparable by sex, age and associated pathology: conservative therapy (Group I, n=16), systemic thrombolytic therapy (TLT) (Group II, n=16), urgent percutaneous coronary intervention (PCI) (Group III, n=16) and CABG surgery for urgent indications (Group IV, n=7). Intraaortic balloon counterpulsation was used in all groups. Starting from the moment of inclusion the patients underwent serial determina-

tion of the levels of interleukin-6 (IL-6), tumor factor necrosis - $\alpha$  (TFN $\alpha$ ), procalcitonin (PCT) – every 6 hours during the first 24 hours of CS, then – every 12 hours. Every 12 hours the patients also underwent integral evaluation of their condition severity using APACHE IV score. Hospital mortality of patients with MI complicated by CS was assessed.

**Results:** No significant differences in hemodynamic indices were revealed at admission between the groups. Hospital mortality in Group I was 68,75% (n=11), in Group II - 75,00% (n=12), in Group III - 56,25% (n=9), and in Group IV - 57,14% (n=4). The levels of IL-g, TFN $\alpha$  were increased in comparison with the baseline values in all groups of patients by the 12th hour after the development of CS, which was accompanied by the increase of APACHE IV score. Maximal values of IL -6 within the first 12 hours in the Group III were significantly lower in comparison with the Groups I and II. The increase of serum PCT level by the 12th hour was significantly higher in the Groups I and II in comparison with the Group III. The lack of decrease or the increase of IL-6 level, the increase of blood level of PCT by the 24th hour of CS in the Groups I, II and III were associated with the increase of severity of patients' condition as judged by APACHE IV score, the development of multiorgan failure, unfavorable outcome of the disease.

**Conclusions:** Laboratory signs of SIRS are noted in all patients with MI complicated by CS, already by the 12th hour of the shock course. The degree of SIRS in patients with CS after PCI is lower in comparison with the patients after TLT or conservative therapy.

## RESULTS OF BBC ONE TRIAL

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The results of this trial were for the first time presented during TCT-2008 in Washington, DC, by Dr. David Hildick-Smith.

**BBC ONE – British Bifurcation Coronary Study: Old, New, and Evolving Strategies** in the treatment of bifurcation coronary lesions.

**BBC ONE** – is a randomized comparison of simple and complex approach to the stenting of bifurcation coronary lesions using drug-eluting stents.

Two techniques of bifurcation stenting were used in BBC ONE trial:

Simple – staged use of provisional T-stenting.

Complex – using crush or culotte technique, depending on the operator choice.

End-points of the trial were: death, myocardial infarction and TVF.

The presence of bifurcation lesions of the coronary arteries necessitating stenting was the inclusion criterion for this trial. The diameter of the side branch should not be less than 2.25 mm, and the diameter of the main vessel – not less than 2.5 mm.

In total 500 patients participated in the trial. These patients were randomized into the groups Simple and Complex (250 patients in each group).

### Results:

#### End-point of the trial

	Complex	Simple
Death	2 (0,8%)	1 (0,4%)
Myocardial infarction	28 (11,2%)	9 (3,6%)
TVF	18 (7,2%)	14 (5,6%)

#### Intraoperative MACE

	Complex	Simple
Number of patients	20 (7,6%)	5 (2,0%)
Death	0	0
Myocardial infarction	18	5
CABG	2	0

#### Results of interventions

	Complex	Simple	p value
Time of procedure (min.)	78	57	<0.001
Time of visualization (min.)	22	15	<0.001
Number of guides used	3,11	2,21	<0.001
Number of balloons used	3,97	2,26	<0.001
Number of stents used	2,21	1,17	<0.001

**Conclusion:** For the studied bifurcation lesions, stepwise use of provisional T-stenting was superior to the tactics of complex treatment using crush or culotte technique by all the indices.

Taking into account the prevalence of complications, such as intraoperative MI, hemopericardium, heart tamponade, etc, in the group of complex treatment, as well as the fact that the stents used in the complex group were significantly longer, the procedure itself was more time-consuming and associated with greater exposure and needed more consumables, one can conclude that more complex technique of bifurcation stenting is less preferable.

## MY CASE OF COMPLICATED CORONARY ANGIOPLASTY IN AMI

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The presentation deals with urgent coronary angioplasty performed in a patient with AMI in the state of clinical death on August 19, 2009.

The patient was brought to the admission and diagnostics department with the complaints of burning retrosternal pain irradiating into both shoulders and the neck. Narcotic analgetics administered by the emergency care team gave partial effect.

The diagnosis was: acute transmural myocardial infarction of the inferior LV wall on 19.08.2009. 1 st degree circulatory insufficiency.

After the examination and the explanation of the necessity of coronary angiography the condition of patient suddenly aggravated: loss of consciousness, neither AP, nor the pulse could be recorded. ECG revealed ventricular fibrillation. Resuscitation measures were started. The patient was transferred to the cathlab in the state of clinical death.

**CAG showed:** balanced type of myocardial circulation. Diffuse changes in the coronary arteries. 70% stenosis of the middle segment of the LAD. Occlusion of the proximal segment of the RCA.

Recanalization of the RCA was carried out. Direct stenting with «Liberte» stent (4,0 x 28 mm) was performed. Arterial lumen was restored. Blood flow TIMI III.

**Conclusion:** After the procedure the patient remained in severe condition during the first five days, with positive dynamics. The severity of condition was caused by post-resuscitation disease, acute stage of myocardial infarction, clinical signs of post-hypoxic brain edema.

On day 6 after the intervention the patient was extubated. His hemodynamcis were stable.

On day 9 he was transferred from the intensive care unit to the profile department for further treatment.

#### **INDICES OF MORTALITY FROM ACUTE MYOCARDIAL INFARCTION DEPENDING ON THE AVAILABILITY OF HIGH-TECHNOLOGY MEDICAL CARE IN THE HOSPITAL ( THE DATA OF ST. PETERSBURG ACUTE MYOCARDIAL INFARCTION REGISTRY)**

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**Purpose:** to elaborate the registry of acute myocardial infarction (AMI) in order to obtain objective information on demographic and clinical characteristics of patients with AMI, the time schedule and the volume of special care for patients with AMI.

**Material and methods:** The workers Research Laboratory have developed AMI Registry on the base of ACS Registry conducted by the European Society of Cardiology (Euro Heart Survey). The formation of the database is presented in a standard Acces program, allowing for the work on PC, as well as on paper carrier. The registry is adapted for the settings of Russia and consists of four blocks. The first block contains the information on pre-hospital stage (including the time schedule of disease development, the character and the volume of care rendered at the emergency stage). The information of the 2nd block concerns the stage of treatment in the intensive care unit (duration of stay in the ICU, clinical characteristics, including the presence and the character of complications, indices of hemodynamics, volume of therapy). The characteristics of the course of AMI during the stay in the department of cardiology / department for AMI patients are stored in the 3rd block and include the data on the

volume of treatment, the results of examinations, particularities of clinical picture, and complications of AMI. The 4th block contains the information on rehabilitation period and the outcomes of the disease. In cases of endovascular intervention / heart surgery the data on time schedule of coronary angiography, the character of coronary lesions, the volume of surgical treatment are introduced in the registry. In cases of death the registry is supplemented by the results of pathological anatomical study.

We analyzed the registry data for two hospitals in St. Petersburg: I – multiprofile hospital with the department of anesthesiology and intensive care for the treatment of cardiological patients, special cardiological department for the treatment of patients with AMI, but without department of cardiac surgery / endovascular surgery, and II – cardiological hospital possessing all the facilities for highly specialized medical care for patients with AMI, including the departments of endovascular surgery and heart surgery.

**Results:** The registry comprised 795 patients with AMI from hospital I and 359 patients from hospital II. One has to note late appeal for medical care and, hence, delayed hospitalization, in both hospitals. Systemic thrombolysis in patients with STEMI admitted within the first 12 hours after the onset of the disease, was performed only in hospital II (in 89,3% of patients). Coronary angiography was performed in 1 patient treated in hospital I and in 68,5% of patients treated in hospital II. Surgical intervention was performed in 1 patient treated in hospital I (PCI) and in 219 patients treated in hospital II (PCI in 146 patients, CABG – in 73). The character and the frequency of complications of AMI were analyzed. The mortality was significantly higher among the patients treated in hospital I (20,5% and 7,2%, respectively,  $p < 0,0001$ ).

**Conclusions:** Our registry allows to reveal the particularities of AMI course, to determine real need of medications and high-technology medical care, to calculate material expenses, as well as to trace the ways for the perfection of care for the patients with AMI.

#### **CHEMOEMBOLIZATION OF THE LIVER FOR ITS MALIGNANT TUMOR**

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**Introduction:** liver diseases rank one of the first in oncology. Metastatic liver tumors are seen 50 - 60 times more often than primary tumors. Irrespective of primary tumor localization virtually one of three oncological patients has secondary liver involvement. Tumor sensitivity to chemical agent is directly dependent on its concentration. Regional arterial administration of an agent into the liver tissue results in its concentration increase by 10 to 100 times in comparison with systemic administration, while general toxic influence, on the contrary, significantly decreases. The administration of embolizing composition contrib-

utes to drug retention in the tissue for several hours to weeks. The embolization of hepatic artery branches supplying the liver an ischemic area is created.

**Material and methods:** we have studied 290 patients with different liver diseases. The set of imaging diagnostic techniques included: ultrasound investigation, CT, etc. In order to precise the genesis of the lesion 195 percutaneous fine needle liver biopsies were performed. Metastatic liver tumor was revealed in 176 patients (90,3%), while 14 (7,2%) had primary lesion.

After morphological verification of the diagnosis 190 patients underwent therapy.

At the first stage we performed catheterization of the right femoral artery with superselective placement of the catheter tip in the hepatic arteries depending on the localization of the damaged liver areas. In both liver lobes were involved, the catheter was placed in the hepatic artery itself. Angiographic study was carried out. After catheter fixation the patient was transferred to the ward for intraarterial infusion of chemical agent. Intraarterial infusion lasted for 1 to 3 days, depending on the indications.

After the infusion we proceeded with final stage of the treatment – chemoembolization. A chemical agent mixed with oily contrast medium was injected into the catheter under X-ray /TV guidance. The treatment was repeated with 3-4 weeks interval.

All patients had post-embolization syndrome, which could be stopped with analgetic agents.

**Results:** intraarterial infusion with subsequent chemoembolization was carried out in 190 patients with primary or metastatic changes. The analysis of the treatment gave the following results: positive effect after the course of treatment (the tumors' size decrease) was achieved in 43 (22,6%) patients, in 87 (45,8%) the process was stabilized, and in 60 patients (31,6%) the treatment did not give the desired effect (negative dynamics).

**Conclusions:** hence, dynamical observation of patients with primary or metastatic liver lesions after the treatment revealed three groups of patients. The 1st group had markedly positive dynamics of the process. The 2nd group was characterized by process stabilization. In the 3rd group the process progressed. The share of patients from groups 1 and 2 is clearly prevalent.

#### **INTRAVASCULAR METHODS OF STUDY AT DIFFERENT STAGES OF CORONARY INTERVENTIONS FOR THE LESIONS OF THE LEFT MAIN CORONARY ARTERY AND BIFURCATION LESIONS**

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**Introduction:** Angiographic diagnostics of the lesions of the left main coronary artery do not give

rise to doubts concerning the tactics of treatment of severe stenoses. Meanwhile several studies comprising patients with borderline lesions of the left main demonstrated the lack of differences in survival indices and MACE in the groups of delayed treatment and surgical treatment in cases with hemodynamically insignificant results of fractional flow reserve (FFR). On the other side, in severe lesions of the left main the results of several studies showed the necessity of IVUS use after stenting with the achievement of the following criteria: minimal intra-stent lumen area  $\geq 8,7$  mm, complete stent apposition, complete coverage of the lesion at the whole length and absence of complications.

At present there is no single opinion concerning optimal tactics of stenting in bifurcation coronary lesions. Some studies have demonstrated comparable results with the use of one or two stents. Also there are studies using the results of FFR measurement as a guide for further tactics of PCI.

**Material and methods:** From 2007 we have introduced into our clinical practice an algorithm of action in cases of the left main coronary artery lesions at the stages of diagnostics and intervention. In LCA stenoses with lumen narrowing from 30% to 50% of the diameter, associated either with borderline lesions in other segments of the left and/or right coronary artery system, or with marked stenoses of not more than two epicardial arteries amenable to PCI performance, we proceed with FFR measurement in the left main. In the presence of FFR over 0,8, depending on the lesions in other segments of the system of the left or right coronary artery, either pharmacological therapy or PCI is indicated. In accordance with the above criteria 8 patients were included in the study: 3 of them had pharmacological therapy and 5 underwent an intervention on the LAD, CxB or RCA.

In cases of interventions for marked lesions of the left main IVUS is performed before and after stenting. Up to date we have performed 22 interventions for the left main lesions under ultrasonic guidance.

From 2007 we are conducting a study of "true and "pseudo" bifurcation lesions, excluding the left main lesions. The main criterion of inclusion consists in the presence of angiographic compromise of the DB ostium after stenting of the LAD with 60%-80% lumen stenosis. After stenting of the LAD we measure FFR in the DB. Irrespective of hemodynamically insignificant FFR indices, in one group of "true" lesions (n = 13) two stents have been implanted, while in another group (n = 14) the intervention was ended by dilatation with the use of kissing-technique. In "pseudo" lesions one group (n = 9) had the intervention ended by dilatation with the use of kissing-technique, while in another group (n = 8) only LAD stenting was performed.

**Results:** The 12-months survival in 8 patients with borderline lesions of the left main and hemodynamically insignificant FFR was 100%.

In 27 patients with marked lesions of the left main after stenting, in 14 cases (52%), on the base of IVUS results we have used either larger balloons, or high-pressure balloons.

At 12-months follow-up the groups of "true" and "pseudo" lesions were not different in the indices of angina recurrence, repeated revascularization, infarction and mortality.

