important complications in postoperative period were related to pulmonar y system, occurring in 10 patients, but without major systemic repercussions.  

Conclusion. Right anterior minithoracotomy associated with aortic cannulation in mitral valve surgery is a simple technique, reproducible and secure. Furthermore, complications related to femoral cannulation were avoided with this technique.

V011

Minimally invasive approach. The better way for redo mitral valve surgery

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Aim. Over the last seven yrs minimally invasive mitral valve surgery (MIMS) has gained widespread application with good Results. Aim of the study was to establish the technique for mitral valve redo-procedures.

Methods. Out of a series of 1246 patients who underwent MIMS (repair or replacement) 117 patients (including high risk and emergency cases) had Redo mitral valve surgery (62±12 yrs, 55 female, 62 male). Previous cardiac surgery comprised of mitral valve surgery (53), CABG (42), aortic valve replacement (7), ASD closure (5), and combined procedures (10). In all cases surgery was performed via a right lateral minithoracotomy and using femoro-femoral cannulation. The operation was performed using deep hypothermia and ventricular fibrillation. In patients with mild adhesions the Chitwood-clamping technique was applied.

Results. The minimally invasive procedure was feasible in all cases avoiding sternotomy. The mitral valve was replaced in 51 (43%) and repaired in 66 (57%) patients. Time of surgery and time of extracorporal circulation were comparable to the overall series. Mean time of intubation was 15 h (5 patients, >72h). ICU stay 1,5d (0-38d), hospitalization time 11 days (6-58days). Mortality was 6.8% (n=8). One patient (0.8%) had low cardiac output, 10 (8.5%) renal failure, 3 (2.5%) permanent and 4 (3.5%) transient neurologic deficits. All patients had normal mitral valve function at follow up.

Conclusion. Redo mitral valve surgery can be safely performed using a minimally invasive approach in patients with a previous sternotomy. The right lateral minithoracotomy offers excellent exposure. It minimizes the need for cardiac dissection and thus the risk for injury especially in patients with patent grafts. Avoiding a re-sternotomy increases patient comfort of redo mitral valve surgery.

V012

Minimally invasive mitral surgery: experience with lower mini-sternotomy

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Aim. Minimally invasive surgery is increasing its popularity mostly because of esthetic reasons. We evaluated and compared our results of cases of mitral valve surgery performed by lower mini sternotomy and standard full sternotomy.

Methods. During the period of January 2002-2005 257 patients underwent mitral valve replacement in our clinic. Of these, 13 cases, all young and female, were performed with lower mini sternotomy. Among patients with full sternotomy 20 randomly selected young female patients were enrolled for comparison.

Results. All of the selected patients had similar demographic features and all received same sized prosthetic valves. The operation times, morbidity and mortality, drainage, post operative pain, pericardial effusion were compared. None of these data differed between two groups except the postoperative pain. The patient satisfaction for surgical incision were asked and was found significantly high in patients lower ministernotomy.

Conclusion. Lower ministernotmy is a favourable approach in young population,especially in female patient group. It has no surgical disadvantages and can be successfully performed in patients worrying about the postoperation incision scars.

V013

Measure of calcium volume in excised stenosed aortic valves: micro CT vs MRI

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Aim. Computed Tomography (CT) has been validated to measure calcifications in coronary arteries and aortic valves (AV). Magnetic Resonance Imaging (MRI) is also used in cardiac imaging. Imaging modality will play significant role in defining geometry for finite element analysis in designing percutaneous aortic stent valve. The purpose of this set of experiments is: first to quantify calcium volume in excised stenosed aortic valves by micro CT(mCT) and MRI and secondly to compare the two imaging modalities. We hypothesize mCT to be significantly better.

Methods. Stenosed AV (n=10) were excised intact from patients undergoing valve replacement and placed in formalin. Valves were imaged by MRI (1.5T Siemens Vision) and mCT scanner (Scanco VivaCT40). Imagel software (NIH) was used to process images and measure calcium area per slice. Area was summed and multiplied by slice thickness (400microns for MRI and 40microns for mCT) to obtain the volume. Absolute difference was plotted against the mean of the two tests using Excel (Microsoft Corp). Data was analyzed using Spearman Rank Coefficient with Statview (SAS Institute Inc).

Results. Calcium volume for the valves was 756.8±129.8mm3 (180.0-1290.1 mm3) for mCT and 806.7±131.4mm3 (220.3-1293.1 mm3) for MRI. The volume calculated by MRI was greater than volume by mCT for 9/10 valves (valve n. 9). The average absolute by MRI compared to mCT was 49.8±21.1mm3. There was no statistically significant difference in the volume calculated by the two modalities (p= 0.68 and r= -0.14). (Figure 1)

Conclusion. There is no difference in the calculated calcium volume in excised AV using by mCT or MRI.

Figure 1. – Comparison between MRI and Micro CT.
Quantification of aortic valve calcium by ct correlates with severity of aortic stenosis
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Aim. Percutaneous aortic valve replacement for aortic stenosis requires wide valvuloplasty of the calcified aortic valve. Calcium deposits on leaflets are result of mechanical stresses. This stiffens the leaflets, restricts their motion, increases transvalvular gradient and decreases orifice area. The purposes of this experiment are to relate calcium volume in aortic valves to the transvalvular gradient and to valve orifice area. We hypothesize calcium volume correlates directly to transvalvular gradient and inversely to orifice area.

Methods. Excised aortic valves from patients undergoing aortic valve replacement were imaged using micro Computed Tomography, with a slice thickness of 40 mm. Volume of the valve tissue and calcium was calculated using image processor. The peak and mean transvalvular gradients and orifice area were obtained from patient charts. These were plotted against the percent calcium. Data was statistically analyzed using linear regression method to obtain the correlation between valve calcium and the gradient or orifice.

Results. The percent calcium median was 50.19% (19.45-70.59%), peak and mean transvalvular gradient were 87.2 mmHg (36.1-148.8 mmHg) and 50.7 mmHg (19.5-82.6 mmHg), respectively. The valve orifice area ranged from 0.44-0.99 cm² (median 0.75 cm²). There was a direct correlation between percent valve calcium and peak transvalvular gradient (r²=0.91) and mean gradient (r²=0.93). There was poor inverse correlation between percent valve calcium and valve orifice area (r²=0.17).

Conclusion. Amount of calcium with respect to total valve tissue affect the transvalvular gradient and orifice area. Calcium volume is a poor predictor of valve orifice area. Both peak and mean transvalvular gradient are directly related to calcium in aortic valves.

Use of an electric drill in aortic valve replacement for extensive calcific disease
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Aim. Calcification is not uncommon on diseased valves. The calcification is usually on the leaflets but can extend on the annulus and even into the inter ventricular septum (IVS). Removal of this

Figure 1.
Figure 2.
Figure 3.
Figure 4.
calcium is mandatory to reach tissues which will take suturing. At the same time removal of the calcium by conventional means can damage surrounding tissues including the conduction pathways. We present a method of removing calcium without damaging the normal tissues.

**Methods.** A 45 year old man presented as a diagnosed case of severe calcific aortic stenosis with a recent worsening of dyspnea to NYHA IV. Investigations revealed a severe calcific aortic stenosis (PG 120 mm Hg), severe PAH and severe LV dysfunction. The calcification was extensive and going into the IVS and the AML. At aortotomy the calcification resembled an ossification and could not be broken with a pituitary ronguer. The smallest bit of a sterilised commercial drill was used to make holes in the block of calcium so that it could be removed piecemeal. The annulus was completely debried and as much as possible of the calcium from the IVS was carefully removed.

**Results.** A thorough decalcification of the annulus allowed a precise and leak proof seating of the valve. There was no conduction defect. The patient is in NYHA I and on 1 year follow up. The technique has been successfully duplicated in 5 more cases so far.

**Conclusion.** We present a safe, cheap and easily available technique of decalcification in the patient with a severely ossified valve with minimal damage to the annulus and the conduction tissue.

### V016

**Aortic valve plasty: early results**

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**Aim.** Our aim is to evaluate early results after aortic valve (AV) plasty.

**Methods.** During 2004 AV plasty was performed at 19 patients. Mean age of patients 60±18.9 y (18-78 yrs).

**Results.** AV plasty procedures included AV plasty with aortic root reconstruction using Valsalva prosthesis \_ in 4 patients with bicuspid AV and aortic root dilatation (group 1), AV or aortic annulus decalcification with subcomissural trigos plasty \_7 patients with AV fibrocalconitic degeneration (group 2), AV subcomissural annuloplasty with triangular resection of one of the cusp, resuspension of the commissures \_ 8 patients with AV incompetence (group 3). In group 2 and 3 concomitant procedures- CABG with MV plasty and / or left ventricular aneurysmectomy were performed. There were no early deaths in group 1 and 3, in group 2 - 2 patients with preoperative left ventricular ejection fraction < 25 % died due to postoperative cardiogenic shock. In group 1 AV incompetence changed from 2.9±0.25 to 0.9±0.6, group 2- 1.9 ±0.8 to 1.8±0.5, group 3 _ 2.4±0.6 to 1.8±0.5.

**Conclusion.** Early functional outcome of AV plasty is encouraging, though confirmation of the advantages of this technique needs a longer follow up.

### V017

**Mitral valve repair: kaunas experience**

R. Benetis, J. Vaskelyte, L. Jankauskienė, E. Eremiiniene, S. Kinduris

**Aim.** Our aim is to review retrospectively early mortality and survival after mitral valve (MV) repair.

**Methods.** Six hundred sixty-seven MV repair procedures performed since 2000 to 2004 were analyzed retrospectively. Early mortality, actuarial survival and freedom from heart failure and > 2 grade MV insufficiency were analyzed.

**Results.** MV repair procedures included ischemic MV repair with concomitant CABG in 479 patients (group 1), MV repair combined with CABG and interventions on the other valves in 52 patients (group 2), non-ischemic MV repair with or without concomitant interventions on the other valves in 136 patients (group 3), among them 75 patients (group 4) who underwent isolated MV repair because of fibro degenerative disease. The incremental ischemic MV repair rate was noted: 65 interventions for ischemic MV insufficiency were performed in 2000 yrs, 74 _ 2001 yrs, 90 _ 2002 yrs, 109 _ 2003 yrs and 141 _ 2004 yrs. Preoperative EuroSCORE in group 1 was 10.0±4.6, 11.1±5.2, 8.1±5.3, 6.0±5.1 and predicted mortality - 24.7%, 31.5%, 18.0%, 11.5%, respectively. Overall postoperative mortality was 11.6%, in group 1 _ 12.5%, group 2 _ 17.3%, group 3 _ 6.6% and group 4 _ 2.7%. In group 1 Kaplan-Meyer estimates for survival at 2-1 years after surgery were 66.7±7.1%, for freedom from > 2 grade MV insufficiency _ 51.1±7.8% as well freedom from heart failure - 51.6±7.9%.

**Conclusion.** Ischemic and non-ischemic MV repair with or without concomitant procedures provide favorable Results.
Results of surgery for irreversible moderate to severe mitral valve regurgitation secondary to ischemic heart diseases

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Belarus Cardiology Center, Minsk, Republic of Belarus

Aim. The management of concomitant moderate or severe ischemic mitral regurgitation in the presence of ischemic heart disease is important for long-term prognosis. Mitral valve repair by different types of annuloplasty has been advocated, although clear superiority of either method has not been established. The AIMs of our study was an estimation of results of various types of mitral valve repair, survival rate and dynamic in a functional condition of patients after surgical treatment of ischemic mitral insufficiency in addition to CABG.

Methods. Combined coronary artery bypass and mitral valve surgery for ischemic mitral incompetence was performed on 209 consecutive patients between January 2001 and December 2004. The outcome in 209 of these patients (23 females, 186 males) who underwent mitral valve repair was reviewed.

Results. Average patient age was 56.1±7.8 yrs. All patients received the maximal medicamentous therapy, and were class III-IV on NYHA. Average left ventricular ejection fraction (LVEF) was 42.4±12.2%. A posterial xenopericardial annuloplasty was used in 95 patients (45%), an original open-ended rigid ring in 77 patients (35%), and at 9 patients it was used flexible xenopericardial closed ring (fig. 1). Mitral valve replacement was performed in 9 patients as primary or in cases of repair failure. The average number of distal anastomoses was 2.95±1.03 (range: 1-6) and aortic cross-clamp time was 111±35 min (range: 58-188 min). Requirement for IABP either before or during surgery was in 30 patients. The average risk of operation on NYHA class I or II. Mild mitral regurgitation on discharge occurred in 23 patients, and moderate in 11 patients and was not related to the type of annuloplasty. Predictive risk factors were preop severe mitral regurgitation (p<0.05), poor LVEF (p < 0.05). 1-year follow up was complete in 95% of cases. Recurrence of mitral insufficiency was predictive of deterioration of NYHA class (p<0.05) and poor outcome (p<0.01). The survival rate (including operative deaths) at 12 months was 85.3±13.1%, and event-free survival rate (no mortality, reoperation or angina) 74.2±6.2%. (Figure 1)

Conclusion. The type of annuloplasty used did not influence outcome. The risk of recurrence of mitral insufficiency on follow up was related to severe preoperative mitral regurgitation, poor LVEF, and was predictive of poor outcome.

Figure 1. – Years description of rigid open-ended rings.
Results. There was one hospital death (1.4%). Late follow-up was obtained for 67 patients; cumulative follow-up was up to 62 patient-yrs. One-year actual survival was 97%, freedom from thromboembolism was 95%, from endocarditis 100%, and from reoperation 97%. Echocardiographic evaluations performed at 3 months after repair showed MR to be grade 1 in 92% of patients and grade II in 6%. Mitral valve area was 3.1±1.9 cm², within normal limits (mitral valve area > or =1.5 cm²) in 95% of patients. Average mean pressure gradient was 5.2±1.9 mmHg. Left ventricular end-diastolic diameter decreased postoperatively, from 61±1.3 to 54±1.8 which may reflect successful correction of MR after mitral valve repair.

Conclusion. These early results show that the Josta annuloplasty system is safe and effective when used with other techniques for repair of MR, and preserves mitral annular flexibility and function at one-year follow-up.

V022 Mitral Valve Plastic Procedures: Early And Late Postoperative Results
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Aim. It is already proven that MV repair in most cases is superior over MV replacement. We analyzed 4 groups of patients who underwent MV plastic surgery in terms of early and late follow-up concerning major morbidity and mortality.

Methods. During last four yrs 121 patients with severe MR underwent MV repair. Patients were devided into 4 different groups according to the etiology and findings during open heart surgery: Group 1: degenerative MV disease; Group 2: rheumatic MV disease; Group 3: ischemic MV pathology; Group 4: other forms of MV pathology (IE, Dilated CMP, Congenital, LA myxomas, etc.). The follow-up period was from 1 to 4.5 yrs. Intraoperative, early and late mortality and major causes of morbidity were analyzed retrospectively with special emphasis on effectiveness of MV repair and improvement of functional NYHA class in four patient groups.

MV repair procedures consisted of: 1) Isolated MV leaflets repair: quadrangular posterior leaflet resection, suturing leaflets defects, leaflets plication, central leaflets coaptation - 72 patients (59.5%); 2) MV anuloplasty with or without synthetic ring- 14 patients (11.5%); 3) Combination of anuloplasty and leaflets repair - 35 patients (29%).

Results. Good intraoperative and early postoperative results were observed in 107 patients (88.5%) with significant improvement in NYHA functional classes (improvement by 1 grade – in 52%, by 2 grade _ in 30%) and trivial or mild residual MR without stenosis of the mitral valve. Early mortality was 9.9% (12 patients) and late mortality - 1.6% (2 patients). Groups differed significantly in terms of intraoperative and early postoperative mortality with best results in group 1 (2%), worst - in group 3 (24.3) and rather encouraging results in group 2 (4.5%) and group 4 (8.5%). In the follow-up period 8 patients (6.6%) were reoperated due to recurrent severe MR with 5 cases in group 1 (reoperation rate in the group -10%) and 3 cases in group 2 (reoperation rate in the group –13.6%). There was no mortality in 8 redo cases.

Conclusion. Good early results of MV plastic procedures were in 88.5% of patients, while late results with significant positive changes in NYHA classes were in 82%. Best results were seen in degenerati- ve mitral valve disease group of patients. The highest early postope- rative mortality was in the group of patients with coronary artery disease and ischemic mitral valve pathology. The biggest rate of reope- rations was in rheumatic patients group.
Conclusion. RADO correct remodeling of the fibrous skeleton of the heart, changes the spherical geometry of the left ventricle, improves hemodynamic action of both ventricles and slows down the progression of heart failure. We recommend this procedure as a new surgical alternative or a bridge to heart transplantation in the early stage of PDCM. The preoperative immunohistological analyses might be useful in predicting the prognosis and the optimal surgical treatment.

V025
The development of “off-pump” tachycardhythmia sur-
gery in Lithuania
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Aim. Management of cardiac arrhythmias for a long time was a privilege of a cardiologist. Beginning in 1968 cardiac surgeons proved that many arrhythmias, especially paroxysmal, have identifiable anatomical [accessory pathways (AP), ectopic focal tachycardia etc.] and are amenable to surgical interruption or ablation. At Kaunas University Hospital (Lithuania) we have started arrhythmia surgery in 1971, using standard surgical techniques- open heart surgery with cold cardioplegia. Our purpose was to develop simple and potentially less traumatic cryoablation techniques in the beating, closed heart, via thoracotomy. In the experimental model we have demonstrated, that use of unconventionally low temperatures for external and endocardial cryoablation (below –100°C) can overcome warming effect of circulating blood and produce transmural lesions. A special set of instruments for cryoablation was developed and surgical methods refined on experimental level.

Methods. The following original procedures were developed and introduced into clinical practice: intracardiac ablation of AV node/His bundle (1977), external ablation of right sided AP (1983), ablation of perinodal pathways in AV node reentry tachycardia (1985), ablation or isolation of atrial ectopic tachycardia (1985), ablation of septal AP (1980, 1983), ablation of left-sided AP through coronary sinus (1983), cryo-fragmentation of low right atrium in atrial flutter (1987, 1988) and ablation of ventricular tachycardia (1987). Total of 1 082 operations were performed with similar results to conventional techniques, requiring open- heart surgery.

Results. Closed heart ablation of cardiac arrhythmias demonstrated following advantages: excellent conditions for mapping and continuous electrophysiological control of ablation efficaciy, decreased procedural time, morbidity and length of hospitalization.

Conclusion. In summary our experience in arrhythmia cryoablation demonstrated safe possibility of transmural lesion (and line) creation in humans with liquid nitrogen based cryo probes and unconventionally low ablation temperatures.

V026
Atrial remodelling markers in patients with atrial fibril-
lization and mitral valve disease after surgery of valvular
pathology
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Aim. To identify most significant predictors of atrial fibrillation (AF) development and recurrence, reveal prognostic factors for sinus rhythm (SR) restoration in patients with chronic AF undergoing surgical correction of mitral valve (MV) pathology.

Methods. One hundred twenty-four patients with rheumatic MV anomalies, among them 65 with paroxysmal AF and 59 with chronic AF, were enrolled in our study. All patients underwent surgical repair of main pathology. In 45% of cases with MV prostheses and dilated left atrium (LA) left atrial plication was performed. Along with traditional noninvasive methods of diagnostics computer tomography of LA pulmonary veins and histological investigation of LA appendage myocardium were used.

Results. Most powerful predictors of atrial remodelling were P-wave duration and dispersion for paroxysmal AF and Doppler flow velocity in LA appendage for chronic AF.

Conclusion. AF duration less than 1 year, preserved LA appendage flow velocity and LA diameter less than 5 cm provided spontaneous SR restoration after MV replacement in early postoperative period. LA plication during MV replacement in patients with preserved LA contractile function increased probability of postoperative SR restoration.

V027
Comparison of transseptal and septal-superior approa-
dches during mitral valve surgery combined with intra-
operative radiofrequency modified maze procedure
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Aim. The aim of our study was to evaluate the risks and benefits of saline-irrigated radiofrequency (RF) modified Maze procedure in patients with atrial fibrillation (AF) undergoing mitral valve (MV) surgery and to compare the results using transseptal approach (TA) and septal-superior approach (SSA).

Methods. Eighty-five patients aged 55±10 yrs (range 27-76) with permanent or persistent AF underwent a biatrial RF modified Maze procedure in combination with MV surgery. Mean duration of AF was 2 yrs (range 0-20). Patients were prospectively assigned to TA group (61 patients) or SSA group (24 patients). These groups did not differ in etiology of valve disease, NYHA class, ventricular function, atrial size, or duration of AF.

Results. Total ablation procedure time was 18.4±4 min in TA group and 16.9±3 min in SSA group. In-hospital mortality was 1.2% (1 patient in TA group). Most powerful predictors of atrial fibrillation (AF) development and recurrence, reveal prognostic factors for sinus rhythm (SR) restoration in patients with chronic AF undergoing surgical correction of mitral valve (MV) pathology.

Table I. – Postoperative rhythm.

<table>
<thead>
<tr>
<th></th>
<th>n=60</th>
<th>TA group</th>
<th>SSA group</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free of AF/AFl after operation</td>
<td>60 (100%)</td>
<td>24 (100%)</td>
<td>24 (100%)</td>
<td>NS</td>
</tr>
<tr>
<td>Temporary postoperative pacing</td>
<td>8 (31%)</td>
<td>5 (45%)</td>
<td>5 (45%)</td>
<td>NS</td>
</tr>
<tr>
<td>Permanent pacemaker</td>
<td>11 (18%)</td>
<td>3 (13%)</td>
<td>3 (13%)</td>
<td>NS</td>
</tr>
<tr>
<td>Early AF/AFl relapse (during 2-15 days)</td>
<td>20 (33%)</td>
<td>6 (25%)</td>
<td>6 (25%)</td>
<td>NS</td>
</tr>
<tr>
<td>Permanent AF/AFl or relapse 1 month</td>
<td>14 (23%)</td>
<td>6 (25%)</td>
<td>6 (25%)</td>
<td>NS</td>
</tr>
<tr>
<td>Permanent AF/AFl or relapse 1 - 3 months postoperatively</td>
<td>11 (19%)</td>
<td>5 (24%)</td>
<td>5 (24%)</td>
<td>NS</td>
</tr>
<tr>
<td>Permanent AF/AFl or relapse 3 - 6 months postoperatively</td>
<td>9 (19%)</td>
<td>2 (12%)</td>
<td>2 (12%)</td>
<td>NS</td>
</tr>
<tr>
<td>Permanent AF/AFl or relapse 6 - 12 months postoperatively</td>
<td>7 (18%)</td>
<td>3 (19%)</td>
<td>3 (19%)</td>
<td>NS</td>
</tr>
</tbody>
</table>

Conclusion. Radiofrequency modified Maze using both transseptal and septal-superior approaches, is effective and safe procedure abolishing atrial fibrillation in 82% of patients at 12 months of follow-up.
Aim. Although the Cox-Maze III procedure is effective for treating permanent atrial fibrillation (AF), its high complexity limits its use. The saline-irrigated cooled-tip radiofrequency ablation (SICTRA) is an alternative source of energy used to ablate AF. The aim of this study was to evaluate the effectiveness of the SICTRA for the treatment of permanent AF in patients with rheumatic mitral valve (MV) disease.

Methods. Between February 2002 and April 2003, 70 patients with permanent AF and rheumatic mitral valve disease were randomly assigned to undergo a modified Maze III procedure using SICTRA associated with MV surgery (Group A) or MV surgery alone (Group B). Groups A and B were similar in terms of baseline characteristics.

Results. Postoperatively, hospital mortality was 2.3% (1 death) in group A versus 0% (no deaths) in group B (p = 1.00). The additional coronary angiography to delineate any coronary lesions. At the preoperative period all of the patients were evaluated routinely by 12-lead ECG, chest film and transthoracic echocardiography. At the postoperative follow-up each group. Two patients in each group received transvenous permanent pacemaker implantation. The mean follow-up time was 24.3±11.2 (12-35) months.

Conclusion. RF ablation especially during mitral valve surgery during mitral valve surgery is a simple technique to be performed. Early and mid-term results of the cohort is satisfying. At the one year follow-up 37 of 45 (80.4%) patients maintained sinus rhythm.

One-year results of modified maze procedure for treatment of chronic atrial fibrillation in patients undergoing mitral valve repair or replacement
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Aim. This prospective study was aimed to explore one-year results after Modified Maze Procedure (MMP).

Methods. We followed-up 50 consecutive patients (mean age 63.5±8.7 years, 28% female) undergoing MMP with Medtronic Cardioblate instrument. Atrial fibrillation (AF) duration ranged from 1 to 120 months (mean 43±4.7 months). Twenty-six patients (52%) underwent mitral valve replacement and 24 (48%) had mitral valve repair. Eighteen (36%) had associated cardiac procedures. Mean follow-up was 16±9 months.

Results. One patient died in the perioperative period of cerebral haemorrhage, the other 49 are alive. At discharge, 92 subjects (82%) were in sinus rhythm. At follow-up, 43 (86%) patients were in sinus rhythm and 6 (14%) in AF. Four patients (8.1%) had a first degree AV block, 22% had an episode of atrial flutter requiring electrical cardioversion, 10 (21.2%) had at least one recurrence of atrial and 2 (4%) showed a re-entry tachyarrhythmia. All patients exhibited a significant clinical improvement (NYHA class 2.7 vs 1.3, p<0.01). A significant decrease of antero-posterior left atrial diameter (p<0.02), left atrium (p<0.01) and right atrium area (p<0.01) were found. Mechanical activity of left atrium was appreciable in 95.7% (45/47) patients in sinus rhythm (SR) in the other 2 the A wave was hardly detectable due to effects of valve prosthesis. In all patients in SR right A wave was present. Age (p=0.03) and pulmonary hypertension (p=0.02) significantly affected early MMP Results. In contrast, prep operative left and right atrium area were the only variables associated with recurrence of AF during follow-up (p=0.04 and P=0.03 respectively).

Conclusion. In our experience, MMP gained satisfactory results at one year and SR was restored in most of patients.

Left atrial size reduction improves the sinus rhythm conversion rate after radiofrequency ablation for continuous atrial fibrillation in patients undergoing concomitant cardiac surgery
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Aim. The radiofrequency (RF) ablation can effectively restore sinus rhythm in the majority of patients with continuous atrial fibrillation (AF). However, no previous randomized studies discussed the association of left atrial size reduction and the improvement of sinus rhythm conversion rate after radiofrequency ablation for continuous AF.

Methods. This prospective randomized study included 46 patients with continuous AF and cardiac disease. Twenty patients underwent cardiac surgery and radiofrequency ablation (group I). The other 26 patients underwent cardiac surgery and RF ablation combined with left atrial size reduction (group II). The patients were followed-up for one year postoperatively. Rhythm, neurological complications, and left atrial size were evaluated.

Results. At the one year follow-up sinus rhythm was restored in 61% of patients in group I and 77% of patients in group II. LA diameter, evaluated by echocardiography, was reduced from 60±15 mm to 55±8 mm in group I and from 69±9 mm to 51±8 mm in group II. One case of transient ischemic attack and one case of stroke was observed postoperatively in each group. Two patients in each group received transvenous permanent pacemaker implantation.

Conclusion. Left atrial size reduction appears to improve the sinusrhythm conversion rate after RF ablation for continuous atrial fibrillation in patients undergoing concomitant cardiac surgery.
V032

Evaluation of atrial contractility after surgical atrial fibrillation ablation


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Aim. Resumption of sinus rhythm (SR) has been the main goal of atrial fibrillation (AF) surgery for many yrs. Recently the presence of atrial contraction has gained much attention too. In fact it may allow withdrawal of specific anticoagulant therapy and guarantee a higher quality of life. Standard echocardiography does not allow evaluation of the posterior left atrial wall and parameters of atrial contractility used so far, are all indirect. Multislice spiral computed tomography (MSCT) with iodinated contrast medium allows direct vision of the atrial chambers either in systole and diastole along the three main axes.

Methods. Among a consecutive series of 95 patients operated for AF, with cryoablation of the left atrial endocardial posterior wall, 82% of the 86 surviving patients are in SR at 5 yrs of follow-up. All SR patients living in Northern Italy were contacted to undergo a MSCT to evaluate the presence and degree of atrial contraction. Among the 21 patients who accepted, 8 and 13 patients were respectively operated with the open or close technique with respect to the posterior left atrial wall and parameters of atrial contractility. Antero-posterior, supero-inferior, latero-medial diameters and left superior-right inferior pulmonary veins distance and atrial volume were evaluated in systole and diastole along the three main axes.

Results. The only significant difference between the two surgical techniques adopted concerned the latero-medial diameter, while SR control patients showed relevant better atrial emptying.

Conclusion. MSCT has proved great advantages over echocardiography for atrial contractility evaluation. The left atrial posterior wall doesn’t usually participate to the atrial contraction. Closed technique has shown overall better results.