**Conclusion:** Our preliminary results allows to suggest, that:

1. In cases when the estimation of LCA lesions with coronary angiography is ambiguous, it is necessary to use FFR measurement.
2. The stenting of the left main should be accompanied by IVUS before and after the intervention.
3. FFR measurement in "true" and "pseudo" bifurcation lesions allows for more accurate, in comparison with angiography, determination of the volume of subsequent intervention.

### **LONG-TERM FOLLOW-UP OF SELECTIVE TECHNIQUE OF STENTING FOR BORDERLINE STENOSES IN MULTI-VESSEL CORONARY LESIONS**

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**Introduction:** Borderline stenoses of the coronary artery constitute an ambiguous problem of interventional cardiology. Coronary angiography has certain limitations in the evaluation of borderline lesions. Several investigations performed with the account of this fact have proven diagnostic effectiveness of fractional flow reserve (FFR) measurement) and determination of morphometric criteria of hemodynamic significance on the base of the results of intravascular ultrasonic study (IVUS) for the choice of tactics of subsequent intervention.

**Material and methods:** From 2005 to 2006 we have studied borderline lesions of the coronary arteries in multi-vessel lesions. Inclusion criteria were: stable angina of functional class III-IV; multi-vessel coronary lesion with borderline and marked stenoses revealed by coronary angiography; primary character of coronary stenoses; FFR in borderline stenoses over 0,75 as evaluated by intravascular manometry; minimal lumen area of borderline stenoses over 4 mm<sup>2</sup>, minimal lumen size of borderline stenoses over 2 mm as evaluated by IVUS; stenting of at least one hemodynamically significant stenosis with drug-eluting stents («Cypher»). Patients with left main lesion, acute coronary syndrome, after bifurcation stenting, after aorto-coronary bypass grafting and with marked LV dysfunction (EF < 40%) were excluded from the study. In conformity with the above criteria 84 patients were included in the study. Group I comprised 41 patients who underwent intervention on borderline lesions along with stenting of severe stenoses. Group II consisted of 43 who

underwent only stenting of severe stenoses without borderline lesions correction. Baseline clinical characteristics of both groups were similar.

**Results:** 98 stents have been implanted in Group I and 55 – in Group II (p<0,05). The interventions resulting in the increase of physical tolerance by 2 or more functional classes, or in total elimination of angina and/or objective signs of ischemia, were considered clinically effective at in-hospital stage of treatment. In cases when physical tolerance did not increase or angina symptoms recurred during in-hospital stay the interventions were considered ineffective. During in-hospital stage no statistically significant differences between the groups were seen.

Long-term results were evaluated at 6, 12 and 24 months on the base of the following parameters: angina-free survival, recurrence of clinical picture of angina, acute myocardial infarction, repeated revascularization (PCI or CABG) and death. No statistically significant differences were observed between the group with the intervention performed in all lesions and the group of selective stenting.

**Conclusion:** On the base of the obtained results we can conclude that:

1. The stenoses with 50% - 70% lumen narrowing as evaluated by coronary angiography require additional study with intravascular techniques.
2. Complex method of study of the coronary arteries - angiography, intravascular manometry, IVUS – is a highly informative mean for the diagnostics of hemodynamical significance of the stenosis and determines further tactics of stenting.
3. Borderline coronary stenoses with lumen narrowing of 50% to 70% of the diameter as evaluated by coronary angiography, FFR >0,75 as evaluated by intravascular manometry, minimal lumen area of over 4 mm<sup>2</sup> and minimal lumen diameter of over 2 mm as evaluated by IVUS do not require stenting.

### **EVALUATION OF THE EFFECTIVENESS OF THROMBUS ASPIRATION DEVICES IN ACUTE CORONARY OCCLUSION**

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**Introduction:** Percutaneous coronary intervention (PCI) is the most effective method for the treatment of patients with STEMI. The results of studies demonstrating the effectiveness of PCI with prior thrombus aspiration in comparison with standard intervention were published recently.

**Material and methods:** We selected 38 patients with acute coronary occlusions. The inclusion criteria were: infarct age ≤ 12 hours, acute occlusion of one major coronary artery as diagnosed by coronary angiography. The exclusion criteria were: cardiogenic shock, history of aortocoronary bypass grafting, left or right bundle branch block, pacing rhythm. At the



first stage of PCI all patients underwent mechanical recanalization with a guidewire. After that the patients were divided into two groups. Patients from Group 1 underwent thrombus aspiration using a special catheter, patients from Group 2 – balloon angioplasty. In both groups PCI was ended by stenting. There were 18 patients in Group 1 and 20 in Group 2. Main clinical characteristics were similar in both groups.

The adequacy of reperfusion after the intervention was assessed on the base of TIMI flow as shown by coronary angiography and of ST segment decrease as assessed by ECG. Reperfusion was judged adequate when TIMI 3 blood flow and ST decrease by > 70% were seen in 30 minutes after the procedure. In cases of TIMI flow  $\leq 2$ , “no-reflow” phenomenon and ST decrease by less than 70% in 30 minutes after the intervention the reperfusion was judged as inadequate.

**Results:** Thrombus fragments were obtained in 12 (66,7%) patients from Group 1, after stenting TIMI 3 flow was seen. In the remaining 6 (33,3%) cases from Group 1 no macroscopic thrombus fragments were found, in 1 case (5,6%) control angiogram performed after the intervention showed TIMI 1 flow with “no reflow” phenomenon.

After mechanical recanalization with subsequent balloon angioplasty 16 patients from Group 2 (80%) had TIMI 3 blood flow and 4 (20%) patients had TIMI 2 or less blood flow with “no reflow” phenomenon. In comparison with Group 1, TIMI 2 or less blood flow with “no reflow” phenomenon were seen in Group 2 patients significantly more often ( $p < 0,05$ ). In 30 minutes after the intervention ST segment decrease was evaluated. In Group 1 ST decrease by over 70% was seen in 16 patients (88,9%), while in Group 2 – in 14 patients (70%) ( $p < 0,05$ ). ST segment decrease by less than 70% was seen in 2 cases (11,1%) in Group 1 and in 6 cases (30%) in Group 2 ( $p < 0,05$ ). The rate of repeated myocardial infarction, mortality and target artery revascularization during in-hospital stage was not statistically different in both groups.

**Conclusion:** Despite the fact that our study showed high effectiveness of thrombus aspiration devices for blood flow restoration in comparison with standard PCI, further accumulation of experience with these catheters will allow for more definite conclusions concerning their effectiveness and safety in clinical practice.

#### **ORGANIZATIONAL AND METHODIC ASPECTS OF HIGH-TECHNOLOGY CARE FOR CARDIOLOGICAL PATIENTS**

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**Introduction:** By the end of 2006 the Clinical Hospital №122 received the right to render high-technology medical care (HTC), namely, coronary angiography, angioplasty and stenting of the coronary, carotid and

renal arteries, implantation of pacemakers, ECG-monitors, aorto-coronary bypass grafting, and after that the number of cardiological patients significantly increased.

Our experience with intervention procedures dates back to 1994, when a 60-beds department of cardiology and a 6-beds department of cardiac resuscitation (CR) were sufficient for the limited number of patients. New conditions required the organization of an additional service of cardiac surgery with a 5-beds department of cardiac surgical resuscitation (CSR) and an additional 8-beds intensive care ward (ICW) for the care of patients after interventional procedures. This ICW corresponds to the so-called “stepdown intensive care unit” (see ACC/AHA Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction, 2004), and is equipped, just as CR and CSR, with cardiac monitors and all necessary devices for resuscitation measures.

This reorganization allowed to intensify and optimize the process of diagnostics and treatment, to concentrate the technique and the specialists at relevant stages of care and to significantly increase the volume of HTC, as well as to distribute the flows of patients brought to the intensive care departments by the emergency teams, from municipal and federal medical institutions, from other hospital's departments.

**Material and methods:** We present some statistical indices of the work of our institution's cardiological service after the reorganization.

**Results:** Among the results of reorganization and additional equipment one can note:

- The increase of the number of treated cardiological patients from 1420 in 2006 to 1900 in 2008; approximately 500 patients have been undergone open-heart surgery after the start of the work of cardiac surgery service;
- The increase of the number of PCIs from 200-300 per year in 2002-2005 to 980 in 2007 and 1126 in 2008, respectively.
- The mastering of new technologies of prophylaxis and treatment of some cardiovascular diseases – pulmonary arterial thromboembolism (placement of cava-filters); cerebrovascular disease (carotid angioplasty); arterial hypertension (stenting of the renal arteries); cardiac arrhythmias (implantation of pacemakers, Reveal cardiac monitors – the first monitor in Russia was implanted in our clinic).

**Conclusion:** A doubtless advantage of HTC introduction in cardiology consists in the improvement of the quality of treatment, manifested, for example, in the decrease of mortality from acute myocardial infarction to 4,2% in 2008. Herewith it is interesting to note, that mean age of patients who died from acute myocardial infarction in 2006 was 75,4 years; in 2007 – 79,1, and in 2008 – 79,8 years. In 2008 there were 8 deaths from massive pulmonary arterial thromboembolism (mean age – 79,6 years), 3 patients died from acute disturbances of cerebral circulation (mean age – 86,0 years).

## AORTIC STENT-GRAFTING

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**Purpose of study:** evaluation of the effectiveness of aortic stent-grafting.

**Material and methods:** from December 2006 till August 2009 we have performed aortic stent-grafting in 16 patients. Endovascular stent-grafting for thoracic aortic aneurysm was carried out in 5 patients, 11 patients underwent stent-grafting of infrarenal segment of the aorta. Patients with aortic aneurysm were aged from 29 to 79 years. There were 4 (25%) women and 12 (75%) men. The methods of preoperative examination included: EchoCG, aortography, MSCT. Helical computer tomography was chosen as one of the main methods of examination. Multi-slice computer tomography with contrast allowed to obtain complete information on the sites of eventual stent-graft implantation, maximal aneurysm diameter, presence of thrombi and calcification. In order to achieve accurate stent-graft positioning relatively to the renal arteries' ostia (for infrarenal segment of the aorta) and to the subclavian artery (for thoracic segment) aortography with labeled catheter was performed in all patients. All patients underwent endovascular stent-graft implantation. The intervention was performed in the cathlab, using angiographic machine Innova (GE). In cases with thoracic segment we have used the stent-grafts GORE TAG (1 patient, 6.3%), MEDTRONIC VALENT (3 patients, 18.8%), RELAY (1 patient, 6.3%). In cases with infrarenal aneurysm we have used bifurcation aorto-iliac stent-grafts GORE EXCLUDER (3 patients, 18.8%), MEDTRONIC TALENT (6 patients, 37.5%) and AORFIX (2 patients, 12.6%).

**Results:** Control aortography performed immediately after stent-graft implantation the leakage of opacified blood in the aneurismal cavity was seen in 1 patient with large infrarenal aneurysm (77 mm) (through collaterals – lumbar arteries, type 2); in the remaining cases hermetic closure of the aneurysm was achieved. Control MSCT before the discharge revealed signs of aneurismal cavity sealing and thrombosis in all patients (100%). Mean in-hospital stay was 5 days. One patient died (6.3%). Control examination was performed in 6 (37.5%) patients – 4 with infrarenal aneurysm in 6 months and 2 with thoracic aortic aneurysm – in 2 months. Control MSCT showed total isolation and thrombosis of the aneurismal cavity.

**Conclusion:** Aortic stent-grafting is an effective method for the treatment of thoracic and infrarenal aortic aneurysms and does not require prolonged hospital stay. Aortic stent-grafting is associated with high frequency of immediate angiographic Results: Long-term results of stent-grafting are characterized by good angiographic and clinical effect, successful aneurysm closure was seen in 100% of cases.

## RESULTS OF RETROGRADE RECANALIZATION OF CHRONIC CORONARY OCCLUSIONS

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**Purpose of study:** to show the feasibility and the effectiveness of retrograde recanalization of chronic coronary occlusions.

**Material and methods:** from October 2007 through July 2009 retrograde recanalization of chronic (over 1 year) coronary occlusions was performed in 69 patients. Previously antegrade recanalization was attempted in 62 (89,5%) patients. There were 59 (85,5%) men and 10 (14,5%) women. The interventions were performed on the right coronary artery - 52 (75,4%), the LAD - 14 (20,3%), the circumflex artery - 2 (2,9%), and in 1 case (1,4%) retrograde recanalization of aortocoronary venous shunt was carried out. The following techniques were used for the recanalization of chronic occlusions: direct retrograde guidewire insertion – 21(30,4%), “kissing guidewires” technique – 39 (56,5%), CART technique – 7 (10,1%), and bent guidewire technique – 2 (2,8%). 65 (94,2%) procedures were performed through the septal collaterals, in 32 cases (49,2%) we had to dilate them, and in 4(5,7%) cases the intervention was carried out through epicardial shunts. DES were implanted in 38 (55%) patients, while in 31 cases (45%) bare stents were implanted.

**Results:** After stenting TIMI 3 blood flow was obtained in 64 (92,7%) patients. There was a 0% periprocedural mortality. The dilatation of septal channels led to intramyocardial hematoma development in 4 cases (5,8%). Early after the procedure hemopericardium was revealed in 3 (4,3%) patients, 2 (2,9%) patients had signs of renal failure. Other early complications were not seen. In the long-term follow-up (6 to 24 months) 38 patients underwent control examination. MACE were revealed in 9 (23,6%) patients.

**Conclusions:** Retrograde revascularization can be successfully performed in patients after failure of previously attempted antegrade recanalization of the occlusion, or in cases when anatomical features interfered with guiding catheter advancement to the coronary artery ostium (occlusion from the ostium). New techniques of retrograde revascularization allow to broaden the indications for the use of this technique and offer to the operator more variants for successful termination of the procedure.

## EVALUATION OF THE EFFECTIVENESS OF ENDOVASCULAR TREATMENT OF ISCHEMIC HEART DISEASE WITH STENOTIC LEFT MAIN CORONARY ARTERY

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**Purpose of study:** to analyze the results of stenting of the left main coronary artery and to show the effectiveness of endovascular treatment in this category of patients with ischemic heart disease (IHD).

**Material and methods:** from January 2006 through December 2008 endovascular interventions for left main coronary artery stenoses were performed in 105 patients. Mean age of patients was  $59,8 \pm 8,4$  года. The majority of them were men (82,1% vs. 17,9% of women). Nosological distribution was as follows: 83 patients (79,1%) had stable angina of functional class II-IV, 7 patients (6,7%) were in non Q-wave myocardial infarction, Q-wave MI was present in 3 patients (2,8%), and 12 patients (11,4%) had unstable angina. Mean left ventricular ejection fraction was 49%. Isolated lesion of the left main was seen in 5 (4,8%) patients, the combination of the left main lesion with the lesion of another coronary artery – in 20 patients (19%), with the lesions of two and more vessels – in 80 (76,2%) patients. Herewith in 16 cases LCA lesion was associated with occlusion of the right coronary artery. Coronarography revealed ostial occlusion of the left main in 13 (12,4%) cases, the stem of the LCA was involved in 17 (16,2%) cases, bifurcation lesion was present in 75 cases (71,4%). Mean degree of left main stenosis was 72,2%. In 8 cases (7,6%) PCI was performed for urgent indications, 97 procedures (92,4%) were elective. “Protected” left main coronary artery was present in 25 patients (23,8%), while “unprotected” – in 80 (76,2%). In total we have implanted 41 DES, 30 BMS, and in 34 cases DES together with BMS. Stenting was performed with different techniques: provisional T-stenting (1 stent) - in 94 cases (89,5%), T-stenting - in 2 (1,9%), «Culotte» - 5 (4,8%), «V-stenting» - in 3 (2,9%), «Y-technique» was used in 1 case (0,9%). Intraaortic balloon pumping was used in 2 patients (1,9%).

**Results:** Immediate angiographic success was achieved in 103 patients (98%). One patient died from perioperative infarction with cardiogenic shock, another patient was transferred to the operating room for aortocoronary bypass grafting (CABG).

Mean duration of the follow up was  $8 \pm 2$  months. Clinical success (absence of angina or the decrease of exertional angina by two functional classes) was noted in 95 patients (92,2%). Myocardial infarction developed in 2 cases (1,9%). During the follow-up period we have performed 87 (84,4%) coronary angiographies. Repeated revascularization was nec-

essary in 17 cases, 12 patients underwent endovascular procedures and in 2 patients aortocoronary bypass surgery was carried out.

**Conclusions:** Endovascular correction of the left main coronary artery stenosis is a safe and effective method of treatment for patients with IHD. In cases with “unprotected” left main coronary artery stenting is also rather safe, but in complex cases the operation of CABG should be considered. In cases with acute myocardial infarction stenting of the left main is a life-saving method of treatment.

## OUR EXPERIENCE WITH BALLOON PULMONARY VALVE DILATATION IN ISOLATED PULMONARY ARTERIAL STENOSIS

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**Introduction:** This study was aimed at the evaluation of the results of balloon dilatation in patients with congenital isolated pulmonary valve stenosis.

**Material and methods:** The study comprised 168 patients who underwent balloon pulmonary valve dilatation. There were 102 males and 66 females. The age of patients varied from 3 months to 41 years (table 1).

**Table 1.** Patients distribution by age.

Age	n	%
Under 1 year	51	30.35
1 year – 3 years	69	41.07
Over 3 years	48	28.58
TOTAL	168	100

The cause of congenital pulmonary valve stenosis is the adhesion of valve cusps without any developmental defects of the right ventricular outflow tract. The size of valvular orifice varied from several millimeters to 1 cm and more.

Depending on the degree of the disease (classification by V.I. Pipia) the patients were divided into three groups (table 2). Systolic gradient varied from 30 to 107 mm Hg.

**Table 2.** of patients depending on the RV systolic pressure.

Group	n	%
Stage 1	57	33.9
Stage 2	90	53.6
Stage 3	21	12,5
Stage 4	0	0
TOTAL	168	100

**Results:** Absolute indices of pressure changes in the right heart are shown in table 3.

**Table 3.**

Group	Baseline pressure (mm Hg)			After valvuloplasty (mm Hg.)		
	RV	PA	Syst. AP	RV	PA	Syst. AP
1	68±4.4	23±0.6	118±2.3	39±1.8	22±0.7	108±1.5
2	110±3.1	22±0.9	113±3.7	58±5.8	24±1.3	108±4.4
3	161±16.4	22±2.2	120±2.6	75±21.6	25±2.4	103±4.9

**Conclusion:** Balloon valve dilatation for isolated pulmonary valve stenosis leads to the normalization of cardiac hemodynamics and is an alternative to open-heart surgery.

### ETHNICAL FEATURES IN CORONARY STENTING

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**Purpose of study:** to evaluate the particularities of coronary stenting procedures in some ethnical groups in the Tiumen region.

The analysis of 6406 cases of coronary angiography included in the register of Tiumen Cardiological center from 2003 revealed that significant atherosclerosis has been found in 4232 patients. Coronary stenting was performed in 2234 patients.

Patient with significant coronary stenosis were divided into 5 ethnical groups (Russians, Ukrainians, Tartars, Azerbaijanis, Armenians). The appartenance to a certain ethnical group was determined on the base of autoidentification. Russian population formed the biggest group – 3743 patients, among them 3189 men (85.2%) and 554 women (14.8%), with mean age of 54.8±8.13 years. The Ukrainian group consisted of 214 patients, 199 men (93%) and 15 women (7%), aged on the average 54.7±6.8 years. The Tartar group consisted of 176 patients, with 152 men (86.4%) and 24 women (13.6%), their mean age was 53.4±8.0 years. The fourth and fifth groups, Azerbaijanis and Armenians, also were analyzed. There were 60 Azerbaijanis, with mean age of 47.9±6.43 years and 39 Armenians, with mean age of 50.5±7.4 years.

Echocardiographic and angiographic characteristics were similar in all groups. The differences in such risk factors as diabetes mellitus, obesity, smoking, did not influence the number of performed stenting procedures.

Financial situation in all ethnical groups were approximately equal and could not influence the particularities of interventional procedures.

Stenting was performed in 46.7% to 64.1% of patients in all groups Bare metallic stents were implanted only in cases when patients refused to have a long-lasting dual antiplatelet therapy, or when such therapy was impossible for other reasons.

The share of implanted DES was 64%-78%.

No refusals from coronary angioplasty and stenting were recorded, so this factor could not influence the amount of performed procedures.

Patients from all ethnical groups, irrespective of the area of their residence on the territory of Tiumen region, baseline inter-group differences and comparable echocardiographic and angiographic characteristics, had equal number of interventions with the use of identical coronary stents.

**Conclusions:** the analysis of the data of interventional registry did not reveal significant differences in the frequency and particularities of coronary stenting between five ethnical groups.

### RESULTS OF CAROTID ARTERIES STENTING IN PATIENTS WITH CHRONIC OCCLUSIONS

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**Purpose of study:** to evaluate immediate results, safety and feasibility of carotid arteries stenting in patients with chronic occlusions.

**Material and methods:** from July 2005 through October 2009 endovascular interventions on internal carotid arteries were performed in 125 patients treated in the Department of endovascular methods of diagnostics and treatment of District clinical hospital of Khanty-Mansisk. Eight male patients in whom recanalization of chronic occlusion of the internal carotid artery (ICA) was attempted were prospectively included into the study. Mean age of patients was 62,8 years (from 53 to 72 years), the interventions were performed on 9 carotid arteries. All patients had complex clinical and instrumental examination including duplex scan of brachicephalic vessels, brain CT or MRT. Before endovascular procedure all patients underwent neurological examination. Selective angiography of the cerebral arteries was performed for detailed evaluation of vascular bed involvement, cerebral blood flow and collateral blood supply. In 2 patients (25%) the process was asymptomatic. Bilateral lesion of the carotid arteries was present in 4 (50%) patients: ipsilateral chronic occlusion and contralateral stenosis in 3 (37.5%), and bilateral occlusion in 1 (12.5%) patient. Stenting of the carotid arteries was performed in 2 out of 8 patients (25%).

The interventions were performed as follows: after total cerebral angiography we assessed the collateralization of the occluded artery territory and, in case of satisfactory collateral filling of the anterior and middle cerebral arteries of the occluded internal carotid artery (ICA) from contralateral ICA, recanalization was attempted. Chronic occlusions of the ICA were passed using coronary technique: after the placement of a guiding catheter JR4 8F (Cordis, USA), successive coronary guidewires were used (TERUMO, Japan), the guidewire was supported

with microcatheters (TERUMO, Japan; Cordis, USA); after the recanalization of the occlusion with coronary balloons (2 to 4 mm in diameter) predilatation was performed. In case of satisfactory antegrade flow, an anti-embolic filter AccUNET (Abbott, USA) was inserted distal to the stenosis site, and stenting was carried out. All patients received Acculink (Abbott, USA) stents. Postdilatation procedure was performed with 5 mm balloon catheters Amia (Cordis, USA) and Ultra Soft (Boston Scientific, USA). The decision on the termination of the procedure was taken after 30-minutes manipulations or the use of 200 ml of the contrast medium, as well as after predilatation in case of absent antegrade blood flow.

**Results:** Angiographic success was achieved in 2 (25%) patients, in 4 (50%) recanalization of the occlusion did not lead to satisfactory blood flow restoration. In 2 cases (25%) we could not pass the occlusion. No complications such as acute myocardial infarction, stroke and death were seen. One patient (12,5%) underwent stenting of contralateral ICA in one month after successful stenting of ICA occlusion, 2 patients (25,0%) had contralateral ICA stented within 3 months.

**Conclusions:** It seems, that endovascular interventions in chronic ICA occlusion have certain perspectives, are safe and, probably, play a certain role in the prevention of ischemic stroke in this group of patients.

#### **OUT-PATIENT CORONARY ANGIOGRAPHY IN THE SETTINGS OF MULTI-PROFILE HOSPITAL**

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**Purpose of study:** to evaluate the safety of coronary angiography performance in out-patient settings of a multi-profile hospital, with the possibility to optimize therapeutic and diagnostic stage in patients with ischemic heart disease.

**Material and methods:** from November 2008 through July 2009 we have performed 40 coronary angiographies (CA) from transradial approach in out-patient settings of our District Clinical hospital. All procedures were performed in the cathlab, with subsequent follow-up in day care service. Mean age of patients was 53.6 (37-72) years, 27 (67,5%) were males. All patients underwent complex clinical and instrumental examination, including Allen test, in out-patient settings. Left transradial approach was used in 33 (82,5%) patients, right transradial approach – in 7 (17,5%). Radial artery catheterization was done using diagnostic sets 4 F Transradial Kit (Cordis, USA) and 5 F Radifocus (Terumo, Japan), for the catheterization

of coronary arteries standard catheters Judkins Left, Right were used. After sheath placement Verapamil (1 ml) and Heparin (2,500 U) were administered intraarterially. At the end of the procedure, before sheath removal, 200 mcg of Nitroglycerin were administered intraarterially. Hemostasis was achieved immediately after CA with the use of pressure cuffs TR Band (Terumo, Japan). After CA patients were followed for 4 hours in day care unit of the out-patient service, control ECG in 12 leads was performed, an aseptic dressing was put on the place of the pressure cuff, and after the examination by endovascular surgeon and cardiologists the patients were discharged. In 1 day all patients underwent a control examination by the cardiologist at the out-patient service.

**Results:** transradial coronary angiography was technically successful in all 40 patients. A stable spasm developed during catheterization of the left radial artery in 2 (5%) patients, but after that the right radial artery was successfully catheterized. Multi-vessel coronary lesions were revealed in 7 (17,5%) patients, 6 (15%) patients underwent elective CABG surgery within 1 month, 1 (2,5%) patient with subtotal lesion of the left main coronary artery was immediately hospitalized and got operated on within 3 days. In 27 (67,5%) cases we did not reveal any hemodynamically significant coronary lesion, 2 (5%) out of 4 (10%) patients with two-vessel coronary disease underwent Ad hoc angioplasty and stenting, with admission to the department of cardiac surgery, the remaining patients underwent elective PCI within 1 month. Single-vessel coronary lesion was revealed in 2 (5%) patients, 1 (2,5%) patient had CABG, 1 (2,5%) patient underwent elective angioplasty and stenting.

**Complications:** Radial artery spasm developed in 3 (7,5%) patients, in 2 (5%) cases it necessitated the transition to contralateral approach, in 1 (2,5%) case the spasm was stopped by drugs, in 1 (2,5%) case an asymptomatic occlusion of the radial artery was revealed at control examination. No MACE were seen.

**Conclusions:** Coronary angiography performed in out-patient settings from transradial approach is a safe procedure, does not require hospitalization in the profile departments, allows to optimize the diagnostics and treatment of patients with ischemic heart disease in the settings of multi-profile hospital.

#### **ENDOVASCULAR TREATMENT OF SUBCLAVIAN ARTERIAL PATHOLOGY**

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**Introduction:** atherosclerosis is the most common cause of cardiovascular disease. The rate of brachiocephalic arteries' atherosclerosis varies between 20 and 50%. Up to 20% of the total number of strokes develop in vertebro-basilar territory because of so-called «vertebro-subclavian steal syndrome», which

most commonly develop in the presence of proximal lesions of the subclavian arteries. The lesions of a. subklavia are characterized not only by clinical symptoms manifested in arms, but also by the presence of more clear and more significant neurological symptoms.

The purpose of our study consisted in the analysis of the results of endovascular treatment of subclavian arterial pathology.

**Material and methods:** the study was carried out with the use of angiographic complex Siemens Axiom Artis. Endovascular treatment of subclavian arterial pathology was performed in 40 patients: 25 with stenoses of different severity, 15 with occlusions. Vertebro-subclavian steal syndrome was present in 19 patients. Most commonly the lesion was located in the left subclavian artery – in 31 patients.