V033

Liquid nitrogen cryothermy device in use of surgical treatment of atrial fibrillation

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Aim. Surgical treatment of atrial fibrillation (AF) evolves to less invasive, safer and technically easier procedures mostly due to the electrophysiological studies, technological progress and creativeness in ablation systems construction. We present the first clinical experience and mid and long-term results of AF treatment with new liquid nitrogen cryotherapy device for endocardial application.

Methods. From September 2001 to June 2004 26 patients with AF underwent endocardial cryoablation of the left atrium concomitant to mitral and/or aortic valve and/or coronary artery disease surgery. We evaluated safety and effectiveness of cryoablation in early postoperative course and 3, 6, 12 and 24 month-long follow-up.

Results. In in-hospital stay and at discharge 72% of patients were in sinus rhythm (SR), after 3 months 75% of patients were in stable SR, in 6 month-long follow-up we found 68,8% of patients in SR. After 1 year there were 71,4% of patients in SR and after 2 yrs 74% of patients were in stable SR. No pacemakers were implanted. One patient died in early postoperative period and one 3 months after discharge due to causes not related to the surgery.

Conclusion. We have found that cryoablation with the new liquid nitrogen cryocatheter is safe, easily repeatable and efficient.

V034

Composites of valve-related complications after aortic valve replacement with bioprostheses: predictors and outcomes

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Aim. Death, stroke and re-operation related to the replacement prosthesis represent major concerns of patients requiring aortic valve replacement (AVR). This study calculates the long-term patient outcomes related to the composites of valve-related complications after AVR with a bioprosthesis and examines the predictors of these composites.

Methods. The occurrence of valve-related complications was derived from the Vancouver experience of 2 179 (16 087 patient-yrs) patients who underwent AVR with a bioprosthesis from 1982 through 1998. All valve-related events were utilized to calculate the composites, namely, valve-related re-operation (VR-Re-operation), permanent impairment (VR-Morbidity) and valve-related mortality (VR-Mortality) respectively. Age-dependant exponential distributions were then constructed, which described the time to first occurrence of each composite. These estimates were entered into a microsimulation model, which calculated the composite-related patient outcomes after AVR. Eight variables were considered as predictors of risk of each composite, which were determined by univariate and multivariate Cox hazard regression analysis.

Results. Re-operation was performed on 207 patients while there were 58 VR-Morbidities and 171 VR-Mortalities. The overall linearized occurrence rate for VR-Re-operation was 1.3%, for VR-Morbidity 0.4% and 1.1% for VR-Mortality respectively. Microsimulation calculated patient outcomes for any given age and sex profile. For a 60-year-old man for example, the calculated life expectancy was 12.5 yrs, re-operation-free life expectancy 11.6 yrs and the event-free life expectancy was 11.4 yrs respectively. The lifetime risk of VR-morbidity for this patient was 4,3%. The lifetime risk of re-operation varied from 3,2% for a 50-year-old patient to 2% for a 75-year-old patient respectively. Predictors for VR-Re-operation were age at valve implantation, presence of coronary artery disease, diabetes and renal failure. The only predictor for VR-Morbidity was age while the predictors of VR-Mortality were age, coronary artery disease, diabetes and the type of aortic valve lesion respectively.

Conclusion. In AVR, a bioprosthesis provides a low lifetime risk of permanent impairment at all implantation ages while the risk of VR-Re-operation reduces appreciably with advancing age of implantation. Age independently predicts the occurrence of the three types of composites.

V035

Mid term results and predicted long-term outcomes after aortic valve replacement with medtronic stentless freestyle bioprostheses

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Aim. This study was conducted to examine patient survival, prosthesis durability and the occurrence of valve-related events after aortic valve replacement (AVR) with the Medtronic Freestyle bioprosthesis. The study also used a mathematical microsimulation model to extrapolate the available primary data in order to calculate the long-term outcomes with the Freestyle bioprosthesis.

Methods. We used 11-year follow-up data set of 725 patients who underwent AVR with a Medtronic Freestyle bioprosthesis. Kaplan-Meier analysis and Cox hazard regression used was examined patient survival and the predictors of mortality respectively. Age-dependent Weibull distributions were fitted to the data to model
structural valvular deterioration (SVD). Assuming constant hazards over time, linearized occurrence rates were calculated to examine the rate of valve-related events. These results were then incorporated into a mathematical microsimulation model, which calculated the long-term outcomes for patients of any given age and sex.

**Results.** The mean age of the population was 72 yrs (SD 8, range 36 _ 92), which comprised 55% males. Actuarial patient survival including 30-day mortality at 10 yrs was 45% for all patients; 82% for the _ 60 age group, 57% for the (61 _ 70) age group and 41% for the (71-80) age group respectively. The 8-year survival of patients more than 80 yrs of age at valve implantation was 32%. Of seven possible predictors of late mortality examined by Cox analysis, only age at implantation predicted patient mortality. The annual hazards for thrombo-embolism and endocarditis were 2.9% and 0.45% while the 10-year freedom from thrombo-embolism and endocarditis were 79% and 95% respectively. For a 65-year-old male patient for example, the median time to SVD was 17.5 (16.0 _ 19.1) yrs. Microsimulation calculated for this patient a life expectancy, re-operation-free life expectancy and an event-free life expectancy of 15.1, 11.0 and 8.4 yrs respectively. The patient had a higher life expectancy compared to age and sex-matched persons in the general population. The lifetime risk of re-operation due to SVD varied from 33% for a 65-year-old patient to less than 5% for an 80-year-old patient.

**Conclusion.** The Medtronic Stentless Freestyle bioprostheses performs well in this mid term review. It offers a low lifetime risk of re-operation for elderly patients requiring AVR. The performance of the valve and the selective patient population might explain the higher life expectancy compared to age and sex-matched persons in the general population.

### V036

**Early experience with shelhigh aortic valve and aortic root replacement: 263 cases**

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**Aim.** To assess the early results of fully biological aortic valve or root replacement with the use of Shelhigh valve or composite graft.

**Methods.** Between November 1999 and February 2005 263 patients underwent 264 procedures, i.e. aortic valve replacement with the use of Shelhigh NR valve _ 205 cases, and aortic root replacement with Shelhigh BioConduit _ 59 cases. Mean age was 71±10 yrs , 47 (17.8%) patients were aged 80 or more. 153 (58%) patients were in NYHA Class III or IV, 3 (1%) patients were in cardiogenic shock. Four patients had acute type A aortic dissection. Eleven patients had acute endocarditis. Twenty-one procedures were reoperations. The data were collected prospectively in a computerised database.

**Results.** There were 100 isolated AVRs. One hundred-five patients underwent AVR and other procedures: ascending aorta replacement, mitral valve repair or replacement, coronary bypass surgery, tricuspid valve repair. Fifty-nine patients had aortic root and ascending aortic replacement, with additional procedures performed in 19 patients. Ninety-four operations (36%) were performed by the trainees. The overall 30-day mortality was 6.4%. (Figure 1). There were no early valve-related deaths. Most early mortality was due to acute heart failure. One patient died of stroke, one of bleeding due to acute dissection with re-entry in descending aorta. Mean pressure gradients in early TTE were between 7.9 and 18 mmHg in various valve sizes (Figure 2). 93.5% of patients had no or a trace of AR, the remainder (6.5%) mild AR. During mean follow up of 29 months 5 patients (0.9% per patient per year) presented with prosthetic valve endocarditis which was treated surgically in 3 patients. Interestingly, the infection did not involve the valve or conduit tissue.

**Conclusion.** The initial experience with Shelhigh NR valve and BioConduit in this group of high-risk patients is favourable. The valve and conduit can be safely used in cases when additional procedures are required, and in emergency procedures.

### V037

**Long term follow-up with the st. Jude medical biocor porcine bioprostheses in mitral position**


Heart Institute University of Sao Paulo, Sao Paulo, Brazil

**Aim.** The purpose of the study was to review the long-term results with valve replacement with the porcine St. Jude Medical Biocor bioprostheses in the Heart Institute of University of Sao Paulo Medical School.

**Methods.** Between March 1983 and December 2000, 546 patients received Biocor porcine bioprostheses in mitral position. The average age was 49.2±17.3 yrs, and 58.6% were female. Rheumatic fever was present in 42.3% of the patients. One hundred and eighty four (33.7%) procedures were reoperations. Associated procedures were performed in 179 patients (32.7%), myocardial revascularization in 54 patients (9.9%). According to NYHA, 41.9% of the patients were in functional class 4 in the preoperative period, and 8.6% of the procedures were emergencies.

**Results.** Hospital mortality was 52 patients (9.5%), 8.3% for first mitral valve replacement and 11.9% for mitral reoperations. Isolated mitral valve replacement presented 7.0% mortality. Cumulative follow-up time was 2 024 patient- yrs. Actuarial survival rate was 45.0±15.8% in 15 yrs. Freedom from structural valve deterioration was 38.5±11.5% and varied with age. Prosthetic valve endocarditis was low, with 88.8±6.1% freedom in 15 yrs. Freedom from reoperation was 33.9±10.4% and from thromboembolism was 82.3±15.0%. Freedom from valve related mortality was 80.7±12.5% in 15 yrs.

**Conclusion.** We conclude that our long-term results with the Biocor porcine bioprostheses were satisfactory.
Aim. The study comprised evaluation of the use of epoxy-treated heart valve bioprostheses in Russia, analysis of the 14-year experience of the Kemerovo Cardiac Center with the latest generation of bioprostheses in surgery of heart valves and intra-annular arterial, establishing the ways to further improve the biomaterials.

Methods. Since their authorization by the state in 1995, cardiovascular bioprostheses treated with ethylene glycol diglycidyl ether (DE) have been in serial production. All-Russian trial of DE-treated heart valve bioprostheses makes up 2487 cases. From March 1991 through December 2004 at the Kemerovo Cardiac Center implanted were 262 stented DE-treated “KemCor” bioprostheses in mitral and tricuspid positions, 30 stentless “AB-Mono” and “AB-Composite-KemeroVo” bioprostheses in aortic position. Over the period of 1993-2003, 315 arterial DE-treated bioprostheses were implanted in infra-annular position. The clinical results were assessed using actuarial analysis. For basic research scanning electron microscopy (SEM) was used with and without element analysis as well as hydrodynamic studies, amino acid analysis and some bacteriological techniques. Bioprostheses were preserved with glutaraldehyde (GA), DE and epoxy compound mixtures (EM). The biomaterials were provided with antibacterial activity using chlorhexidine modification, additional thromboreistance resulted from treatment with non-fractional and low molecular heparins.

Results. Infective endocarditis made up 0.48% of the valves implanted in Russia, calcification primary tissue failure (PTF) - 0.3%. For the AgmitralAh group operated in the Kemerovo Cardiac Center, actuarial freedom from infective endocarditis was 98%, from PTF 96%, from reoperation 90% by the end of 13 postoperative yrs. Some aspects of calcific PTF pathway of DE-treated biomaterial were studied. In the AgtricuspidAh group complications were observed only in the injection addicts (38% of AgtricuspidAh group). Developed and launched was the all-biologic stented “PeriCor” valve featuring antibacterial modification with chlorhexidine. The hydro- and hemodynamic properties of stented and stentless DE-valves were studied. In Articular reconstructionAH group 47% of the patients are free from any complications, thrombosis occurred in 46%. The contribution of suture material to the process of neointima hyperplasia was studied. A new method of xenartery preservation using EM and Clexane was studied.

Conclusion. The 10-year experience with epoxy-treated cardiovascular bioprostheses in Russia is altogether positive. Epoxy preservation imparts bioprostheses with entirely new properties and makes it possible to further perfect and modify the biomaterial.

Aim. The study was to analyze results of the surgical treatment of patients with valve disease by new Belarusian bileaflet mechanical prostheses Planiks-T.

Methods. We assessed clinical and echocardiographic data of 187 patients (mean age 48.8±0.9, NYHA 2.90±0.13) who were consecutively operated during 2004 with CPB. Mitral, aortic and both valves were replaced in 92 (prosthesis diameter 27-31mm), 50 (prosthesis diameter 21-31 mm) and 45 patients, respectively, with rheumatic valve disease (150), infection endocarditis (17), atherosclerosis (6), Marfan syndrome (7), Barlow syndrome (6), lues (1). Tricuspid valve disease was marked in 80 (42.8%) patients and was corrected by annuloplasty. Left atrium plasty was performed in 44 patients, CABG was done in 10 patients.

Results. Hospital mortality was 1.6 % (3 patients) due to severe heart failure and pulmonary hypertension. At the follow-up (mean 10±2 months) 2 patients died due to infection complication. Thrombotic disorders were occurred in 5 patients: one patient had an ischemic attack, 4 patients had mitral prostheses thromboses because of irregular anticoagulant therapy. The rest of patients (177) had the improving of NYHA to 1.6±2.05 (p<0.001) and physical tolerance (p<0.0001), the decreasing of pulmonary hypertension (at 3 months p<0.01), LV volume (p<0.05) and LA area (p<0.01). Peak and mean pressure gradients, degree of closing regurgitation are shown in Table I.

### Table I. – Peak and mean pressure gradients, degree of closing regurgitation

<table>
<thead>
<tr>
<th>Prosthesis</th>
<th>Peak gradient, mmHg</th>
<th>Mean gradient, mmHg</th>
<th>Regurgitation degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aortic (25 mm)</td>
<td>26±3±1</td>
<td>11±2±3</td>
<td>0.8±0.3</td>
</tr>
<tr>
<td>Mitral (29 mm)</td>
<td>11±2±1</td>
<td>3±1±1</td>
<td>1.6±0.2</td>
</tr>
</tbody>
</table>

Conclusion. Valve replacement with PLANIKS-T is an effective method of the treatment of valve disease. The good hemodynamic performance of original valve prosthesis lets get good results at the remote period.

Aim. Analyzing the long-term performance of Omnicarbon mechanical prostheses implanted in the aortic position in our institution.

Methods. A total of 180 patients (143 males, 37 females; mean age 56±9 yrs) undergoing isolated aortic valve replacement with this device between November, 1991 and October, 2004 were included in the present retrospective study. Follow-up was 96% complete. Total follow-up was 920 ±14 yrs per patient. With a mean follow-up of 5.4±3.7 yrs per patient.

Results. Ten patients (5.6%) died in hospital. There were no instances of valve thrombosis or structural failure. The incidence of valve-related complications (linearized rates in events per 100 pt-yr) was 2.3% (actuarial freedom at 13 yrs, in %) was the following: valve-related mortality 1.7/88.8; non-structural failure 0.2/98.7; thromboembolism 0.7/92.9; anticoagulant-related hemorrhage 2.7 / 77.9; prosthetic valve endocarditis 0.1/99.3; reoperation 0.5/95.9.