**Results:** technical success of the procedure was achieved in 38 patients: in 100% of cases with subclavian arterial stenoses and in 86,5% of cases with occlusions. In case of successful intervention antegrade blood flow in the vertebral artery at the side of lesion was noted in all patients with vertebro-subclavian steal syndrome. No peri-procedural complications occurred. Within 3 years after the intervention restenosis of the target segment of the subclavian artery was revealed in 2 patients.

**Conclusion:** hence, endovascular interventions is a procedure of choice in patients with subclavian arterial pathology with vertebro-subclavian steal syndrome.

#### **URGENT INTERVENTIONAL PROCEDURES IN PATIENTS WITH ACUTE CORONARY SYNDROME**

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**Introduction:** Acute disturbances of coronary circulation (acute myocardial infarction and unstable angina), occupying one of the leading places in the structure of cardiovascular mortality and morbidity, remain the main problem of cardiology. Current strategy of treatment for acute coronary syndrome (ACS) includes the methods of maximally rapid restoration of coronary blood flow with the help of interventional procedures.

**Purpose:** To show the effectiveness and feasibility of urgent high-technology care for the patients with ACS in the settings of a specialized therapeutic and diagnostic service of a multi-profile hospital.

**Material and methods:** The Department of endovascular diagnostics and treatment of Ivanovo Regional Clinical Hospital has an experience with over 3,5 endovascular procedures for different forms of IHD. We have elaborated an algorithm of therapeutic tactics and selection of patients for urgent endovascular care, which includes the indications, the contraindications

and optimal timing of patient's transfer to the cathlab depending on clinical situation and determines the role of all services and medical institutions participating in the treatment, from the primary stage. The indication for urgent procedure in patients with unstable angina consisted in the lack of effect from antianginal therapy, in patients with AMI – reliable clinical picture of macro-focal myocardial infarction within the first 6 hours after the onset of the disease. The accumulated experience served as a background for the organization of an inter-regional center of cardiac surgery and interventional cardiology on the base of Ivanovo Regional Clinical Hospital. Additional budget financing in the frames of departmental program «Cost-intensive medical technologies» allowed to create conditions for 24-hour rendering of emergency endovascular care to patients with ACS. Intracoronary interventions for urgent indications were performed in 1128 patients: PTCA and stenting were carried out in 461 patients with unstable angina (UA) and in 667 patients with acute myocardial infarction (AMI). Mean patient's age was 65±0,2 years, there were 876 males

**Results:** The rate of primary effect of the intervention (restoration of adequate antegrade blood flow in symptom-related coronary artery after interventional procedures) in most patients with UA corresponded to the clinical results – 84% of patients were discharged without clinical picture of angina. Mortality was 1,5%. Mortality in the group of patients with AMI decreased to 3,4%, while mean index of AMI-related mortality in Russia exceeds 15%, and in Ivanovo region it is over 20%.

**Conclusion:** The perfection of medical infrastructure of a hospital associated with target financing of cost-intensive high-technological methods of treatment of acute disorders of coronary circulation allow for a radical increase of the availability of effective urgent medical care, aimed at the decrease of mortality and morbidity from coronary pathology.

#### **INTERVENTIONAL METHODS OF TREATMENT OF ISCHEMIC BRAIN DISEASE**

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**Introduction:** According to National Registry data, cerebral stroke is the leading cause of morbidity in Russian population. During the last years interventional methods of cerebral blood flow correction – angioplasty and stenting of brachiocephalic arteries – are taking on great significance among the methods of secondary prophylactics of the ischemic stroke.

**Purpose:** To evaluate the effectiveness of endovascular methods of cerebral blood flow correction in patients with ischemic brain disease.

**Material and methods:** Stenting of brachiocephalic arteries was performed in the Department of endovascular methods of diagnostics and treatment of Ivanovo Regional Clinical Hospital in 62 patients aged 63±0,2 years (56 men) with significant atherosclerotic stenoses. Among these patients 25 had the history of ischemic stroke (IS), and transitory ischemic attacks (TIA) were indication for stenting in 37 patients. Stenting of the internal carotid arteries was performed in 60 patients: left internal carotid artery (LICA) – in 35 and right internal carotid artery (RICA) – in 22 patients, in three cases both ICA were stented. One has to note that 4 patients had their single carotid artery stented. Stenting of the left subclavian artery was performed in two patients with marked steal syndrome. Stenting of ICA was performed with the use of the devices for distal brain protection (Angiogard RX, Spider FX), in 14 the technology of proximal protection (MoMa) was used. Self-deployable stents were used: in 26 cases these were cone-shaped stents (Cristallo ideale («Invatec»), in 36 – Precise PRO FX stents («Cordis»). Balloon dilatation of the implanted stent was necessary in 57 (91,9%) patients; among them the technique of synchronous inflation of two coronary balloons for the decrease of blood flow reduction and the decrease of barotrauma in balloon stent deployment for postdilatation was used in 34 patients.

**Results:** Primary effect of the intervention – adequate increase of stented arterial segment's lumen was achieved in all patients. Clinical effectiveness was assessed using J. Rankin scale: neurological symptoms were reduced by 1 point in 14 (22,6%) patients, by 2 points – in 17 (27,4%) and by 3 points – in 13 (21%) patients. No complications were seen in early post-procedural period.

In the long-term follow-up 33 patients (53,2%) were examined. Control ultrasound examination and/or angiocerebrography did not reveal signs of restenosis in the dilated segment.

**Conclusion:** Stenting of brachiocephalic arteries in patients with ischemic brain disease is an effective and safe method for secondary prophylactics of cerebral circulation insufficiency and can be recommended for wide use in clinical practice.

#### **TECHNIQUE OF ADAPTATIVE REPERFUSION IN INTERVENTIONAL PROCEDURES FOR THE TREATMENT OF ACUTE MYOCARDIAL INFARCTION**

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**Basement:** Interventional procedures allowing for a relatively prompt and effective restoration and

normalization of coronary blood flow by the way of mechanical recanalization of thrombotic occlusion with subsequent coronary angioplasty and stenting are the most effective pathogenetical methods for the treatment of acute coronary thrombosis in macro-focal myocardial infarction (MI). Reperfusion syndrome manifested by different arrhythmias and accompanied by a sharp decrease of cardiac output is the most common complication of recanalization. Z.Q. Zhao and co-authors described the phenomenon of “ischemic post-conditioning” of the myocardium, consisting in arrhythmia cessation with repeated occlusion of the coronary artery; this phenomenon allowed us to elaborate the method of “adaptative gradual myocardial reperfusion” and use it in our clinical practice.

**Purpose:** To evaluate the effectiveness of anti-arrhythmic action of the technique of “adaptative gradual myocardial reperfusion” for the optimization of the algorithm of interventional treatment of patients with AMI.

**Material and methods:** Endovascular methods are being used in the Center of Cardiac Surgery and Interventional Cardiology at Ivanovo Regional Clinical Hospital for the restoration of disturbed coronary blood flow from 1994. To date interventional procedures have been performed in 668 patients with true acute macro-focal MI within 0,5 to 12 hours from the start of angina attack. Reperfusion disturbances of heart rhythm were recorded in 527 (78,9%) patients, and in 18 (3,4%) of them the developed reperfusion syndrome was accompanied by sharp decrease of cardiac output and caused death.

The technique of “adaptative gradual myocardial reperfusion” consisting in 3-5 short-time (30 seconds) blockage of antegrade blood flow in the recanalized IRA with inflated dilatation balloon, was used in 250 patients. Anti-arrhythmogenic effect (cessation of rhythm disturbances during IRA reocclusion with inflated balloon) was noted in 238 (95,2%) patients. After the end of gradual reperfusion protocol baseline rhythm was restored in 187 patients (74,8%).

**Conclusion:** The technique of “adaptative gradual myocardial reperfusion” can be recommended as an additional method allowing for the improvement of the prognosis of interventional treatment of AMI.

#### **CATHETER-BASED METHODS FOR THE CORRECTION OF CONGENITAL HEART DEFECTS**

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**Introduction:** Transcatheter methods of correction of congenital heart defects (CHD) allow for a significant decrease of the intervention-related trauma and

of in-hospital stay, totally exclude cosmetic defects, inevitable after traditional heart surgery.

The purpose of this work consisted in the evaluation of the effectiveness of endovascular methods of treatment of the most common CHD: secondary atrial septal defect (ASD II), isolated pulmonary arterial stenosis (IPAS) and coarctation of the aorta (CoAo).

**Material and methods:** Transcatheter correction of CHD was performed in the Center of Cardiac Surgery and Interventional Cardiology at Ivanovo Regional Clinical Hospital in 56 patients. Balloon valvuloplasty was performed in 12 patients with IPAS aged  $8 \pm 4$  years, with mean PA/RV pressure gradient of  $56,5 \pm 21,5$  mm Hg. 13 patients with incomplete form of the CoAo and 1 patient with aortic re-coarctation developed in 8 years after direct isthmoplasty were selected for balloon dilatation; their mean age was  $12,5 \pm 4,5$  years, mean pressure gradient determined by intracardiac manometry was  $42,5 \pm 12,5$  mm Hg. У 30 with ASD II patients aged from 3 to 34 years (flow diameter from 5 to 24 mm) underwent endovascular defect closure with Amplatzer occluder.

In three patients with IPAS the dilatation was performed by one balloon catheter with the diameter exceeding the size of pulmonary valve ring by  $\approx 1,2$  times. In 9 cases we have used the technique of simultaneous inflation of two balloons with total diameter exceeding the size of pulmonary valve ring by  $\approx 1,4$  times. Among 14 patients with coarctation (re-coarctation) of the aorta the dilatation was performed with one balloon in two cases, the remaining interventions were done with two balloons (diameters ratio 1: 1). Amplatzer occluders (№ 7 - № 24) were implanted through transfemoral approach under fluoroscopic (Angiosnar Plus, «Siemens», Innova 3100, «General electric») and echocardiographic (Aplio XJ, «Toshiba») guidance.

**Results:** Valvuloplasty was effective in all patients with IPAS: according to the data of intraoperative manometry, endovascular dilatation in the area of valvular stenosis led to a significant decrease of pressure gradient (from  $56,5 \pm 21,5$  mm Hg to  $16,5 \pm 4,5$  mm Hg) In the group of patients treated for coarctation (re-coarctation) of the aorta, the pressure gradient also significantly decreased (from  $42,5 \pm 12,5$  mm Hg to  $7,0 \pm 7,0$  mm Hg.), at the same time we have noted marked increase of femoral arterial pulse and the apparition of foot arterial pulse confirmed by control rheovasography. Disappearance of blood shunting at the AS level was noted at intraoperative EchoCG in all patients after transcatheter occlusion of the ASD. EchoCG control was carried out in all patients at day 2 after the intervention. One 4-years old girl with a large defect (24 mm) control контрольная EchoCG revealed partial displacement of the occluder, which served an indication for open-heart surgery. Surgical correction – ASD closure with a patch – was performed under extracorporeal circulation after the removal of the occluder. Postoperative course was uneventful.

**Conclusion:** Transcatheter methods of correc-

tion of the most common CHD have certain advantages in comparison with traditional operations, are highly effective, and, if indications are respected, can be recommended as a method of choice for complex treatment of this category of patients.

### POSSIBILITIES OF ENDOVASCULAR OCCLUSION FOR THE TREATMENT OF PELVIC VENOUS PATHOLOGY IN CHILDREN

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**Introduction:** pelvic venous pathology in children still is a complex and ambiguous pediatric problem. At present many specialists do not pay due attention to this problem, meanwhile it is doubtless that most venous diseases have hereditary character with manifestations starting at childhood or adolescence.

**Material and methods:** endovascular methods of treatment were applied in Russian Pediatric Clinical hospital in 1600 boys with varicocele and 12 girls with varicose disease of the small pelvis' veins (ovaricocele). The indications for retrograde endovascular occlusion (REO) of the left internal testicular vein (ILTV) in boys consisted in clinical varicocele of II-III Dubin degree. The performed studies revealed steady increase of hemodynamical disturbances in reno-testicular territory with time, the diameter of the testicular vein in older age group (20-29 years) was by 1,7 times greater than in the group of 12-years old adolescents ( $t=7,3$ ). Mandatory phlebometry was carried out, pressure gradient between the left renal and inferior caval veins was measured. Patients with pressure gradient not exceeding 10 mm Hg underwent REO, besides we have determined anatomical variants of ILTV associated with the particularities in REO performance. The veins up to 5 mm in diameter, especially in cases with satellite veins visualization, were occluded with 3% solution of sodium sulphate tetradecyl (SST). Veins measuring more than 5 mm in diameter were occluded with coils and foam-form SST. Right-sided varicocele was seen in 1,9 % of cases. No particularities in REO performance were met. After the procedure clinical signs were absent, the indices of RI (as judged by USDG) improved. The recurrence rate was 2,6%. In girls the indications for REO were polymenorrhea, hypermenorrhea, endometrial hyperplasia. REO was performed with coils and foam-form SST. After the procedure menstruations were normalized in all girls, endometrial hyperplasia was stopped. The patients were followed up to 1 year.

**Conclusion:** REO is an effective and safe method for the treatment of gonadal veins pathology in children and allows for the prevention of more serious hemodynamical disturbances in reno-gonadal territory in the future.



## CEREBRAL ARTERIAL AND VENOUS BLOOD FLOW. CORRELATIONS IN PATIENTS WITH VERTEBROBASILAR INSUFFICIENCY

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**Introduction:** according to current standards diagnostic complex for patients with vertebrobasilar insufficiency includes mandatory ultrasonic examination of neck and brain arteries, with the determination of blood flow velocity parameters. During the last years one assist at stepwise perfection of ultrasonic equipment and accumulation of information on cerebral blood flow physiology and the increasing interest towards the indices of cerebral venous blood flow. However insufficient information about the particularities of venous blood flow inhibits clinical interpretation of the obtained data. We have analyzed the correlation between the indices of intracranial arterial and venous blood flows in patients with vertebrobasilar insufficiency.

**Material and methods:** we have studied 78 patients with vertebrobasilar insufficiency, among them 27 men and 51 women. Mean age of patients was 48,6 years (from 18 to 77 years). Clinical picture was most commonly characterized by mild and moderate static and dynamic ataxia, pyramidal symptoms (anisoreflexia, reflex axial dissociation, pyramidal insufficiency, mild hemipareses), nystagmus, Gorner syndrome, fuzzy gaze disorders (limitation of upper gaze, decreased convergence) and changes  $\mu$  of the visual field, the signs of cranial nerves' dysfunction (V, VIII, IX, X) were somewhat less common.

24 patients had history of acute cerebrovascular accidents in vertebrobasilar territory (VBT), 13 patients had history of TIA in VBT, in 41 cases no acute episodes related to dyscirculation in VBT were recorded.

All patients had a standard set of diagnostic procedures: examination by a neurologist, neuroophthalmologist, otoneurologist, laboratory tests, EEG, MRT, triplex arterial and venous scan of the neck and head. Ultrasonic examination was performed with the apparatus Siemens SonoLine Versa plus, with 2,5 and 7,5 mHz transducers.

During intracranial examination we located anterior (ACA), middle (MCA), posterior (PCA) cerebral arteries, the main (MA) and vertebral (V4) arteries and Rosenthal veins (RV).

In order to determine the correlation between the parameters of arterial and venous blood flows we used Spearman correlation analysis with software Statistica 6,0.  $p < 0,05$  was considered statistically significant, the significance at trend level was considered at  $p \leq 0,1$ .

**Results:** the comparison of velocity indices in MCA and RV did not reveal significant correlations. The same picture was seen when comparing the blood flows in ACA and RV.

The study of blood flow indices in VBT revealed significant correlations between linear blood flow velocity in the MA and velocity indices (maximal and mean linear velocities) in Rosenthal veins (the value of  $p$  as determined with Spearman test ranged 0.006 to 0.016).

We also revealed clear correlation between peak systolic velocity in the PCA and the blood flow indices in the right RV. The correlation with blood flow velocity in the left VR was seen only at tendency level.

It is worth noting that no correlation between the blood flow in RV and any other arterial pools was found.

**Conclusion:** One has to note that while Rosenthal veins are more anatomically related to the MCA territory, no correlations with this pool were found. Blood flow velocity in basal cerebral veins in patients with vertebrobasilar insufficiency correlates only with the indices of arterial blood flow in vertebrobasilar territory.

## COMPARISON OF IMMEDIATE RESULTS OF ENDOVASCULAR TECHNIQUES AND CLIPPING IN PATIENTS WITH ARTERIAL BRAIN ANEURYSMS IN ACUTE PERIOD OF SUBARACHNOID BLEEDING

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**Purpose:** Comparison of immediate and long-term results of endovascular techniques and clipping in patients with arterial brain aneurysms in acute stage of subarachnoid bleeding

**Material and methods:** The study comprised 103 patients with arterial brain aneurysms. Depending on the operation technique they were divided into two groups. Group 1 (endovascular treatment) included 47 patients. Group 2 (open aneurysm clipping) included 56 patients. Main clinical parameters were comparable in both groups. Postoperative hospital mortality, neurological deficit and duration of postoperative in-hospital stay were evaluated.

**Results:** Postoperative mortality in groups of endovascular treatment and open clipping was 6% and 15% ( $p < 0,05$ ), respectively. Neurological deficit of a certain degree and cognitive disorders were seen in 32% of patients in Group 1 and in 34% of patients in Group 2 ( $p > 0,05$ ). Mean duration of postoperative in-hospital stay was 12 days in Group of endovascular techniques and 16 days in Group of open clipping ( $p > 0,05$ ).

**Conclusions:** immediate results of endovascular techniques in patients with arterial brain aneurysms evaluated by the indices of postoperative mortality, mean duration of postoperative in-hospital stay and postoperative neurological deficit match the results of open methods of treatment.

## TREATMENT OF ACUTE MYOCARDIAL INFARCTION IN PATIENTS WITH IHD WITH DIFFUSE CONNECTIVE TISSUE DISORDERS

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**Introduction:** Diffuse connective tissue disorders (DCTD) are the disease characterized by inflammatory changes in connective tissue, which can develop virtually in all body systems. DCTD includes: dermatomyositis (DM), systemic lupus erythematosus (SLE), systemic scleroderma (SSD), rheumatoid arthritis (RA). The treatment of atherothrombosis in DCTD represents significant difficulties, and only single cases of DCTD with acute coronary disorders are described, often with unfavorable early or mid-term Results: For this reason up to date several questions remain unsolved: Which is the optimal treatment of AMI in DCTD? Are complications frequent and how they are distributed after thrombolytic therapy (TLT) and after PCI in patients with DCTC? Which is the long-term prognosis after different types of reperfusion?

**Material and methods:** from 2000 through 2004, 11640 patients with STEMI were treated in 5 clinics in Russia, Azerbaijan and Turkey. They underwent TLT or PCI (balloon angioplasty, coronary stenting, rheolytic thrombus extraction). In 111 out of 11640 patients MI developed in the presence of different DCTD (0,95%). In the group of TLT 8 patients had SLE, 33 had RA, and 4 had SSD. In the group of PCI 21 patients had SLE, 46 had RA, and 2 had SSD. At the moment of MI onset or within the following 7 days 65% of patients after PCI and 60% of patients receiving TLT were on steroid therapy. TLT was carried out only at pre-hospital stage. Thrombolysis was strictly systemic and was performed if rapid (with 150 minutes) admission of patient into the cathlab was impossible. PCI were performed as primary procedures, if no pre-hospital TLT was carried out. Besides primary procedures, PCI were conducted in patients with ineffective TLT. All lesions were stented with standard bare metal stents.

**Results:** the rate of immediate success of thrombolysis was extremely low – 38% (versus 57% in TLT in the same population of patients but without associated pathology). The rate of hospital complications of TLT in patients with DCTD exceeded all the expectations and reached 72%, including 21% mortality (versus 8% mortality in TLT in the same population of patients but without associated pathology). The rate of successful PCI in MI patients with DCTD was high (96%) and comparable to the rate of successful PCI in AMI patients without DCTD (97-99%). The rate of hospital complications after PCI in patients with DCTD was significantly lower than after TLT (22% vs. 72%). The rate

of hospital complications after TLT in patients receiving steroids was 100%. The rate of hospital complications after TLT in patients not receiving steroids (29%) was comparable to the rate of complications after PCI in patients receiving steroids (31%). Minimal rate of hospital complications was seen after PCI in patients not receiving steroids (4%).

**Conclusions:** percutaneous coronary interventions are the method of choice for the treatment of AMI in patients with DCTD. Hormonal therapy for DCTD significantly influences the increase of hospital complications rate in any method of treatment.

## THE PROBLEM OF THE EFFECTIVENESS OF ENDOVASCULAR TREATMENT OF ARTERIAL ANEURYSMS

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**Purpose:** The study of the first experience with embolization of brain arterial aneurysms using detachable microcoils.

**Material and methods:** From 2008 we have performed 48 operations for endovascular embolization of brain arterial aneurysms in 47 patients. Mean age of patients (42% men and 58% women) was 47 years. Non-ruptured (asymptomatic) aneurysms have been operated in 4 patients, ruptured – in 43. Among 43 patients with ruptured aneurysms 14 underwent early operation (within 14 days, delayed operations were performed in 29. The state of patients with subarachnoid bleeding was evaluated using Hunt-Hess scale: grade I – 16 patients, grade II – 13, grade III – 10, grade IV – 3, and grade V – 1 patient.

The indications for endovascular operations were aneurysms located in the areas with difficult access for clipping (posterior circulation and aneurysms of the internal carotid artery), as well as aneurysms of the anterior cerebral and middle cerebral arteries in patients with severe associated pathology and/or Hunt-Hess grade IV-V.

Detachable coils produced by Boston Scientific, BALT, Cordis, EV3 were used for embolization. On the average one aneurysm required the use of 4,5 coils. In 5 cases (large-neck aneurysms and fusiform aneurysms) embolization was performed with stent-assistance using self-deployable intracranial stents. In all cases we performed total-subtotal embolization of the aneurysm with the preservation of supplying artery patency. One female patient with giant aneurysm of the cavernous segment of the ICA underwent aneurysm exclusion using Jomed stent-graft.

**Results:** In all cases we performed total-subtotal embolization of the aneurysm with the preservation of supplying artery patency. At discharge the condition of 29 patients corresponded to Glasgow outcome scale grade I, 15 patients had moderate focal and cognitive disorders. Three patients with massive basal bleeding

and stem ischemia died. Postoperative mortality was 6%. Long-term results (from 6 to 18 months) were followed in 16 patients (36%). One patient had aneurysm recurrence in the form of cervical segment dilatation 1 year after the embolization of basilar artery aneurysm. Repeated total embolization was carried out.

**Conclusions:** The introduction of endovascular method for the treatment of aneurysms with the use of modern instruments allows to improve the quality of care for patients with aneurysms located in the areas hardly accessible for clipping (posterior circulation and ICA aneurysms), as well as for patients with severe associated pathology and/or Hunt-hess grade IV-V. Our experience shows that postoperative mortality after endovascular treatment is lower than after open surgery, which confirms the opinion on the effectiveness and safety of intravascular embolization of the aneurysms. However the effectiveness and safety of this method require further study and development.

### ANALYSIS OF PCI OUTCOMES IN PATIENTS WITH ACUTE CORONARY SYNDROME

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**Purpose:** analysis of the outcomes of percutaneous coronary interventions (PCI) performed within the first 24 hours after the onset of clinical symptoms.

**Material and methods:** from September 2008 through June 2009, 86 patients with acute coronary syndrome underwent PCI in the department of endovascular methods of diagnostics and treatment of Clinical hospital №3 of Saratov state medical university (59 patients with ST segment elevation and 27 patients without ST elevation). All patients had PCI within the first 24 hours after the onset of clinical manifestations. There were 53 men and 33 women, mean age of patients was 58±8 years. All outcomes of PCI were divided into three groups: Group 1 comprised patients who had balloon angioplasty with stenting of the symptom-related artery, Group 2 – patients in whom stenting was not performed and who had indications for aorto(mammario)-coronary bypass grafting, and patients of Group 3 had only insignificant changes of their vascular bed not requiring revascularization, or their coronary arteries were not changed at all.

**Results:** in 20 cases the procedures were ended at the stage of coronarography, among them in 11 any stenosis was over 30% (in vast majority these were women aged on the average 52±4 years). In 8 out of these 11 patients coronary spasm developed during coronarography (in 6 patients the spasm affected the right coronary artery, in 2 men the left coronary was affected).

In 9 cases coronary lesions were diffuse, the arteries themselves were small and severely calcified (most commonly this was found in men aged 68±8 years on the average, with multiple cardiovascular risk factors, among which a special attention should be paid to tobacco smoking for at least 30 years).

The remaining 66 patients underwent successful percutaneous revascularization of the symptom-related artery with stenting, either with, or without prior balloon angioplasty. This group comprised 48 men and 18 women aged on the average 54±7 years. In 48 cases one stent was implanted, 14 patients had 2 and 4 patients – 3 stents implanted.

**Conclusion:** the analysis of the obtained data (a relatively big number of coronarographies, ended at the stage of diagnostic examination – almost 25%) suggests that in order to decrease this number one has to select patients for PCI on a more strict basis. Also it is necessary to perform additional study in the subgroup of patients with acute coronary syndrome in whom coronary spasms developed during coronarography, while hemodynamically significant stenoses were absent.

### THREE-DIMENSIONAL ROTATIONAL ANGIOGRAPHY IN THE SETTINGS OF MULTI-PROFILE CLINIC

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Three-dimensional rotational contrast angiography is one of the modern and perspective trends in endovascular surgery.

**Material and methods:** the method of virtual construction of three-dimensional models of the vascular bed is based on the series of standard angiograms obtained with the X-ray tube rotation. The software includes:

- the program for the construction and the processing of three-dimensional reconstruction of peripheral vascular bed (3-DRA);
- the program for the reconstruction of the coronary arteries (3-DCA);
- the program for the visualization of calcium depositions within the vascular walls (Calci View), and
- the program for vascular lumen examination (Endo View).

Three-dimensional model is a true image of the vascular bed, hence, it excludes erroneous interpretation of the vessels' length and position which can arise in case of two-dimensional image.

Our practice is mainly directed to the study of three-dimensional models of the coronary arteries, head and neck vessels, aortic arch and its branches, renal arteries, infrarenal segment of the aorta, pelvic and legs' arteries. We constructed three-dimensional models in cases of:

- difficulties with the interpretation of a standard image;
- impossibility to study the vessel's architectonics;
- coronary and peripheral virtual stenting (when stent choice was difficult)

**Results:** in 90% of cases the results of quantitative analysis of the data of three-dimensional rotational angiography coincided with the results of routine angiographic study. Herewith in 10% of cases the divergences were minimal: 1-2 mm in cases of big vessels evaluation, and centimeters in case of coronary arteries. In 30% of cases the pathology was revealed only with

three-dimensional rotational angiography, while routine angiography in standard views did not show it.

After rotational scan is obtained and a three-dimensional model is constructed, in case of necessity the vascular walls can be examined internally using one of virtual interventional instruments, «Endo View», and in case of stenotic changes one can perform virtual stenting and evaluate the final Results:

If necessary, the presence of calcium within the vessel's wall can be determined with «Calci View» technique.

The detection of calcium depositions confirms the presence of atherosclerotic plaque formation process, but these calcifications did not necessarily coincide with the stenoses location.

**Conclusion:** three-dimensional contrast rotational visualization of the vessels allows for the most complete analysis of the vascular bed and gives the possibility to:

- study more accurately the topography, the extension and the character of the lesion;
- visualize anatomical parameters of the studied area with minimal error;
- conduct highly accurate necessary measurements in the cathlab settings;
- detect the presence of calcium in atherosclerotic plaques and determine their density;
- reduce the time of study;
- determine pre-operatively the tactics of subsequent endovascular and general surgical interventions.