Conclusion. In our experience, apart from displaying a high incidence of anticoagulant-related hemorrhagic events, the performance of this device implanted in the aortic position is satisfactory in the long term.
and with the detoxification post-treatment since 2000. The conventional implant technique for PF valve consists of two suture lines (inflow and outflow). Some years ago Dr. O. Brien applied the single-suture line technique to porcine stentless valves for a supra-annular implantation. The single suture approach for PF consists of a personal modification by trimming away all the extra tissue of the valve inflow side and scalloping the outflow side. In addition to that pericardium fully retains the sutures. Tearing, as reported with aortic porcine wall, is less likely to occur.

**Methods.** Between February 2002 and August 2004 65 patients (48% male, mean age 69±12 yrs) underwent aortic valve replacement at our Institution with PF implanted with a single suture line. Most recurrent etiology was senile degeneration (80%). PF 25 mm and 27 mm were the most implanted sizes. Thirty patients had concomitant procedures (mainly CABGs, 16 patients). Overall cross clamp time was 76±21 min.

**Results.** All patients survived intervention. One patient died early for multi organ failure (10th post-operative day). There were 4 early non valve related complications and no late complications at a mean follow-up of 491±270 days. Four patients showed trivial central prosthetic regurgitation at intra-operative TEE, among them only 1 confirmed at 6-month TTE. At post-operative echo assessment mean pressure gradient was 10±7 mmHg, and peak pressure gradient 18±12 mmHg.

**Conclusion.** Our initial experience showed that the single-suture technique applied to the PF valve is safe and reliable, even though it requires an adequate experience. Careful sizing and respect of surgical/anatomy indications are mandatory. Clinical outcomes are similar to those obtained with other techniques with satisfactory hemodynamic performance. Freedom SOLO (FS) valve, now available in the market, is pre-trimmed by the manufacturer for the single-suture line implant technique in supra-annular position.

**V043**

**Usefulness of midwall indices of systolic function to predict outcome after aortic valve replacement for pure aortic stenosis**

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**Aim.** Ejection fraction (LVEF) and fractional shortening measured at endocardium (FSendo) are strongly influenced by myocardial loading, LV geometry and relative wall thickness (RWT). Thus, in hypertrophied hearts, these might be normal or supranormal even in presence of systolic dysfunction.

This study was Aimed to evaluate if load-independent midwall-indices may better predict outcome after aortic valve replacement (AVR) in patients with aortic stenosis (AS) and may help to recognize, among them, subjects who really benefit from surgery.

**Methods.** Midwall fractional shortening (FSmw), circumferential end-systolic stress (sc), ratios of observed to predicted FSmw (FSmw_r) and FSendo (FSendo_r) and FSmw/sc relations were retrospectively analyzed in 498 consecutive AS patients (mean age 64±11, 62.4% male). Sc was obtained by the Bechek formula. FSmw was calculated using a 2-shell cylindrical model. Normal values were obtained from 1000 matched controls and FSmw_r was 0.1382, FSendo_r 0.81 and FSmw_r<0.79% resulted indicative of myocardial dysfunction.

**Results.** Preoperatively, 162 patients (32.5%) had low FSmw and 154 (30.9%) showed a FSmw_r<79%; in contrast, only 41 subjects (8.2%) had a subnormal FSendo_r<0.001 and 286 (56.6%) a FSendo_r>81% (p<0.001). At logistic regression FSmw resulted to be a strong predictor of early death [p=0.001; OR 6.21(95% CI) 2.22-10.30] and postoperative events (p=0.003; OR 4.25;1.49-7.51). In addition FSmw was multivariate predictor of late death at Cox regression analysis (Wald E 2.85; p=0.006; Exp(E)=1.87(95%CI 1.61-2.13). Conversely, FSendo and FSendo/sc, resulted not significant. In RWT-corrected model, with RWT<0.60, FSmw was still an independent predictor of early death (p<0.001), postoperative events (p=0.04) and late death (p=0.01). Constrastingly, it resulted not significant when RWT>0.60.

**Conclusion.** Midwall indices resulted strong predictors of adverse outcome after AVR for AS. FSmw_0.13 and RWT>0.60 identifies subjects at markedly increased risk. In these patients, the surgical option should be carefully evaluated. Further larger studies are necessary to confirm our findings.

**V044**

**Risk-factors in surgery of combined mitral-aortic valve diseases**

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**Aim.** Our aim was to analyze risk-factors in surgery of combined mitral and aortic valve diseases (CMAVD).

**Materials.** 1158 adult patients with CMAVD were consecutively operated from January 1st 1981 till January 1st 2004 in Amosov Institute of Cardiovascular Surgery.

**Methods.** Predominant genesis of CMAVD was rheumatism. Forty-one patients (3.5%) were in II NYHA class, 289 (24.9%) patients were in III class and 828 (71.5%) patients in IV. The average age was 44±8±2 (14-69) y. The following procedures were performed: double valve replacement (DVR) (n=814), mitral valve replacement + plastic procedure on aortic valve (AV) (n=153), aortic valve replacement + plastic procedure on mitral valve (MV) (n=164), plastic procedure on both valves (n=27). Only mechanical valves were used in any position. It was in cases monodisc, at the last period bileaflet. Concomitant tricuspid valve disease was corrected by De Vega procedure (plus tricuspid commissurotomy in organic disease) in 286 (24.7%) patients. All operations were performed with cardio-
pulmonary bypass, moderate hypothermia (28-32°C), St. Thomas crystalloid cardioplegia (homemade) (only combined ante-rettrograde at the last 14 yrs) with external cooling of myocardium.

Results. The hospital mortality (HM) at the last 4 yrs (2000-2003 yy) was 7.1% (n=15/211). Average 2 times HM was higher for DVR than in cases with plastic procedure on 1 valve and replacement of other. The value of HM depends on the following factors: IV NYHA class, end-systolic volume index of left ventricle (ESVI) <15 ml/m.q. (especially for combined MS + AS), left ventricle’s ejection fraction < 0.35, systolic pressure in pulmonary artery > 90 mm.Hg, massive thromboses of left atrium (thrombotic masses more than 1/3 of volume), constrictive pericarditis, previous heart operation, calcification on both valves + 3, ESVI > 110 ml/m.q. (especially for combined MI +AI), organic tricuspid valve diseases, triple stenoses, cross-clamping time more than 180 minutes. The combination of described risk-factors increases significantly value of HM.

Conclusion. It is preferable to perform correction of CMAVD without complicated forms – in II or III NYHA class with bileaflet mechanical valve. Contraindication of operation is combination of 3 and more risk-factors.

V045
Beating-heart valvular surgery for patients with severely compromised ventricular function
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Aim. This study is directed to assess the new approach of beating-heart valvular surgery using retrograde coronary sinus perfusion for patients with severely compromised ventricular function.

Methods. On-pump beating-heart valvular surgery using continuous retrograde coronary sinus perfusion as the myocardial protection technique were performed. Total 15 patients (12 men and 3 women; mean age, 51±8.2 yrs) with 8 aortic, 5 mitral and 2 double valvular disease were operated. All patients were in NYHA IV class. Mitral replacement were performed in 4 patients, aortic replacement - in 10 patients and mitral valve repair were performed in 3 patients. Preoperative left ventricle ejection fraction was 29.8±5.1%. We used retrograde coronary perfusion and special myocardial stabilization protocol for myocardial protection. Heart rate was in about 40 per minute. Mean EuroSCORE risk profile was 17% (11-33%).

Results. All patients were successfully operated with acceptable postoperative cardiac contractility function. Oxygen demand and supply was normal during aorta crossclamping. Postoperative peak concentrations of the creatinine kinase-MB and Troponin T were 22±8.5 IU/L and 0.32±0.05 ng/ml respectively. We have considered this parameters as the main criteria of the myocardial protection adequacy. Hospital mortality was 6.7% (one patients died on 6 day from neurological complication). Ventilation duration was 21±9.0 hours and the mean time in ICU was 48 hours. All patients discharged within 2 weeks.

Conclusion. New method of myocardial protection shows good results for valve surgery in patients with poor left ventricular function. May it be allows to minimize the operative risk for patients with compromised ventricular function.

V046
Impact of coronary artery bypass grafting in operative risk of aortic valve replacement
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Aim. We compared the hospital results of operative aortic valve replacement and the influence of coronary artery bypass grafting and age.

Methods. A total of 762 patients who underwent an aortic valve replacement with or without coronary artery bypass grafting (≤65 yrs) between January 1994 and January 2000, were analysed. The patients were divided in 4 groups. G1: AVR without CAD and ≤65 yrs old, 357 patients. G2: AVR without CAD and >65 yrs old, 71 patients. G3: AVR with CAD and ≤65 yrs old, 165 patients. G4: AVR with CAD and >65 yrs old, 174 patients.

Results. Hospital mortality was 5.04%, 5.63%, 11.51% and 22.5% respectively. After adjustment for preoperative factors statistical analysis between G1-G3 and G2-G4 showed p = 0.836 and p = 0.0032. RR=4.48.

Conclusion. The risk of operative aortic valve replacement in association with coronary artery bypass is not different of isolated aortic valve replacement in younger patients. In older patients the coronary artery bypass grafting increase the hospital mortality.

V047
Avt after CABG: a high-risk procedure?
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Aim. Our aim is to evaluate the perioperative risk of aortic valve replacement (AVR) after coronary artery bypass grafting (CABG).

Materials. Fifteen patients (11 male, 4 female, mean age: 67.7 yrs) underwent AVR after CABG in our department from 1999-2003. Mean duration from AVR to CABG was 8.5 yrs (1-20). Patients had received a mean number of 4 grafts with the left internal thoracic artery used in 10 patients. The aortic valve orifice area was 0.8 cm² (0.34-1.1) with a mean pressure gradient of 45.8 mmHg (22 - 68). Nearly all patients had a significantly reduced left ventricular ejection fraction (mean: 40.7%, 20-60). Fourteen procedures were performed electively and one operation on an urgent basis due to a cardiac decompensation.

Results. Mean duration of surgery and cardiopulmonary bypass as well as cross-clamp-time was 293.4 (205-425), 148 (87 - 265), and 71.4 (46-90) min, respectively. Crystalloide cardioplegia (Breitschneider's Solution, mean: 1 700 mL, 1 200-2 000) was administered ante-grade via the ascending aorta or selectively via the bypass grafts. All procedures were performed in mild hypothermia (28 or 32°C). Ten patients received a mechanical prosthesis (mean diameter: 23.7 cm) and five a biological one (22.5 cm). Mean duration of mechanical ventilation as well as stay on the intensive care unit and the normal ward was 38.8 hours (3-240), 3.3 days (1-10), and 8.5 days (0-12). Five patients had an uneventful postoperative course. One patient each suffered from a temporary neurologic impairment, renal failure, and reintubation for respiratory insufficiency. One patient died 10 days after AVR due to multiple cerebral infarctions because of a thrombosis of the basilar artery.

Conclusion. AVR after CABG is associated with an increased perioperative risk but justified regarding quality of life and life expectancy.

V048
Should the aortic valve be replaced in patients with mild aortic stenosis admitted for coronary surgery?
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Aim. There is controversy whether in patients with mild aortic stenosis undergoing coronary artery bypass grafting (CABG), the aortic valve should be replaced or left alone. To evaluate the different approaches, we compared morbidity and mortality rates of aortic valve replacement (AVR) as a reoperation after a CABG procedure and compared these data with the outcome after a primary combined approach.
Methods. Between January 1995 and December 2003, 45 patients (36 male, 9 female; mean age 69.9±2.8 yrs) had redo AVR 7.0 +/- 4.7 yrs after primary CAGB. The data of this group were compared with the data of 202 patients (125 male, 77 female; mean age 72.7±7.8 yrs) undergoing combined AVR and CAGB (1.9±0.8 grafts/patient) between January 2001 and March 2004.

Results. Mean procedure time (207±60 vs 259±67 min), CPB time (142±51 vs 182±41 min) and aortic clamping time (86±36 vs 99±24 min) for the redo-AVR group vs the combined group, respectively, were similar (Table I).

Table I. – Clinical results.

<table>
<thead>
<tr>
<th>%</th>
<th>Staged approach (n=45)</th>
<th>Combined approach (n=202)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>4.5</td>
<td>2.0</td>
<td>0.92</td>
</tr>
<tr>
<td>Stroke</td>
<td>0</td>
<td>2.0</td>
<td>0.34</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>0</td>
<td>1.5</td>
<td>0.41</td>
</tr>
<tr>
<td>Reop. for bleeding</td>
<td>6.7</td>
<td>5.2</td>
<td>0.71</td>
</tr>
<tr>
<td>Dialysis</td>
<td>2.2</td>
<td>2.9</td>
<td>0.11</td>
</tr>
<tr>
<td>Temporary Atrial fibrillation</td>
<td>33.3</td>
<td>45.5</td>
<td>0.14</td>
</tr>
<tr>
<td>Temporary AV-Block III</td>
<td>6.7</td>
<td>4.0</td>
<td>0.43</td>
</tr>
<tr>
<td>Wound infection</td>
<td>0</td>
<td>4.7</td>
<td>0.14</td>
</tr>
</tbody>
</table>

After surgery, median ventilation time (20 vs. 17 h) and ICU stay time (64 vs. 26 h) were longer in the redo group, whereas hospital stay time (10 days in both groups) was similar.

Conclusion. Combined AVR and CAGB in patients with coronary artery disease and mild aortic stenosis seems advisable due to a favorably low mortality rate. In case of a staged approach, perioperative risks after the primary CAGB procedure even have to be added.

Evaluation of the long-term results of tricuspid valve replacement

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Aim. Interventions on the tricuspid valve are not in the same amount compared to the aortic and/or mitral valve interventions in cardiac surgery and valvular plasty procedures consists the majority of these interventions. Because of its poor long-term results, Tricuspid valve replacement (TVR) is reserved for the patients who have not other therapeutic means. We present in the current manuscript the long-term follow-up results of the patients who have undergone TVR procedure.

Methods. Between 1990 and 2003, 33 patients (22 female, 11 male) underwent TVR procedure in our clinic. The mean age of the patients at the time of operation was 36.2 (±18.2). Of these patients, 9 had congenital cardiac pathologies and 6 had already undergone tricuspid valve plasty procedures. Isolated TVR was accomplished in 14 patients whereas concomitant cardiac procedures were added to TVR operation in 19 patients. The type of the prostheses was mechanical in 26 and biologic in 7 patients.

Results. Six patients died during the early post-operative period (18.2%) and 27 patients were discharged from the hospital. Of the discharged patients, 3 were lost to follow-up. The remaining 24 patients (88.9% of the discharged patients) were followed for a mean period of 70.6 months (±54 months). Seven patients died during the follow-up period and thrombosis on the tricuspid prosthesis was detected in 2 patients. The remaining 15 patients (45.4%) are still alive without any need for a re-intervention on the tricuspid valve. In statistical analysis, we could not detect any factor related directly to mortality following TVR operation.

Conclusion. The results of the TVR operation are still far from ideal and carry a significant mortality. As the disease is generally a result of advanced aortic and/or mitral valve disease, the most effective prevention should be to intervene in aortic and/or mitral valve diseases at the most suitable time point before it causes an irreversible tricuspid pathology. In cases where TVR is mandatory, the tendency of our clinic is to use bioprosthesis.

Multiple valve reoperation. Review of surgical aspects and results of 45 cases

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Aim. Reoperation for valve heart disease has been associated with a higher operative mortality than primary operations, specially in patients who had multiple prior operations. The purpose of the study was to review the surgical results of multiple valve reoperations in the Heart Institute of University of Sao Paulo Medical School.

Methods. Between 1988 and 2000, 45 patients were submitted to multiple valve reoperations (fourth, fifth and sixth valve operation) by one surgeon with standard technique. The average age was 44.3±11.9 yrs, and 66.7% were female. Rheumatic fever was present in 88.9% of the patients. We performed 30 mitral valve re-replacements, 10 aortic re-replacements, 3 mitral and tricuspid re-replacement, 1 mitral and aortic re-replacement and 1 triple (mitral, aortic and tricuspid) re-replacement.

Results. There were 2 inominate vein lesion during sternal reentry, repaired with success. Reoperation for bleeding occurred in 3 cases (6.7%). Hospital mortality was 8 patients (17.8%), 20% (6 patients) for mitral re-replacement, 66.7% (2 patients) for mitral and tricuspid re-replacement. The causes of hospital mortality were low output syndrome in 5 cases, multiorgan failure in 2 cases and bleeding in 1 cases. There were no mortality in the aortic re-replacement group or in other positions. In the same period, the hospital mortality in valve reoperations was 9.2%.

Conclusion. We conclude that the surgical risk of multiple valve reoperation is higher, intraoperative strategies are important to avoid surgical problems and to reduce operative risk.
12 prosthetic heart valve thrombosis cases we lost 1 patient (mortality rate 8.3%) already being critical before redo surgery.

**Conclusion.** According to our experience we advocate aggressive surgical approach as soon as prompt diagnosis using TEE is established. Patient education with clear recommendations of necessary anticoagulant regimen after prosthetic heart valve implantation may help to avoid this potentially detrimental complication.

**V052**

**Causes and results of heart valve prostheses reoperations**

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**Aim.** The number of heart valve replacement operations is increasing, survival period is longer and the number of reoperations is increasing too. At our Heart Surgery Centre from 1967 till 2004 7,646 heart valve replacement operations were performed. During this period 514 reoperations for 477 patients were performed due to various complications.

**Methods.** Patients were divided in groups. The most numerous group was of patients with paraprosthetic leaks (159 patients - 174 operations), 33.9% of all reoperations. Main reason of paraprosthetic leaks was sepsis - 40.8% of all reoperated patients. Parasthetic thrombosis had 18.2% of all patients. Lately more and more thrombosis are related with sepsis. Important number of operations is those with addressed prosthetic valve complications. In these cases usually first correction was not sufficient during the first operation or heart valve disease was not exactly established or because of the progress of the main disease. Aortic and mitral valve operations were 68 (14.3% of all operated patients). Another group of operations was of tricuspid valve insufficiency correction after mitral valve replacement, 52 patients (10.9% of all operations). There is a group of patients reoperated due to the degeneration of biological prosthesis, dysfunction of mechanical valves, coronary arteries disease, ascending aorta aneurysm after aortic valve replacement. The number of reoperations due to wear of prosthesis is increasing too. These operations are usually performed together with other valve surgical corrections. Thirty-seven patients underwent few reoperations (35 patients had 2 reoperations and 4 patients 3).

**Results.** Results of reoperations due to paraprosthetic leak are closely related to the patient's condition before operation, type of operation and infection. Mortality rate of operated patients is 51%. Up to 2001 mortality rate was 38% and during the past 4 yrs - 16.6%. The highest mortality is in the group of patients reoperated due to infectious complications and at the end stage of disease (70% after aortic valve operations and 49% after mitral valve operations). Lately results are better (17.7% of all paraprosthetic leak operations). Mortality rate of patients of IV F.C. operated due to prosthetic thrombosis decreased from 60% to 37.5%.

**Conclusion.** The number of reoperations is increasing, but due to the improvement of operation methodologies and advances in diagnostic of complications, mortality rate is decreasing.

**V053**

**Surgical treatment of valve endocarditis: eleven-year experience**

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**Aim.** We evaluated our 11-year experience in treating native and prosthetic valve endocarditis (VE) in a retrospective analysis of 60 cases operated on, with a 74 month mean follow up.

**Methods.** In our center from April 1993 to December 2004, 60 patients underwent valve surgery for endocarditis of the native (group I) or prosthetic valve (group II). In group I, there were 40 patients (29 male, mean age 50 ± 12.7); nine patients (22%) were in cardiogenic shock and were operated on emergency basis; the infected valve was aortic in 23 cases (38%), mitral in 10 (25%), both aortic and mitral in 7 (17%). Twenty-seven mechanical and 9 biological prostheses were implanted. Fourteen associated procedures were performed. In group II there were 20 patients (17 male, mean age 57 ± 14); 6 patients (30%) were in cardiogenic shock; the infected prosthetic valve was aortic in 14 cases (70%), mitral in 2 (10%), both aortic and mitral in 1 (5%), and a permanent pacemaker wire on tricuspid valve in 3 (15%). Eight mechanical and 10 biological prostheses were implanted. Twenty associate procedures were performed. Infective micro-organisms was identified in 71% and 84% of group I and group II, respectively. The most common infecting organisms were Strepotococcus in group I and Staphilococcus in group II.

**Results.** The overall hospital mortality was 13.5% (8/60); it was considerably higher in the group II [30% (6/20)] than in the group I [5% (2/40); p = 0.013]. Myocardial failure with low output syndrome was the cause of death for all patients. There were two late cardiac deaths in group I (5.2%) and 1 in group II (7%). Ten-year survival rates were 0.27 ± 0.20 (HR 1.28 ± 0.75) and 0.94 ± 0.03 (HR 0.05 ± 0.03) in group I and II, respectively (E2 = 12,762; p = 0.0004). The extent of exposure to risk of death was 2.34 in the group II (Relative Rate (RR) = 2.97) and 6.65 in the group I (RR = 6.30).

**Conclusion.** Native VE surgery showed acceptable risk and good early and late results, where prosthetic VE surgery presented high early mortality and poor long term results with high number of associate procedures. If repair is not feasible the choice of the device seems to be not crucial. Emergency operation, when needed, is justified, particularly in native VE.

**V054**

**Infective endocarditis of the aortic valve: surgical treatment using fresh, antibiotic sterilized aortic homograft**


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**Aim.** Our aim is to evaluate short and long-term results of surgical treatment for infective endocarditis of the aortic valve, using fresh, antibiotic sterilized aortic homograft.

**Methods.** From January 1st, 1996 through December 3rd, 2004 1,112 patients underwent isolated aortic valve replacement at our institution. There were 67 patients with active infective endocarditis (IE) of the aortic valve (51 of the native valve, 8 of the prosthetic valve, 6 of the composite graft, and 2 of the previously implanted aortic homograft). Prosthetic valve was aortic in 23 cases (58%), mitral in 10 (25%), both aortic and mitral in 7 (17%). Ten-year survival rates were 0.64 ± 0.03 (HR 1.28 ± 0.75) and 0.94 ± 0.03 (HR 0.05 ± 0.03) in group I and II, respectively (E2 = 12,762; p = 0.0004). The extent of exposure to risk of death was 2.34 in the group II (Relative Rate (RR) = 2.97) and 6.65 in the group I (RR = 6.30).

**Conclusion.** Fresh, antibiotic sterilized aortic homograft is a valuable and durable biologic material for patients with IE of the
aortic valve. Hemodynamic characteristics of the homograft are superior to other alternatives available (particularly in sizes ≤23), while long-term degeneration rate is acceptable. Minimal amount of foreign material implanted and wide range of reconstructive options that homograft offers, makes it an ideal option in cases where annular destruction and fistula formation is present. Low cost of this excellent aortic valve substitute is another important aspect, particularly in countries with limited resources.

V055

Predictors of adverse and favorable outcomes in patients undergoing surgery for infective endocarditis


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Aim. Limited data are available regarding specific surgical factors as they relate to outcomes of infective endocarditis (IE) requiring surgical treatment. We present a review of our surgical experience from a large, heterogeneous population representing a wide range of racial and socioeconomic patient populations.

Methods. The study was conducted as a retrospective review of 197 consecutive patients treated surgically for IE within a single system of university-based hospitals during a 13-year time interval through January 2004.

Results. In our series of patients requiring surgical treatment for IE, in-hospital mortality was 14% (28/197). Patient demographics included: mean age 45.5 ± 14.4, 65% male, 49% Caucasian, 34% Black, and 9% Hispanic. Valve procedures were performed as follows: aortic replacement(102/repairs(36), mitral 97/67, tricuspid 81/18, pulmonic R = 7/10. Patients undergoing nonelective surgery had an increased mortality rate (p<0.01) as did those requiring valve replacement (p<0.01) or intra-aortic balloon pump placement (p<0.01). A finding of valve perforation was associated with improved survival (p<0.01). Other statistically significant perioperative factors predictive of mortality included: procedure time, cross-clamp time, cardiopulmonary bypass time, volume of intraoperative blood loss, requirement for intraoperative volume of (each) PRBC, platelets, and volume of platelet transfusions.

Conclusion. Duration of surgery, nonelective surgery, and need for blood products all predict hospital mortality in patients treated surgically for IE. Patients requiring valve replacement also had increased mortality, likely related to more extensive disease. Valve perforation was associated with improved hospital survival, which may be explained by reparability of such a lesion, but certainly warrants further investigation to better define this population demonstrating improved outcome.

V056

Influence of the total body controlled hyperthermia on an organism increase of resistance to infection in patients with infective endocarditis

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Aim. The fever is a protective-adaptive reaction of an organism in struggle against an infection. We used this physiological phenomenon in the treatment of patients with infective endocarditis (IE) by creating artificial rise of a patient's body temperature during operation, applying total body controlled hyperthermics perfusion (TBCHP). The aim was to study influence of TBCHP on mechanisms of immunobiological processes of the patients with IE.

Methods. Influence of TBCHP was applied to organism of 123 patients with IE at the age of 42.8±1.2 yrs. It was established, that 99% of them had the secondary immunodeficiency of III or IV degree. Persistence of a chronic virus infection (family Herpesviridae, a virus hepatitis), in 62.3% cases S.epidermidis was found. Perfusion parameters of patients with IE, who were operated on conditions of hyperthermia: perfusion duration is 153.2±6.5 min, aorta cross-clamping duration is 91.45±3.3 minutes, patients warming time up to 370 C was 30.0±1.2 min and hyperthermic period (HP) made up 30.0±1.34 min. Immuno biological parameters and factors of an inflammation were studied in the blood serum judging the levels of FNO-Éø IL-6 with the use of French test-system ÄgImmunotech Ah the levels of component of factor C3 using Sentinel CH, Italy. A phenotype study of lymphocytes subpopulations to receptors CD3+ CD4+ CD8+, CD16+, CD95+ was performed with help of monoclonal antibodies (Russia).

Results. The long antigen bacterial-virus influence entailed intoxication of patients organism, accompanied with violation of immunological, metabolic and an inflammatory reactions. Activation of CD95+-apoptosis is observed with increases of suppressive component of the cellular immune response. Dysfunction of CD16+ leads to violation of cytokines and the inflammatory factors, which contribute to liquidation of the infection. Metabolic intoxication in the system inflammatory response of patients with IE is due to imbalance of the POL and the AOA of WMM and reduced CD3+ and CD4+/CD8+; the C3 component of compliment, IL-6 and RIL-2 were activated. TBCHP for 30 min at 39.5Åã C entails activation of immunobiological and metabolic processes and the organism immunoreactivity increase of the patients with IE.

V057

Role of intraoperative transesophageal echocardiography in patients undergoing valve replacement

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Aim. The role of intraoperative transesophageal echocardiography in valve replacement is not well established. The AIM of this study was to evaluate the role of TEE in early post pump valve replacement surgery.

Methods. A prospective study was done on 211 patients (46% male, mean age=52±12). Prepump and postpump TEE was performed in all patients. A single valve was replaced in 165 patients (78%) and two or more valves were replaced in 46 patients (22%) Overall 269 valves were inserted: mitral, 142 (92 mechanical, 50 biological); aortic, 102 (61 mechanical, 41 biological); tricuspid 25 (3 mechanical, 22 biological).

Results. Unexpected pathologic echocardiographic findings on postpump TEE necessitated immediate surgical correction in 7 patients (3.3%): paravalvular leak in 4 patients (3 mitral, 2 aortic), immobili- zed leaflet in 2 patients (1 mitral, 1 tricuspid), Coronary obstruction by an aortic bioprosthesis in 1 patient. Prolonged removal of air was necessary in 24 patients (11.4%). In 28 patients (13.3%) TEE was used to evaluate patient with difficult pump weaning and to its appropriate therapeutic management.

Conclusion. Immediate postpump TEE is an important diagnostic and therapeutic role in valve replacement surgery.

V058

Evaluation of paravalvular jet in valve replacement before and after protamin detected by intraoperative transesophageal echocardiography

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Aim. Multiple paravalvular jets following valve replacement decrease after anticoagulation reversal with protamin. Their significance, however, must be evaluated.
Methods. Forty-eight patients who had mitral aortic valve replacement surgery underwent intraoperative transesophageal echocardiography so as for the number, length and area of their paravalvular jets to be assessed before and after protamin.