#### **FIRST EXPERIENCE WITH THE ORGANIZATION OF A DEPARTMENT OF ENDOVASCULAR DIAGNOSTICS AND TREATMENT IN A MUNICIPAL MEDICAL INSTITUTION IN THE MOSCOW REGION**

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**Purpose of study:** to evaluate the necessity of organization of the departments of endovascular diagnostics and treatment in municipal medical institutions.

**Material and methods:** in December 2007 with the support of the Moscow region administration the first department of endovascular diagnostics and treatment was organized in the city hospital of the town of Mytischki. It was equipped with multifunctional Philips angiographic machine. The department is staffed with certified specialists – endovascular surgeons, anesthesiologist, electrophysiologist and nurses. The main problem related to uninterrupted and effective work of the department of endovascular surgery within the frames of a municipal institution consists in the availability of well-skilled staff and optimal budget financing – municipal as well as federal.

**Results:** the organization of the department allowed for a new, higher qualitative level of therapeutic and diagnostic clinical work. During 1,5 years of work we have performed over 600 endovascular procedures, including angiography of peripheral, coronary and visceral arter-

ies; stenting of coronary, renal and peripheral arteries; embolization of testicular veins, uterine and hepatic arteries, mammary shunt branches which were not ligated during aortocoronary bypass grafting, implantation of pacemakers and cava-filters. The department is territorially and functionally associated with the department of urgent cardiology for the treatment of patients with acute myocardial infarction, which resulted in more than 170 successful operations of myocardial revascularization in the territory of the infarct-related artery. To date all legal aspects of federal financing of high-technological endovascular care for the subjects of federation have been regulated and require the introduction at regional level.

**Conclusion:** The organization of the work of a department of endovascular diagnostic and treatment in municipal healthcare institutions is very important, as these department broaden the possibilities of ordinary diagnostic procedures up to the active performance of effective therapeutic interventions and increase the quality of life of patients.

#### **FREQUENCY AND CAUSES OF CORONARY IN-STENT THROMBOSES**

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**Introduction:** In-stent thrombosis (ST) develops more commonly within the first month after stent implantation and in such case is designated as “early”. However many cases of “late” ST (1 to 12 months) after drug-eluting stents (DES) use have been described in months and even years after the implantation. To date DES are being used for high-risk stenoses and, according to the available literature, their use can be associated with slowed endothelization and local hypersensitivity reactions. Meta-analysis of 6 trials conducted from the 1990-ies has shown that the rate of death and myocardial infarctions related to angiographically documented ST, was 64,4%, while a mortality in case of supposed or documented ST ranged from 20 to 45% (Kaul et al., 2006; Grines et al., 2007). Our work aimed at the study of early ST frequency and related mortality and the search of eventual causes of late ST.

**Methods of study:** The study comprised 748 patients who have been stented in our clinic in 2003-2008, including 345 patients with DES (Cypher), some of whom had repeated coronarography.

**Results:** We noted 8 cases (1,01%) of early ST, in patients with DES as well as with bare metal stents, more often in cases of multiple stenting (62,5%), developed in 1 to 6 days after the procedure. Mortality was 37,5%. Repeated coronarography performed in patients with Cypher stents revealed an opacified «case» of lacunae in vascular media surrounding the stent in 4 patients (1,15%), which was not seen after bare metal stents implantation (Khmelnitzky A.V., Kozlov K.L., 2008). The authors named this phenomenon “media loss” and

related it to the influence of antiproliferative stent coating. All 4 patients (men aged 42, 57, 64, and 71 years) had symptoms of angina while applying to the physician before repeated coronarography. The phenomenon was revealed in 4, 12, 14 and 14 months after stenting.

**Discussion and Conclusion:** Average rate of early ST in our era of dual antiplatelet therapy is about 1%. Early after the procedure this therapy, along with Aspirin and Clopidogrel is supplemented by 12-18 hours of continuous infusion of non-fractionated Heparin under the control of APPT. After the use of DES (but not bare metal stents) thrombosis can develop later. The predictors of late ST include stenting of small vessels, multiple, ostial stenoses, long stents, their overlapping, prior brachytherapy, suboptimal result of stenting (including residual stenosis or dissection), low ejection fraction, old age, diabetes mellitus, renal insufficiency, acute coronary syndrome and premature cessation of antiplatelet regimen. The phenomenon of "media loss", probably preceding the thrombosis, can be one of the causes of late ST.

### **BLOOD PLASMA HOMOCYSTEINE AND MYELOPEROXIDASE AS THE PREDICTORS OF COMPLICATED COURSE OF ACUTE CORONARY SYNDROME**

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To date homocysteine (HC) is known to be an independent modifiable cardiovascular risk factor (Warren C., 2002, et al.). The relation between acute myocardial infarction (AMI), as well as the death from ischemic heart disease, and the high HC level in blood plasma is well established (Bots M. e.a., 1999, et al.). The mechanisms of HC influence on the vessel's wall: disorders of endothelium-dependent vasodilatation, oxidative stress, contributing to proteins and lipids peroxydation due to the increase of superoxide dismutase production, as well as the enhancement of thrombogenesis and coagulation, are under discussion (Genser D., 2003 et al.).

It is also known that myeloperoxidase (MPO) – the protein, released by neutrophilic leucocytes, can at the same time produce oxidative damage of the endothelium. It is not accidentally that a close relation between the prognosis of AMI and the level of mononuclears has been established (Semigolovsky N.Yu., 1994, 1998 et al.), and recently it was proven that MPO is an independent risk factor in acute coronary syndrome – ACS (Baldus S. e.a., 2003), as well as in AMI and its outcomes irrespectively of myocardial necrosis, unlike Troponine (TT), MB-CPK and C-reactive protein (Brennan M-L. et al., 2003). We thought it interesting to determine simultaneous levels of HC and MPO in patients with ACS, including those treated with interventional methods.

**Material and methods:** The study comprised 20 patients with ACS (15 with AMI and 5 with unstable angina), who had their TT, MB-CPK, HC and MPO levels determined at admission in 22 blood samples (in two cases of complicated coronary stenting – in a sequential fashion).

**Results:** We saw a significant spread of HC (from 10,2 to 32,5 mcmol/l, on the average  $18,5 \pm 3,2$ , with normal values being from 3,4 to 13,8) and MPO values (from 304 to 1993 ng/ml, on the average –  $947,8 \pm 287,3$ , with normal values being from up to 200). In most cases baseline HC level was increased (13 out of 20, 65%), and baseline MPO level exceeded the upper limit of normal values by 3 to 9 times (20 of 20 baseline samples, 100%), while being more specific marker than TT and MB-CPK. We did not see clear correlation between the levels of HC and MPO; HC, MPO and the age of the studied patients, respectively. Seemingly, there is no relation between HC and MPO levels with clinically determined severity of ACS course; Q-wave and non Q-wave AMI; the presence of early complications. However in one case coronary in-stent thrombosis was associated with increased content of MPO – from 399 to 1042 ng/ml.

**Conclusion:** The increased HC and MPO levels in patients with ACS is a frequent finding in patients with ACS at their admission to the hospital, and can elucidate some new aspects of coronary disease pathogenesis. Larger and longer prospective studies are needed for more precise determination of HC and MPO role in prediction of ACS outcome and the effectiveness of interventional treatment.

### **CORONARY ARTERIAL RESTENOSIS AFTER STENTING IN PATIENTS WITH HYPERHOMOCYSTEINEMIA**

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**Intorduction.** Hyperhomocysteinemia is an independent marker of high cardiovascular mortality (Framingham study, 1996; Warren C., 2002) along with systolic arterial pressure and the level of C-reactive protein (Blacher J. et al, 2002). It is also known that the rate of restenosis after coronary angioplasty in patients with hyperhomocysteinemia is increased (Marcucci R. et al, 2000; Schnyder G. et al, 2002). According to G. Schnyder et al. (2001), homocysteinemia below 9 mcmol/l is associated with almost twofold less restenoses rate than higher homocysteine levels. In 2001 the same authors demonstrated the feasibility of restenoses rate decrease by reducing blood homocysteine level with B6, and B12 vitamins and the folic acid. We observed 3 cases of restenosis developed in different time periods after angioplasty in patients with hyperhomocysteinemia.

**Material and methods:** We present a case of stented artery restenosis in a patient with hyperhomo-

cyteinemia and found afterwards homozygotic C677T mutation of methylenetetrahydrofolate reductase gene (data of "Medical Laboratory of St. Petersburg"), which can be seen in 4–14% of population (Brophy J., 1997).

Patient G., male, aged 47 years (case history №5678, from November 18 to 25, 2008) was admitted with the diagnosis: «Syncope after bicycle ergometry (BEM) performed in out-patient service in 1 year after stenting of the LAD and RCA for Q-wave MI performed in our hospital. At admission the patient complained of weakness, chest "heaviness", short loss of consciousness immediately after BEM. ECG revealed sinus rhythm, pQ-0.18; QT-0.36; LV hypertrophy, scarred posterior wall; EchoCG – the size of heart cavities is without changes, without hypo/akynetic areas, fibrosis of the posterior wall. LV EF - 62%. Troponine I – 0,00; cholesterol– 4,7; D-dimers – 500; plasma potassium - 4.2; Na-143; lactate - 5.0; GOT - 22; GPT -38; CPK-123; MB-CPK-50; glucose -6.1; INR -1.08. Homocysteine -19.1 mcmol/l (norm - 3,4-13,8; mean value in normal patients 7,9±0,6).»

**Results:** Coronary angiography (19.11.2008) showed the stents in the LAD without restenosis, in the RCA: 90% stenosis at proximal stent edge, 60% in-stent stenosis in the middle segment. Repeated stenting in the stent of the RCA was performed (chromium-cobalt 2,5 X12 mm) after dilatation under 14 atm. pressure.

The patient was recommended to take, along with Plavix (75 mg daily for 1 year), Aspirin (100 mg daily), Egilok (25 mg x 2 daily) and Zocor (20 mg daily), the medication Angiovit (1 tab. X 2 daily), possessing homocysteine-reducing properties and containing the folic acid, B<sub>6</sub> and B<sub>12</sub> vitamins. Lipigogram and homocysteine level control were also recommended. The latter can also be decreased with statins therapy (Soboleva E.V., 2007).

**Conclusion:** This case is an example of restenosis in a patient with hereditary hyperhomocysteinemia and of eventual correction of this pathology.

### **TIPS – AN ENDOVASCULAR METHOD FOR THE TREATMENT OF THE COMPLICATIONS OF PORTAL HYPERTENSION**

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From 2002 through 2009 transjugular intrahepatic portosystemic shunts (TIPS) were created in 68 patients for the correction of bleeding from the varicose esophageal and gastric veins, resistant ascitis. Mean age of patients was 51,8 years. Later one of the patients underwent orthotopic liver transplantation in Germany. Three types of stents were used: matrix (n=9), self-deploying (n=46) and stents-grafts (n=22). In 2 patients the stent-grafts were used according "stent in stent" technique after mechanical recanalization for stent thrombosis and residual stenosis.

The patients were assigned into 2 groups. Group 1 (n=21) had TIPS performed with the stent-grafts (Gore Viatorr TIPS Endoprosthesis и Wallgraft). Patients from Group 2 (n=50) underwent TIPS with two types of

bare metal stents: matrix (Perico, Genesis and JoMed) and self-deploying (Za-stent, Zilver, Wallstent, sinus-SuperFlex Visual-Stent, SMART-control, Resistant and HiFlype Carbostent).

Technical success was achieved in 69 (85,2 %) out of 81 patients. In 12 cases the attempt of TIPS performance failed. The causes and the number of the failed procedures in our study were: high density of the liver making its puncture unfeasible (n=3) and failure of multiple attempts of portal vein cannulation (n=9).

The results were assessed with the help of the standard medical statistical Kaplan-Meier analysis. During 18 months of the follow-up in Group 1 there were no cases of thrombosis or significant stenosis, primary shunt patency was 100%. Fifteen patients from Group 2 (30,0%) had thromboses of the intrahepatic stent, repeated interventions have been successful in 12 patients (technical success - 80%). That ism primary and secondary patency was 66,7% and 84,3%. Recurrent bleeding from varicose esophageal veins (VEV) as seen in 2 patients from Group 1 and in 13 patients from Group 2. Freedom of bleeding from VEV was 86,8% and 69,0%, respectively. Ascitis/hydrothorax increase was seen in 1 patient from group 1 and in 10 patients from Group 2, the regression of ascitis/hydrothorax was seen in 95,1% and 77,0%, respectively. The degree of hepatic encephalopathy increase also in 1 patient from Group 1 and in 9 patients from Group 2. Freedom from the increase of hepatic encephalopathy severity was 95,1% and 81,2%, respectively. Three patients died during the follow-up in Group 1 and 11 – in Group 2 (survival - 85,2% and 75,9%, respectively).

Hence, TIPS, as well as repeated interventions, is an effective method for the decompression of portal vein system used in the treatment of patients with portal hypertension syndrome, contributing to a significant decrease of repeated bleeding from varicose esophageal veins and of the amount of ascetic liquid. The increase of hepatic encephalopathy severity was, as a rule, related to diet violations and could be stopped by conservative means. As a result life expectancy for the patients with portal hypertension can be prolonged up to eventual liver transplantation. The same effect has been obtained for many years by surgical shunting procedures, associated with high risk. TIPS allows for a safer, more rapid and less expensive decompression of the portal system. The use of stent-grafts for TIPS in patients with portal hypertension improves the patency of the intrahepatic shunt, which is of principal importance for the perfection of long-term results of this procedure.

### **ENDOVASCULAR APPROACHES TO THE TREATMENT OF BIFURCATION LESIONS OF THE CORONARY ARTERIES**

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Bifurcation coronary lesions presents one of the most technically challenging problem for endovascular surgeons. According to different authors, from 15 to 20% of all endovascular interventions of heart vessels are being performed for bifurcation lesions. The diversity of anatomical variants, dynamical changes during the procedure, make it impossible to use the same strategy of treatment in all patients. In this connection an active search for the best technique of stenting is under way.