Results. Fifty-three valves (20 aortic and 33 mitral) were replaced in 48 patients. In 5 patients, there was no jet after valve replacement. Eighty-six jets were detected: 17 in aortic and 69 in mitral positions. The length of jets decreased significantly (1.62±0.35 cm for aorta and 1.82±0.45 cm for mitral) before protamin vs 0.41±0.52 cm and 0.63±0.706 cm after protamin, respectively (P<0.001). Jet areas also decreased significantly (0.95±0.306 cm² for aorta and 1.16±0.418 cm² for mitral) before protamin vs 0.25±0.320 and 0.38±0.508 after protamin, respectively.

Conclusion. Multiple paravalvular jets in valve replacement surgery improve significantly after protamin.

V059
Compression between risk of primary and repeat mitral valve replacement
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Aim. Prosthetic valve replacement requires to choose between mechanical valves that need to careful anticoagulation while bioprosthetic valves with risk of degeneration. This study designed to evaluate risk of reoperation to better make decision.

Methods. We evaluated 48 patients undergoing repeat mitral valve replacement and compared with 164 control patients undergoing primary mitral valve replacement.

Results. There were no significant differences between primary and repeat groups in age (mean 51±12 vs 53±11 yrs), sex (female 58% vs 59%), NYHA class, and ejection fraction. The indication for reoperation in the repeat group was structural dysfunction in 20 patients (54.2%), paravalvular leak in 13 (27%), nonstructural dysfunction in 4 patients (8.3%), progression of other native valve disease in 5 (10.4%). Mean time to reoperation was 12.2±5 yrs. There were 2 deaths of 48 patients in repeat group (4.2%) and there were 6 deaths of 164 patients in control group (3.7%) (P>NS).

Conclusion. The risk of repeat mitral valve replacement was not significantly more than primary mitral valve replacement. It can help us to choose bioprosthetic valves for younger patients.

V060
The comparison of midterm results of aortic valve replacement on left ventricular function those are made with st. Jude and carbomedics mechanical aortic valve prostheses
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Aim. For the patients with aortic valve disease and aortic mechanical valve replacement is implanted, we expect an improvement at the patients functional capacity, left ventricular function, and systolic gradient across the aortic valve. In this study we investigated the effects of aortic mechanical valve replacement with St. Jude and carbomedics valves on the left ventricular function, and systolic gradient at the postoperative 1st year.

Methods. This study was performed at Izmir Ataturk Education and Research Hospital between april 2001 and december 2003. Forty one patients with isole aortic valve disease and those were aortic mechanical valve implanted were included in the study. The patients with additional coronary artery hearth disease, and additional valve disease those needed intervention weren included in the study. In twenty-two patients (53%) we performed St. Jude mechanical valve. Fifteen of them were male and 7 of them were female. In nineteen patients we performed valve replacement with carbomedics valve. Twelve of them were male and 7 of them were female.

We examined the patients in whom we implanted 19, 21, 23, 25 size mechanical aortic valve in their functional capacity, ecocardiographic parameters, and left ventricular mass index according to their mechanical valve trademark and size.

Results. There was no mortality in the study for the patients with 19-sized aortic mechanical valve there was no significance alteration in their NYHA class, ecocardiographic parameters, and left ventricular mass index. For the other aortic mechanical valve sizes and trademarks there was a significance impairment in two groups.

Conclusion. For the patients to whom we implanted aortic valve there were a significance impairment in their left ventricular function and diameters, but there was no significance difference between St. Jude medical and carbomedics mechanical valves.

V061
Aortic annulus enlargement in our cardiac surgery department 2001-2005
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Aim. The treatment of the significant aortic stenosis is surgical. In some cases there are mismatch between the aortic annulus area and the body surface area, the small aortic annulus represents one of the most vexing problem to the cardiac surgeon. In this situation such a little sized aortic prosthesis would be implantable, as it would maintained a high gradient between the left heart chamber and the aorta. The Patient Prosthesis Mismatch is an extremely important variable that predicts morbidity and mortality. Severe PPM is particularly deleterious in patients with poor Left Ventricular function. To handle the small aortic annulus there are 3 aortic annular enlargement procedures in adults (apico-aortic bypass, Manougian and the Nicks procedures) and the Konno procedure is useful in children. The postoperatively indexed Effective Orifice Area (EOA) can be predicted preoperatively. A strategy wich preoperatively adress the potential for mismatch postoperatively will have a significant benefit on mortality.

Methods. In the autorAs practice the aortic annulus patch plastique is to be in use for the enlargement of the aoric annulus. In the years of 2001-2005 we performed 518 aortic prostesis implantation. In 34 cases was the patch plastique procedures done.

Results. The patients were in NYHA stadium before the operation: I-1, II-4, III-24, IV-5. The mean transvalvular grade was before the operation: 48-101 (mean 72 mmHg). The enlarged annulus: 21-29/34, 19-5/34. Aortic crossclamp time: 54-115 (mean 85) min. The transvalvular mean grade after the operation was: 21-39 (mean 32) mm Hg, and the NYHA stadium: I-10, II-22, III-19, IV-0. The mean crossclamps time was 85 minutes. There were 2 haemorhagic sequelae. The patients are in a good conditions after the operation and they are under regular medical control.

Conclusion. The autors assess, that the method is usefull, it does not extend substantially the duration of the operation and the rate of sequelae is low in a practised hand. In summary, PPM can largery be avoided with a good strategy.
AIM of this study was to describe the technique and the results obtained from the aortotomy reinforcement with autologous pericardium in the surgical treatment of aortic valve.

Methods. From 1999 and 2003, a total of 23 patients with atherosclerotic, thin and friable aorta identified intraoperatively, with mean age of 69±10.2 yrs, 16 (69.6%) female, were selected at the Heart Institute University of S. Paulo Medical School for the aortotomy suture reinforcement with autologous pericardium in the surgical treatment of aortic valve. Were excluded patients with aortic diameter measured preoperatively by the echocardiogram higher or equal than 4.2 cm. Any patients need surgical intervention. There was not any death during the follow-up. There was no statistical significance for the aorta diameter before and after the procedure (34.29±4.2 mm, respectively, p=0.17).

Conclusion. The reinforcement of the aortotomy suture with autologous pericardium is a simple and secure technique.

V064
Surgical treatment of active infectious aortic valve endocarditis with associated perivalvular abscesses
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Aim. to study the influence of preoperative state for postoperative and remote results of patients operated due to infectious aortic valve endocarditis with associated perivalvular abscesses.

Methods. Retrospective analysis of 17 patients operated at our Heart Surgery Center from 1994 up till 2004. During the operations infectious valve endocarditis and paravalvular abscesses were found. Age of patients was 25-72 yrs (mean 50.9±13.4 yrs), 15 men and 2 women (82.4%). Eight patients suffered from native endocarditis and 9 prosthetic valvular endocarditis. Diagnoses were made from clinical, microbiological and echocardiographic data. Main indication for surgical treatment was heart failure. All patients before operation were in serious conditions 15 patients (88.2%) of IV NYHA functional class. One patient had complication - atrioventricular blockade. Eleven (64.7%) had no growth of pathologic flora and the rest _ 2 had Staphylococcus epidermidis, 2 _ Acinetobacter, 1 _ Haemophilus influenzae, 1 _ Enterococcus sp. All patients underwent treatment with antibiotics. During the operation mechanical valve prosthesis, teflon patches, homografts, allografts were used. Postoperative follow-up was carried on and reasons of hospital and remote mortality, postoperative complications were analysed.

Results. Transesophageal echocardiography is very valuable method for diagnostics and choosing tactics for surgical treatment. Major examination data - 14 patients (82.4%) - corresponded to the findings during the operations. During the hospital period 3 (17.6%) patients died. Two from them had their aortic valve prosthesis replaced because of prosthetic valve endocarditis. Twelve patients follow-up during the remote period had shown that 8 patients (67%) were in satisfactory conditions, aortic valve prosthesis functioning normal. One patient had paraprosthetic valvular fistula diagnosed after 6 month after the operation but without complaints, 1 patient had remaining left ventricle inotropic disorders. During the second postoperative year 1 patient died, operated due to prosthetic valve endocarditis. In spite of antibiotic treatment he suffered recurrent infection (pathological flora _ Enterococcus sp.). One patient operated because of prosthetic valvular endocarditis died from acute coronary insufficiency 5 month after the operation. General mortality rate (hospital and remote) _ 29.4%

Conclusion. Transesophageal echocardiography is very useful for diagnostic of perivalvular abscesses. High hospital mortality rate was remaining regardless aggressive surgical intervention. Postoperative mortality rate was higher for patients with prosthetic infectious endocarditis. Complications during remote period were: recurrent infection, heart failure and mostly for patients with prosthetic valvular infectious endocarditis.

V065
The use of the stentless epoxy-treated aortic valves in active infective endocarditis
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Aim. Our aim was to determine the outcome after aortic valve replacement (AVR) with stentless epoxy-treated bioprosthesis in active infective endocarditis.

Methods. Between April 1999 and December 2004, 63 patients (56 men and 7 women, mean age, 45.5±12.1; range, 16 to 67)
underwent AVR for active infective endocarditis in our institution using stentless epoxy-treated valves. 58 patients (92.1%) had native aortic endocarditis, and 5 patients (7.9%) had prosthetic valve endocarditis. Sixty patients (95.2%) were in NYHA class III-IV. Kemerovo-AB-Mono valve was implanted in 24 patients (38.1%), Kemerovo-AB-Composite in 38 (60.3%), and Kemerovo-AB-Composite-Conduit in 1 (1.6%). A subcoronary implantation technique was used in 60 cases (95.2%), mini-root in 1 (1.6%), and a total root re-placement in 2 (3.2%). Forty-two patients (66.7%) were examined in follow-up period (mean, 23.2±12.3; range, 4 to 51 months).

Results. Hospital mortality was 9.5% (6). Postoperative echocardiography revealed significant differences (p=0.01) in reduction of the left ventricular (LV) end-diastolic dimensions, the LV end-diastolic volume index, the LV mass index and the LV stroke volume. There was no evidence of early prosthetic valve endocarditis in any of patients. Five-year freedom from valve-related death, reoperation, embolism and prosthetic endocarditis was 84%, 93%, 97% and 76%, respectively.

Conclusion. The use of the stentless epoxy-treated bioprosthesis in active infective endocarditis allows to achieve a high level of survival at low rate of valve-related complications.

**V066**

Early experiences and short-term follow up with the solo freedom stentless pericardial aortic heart valve

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Aim. Due to the aging population demographics and the need to avoid anticoagulation, a wide range of biological heart valves is available on the market. Stentless valves have gained in popularity because of advantages in hemodynamics and durability compared with stented bioprostheses. In addition, surgeon-friendly implantation is an important factor. This study was conducted to evaluate the benefits of the SOLO FREEDOM aortic heart valve with the postoperative hemodynamics and clinical outcome.

Methods. Between October 2004 and January 2005, 9 patients (3 women, 6 men mean age 77.4 yrs) underwent first time aortic valve replacement with the above mentioned valve. The indication for surgery was severe aortic stenosis. Four patients had concomitant myocardial revascularisation. Ejection fraction was over 50% in all patients. Postoperative echocardiographic examinations were performed before discharge from the hospital and again 3 months later.

Results. There was no surgical implantation problem, mean X-clamping time was 46.4 minutes for the valve-replacement only and no re-operation due to prolonged bleeding was necessary. All patients survived the early postoperative period; however one patient developed a transient ischemic stroke. Echocardiographic evaluation before discharge demonstrated favourable hemodynamics of the valve prosthesis with mean transvalvular gradients of 11.7 ± 4.8 mmHg. Transvalvular gradients were even lower after three months follow-up. No regurgitation across the valve was seen in any of the cases.

Conclusion. Early experience with the SOLO FREEDOM aortic heart valve is encouraging. It offers excellent hemodynamic results and low transvalvular gradients. It is a suitable device for patients in whom anticoagulation should be avoided, and offers a very surgeon-friendly implantation with short X-clamping time.

**V067**

Is durability of stented aortic valve bioprostheses shortened by atherosclerotic burden?

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Aim. Our aim was to determine if arteriosclerosis plays an important role in structural valve deterioration (SVD) of stented aortic bioprostheses, identify main causes of explants on patients with bioprosthetic aortic valves, identify if lipid profile, peripheral vascular disease or coronary disease are related to SVD.

Methods. Form 1982 to 2002, 2 621 aortic bioprosthetic valves were placed in a population of patients over 18 yrs of age, who had concomitant coronary bypass grafting(CABG). Two types of valves were used. Carpenter-Edwards porcine and bovine. The primary end point was to study the valve explants for SVD. The patients were followed at two-year intervals questionnaire. The time-related events of explants for SVD were analyzed both nonparametrically and parametrically in order to obtain hazard function. We were focused on SVD itself and its determinants. These patients were pairmatched by a greedy matching algorithm. Freedom form SVD and hazard functions for SVD were empared among the matched pairs.

Result. Structural valve deterioration was the most common indication for explants. The dominant mode of failure for pericardial prostheses was calcification, whereas it was degenerative (torn cusps) in porcine valves. Both types of prostheses had an equal tendency to fibrosis and dehiscence. Overall freedom form explant for SVD at 5, 10, 15, 20 yrs was 99%, 94%, 77% and 50% respectively. Freedom for SVD was similar for pericardial and porcine prostheses. When patients were matched pericardial valves appeared to be slightly more durable than porcine valves. Young age was determined as a dominant risk factor and smaller patients were at somewhat less risk of SVD, neither, the presence of coronary artery disease, peripheral vascular disease, nor lipid profile appeared to be associated with SVD, even with age suppressed.

Conclusion. SVD was not observed to correlate with coronary artery disease, peripheral vascular disease or elevated lipid profile. Calcification and deterioration of the valve are the mayor reason for explant. Young age and heavier body weight are important risk factors for presenting SVD.

**V068**

Tricuspid valve replacement, mechanical versus biological prosthesis: an analysis of 23 years of experience

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Aim. Tricuspid valve replacement (TVR) procedure is uncommon in clinical practice. But the choice between mechanical and biological prostheses still remains controversial. Therefore we review the results of our center during last 23 yrs.

Methods. Between 1981 and 2004, 51 patients underwent tricuspid valve replacement at Vilnius Heart Surgery Center. 24 (47%) of them underwent replacement with mechanical prosthesis (group I), 27 (53%) bioprosthesis (group II). All data were described as mean±SD or percentage.

Results. Patients age with mechanical prosthesis was 54.9±8.7, compared with 47.3±16.7 yrs in those who underwent replacement with biological prosthesis (p=0.7). There were 8 male and 16 female in group I, and 13 male and 14 female in group II. Isolated TVR was performed in 19 (79.2%) patients, 5 patients were undergoing double valve replacement in mechanical valve group, 18 (66.7%) patients with isolated replacement and 10 double valve replacement in biological valve group. New York Heart Association class was assessed before operation, it was 3.8±0.4 in group I, comparing to 3.4±0.6 in group II (p=0.02). Operation was urgent in 8 (33.3%) patients from mechanical valve group versus 5 (18.5%) patients in biological valve group. 16 (66.7%) patients in first group and 9 (33.3%) in second group were undergoing repeat procedure (p=0.05). Early (up to 30 days) survival rate comparing between groups was 62%±2% (group I) and 85%±6% (group II), p=0.02.

Conclusion. The use of biological prosthesis in tricuspid position is a good option for patients because of high early survival and less prosthesis failure events.
P001
Thirteen-year experience with the arterial switch operation
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Aim. Arterial switch operation (ASO) is considered the most appropriate procedure for transposition of the great arteries. We analyze our experience in St. Petersburg, Russia with the ASO over the past 13 years.

Methods. From May 1992 to April 2005, a total of 163 patients underwent an arterial switch operation for transposition of the great arteries. 117 patients (72%) were newborns. Group I (n=87, 53.4%) comprised patients with transposition of the great arteries with intact ventricular septum. Group II patients (n=76, 46.6%) had transposition of the great arteries with an additional significant ventricular septal defect, including 14 patients with Taussig-Bing heart. The ages ranged from 16 hours to 7 years (median 15 days) and weight ranged from 1.7 to 26 kg (median 3.5 kg). Twelve patients had pulmonary artery banded before the ASO (7%). 21% of patients continued to get PG1E1 infusion by the time of the operation. Rashkind procedure was necessary in 19% (31/163) patients. Eight patients required concomitant relief of associated obstruction of aortic arch. Circulatory arrest was employed in 86 (53%) of all patients. Delayed sternum closure was used in 41% (67/163).

Results. Operative mortality was 10.3% (9/87) in group I and 19.7% (15/76) in group II with an overall mortality of 14.7% (24/163). Cases of single coronary artery were associated with higher perioperative mortality. There were 4 late deaths due to pulmonary hypertension (2), coronary stenosis (1) and sudden (1). Only 3 patients required reoperation for pulmonary stenosis. There is one patient with severe neurological deficit and one with persistent AV-block.

Conclusion. ASO remains the procedure of choice for the treatment of various forms of TGA with acceptable early and late outcome in terms of overall survival and reoperation rate even in the society with the limited medical resources. Good long-term results are obtained in operative survivors following the arterial switch operation.

P002
Optimum timing for early definitive repair of fallot tetralogy under the age of 12 months
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Aim. To assess the impact of early corrective surgery on morbidity and mortality in patients with Tetralogy of Fallot (TOF).

Methods. Data from all patients under 12 months of age undergoing correction of TOF between February 1997 and July 2003 were collected retrospectively. Outcome data for mortality, post-operative care management and major morbidity were analysed. Patients with multiple major associated cardiac anomalies such as multiple ventricular septal defects (VSD) and complete atrio-ventricular (AV) canal defect were excluded from this study.

Results. A total of 52 operations were performed during the study. The mean age at surgery was 5 months (range 1-12). 16 (30.8%) patients were less than 3 months of age of whom 2 were neonates. 22 (42.3%) patients were between 3 to 6 months of age while 14 (26.9%) patients were between 7- and 12-months-old. There were 2 (3.8%) deaths and the causes of death were cerebrovascular accident and acute infective endocarditis. There were no age related differences in post-operative morbidity. Table I shows the increase in number of days (d) required for post-operative ventilation, ITU stay and in-hospital stay for patients under 3-months old.

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Ventilation (d)</th>
<th>ITU stay (d)</th>
<th>In-hospital (d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 3-months-old</td>
<td>3.7±1.20</td>
<td>11.0±4.10</td>
<td>24.7±8.92</td>
</tr>
<tr>
<td>3- to 6-months-old</td>
<td>1.35±0.15 *</td>
<td>5.07±0.76  *</td>
<td>14.80±1.32</td>
</tr>
<tr>
<td>7- to 12-months-old</td>
<td>1.43±0.23*</td>
<td>3.93±0.63*</td>
<td>13.6±1.18*</td>
</tr>
</tbody>
</table>

(Data is presented as mean ± SEM. * p < 0.05 v < 3-month-old)

Conclusion. Early definitive repair of TOF can be performed on patients under 6-months-old with excellent outcome when compared to late infancy. However the in-hospital morbidity particularly the duration of ventilation and the ITU stay were significantly higher in patients less than 3 month of age.

P003
Tetralogy of fallot in infants: is it a chance to decrease percent of transannular patching
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Aim. The aim of the study is to analyze the results of quantitative evaluation of natural pulmonary artery annulus valve (PV) evolution in patients with tetralogy of Fallot (TOF) and to represent the first experience of total correction in infancy.

Methods. By the computer program developed in our center was evaluated PV natural evolution on the group of 23 patients with TOF without any correction. Each patient underwent 3 echocardiographic examinations consequently at 31; 92; 181 days. Second group 11 patients, age 91±39.3 days, underwent primary correction of TOF.

Results. In the first group of patients PV diameter was normal in 8 (34.8%) patients. Hypoplastic PV registered from the first echocardiographic examination in 1 (4.3 %) cases, from second and third consequently 11 (47.8%), 15 (65.2%). In the second group 4 (30%) patients age 25-93 days with RVOT reconstruction without transannular patch. Hypoplastic PV in 7 (64%) patients, age 97-124 days. For RVOT reconstruction transannular patch was used. There was 1 hospital death (9.1%) in the group of patients with transannular patch.

Conclusion. Natural evolution of PV in patients with TOF in 65.2% provides hypoplasia. PV diameter in patients with TOF until 3 month old is normal in 52.2%, that gives a possibility for RVOT reconstruction without transannular patch.

P004
Reoperation after correction of tetralogy of fallot
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Aim. Although the immediate results of radical correction of tetralogy of Fallot are excellent, long-term follow-up has shown that the number of reoperations has increased in many centers. We describe patients which underwent a second or third procedure after radical operation for Tetralogy of Fallot.

Methods. Between 1965 and 2004, 421 patients underwent complete correction of tetralogy of Fallot. 41 patients underwent reoperation after total correction (9.7%). The indications for surgical repair were recurrent or residual lesions alone or in combination with other lesions. The reoperations consisted of closure of residual ventricular septal defect (VSD) in 21 patients (51.3%), closure VSD and relief of residual right ventricular outflow tract (RVOT) gradient in 2
such cases in literature), aged between 2 years 9 months and 12 years, 2 of them male, with DORV combined with APW were exami-
ned. Ventricular septal defect, right ventricular outflow tract gradient and pulmonary artery regurgitation were the main indications for a second operation.

Conclusion. The surgical results of a second procedure after radical correction of tetralogy of Fallot were satisfactory. Right ven-
tricle-pulmonary artery conduits were the most frequently used tech-
nique for relief of pulmonary regurgitation.

P005
Double outlet right ventricle combined with aortopulmonary
window
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Aim. Our aim was to present the results of diagnostic and surgical treatment of double outlet right ventricle (DORV) combined with aortopulmonary window (ARW).

Methods. From 1985 to 2004, 5 patients (we have found only 2 such cases in literature), aged between 2 years 9 months and 12 years, 2 of them male, with DORV combined with APW were exami-
ned. The complex of diagnostic examinations included 2-D echo-
cardiography with Doppler echocardiography, catheterization of the heart with angiography, biopsy of the right lung in one case.

Results. Visceroatrial situs solitus with concordant atrioventricular connections and bilateral conus were observed in all cases. Anatomo-
cial variations of DORV were the following: 'tetralogy of Fallot type' (n=2) and 'VSD type' (n=1). APW was located in the middle part of the septum in 2 patients (intermediate type) and proximally - in 1 (proximal type). Two patients ('tetralogy of Fallot type' and 'VSD type') were successfully operated on. The surgical correction included: standard procedure for correction of DORV with subaortic VSD and transaortic closure of APW with a patch. The oldest patient was considered to be inoperable (IV-V stage by Heath, Edwards).

Conclusion. In accordance with the type of APW and DORV anatomy the following variants were identified: intermediate APW with DORV 'tetralogy of Fallot type', intermediate APW with DORV 'tetralogy of Fallot type', proximal APW with DORV 'tetralogy of Fallot type'. The timely diagnostic of the combination of DORV with APW gives the oppor-
tunity of successfully complete surgical correction of this pathology.

P006
Lung pathology following cardiopulmonary bypass in patients with down syndrome and common atrioventric-
ular canal
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Aim. On the one hand, there are some histological varieties of miscellaneous tissue in patients with Down syndrome in comparison to those without it. On the other hand, there is known harmful ischemic influence of cardiopulmonary bypass on lung tissue. The aim of the study was to parallel the status of lung tissue in patients with Down syndrome and those without it, as the subject of cardiopulmonary bypass (CPB) used for surgical correction of cardiac anomaly. The patients were divided into two groups: patients with Down syndrome (CAVC-DS) and two patients with CAVC but without Down syndrome (CAVC-non-DS), aged 3 to 7 months, were operated on (total correction of CAVC). Aortic clamping time ranged from 42 to 71 minutes and total CPB time from 60 to 115 minutes. Perfusion flow rate oscillated from 2.4 to 2.7 L/min/m². Systolic pul-
monary pressure varied from 37 to 53 mm Hg before operation and from 24 to 39 mm Hg after surgery. Surgical biopsies of pulmonary tissue were taken immediately after completing CPB and protamine injection. Staining was performed with haematoxillin-eosin and with fuchsin and methyl green for evidence of red cells. Twenty five spec-
cimens (taken from five patients) were analyzed using light micro-
scopy computer imaging. Volume of haemorrhagiae in pulmonary tis-
uce and other pulmonary histostructure parameters were estimated (15 different in sum). Statistical analysis was based on Student and χ² tests and on p <0.05.

Results. Lung tissue of CAVC-DS patients demonstrated much more severe intra-parenchymal hemorrhages than that of CAVC-non-
DS patients. The former revealed significantly decreased general alveolar number, number of alveoli adjoining to one alveolus and whole parenchymal development. No obstructive changes in micro-
vascular net in any specimens were observed.

Conclusion. We conclude that CAVC-DS patients have much more severely intra-parenchymal hemorrhages, which developed during CPB and were associated with the ischemia-reperfusion injury of the lungs. We state that CAVC-DS patients have an altered histostructure of lung tissue in opposition to normal lung tissue in CAVC-non-DS patients. They have a pulmonary parenchymal hypo-
plasia or otherwise a structural pre-emphysema.

P007
Atrioventricular valves regurgitation: surgical conside-
ratings within the fontan procedure
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Aim. Atrioventricular valves regurgitation is one of the risk factors worsening the results of univentricular correction of the complex congen-
tal heart lesions. The purpose of this study was to determine the surgical tactics and the results of the Fontan procedure in complicated cyanotic cardiac anomalies with atrioventricular valvular regurgitation.

Methods. Since 1983 we have performed 502 operations of partial and complete bypass of the right heart: 278 Fontan procedures and 224 bidirectional cavopulmonary connection. Fifty patients (10.4%) had atrioventricular valvar regurgitation of the different degree. Sixty-eight percent of patient had severe, and 32% had moderate tri-
cuspid, mitral or common atrioventricular valve regurgitation on their preoperative Doppler echocardiograms. Fifteen children (median age 7.7 years (range: 4 to 22 years) with moderate or severe atrioven-
tricular regurgitation underwent a De Vega annuloplasty (n=7), repair of an abnormal atrioventricular valve (n=1) and both (n=4) during a bidirectional cavopulmonary connection. During the Fontan procedu-
re atrioventricular regurgitation was corrected in 12 patients: a De Vega annuloplasty (n=5), repair of an abnormal atrioventricular valve (n=5) and additional semicircular annuloplasty (n=1), closure of the abnormal atrioventricular valve with the pericardial patch (n=1) and replacement of the systemic atrioventricular valve (n=2). Four patients with moderate atrioventricular regurgitation did not undergo any correction of the atrioventricular valve.

Results. There was no operative death. Hospital mortality in patients of bidirectional cavopulmonary connection group was 13.3%, there was no deaths in the group of patients without of the atrioventricular valves with common atrioventricular canal and 12.5 %. In all survivors, the degree of regurgitation decreased and in 84% of cases appeared to be satisfactory up to the patients AF dismissing. In 5 patients of the group without the correction of the atrioventri-
cicular valve moderate to severe regurgitation influenced postoperative complications and caused one death in 6 months after bidirectional cavopulmonary connection. Mean follow-up was 5.1 years (range 6 months to 4.5 years). In the majority of cases regurgitation did not increase. In one patient who had undergone a De Vega annuloplasty during a bidirectional cavopulmonary connection, the replacement of the atrioventricular valve was done.

**Conclusion.** The moderate and severe atrioventricular valves regurgitation during the partial and complete bypass of the right heart requires surgical repair. It is preferable to repair a-v valve regurgitation during bidirectional cavopulmonary connection.

**P008**

**Histomorphometric analysis of pulmonary vessels changes and its influence on the results of the fontan-type operations**

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**Aim.** The Fontan-type procedure is the only possible method of the surgical correction many congenital heart diseases (CHD) with single-ventricle physiology. We analysed specimens from intraoperative open lung biopsies performed on 22 patients aged 16 months to 15 years with such a heart physiology in relationship with surgical Results.

**Methods.** Congenital heart malformations which we observed were: univentricular heart (11 cases), tricuspid atresia (6 cases), other complex CHD (5 cases). Histomorphometric changes and the results of the hemodynamic correction were compared in three groups of patients: 1 - after previous pulmonary artery banding (7 patients); 2 - after modified Blalock-Taussig shunt (7 patients); 3 - with initially reduction of the pulmonary blood flow (8 patients).

**Results.** The most frequent histologic abnormality observed was extension of smooth muscle cells in the wall of distal intra-acinar pulmonary arteries (in all patients but 5) and increasing in percentage wall thickness of the proximal intra-acinar pulmonary arteries (5 patients after palliative surgery). The mean pulmonary artery pressure was less than 15 mm Hg in all patients except one of them after banding procedure. In this case the mean pressure was 24 mnmHg. Of the 22 patients who underwent partial cavopulmonary connection 15 had good surgical Results. The remaining 6 had complications (pleural infusion). One of them died (with initially reduction of the pulmonary blood flow) and the Fontan circulation taken down was performed in second patient (after banding procedure). The mean percentage wall thickness of distal intra-acinar pulmonary arteries was similar in all three groups of patients with relationship neither preoperative pulmonary arterial pressure nor outcome. But the mean percentage wall thickness of proximal intra-acinar pulmonary arteries (more than 50 m) was significantly greater in complicated cases especially in both patients with bad result (23 and 26% respectively).