**Material and methods:** From 2007 we are performing a study on the base of Semashko Central clinical hospital 2. The study involves 122 patients with «true» bifurcation lesions and side branch diameter of at least 2,00 mm (determined by quantitative angiography), with angina of functional class III-IV. The plan of study included 3 stages. At the 1<sup>st</sup> stage we have enrolled 58 patients in whom, after the evaluation of myocardium viability with stress-EchoCG, the lesion was corrected using “provisional” T- stenting. Immediate success was determined as the restoration of TIMI 3 blood flow in the main and side branches at the end of the procedure, absence of subtotal stenosis in the side branch, absence of MACE. At the 2<sup>nd</sup> stage we have analyzed the causes of the passage to “complete” stenting of the bifurcation, which allowed for preliminary planning of the tactics of treatment at the 3<sup>rd</sup> stage. The patients enrolled in the 3<sup>rd</sup> stage of the study were assigned into 2 groups (n=64). Group 1 included patients who had planned “provisional” T-stenting (n=34), while Group 2 patients (n=30) had “complete” bifurcation stenting using different techniques: «crush» (n=2) and «mini-crush»(n=2), «T-stent»(n=20), «Y-stent»(n=6). In total 146 stents have been implanted (on the average - 1,84±0,75 stents per patient). The end-points of the study were: regress of clinical signs of angina, as well as freedom from MACE.

**Results:** At the 1<sup>st</sup> stage immediate success of the procedure was 88%. Nor intra-, neither postoperative complications were revealed. At the 2<sup>nd</sup> stage we determined independent unfavorable prognostic factors related to “provisional” T-stenting. These included: calcification, the length of side branch lesion > 2 mm, the diameter of the side branch >2,5 mm. At the 3<sup>rd</sup> stage the procedure of stenting was successful in 96,8 % of cases. One patients from Group 2 had TIMI 2 blood flow in the side branch territory, in another patient from the same group an asymptomatic intraoperative thrombosis of the side branch was found. Intra- and postoperative survival was 100% in both groups. Complete myocardial revascularization was achieved in 31 patients (91,2%) from Group 1 and in 27 (90%) from Group 2 (p>0,05). The second stent was necessary in 3 patients (8,8%) from Group 1 during the procedure. During in-hospital stay single increase of cardiac Troponine levels without ECG changes was seen in 2,9 and 16,7% of patients, respectively (p<0,05). Clinical signs of angina regressed in both groups – in 91,2% and 90% of patients, respectively (p>0,05). Long-term results (12 to 18 months) were followed in 61 patients(50%), among them 34 (55,7%) from Group 1 and 27 (44,3%) from Group 2. Survival was 100% in both groups. The rate of

main branch restenosis was 0% in both groups, the side branch restenosis developed in 6,9 and 4,6%, respectively (p>0,05). The rate of repeated revascularization was 3,4% in Group 1 and 0% in Group 2 (p>0,05).

**Conclusions:** The technique of “provisional” T-stenting allows for effective and safe correction of most bifurcation lesions of the coronary arteries. “Complete” bifurcation stenting should be planned initially for patients with pronounced calcification, the diameter of the side branch >2,5 mm and the length of the lesion > 2 mm.

#### ROLE OF CREATININE CLEARANCE IN LONG-TERM OUTCOME OF CORONARY STENTING

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It is known that pronounced decrease of the kidney's function significantly compromises clinical outcome after percutaneous coronary interventions (PCI). However far more often the patients undergoing PCI had mildly or moderately decreased renal function, when the manifestations of chronic renal disease (CRD) are hardly noticeable. For this reason the underestimation of the general condition of patients undergoing coronary stenting in real clinical practice can cause unfavorable long-term Results:

**Purpose:** this prospective study was planned for the detection of the role of renal function in long-term outcome of PCI with stenting considered as technically successful.

**Material and methods:** The study comprised 727 consecutive patients who underwent successful PCI with the implantation of one or several bare metal stents (BMS) in 2005. All patients were assigned to 3 groups on the base of their creatinine clearance (CC) determined prior to PCI. CC calculation was made according to Cockcroft-Gault formula: the group with normal CC (without renal lesions) included the patients with CC over 60 ml/min., the group with moderate renal dysfunction included patients with CC ranging from 30 to 60 ml/min., the group of severe dysfunction comprised patients with CC under 30 ml/min.

**Results:** Complex and multivessel coronary disease was seen more frequently in patients with moderate or severe renal dysfunction. As favorable in-hospital outcome was the inclusion criterion, immediate and early results were not different between the groups. The analysis of long-term (up to 3 years) results showed that the decrease of left ventricular ejection fraction (OR=2.42, 95% CI 1.37-3.86, p=0.007) and older age of patients (OR =1.61, 95% CI 1.22-2.89, p=0.009)

were significant independent predictors for death and non-fatal myocardial infarction (MI) in all groups. The decreased CC in the groups of patients with CRD was also strict predictor of long-term (up to 3 years) mortality (in CC 30-60 ml/min. OR=1.93, 95% CI1.28-4.06, p=0.001; in CC < 30 ml/min. OR =4.52, 95% CI 2.49-8.61, p=0.001) and non-fatal MI (in CC 30-60 ml/min. OR =1.57, 95% CI1.03-2.40, p=0.04; in CC < 30 ml/min. OR =3.91, 95% CI1.63-6.46 p=0.001). The rate of repeated PCI and CABG operations during the same period was significantly higher in the groups of patients with moderate and severe CRD.

**Conclusion:** The presence of chronic renal disease with decreased creatinine clearance in patients with coronary heart disease after successful PCI is an independent cause of the increase of long-term (up to 3 years) MACE (death, non-fatal MI, repeated revascularization). Herewith the degree of creatinine clearance decrease significantly increases the risk of all events. For this reason the tactics of care for such patients should include the prevention and the treatment of renal failure in order to improve long-term outcome of invasive treatment of coronary heart disease.

#### **EMBOLIZATION OF BRONCHIAL ARTERIES IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE COMPLICATED BY BLEEDING**

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**Introduction:** In 1990 chronic obstructive pulmonary disease (COPD) ranked 13th, outgoing low respiratory tract infection (1st in rank) and tuberculosis (7<sup>th</sup> in rank); it is suggested that by 2020 COPD will rank 5<sup>th</sup> outgoing all respiratory diseases.

According to summary statistics, from 7 to 5% of all patients with COPD have pulmonary bleeding and hemoptysis. Pulmonary bleeding is seen in 9-60% of all patients with COPD and their rate does not decrease with the course of time. Despite the progress of endoscopic methods, surgical technique, the use of new pharmacological agents and active infusion therapy, the problem of treatment of pulmonary bleeding remains a challenge.

**Material and methods:** from 2008 in the Department of endovascular methods of diagnostics and treatment of the Regional clinical hospital, angiography and embolization of bronchial arteries were performed in 9 patients with aggravation of chronic obstructive pulmonary disease accompanied by pulmonary bleeding. The patients were aged from 53 to 69 years (mean age 58 years).

The duration of the disease in this group of patients varied from 5 to 15 years. The bleeding lasted from 5 to 12 days. The procedure was indicated in patients with COPD of III-IV severity degree, complicated by bleeding, in whom conservative therapy proved ineffective. Before the procedure all patients

were examined. They underwent clinical studies, spirometry, studies of arterial and venous blood gases and acid-base balance. All patients also had high resolution computed tomography of the chest and bronchoscopy with biopsy of the segmental bronchi mucosa.

Endovascular intervention was performed with the use of angiographic complex "Allura FD20" (Philips). Catheterization and embolization of both bronchial arteries were carried out in all patients. Arterial embolization was performed with Teflon balls of 0,3-0,4 mm in diameter. The embolizing was administered at a rate of 0,1 ml/sec. in order to avoid emboli washout into the descending segments of the arteries.

**Results:** Pulmonary bleeding stopped after the procedure in all patients, which was confirmed by bronchoscopy data. Repeated spirometry was carried out, blood gases were studied at days 7 and 14 after the manipulation. We noted the improvement of blood gases content and acid-base balance starting from the day 7 after the procedure.

The improvement of spirometry indices was manifested clinically by elimination of resting dyspnea and increase of physical tolerance.

**Conclusion:** Embolization of the bronchial arteries in patients with COPD complicated by bleeding not only allows to stop this fatal complication, but also improves the quality of life of patients.

It is seen that besides hemostatic effect of bronchial arteries embolization this method influences positively the course of inflammatory processes in bronchi and lungs. Together with other therapeutic procedures this methods allows for more rapid cessation of chronic processes and, thus, for the decrease of the amount of necessary therapeutic fibrobronchoscopies, the duration of in-hospital stay and, consequently, financial expenses for the treatment.

#### **POSSIBILITIES OF ENDOVASCULAR TREATMENT OF VARICOCELE**

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Varicocele treatment in men remains a thrilling problem. According to the literature, the rate of varicocele is 4,4-30,7%. Herewith the share of varicocele among sterile males reaches 39%, and the rate of spermatogenesis disorders in patients with varicocele varies, according to different authors, from 20 to 90%. The choice of the method for the treatment of this pathology is a challenge for all specialists dealing with this problem.

Endovascular methods of gonadal veins occlusion - retrograde and antegrade sclerogenous therapy - are now widely used. These methods lead to total thrombosis of the veins up to grape like plexus and excludes eventual influence of portocaval anastomoses.



We conducted a trial **aimed** at the study of early and late results of the use of antegrade sclerotherapy of the gonadal veins. The **material** of trial consisted of 154 patients with varicocele who underwent antegrade catheterization and sclerotherapy of the testicular vein. The diagnostics of varicose gonadal veins included clinical examination as well as ultrasound and complex phlebographic studies.

**Results:** Our study showed that antegrade sclerotherapy with or without additional ligation of the testicular veins at the external inguinal ring gives positive results in 98% of cases. The complications of antegrade venous catheterization were seen only in 1,3% of cases (thrombophlebitis of the grape like plexus' veins, related to uncontrolled retrograde spreading of the sclerogenous substance; scrotum lymphostasis developed after unsuccessful antegrade catheterization of narrow, spasmodic testicular veins of the 3rd segment and being a consequence of surgical approach). The main ways for the decrease of complications rate in endovascular occlusion of the gonadal veins consist in the perfection of interventional technique.

The recurrence of the disease was seen in 4 patients (2,6%). It was caused by insufficient sclerogenous substance administration in the presence of portocaval anastomoses (2 cases), deep catheter insertion into the vein (over 4 cm) in 1 case and in 1 patients sclerotherapy was conducted through a narrow lateral branch of the testicular vein with insufficient etoxysclerol administration. In order to prevent the recurrence of the disease we recommend to administer at least 6 ml 3% etoxysclerol by divided doses.

**Conclusions:** Thus, the use of time-tested method for the occlusion of the gonadal veins in patients with varicocele allows for complete clinical effect in 98% of cases. Herewith the probability of complications and disease recurrence can be minimized, making this method of varicocele treatment generally available in wide clinical practice.

#### **ACUTE MYOCARDIAL INFARCTION IN ACUTE OCCLUSION OF THE LEFT MAIN CORONARY ARTERY: EARLY AND LONG-TERM RESULTS OF ENDOVASCULAR INTERVENTION AND OPTIMAL TACTICS OF TREATMENT**

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AMI caused by acute occlusion of the left main coronary artery is an extremely severe condition, often non compatible with life, with unfavorable prognosis, accompanied by cardiogenic shock, life-threatening rhythm disturbances, and sometimes – by clinical death.

To the date Moscow City Center of Interventional Cardioangiology has an experience with successful treatment of 14 patients with AMI caused by acute

occlusion of the left main. Mean age of patients was 52±2,3 года. There were 12 (85,7%) men. Cardiogenic shock of different severity degree was present in 9 (64,3%) patients. IABP was conducted during and after PCO in 8 (57,4%) of them. In all cases PCI was ended by stenting of the left main. Bare metallic stents were used in 11 (78,8%) cases, 3 (21,2%) patients received stents with antiproliferative drug coating. Immediate success of PCI was observed in 13 (92,8%) cases, “no-reflow” phenomenon after mechanical recanalization and PTCA of the left main was seen in 1 case (7,2%). Four patients (28,6%) died at different stages of hospitalization period from increasing heart failure. No acute or subacute thromboses, reocclusions, reinfarctions in the PCI area were seen. All patients received standard dual antiplatelet therapy.

Control examination was carried out in 8±4 months after the procedure in 8 (57,2%) patients. Along with clinical methods (24-hour monitoring, exercise test, EchoCG, etc.) all patients underwent control coronary angiography with left ventriculography. Significant stenosis was revealed in 4 (50%) patients, which led to PTCA of in-stent stenosis in 2 cases, one stent with antiproliferative drug coating was implanted in 1 patient, and in the last patient, with multiple coronary lesions, surgical myocardial revascularization was recommended. The remaining 4 (50%) patients had good mid-term results of PCI (two of them received stents with antiproliferative coating).

On the base of our experience we can recommend the following set of urgent measures in this extremely severe category of patients:

1. Adequate restoration of the blood flow in the left main coronary artery, eventually with simultaneous use of cytoprotectors (Mexicor), able to reduce reperfusion myocardial injury;
2. Mandatory dual antoplatelet therapy;
3. Prolonged hemodynamic support with IABP;
4. If necessary – auxiliary mechanical ventilation;
5. Also if necessary – hemosorption or blood ultrafiltration.

Only the use of complex approach to the treatment of such patients allows to increase the area of viable myocardium and, thus, to save the life in these extremely severely ill patients.

#### **BROADEN OPTIONS OF ORGAN-PRESERVING TREATMENT OF UTERINE MYOMA USING EMBOLIZATION OF THE UTERINE ARTERIES**

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**Introduction:** Embolization of the uterine arteries (EUA) is widely known and productively used for the treatment of patients with uterine myoma. Due to certain causes, the main of them being lack of information for patients and physicians, insufficient technical

equipment of medical institutions and absence of EUA in medical and economical standards of medical care, the availability and the use of this method is far from satisfy the needs and does not reflect the social and epidemiological significance of the problem of uterine myoma. Besides, to our opinion, this method's potential is not yet exhausted, and it is possible to broaden the spectrum of its clinical use.

**Purpose of study:** To validate perspective trends of the development of organ-preserving treatment of patients with uterine myoma using EUA as an independent method, as well as before and after conservative myomectomy of multifocal and giant uterine myomata.

**Material and methods:** The study is based on the analysis of the results of treatment with the use of endovascular occlusion of the uterine arteries in 536 patients admitted for in-hospital treatment in the departments of gynecology of the clinics, serving as the bases for the chair of obstetrics and gynecology of the Faculty of Therapy of Moscow State Medical Stomatological University. We conducted a preliminary analysis of the possibilities of EUA in staged, complex organ-preserving treatment of giant and "complex" myomata. For this purpose we evaluated clinical results of treatment using uterine arteries embolization in patients with giant myomata, in particular – as the first stage before conservative myomectomy for the creation of necessary conditions for surgery performance. Besides, we evaluated the particularities and the effectiveness of endovascular hemostasis in patients after conservative myomectomy with the opening of the uterine cavity.

**Results and discussion.** EUA is an effective intervention, however the method has obvious limitations in cases of large myomata, when even «good results», absence of symptoms and decrease of uterine size from 38-40 to 18-22 weeks do not allow to ascertain the sufficiency of the treatment and to count upon the realization of reproductive function.

In practice, the lack of clear tactic approaches to surgical treatment of this contingent of patients looks like a choiceless proposal of hysterectomy. In accordance with the suggested algorithm such clinical situations provide for EUA performance as a first stage, with conservative myomectomy as a second stage. This algorithm was proven in practice.

On the base of the presented data one can conclude that EUA often allows to receive a unique chance for the performance of an organ-preserving surgical intervention in very disadvantageous clinical situations, often assigned to "non-operable" category.

Besides, the presented clinical experience demonstrates the most typical variants of the use of endovascular hemostasis as well as the variants of early postoperative hemostasis after conservative myomectomy with the opening of the uterine cavity, not described previously (n=4), when repeated surgical hemostasis seems injurious for the reproductive function.

Endovascular hemostasis has significant advantages, such as minimal invasiveness, effectiveness and feasibility of precise visualization and influence on the source of bleeding. The results allow to include this valuable instrument in the arsenal of organ-preserving surgical treatment of uterine myoma.

**Conclusion:** The possibility to preserve the uterus and potential reproductive function is a positive effect allowing for promulgation of complex organ-preserving surgical treatment of patients even with "complex" and giant uterine myomata.

#### **Resume.**

- The use of EUA as an independent effective micro-invasive method as well as in combination with myomectomy in multifocal and giant myomata contributes to the broadening of the possibilities of organ-preserving treatment.
- The use of EUA as the first stage of organ-preserving surgical treatment allows to obtain the conditions for conservative myomectomy in complex clinical situations and in cases of giant myomata. EUA can be effectively used for the treatment of myoma recurrence after conservative myomectomy.
- EUA allows to perform a safe and effective hemostasis in early postoperative complications of conservative myomectomy with the opening of the uterine cavity, when repeated surgical intervention can be detrimental for the reproductive function.

### **ENDOVASCULAR OCCLUSION OF CERVICAL CORD AVM SUPPLIED FROM SUBCLAVIAN ARTERIAL BRANCHES**

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Sixty eight patients with arteriovenous malformations (AVM) of the cervical part of spinal cord have been treated in Burdenko Research Institute of Neurosurgery from 1983 through 2009.

All patients with cervical cord AVM had MRT and selective spinal angiography. Angiographic examination allowed to receive complete picture of the sources of blood supply, blood outflow tracts, location and hemodynamic characteristics, as well as of the structure of vascular conglomerate of the AVM. These data gave the basis for the choice of the technique of endovascular treatment of AVM.

**Methods:** AVM were mainly supplied from radiculomedullary branches of the vertebral arteries, costocervical and thyrocervical trunks. Among the used methods of treatment were the occlusion with detachable balloons (method of F.A. Serbinenko), occlusion with PVA emboli and histoacryl glue.

In total 118 vessels have been embolized using endovascular method of treatment for AVM of cervical part of spinal cord. The interventions were conducted

under local anesthesia and intravenous narcosis. In two cases embolization was performed with the combination of balloon occlusion and PVA emboli. The combined method was used in cases when AVM had multi-channel supply. In 9 cases we have used the occlusion with detachable balloons according to the method suggested by F.A. Serbinenko. Occlusion with PVA emboli measuring 100-300  $\mu\text{m}$  was performed in 42 patients, in 23 out of them repeated embolization was necessary. Embolization was carried out under continuous control angiography. Occlusion with glue composition (lipoidol and histoacryl) was carried out in 17 patients. Different microcatheters with microguides (BALT) were used for embolization of afferent AVM vessels. In order to avoid glue thrombosis in the microcatheter lumen, 40% glucose solution or lipoidol solution was administered before each injection of histoacryl. Control contrast identifications of AVM are important for the evaluation of "restructurization" of circulation in the aneurysm and the spinal cord during embolization.

The quality of AVM occlusion after endovascular interventions was assessed by prolonged angiographies of the afferent vessels. MRT was carried out in several days. Tortuous vessels of the aneurysm, producing low signal at preoperative tomograms, were not seen during control postoperative examination in T1 regimen. Instead an increased signal from thrombosed vessels of the AVM was revealed.

**Results:** The effectiveness of endovascular intervention was evaluated for each patient and each symptom of the disease. A significant regression of neurological deficit was noted in 62 patients. This group included patients with complex neurological symptoms: paraparesis, paraplegia, teraparesis, tetraplegia, combined with sensitivity and pelvic organs' function disorders. Neurological symptoms did not regress in 6 patients. AVM in 4 of them was revealed during laminectomy performed prior to the admission to the Institute of neurosurgery. The malformation was not removed, and cicatricial adhesions developed with the occlusion of subarachnoid space. Despite embolization in these cases **main symptoms of the disease persisted practically with the same intensity.**

**Conclusion:** Hence, positive dynamics of neurological symptoms in 91% of patients with AVM of the cervical cord after the above mentioned methods of endovascular treatment allow to consider them adequate methods of choice.

#### **DIAGNOSTICS AND ENDOVASCULAR TREATMENT OF SPINAL CORD AVM SUPPLIED FROM INTERCOSTAL AND LUMBAR ARTERIES**

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Selective spinal angiography is the method of preference for the diagnostics of arteriovenous malforma-

tions (AVM) of the spinal cord. Blood supply at the mid-thoracic level of the spinal cord (from D-IV to D-XI segments) comes mainly from the great radicular artery (Adamkewicz artery) and small radicular arteries arising from intercostal arteries. Lower thoracic and lumbosacral portions receive blood from terminal segments of the great radical artery and in 15-20% of cases – from the ascending lumbar artery. This happens when the great radical artery arises high from intercostal arteries at the level of D5-D8 vertebrae.

**Methods and material:** over 1000 afferent vessels of AVM have been occluded in the Institute of neurosurgery from 1983 through 2009. The patients' age varied from 6 to 76 years. In total 394 have been operated. We have elaborated the algorithms of AVM embolization methods, the indications for the use of PVA emboli, glue (histoacryl), microcoils or combined methods.

**Results:** the performance of endovascular interventions in AVM requires detailed angiographic study of anatomical structure of the malformations. It is necessary to take into account the condition of afferent vessels, the linear blood flow velocity, the state of drainage system, that is, all hemodynamic particularities of all segments of the aneurysm. In cases when simultaneous AVM and spinal cord supply was revealed, we performed partial embolization with the preservation of the afferent vessel. The main objective while performing AVM embolization consists in the exclusion of vascular conglomerate of the aneurysm with the preservation of spinal cord supplying arteries. Malformations were occluded with the use of microcatheters with microguides (BALT) for super-selective catheterization of the afferent vessel. While performing the occlusion with histoacryl and PVA emboli it is necessary to take account of the character of the venous outflow, in order to avoid venous thrombosis and development of venous ischemia of the spinal cord due to the impairment of venous outflow. The selection of proper diameter of PVA emboli and the amount of glue compositions for embolization is made on the base of afferent vessels' diameter and the size of AVM. In cases with hypertrophied afferent vessel and high linear velocity of the blood flow in the AVM we have used microcoils, inserted just near the malformation's stroma, that is before the formation of "artery – vein" shunt

**Conclusion:** AVM occlusion necessitates detailed study of the blood supply of the spinal cord and of the structure of malformation. Such study can be done with selective spinal angiography. It is necessary to account for linear velocity of the blood flow, the diameter of afferent and efferent vessels, the existing clinical symptoms. All this is considered for the selection of endovascular instruments and performance of an adequate exclusion of the malformation from the spinal cord circulation.

## INTERVENTIONAL MYOCARDIAL REVASCLARIZATION IN AMI

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The last decade is marked by intense introduction of myocardial revascularization methods - balloon angioplasty and stenting of the coronary vessels - in patients with acute myocardial infarction (AMI) in our country.

**Purpose of the study:** to investigate the course of the disease, the development of complications and mortality depending on the methods of AMI treatment.

**Material and methods:** We have studied 164 patients with AMI. Mean age was 55,7±0,95 years. There were 130 males and 34 females. Total mortality in this sample of patients was 17%. The diagnosis was verified on the base of clinical and ECG signs, early and late markers of myocardial necrosis (Troponin T, CPK, MB-CPK, LDH) were determined. The patients were distributed into two groups depending of the methods of treatment: Group 1 (89 patients) underwent conservative treatment in accordance with generally adopted standards; Group 2 (75 patients) received, following the indications, thrombolytic therapy or myocardial revascularization using percutaneous coronary interventions (PTCA, stenting)

**Results and discussion.** While being statistically similar by age, sex, localization of the infarcted area ( $p>0,05$  in all cases), the groups significantly differed by the level of mortality ( $p<0,05$ ), the frequency of early postinfarction angina ( $p<0,05$ ), pericarditis ( $p<0,05$ ), conduction disturbances ( $p<0,05$ ) (table).

Group/complication (%)	Group 1, no intervention (n=89)	Group 2 Thrombolys.+PCI (n=75)	p
Cardiogenic shock	30 %	27%	$_{1-2} >0.05$
Ventricular fibrillation	18 %	16%	$_{1-2} >0.05$
Pulmonary edema	28%	17%	$_{1-2} >0.05$
Ventricular aneurysm	17 %	12 %	$_{1-2} >0.05$
Ventricular tachycardia	16 %	18 %	$_{1-2} >0.05$
AV block, 3 <sup>rd</sup> degree	7%	13%	$_{1-2} >0.05$
Postinfarction angina	30 %	13 %	$_{1-2} >0.05$
Pericarditis	7 %	2 %	$_{1-2} >0.05$
Mortality	26 %	7%	$_{1-2} >0.05$

**Conclusions:** organizational measures aimed at conservative treatment of AMI, conducted in our country from the 1980-ies, have reached the peak of effectiveness in the decrease of mortality and complications related to this pathology. Further development is connected with broad introduction of the methods of interventional myocardial revascularization in patients with AMI into the clinical practice.

## OUR EXPERIENCE WITH CORONARY STENTING IN PATIENTS WITH LEFT MAIN CORONARY ARTERY LESION IN A HOSPITAL WITHOUT CARDIOSURGICAL FACILITIES

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**Introduction:** The work was aimed at the evaluation of the safety and effectiveness of coronary stenting in patients with left main coronary artery lesion in a hospital without cardiosurgical facilities.

**Material and methods:** From February 2006 through December 2008, 42 patients (32 men (76,2%) and 10 women (23,8%)), received 46 stents for left main coronary artery lesion. Mean age of patients was 53,5±1,3 years. Among these patients there were 14 (34,1%) smokers, obesity was revealed in 28 (66,7%), dyslipidemia in 38 (92,7%), diabetes mellitus in 6 (14,3%) patients. 26 (38,1%) patients had history of myocardial infarction. At admission 29 (69%) patients had exertional angina, and 26 (89,6%) of them had II and III functional class angina. Heart failure of NYHA class II and III was revealed in 30 patients (73,2%). The majority of patients had two-vessel (14; 33,3%) and multi-vessel (8; 19,0%) coronary lesions. In 30 (71,4%) patients the lesion was located in distal segments of the left main, in 9 (21,4%) - in the main trunk, in 3 (7,1%) - in the ostium of the left main coronary artery. Bifurcation lesion of the distal segments of the left main was present in 29 patients (69%).

**Results:** Immediate angiographic success was achieved in 100% of cases. In 1 case (2,4%) in-hospital course was complicated by non Q-wave myocardial infarction. Long-term results were evaluated in 39 patients (92,9%). The duration of the follow-up was 12,6 ± 1,6 months. After the procedure 37 patients (97,4%) felt better. During the follow-up major adverse cardiac events (MACE) were noted in 3 patients (7,8%). One patient died (2,6%), there was one repeated revascularization of the target segment (2,6%) for diffuse in-stent restenosis of the left main, one patient had Q-wave MI (2,6%). Another patient (2,6%) had gastrointestinal bleeding. Continuous clopidogrel intake was prescribed in 37 patients (94,9%). Mean duration of Clopidogrel intake was 11,9±0,2 months. Control coronary angiography was performed in 14 (35,9%) patients, on the average in 12,5±2,2 months after the procedure. According to the data of coronary angiography restenosis was revealed in 1 case (7,5%). The number of totally angina-free patients during the follow-up was higher that before the interventions (14,3% vs 42,1%,  $p=0,001$ ). We found a positive correlation between the rate of MACE and multi-vessel coronary lesions ( $r=0,331$ ,  $p=0,032$ ). A negative correlation was revealed between the rate of MACE and regular Clopidogrel intake ( $r=-0,369$ ,  $p=0,021$ ).

**Conclusion:** Coronary stenting is an effective and relatively safe method for the treatment of ischemic heart disease in patients with the lesion of the left main coronary artery and can be used in a hospital without cardiosurgical facilities.