**Conclusion.** Lung biopsy specimens were abnormal in 77% of all patients and in 38% of patients with low blood flow. There was no relationship between preoperative pulmonary arterial pressure and outcome. Great percentage wall thickness of proximal intra-acinar pulmonary arteries particularly after palliative surgery may be a risk factor even for partial cavopulmonary connection making.

**P009**

**Ten-year experience with heart valve replacement in infants and children aged four years and younger**

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**Aim.** Heart valve replacement in infants and children remains challenging because of patients’ growth relative to the size of prostheses placed, potential risk of anticoagulation with mechanical valves, and degeneration of biological prostheses. The aim of this study is to analyze early and long-term results of valve replacement in infants and children aged 4 years and younger.

**Methods.** We have reviewed our immediate and long-term results retrospectively, following heart valve prosthesis in pediatric patients. Over a 10-year period from January 1995 through December 2004, a total of 116 patients underwent valve replacement. Their age ranged from 2 months to 4 years (mean 2.1±1.2 years), and body weight varied between 5.5 and 17.0 kg (mean 11.0±0.5 kg). In 47 cases, valve disease was combined with other congenital cardiac malformations. Diagnosis included congenital mitral, aortic or tricuspid insufficiency, Ebstein's anomaly, corrected transposition of great arteries, and incomplete atrioventricular canal. During the surgical procedure, the following valves were replaced: mitral valve (n=73), tricuspid valve (n=25), mitral and tricuspid valves (n=1), arterial intraventricular valve (n=2), aortic valve (n=14), mitral and tricuspid valves (n=1). We used St. Jude Medical and Edwards mechanical prostheses as well as Bioniks and Biolab bioprostheses. Follow-up examination included echocardiography, chest x-ray examination, and blood coagulation tests. Cardiac hemodynamics was evaluated at rest and after exercise as well.

**Results.** Early mortality rate was 8.6% (10 patients). One patient required re-operation because of paravalvular leakage. Mean follow-up was 4.2 years (ranged from 1 to 8 years) and was 94% complete. One patient died late after surgery (mortality rate of 1%). There were no no re-operations. We did not observe any anticoagulation-related complications. Of those patients who survived, 87% were at New York Heart Association functional class I at the date of the last follow-up. On echocardiography, systolic gradient over the prosthesis was 11.0±4.1 mm Hg. Regurgitation never exceeded grade one. Left ventricular ejection fraction reached 59.4±9.0%. X-ray examination revealed the decrease in cardio-thoracic index compared to preoperative values (65.2±11.1% vs. 54.6±12.3%, p<0.05).

**Conclusion.** This experience demonstrates that heart valve replacement in infants and children aged four years and younger provides good early and long-term Results. Up to eight years after the operation, valve hemodynamics remained satisfactory in spite of children growth. The incidence of re-operations and anticoagulation-related complications is low. Thus, valve replacement should be reserved for pediatric patients in whom valve repair is not technically feasible.

**P010**

**Modified technique of proximal homograft anastomosis in Ross operation**

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**Aim.** Ross operation could be done with acceptable immediate and mid term Results. One of the early complications is bleeding, especially from the homograft proximal anastomosis. Vilnius modified technique prevents that complication.

**Methods.** Modified suture of proximal part of homograft prevent early bleeding after operation. New ring, made from surrounding right ventricle tissues, cover usually bleeding site of right ventricle. In last series of 78 patients, we don't have bleeding complications from proximal homograft suture.

**Results.** From 110 Ross operations 32 made in standard Ross technique and 78 using modified suture of proximal homograft anastomosis. From 32 patients in standard technique 3 have had rethoracotomy for bleeding from proximal homograft anastomosis, in 78 cases - only 1, but from another site (aortic ring).

**Conclusion.** Vilnius modified technique helps to solve bleeding problems from posterior wall of right ventricle outflow tract without glue and electro coagulation.
Mid-term results of pulmonary valve autotransplantation in adults
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Aim. Ross procedure is perspective alternative to different techniques aortic valve replacement in adults. Main advantages of Ross procedure is balanced by excellent hemodynamics, the potential for a permanent replacement for the aortic valve and no need for anti-coagulation.

Methods. Between 2000 and 2005, 65 adult patients underwent Ross procedure. Mean age was 41.7±18.6. In all cases we used total root replacement technique and in 6 patients autograft replacement was combined with enlargement of the tunnel-like obstruction of the left ventricular outflow tract (Ross-Konno procedure). In 59 cases we used diepoxide-fixed xenografts to reconstruction right ventricular tract and in 6 - glutaraldehyde-preserved. We fixed aortic annulus with xenopericardium in 10 (15.4%) patient (with aortic insufficiency) to prevent aortic root dilatation.

Results. The hospital mortality rate was 6.2% (4 patients). Two patients (3.1%) were re-explored for bleeding and one (1.5%) - periprocedural myocardial infarctions. The mean follow-up was 34.2±21.3 months and was 95% complete. There have been no late deaths and actuarial survival is 93% (no patient has died beyond the periprocedural period). According to clinical criteria, 94.8 % of the followed-up patients were in New York Heart Association (NYHA) functional class I or II. No patient has had a mean gradient across the autograft greater than 12 mm Hg. The diameter of the autograft annulus has been stable in follow-up in all patients. One patient had aortic insufficiency 12 months postoperatively that required valve replacement. The peak gradient across the xenograft valve in the pulmonary position was 22.4±7.3 mm Hg and two patients (3.1%) developed mild pulmonary xenograft stenosis with a peak gradient 37-39 mmHg.

Conclusion. The Ross procedure is an effective means of aortic valve replacement in adults. The technically demanding Ross procedure produced excellent clinical and hemodynamic mid-term results. It is thus an appealing alternative to the widely used replacement by a prosthetic valve.

Mid-term results of modified implantation of pulmonary autografts in bicuspid aortic valve disease
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Aim. To avoid pulmonary autograft failure in bicuspid aortic valve disease, where the aortic root itself is often asymmetric and dilated, a modification in surgical technique may be necessary.

Methods. Twenty-six patients with bicuspid aortic valve disease underwent partial supraannular implantation of pulmonary autografts. In 13 of these patients, additional tailoring of the non coronary sinus was performed, to correct the geometric mismatch. Patients were followed up one, two and five years postoperatively.

Results. There were no early or late deaths. One patient was reoperated for severe pulmonary autograft regurgitation, after reexposure for coronary ostial bleeding. Another two patients were reoperated for formation of subannular pseudoaneurysms, nine and 30 months postoperatively. Echocardiographic follow-up of the remaining patients showed no evidence of residual or recurrent pulmonary autograft regurgitation or progression of aortic root dilatation.

Conclusion. Adaptation of the asymmetric bicuspid aortic root to the autograft is important to achieve primary competence. Pseudoaneurysm formation with this technique remains a worrying aspect and stresses the importance of reinforcing the neoaortic root.

Ross procedure: follow-up results
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Aim. The aim of the study was to evaluate postoperative hemodynamic performance and to compare results in children and adults.

Methods. A total of 110 Ross procedures were performed between 1999 and 2005. Mean age was 23.7 years (range from 4 to 65). S6 (50.9%) were less than 18 years. All operations were performed as a total root replacement with supporting of the root with pericardial strips in 95, with synthetic strips in 5 and without strips in 10 patients. Function of the pulmonary autograft and homograft at rest and during exercise, changes of the size of the neoaortic root, function of the LV and RV were assessed.

Results. There were 6 (5.4%) early death (no deaths since 1999), 4 reoperations, 2 due to homograft, 1 due to autograft and 1 due to...
both valves failure. Aortic root dilatation was detected in all patients, progression of regurgitation due to dilatation was only in one patient (preoperatively-bicuspid AoV with pure insufficiency). Pulmonary autograft (PAG) was competent or with trivial regurgitation in 75 patients, mild in 31, moderate in 4 patients. There were no stenosis of the PAG at rest and during exercise. PAG valve size in growing patients was related to body surface area. Regression of the LVH was in all younger patients. Mean gradient through the homograft was 12mmHg, 3 patients less than 18 years have gradient more than >45mmHg, one underwent balloon dilatation of the homograft valve.

Conclusion. Ross operation leads to regression of LVH due to excellent haemodynamics of the PAG. Supporting of the PAG root with strips does not prevent of root dilatation, detected in all patients, progression of regurgitation was in one patient. Homograft stenosis more rapidly developed in younger patients.

P015
Use of cryopreserved homografts for surgical repair of congenital heart diseases: ten years experience
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Aim. Cryopreserved homografts (CH) are attractive alternative to mechanical valves. However, the durability of homografts, especially in young patients, remains controversial. We report our 10 years experience of CH use in patients with congenital heart diseases (CHD).

Methods. From 1992 to 2003, 45 patients (20 women, 25 men), with CHD received in total 29 (64%) aortic and 16 (36%) pulmonary CH. 18 patients (40%) with atresia of pulmonary artery received 11 aortic and 7 pulmonary CH, 17 patients (37%) with transposition of main arteries received 12 aortic and 5 pulmonary CH, 5 patients (11%) with tetralogy of Fallot received 4 aortic and 1 pulmonary CH, 3 patients with right side heart formation and corrective transposition of main arteries (CTMA) received 2 aortic and 1 pulmonary CH, 2 patients with CTMA (5%) received 2 pulmonary CH. Mean age was 11.7 years (2.7-22). 22 patients (49%) had other congenital heart abnormalities. 30 (68%) patients were in NYHA class 3 or 4 preoperatively.

Results. Hospital mortality was 22% (10 patients). Mean follow-up was 5.6±3.8 years. The graft complications occurred in 22% (10 patients) (a 10-year mortality). Freedom from graft dysfunctions was in 11% cases (5 patients): 4 (9%) - with pulmonary CH and 1 (2%) - with aortic CH. 18 patients (73%) survivors were in NYHA class 1 or 2 (10-year follow-up). Ten patients (22%) had homograft valve stenosis, 5 patients (11%) had homograft valve stenosis and regurgitation, 5 patients (11%) had increased transvalvular gradient (more than 20 mm Hg). We noted calcium deposits in the homograft wall, but valve cusps were intact. Four patients were reoperated for reason of critical stenosis and calcification (3) and for reason of endocarditis (1).

Conclusion. The calcification of homograft wall and stenosis are the main complications for the patients with congenital heart diseases. CH should be preferably used in older patients, because dysfunction rate is significantly decreasing (12% in these patients). Recently we have developed a new method of homograft processing to prevent their calcification, and new generation of CH is used from 2004.

P016
Comparison of commercial porcine xenografts and pulmonary cryopreserved allografts used for pulmonary valve replacement in children
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Aim. Our aim was to determine an optimal type of the conduit for the pulmonary valve replacement in children.

Methods. Between April 1998 and January 2004, 70 patients (median age 5±4 years, range 5 months-5 years) were operated on congenital malformations (PA, TOF, TOF+PA, DORV, TGA+PS, TAC, corrTGA+PS, aortic malformations followed by the Ross procedure). They received their first valved conduits: glutaraldehyde- (n=18; size 14 to 21 mm) and epoxy-preserved porcine xenografts and cryopreserved pulmonary xenografts (n=52; size 13 to 26 mm), and cryopreserved pulmonary allografts (n=14; size 15 to 25 mm).

Results. Hospital mortality was 7 of 70 patients: all of them were from xenograft group. Long-term results were studied for the period from 7 to 76 months. One patient from the pulmonary allograft group demanded conduit replacement due to total wall calcification during first year from the operation. We found moderate stenosis of xenografts, especially epoxy-preserved ones (conduit median gradient was 25.2 mm Hg, it ranged from 5 to 44 mm Hg on Doppler-echocardiography). In the period from 13 up to 48 months 5 transcatheter interventions (1 - pulmonary allograft, 4 - epoxy-preserved xenografts) and 2 reoperations (all of them - epoxy-preserved xenografts) were performed. All patients have the conduit gradient exceeded 60 mm Hg on Doppler-echocardiography (63 - 140 mm Hg). By the end of the third year we found calcification in 100% of epoxy-treated xenografts. Xenograft stenoses were located at the valves and internal anastomosis of the conduits. In the period from 49 to 72 months 1 transcatheter intervention and 1 conduit-exchange were performed (conduit gradient was from 65 to 75 mm Hg on Doppler-echocardiography). Mostly, patients with TGA+PS, TAC, corrTGA+PS and DORV underwent reinterventions. Patients after the Ross procedure had the best operative result.

Conclusion. We consider cryopreserved pulmonary allografts to be an optimal type of biological conduit for pulmonary valve replacement in children. Early failure of commercial porcine xenograft conduits is of their more likely degeneration in first three years after the operation. This limits their usage in newborns, infants and young children.

P017
Decellularized human valve homograft
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Aim. The purpose of this research was the evaluation of a technique of preparation decellularized aortic and pulmonary homografts and to examine the durability of unfrozen homografts used to replace the pulmonary valve.

Methods. The technique consists of preservation of the natural leaflet matrix carrying out the decellularization process. Two hundred eighty seven homografts were harvested within 23 hours of death (mean 17±1.25). A cellular lysis step was initiated immediately after dissection of the homografts from cadavers and continued up to the removal of ovarian homografts were incubated first in the hypotonic solution and then in Hanks solution with antibiotics. After cell lysis and washout, the processed valves were preserved using solution DMEM/F12 at 4°C.

Results. After exposure to the decellularization protocol, endothelial cells in the leaflets could not be detected in 250 preparations by standard microscopy examination. The stromal cells were severely damaged. The leaflet matrices and conduit linearly arrayed collagen fiber structure retained the trilaminar structure of native tissue after decellularization. Fifty-two homografts were successfully implanted during the repair of congenital heart defects in the pulmonary position. We have 2 replacements of implanted homografts in this group during 8.5±1.8 mean patient follow-up. Systolic gradient across the valve more the 40 mm Hg occurred in 13.4% (7 of 52patients) during the same period.

Conclusion. Our technique of preparation for homografts effectively preserve structure and provide decellularization. Decellularized homograft valves function satisfactorily in the pulmonary position in children at mid-term follow-up.
P018
Early and mid-term results of conterga conduit for right ventricular outflow tract reconstruction in pediatric patients
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Aim. The ideal valved conduit, for right ventricular outflow tract reconstruction in pediatric population, has not been identified yet. Aim of the present study was to retrospectively evaluate early and mid-term results of Conterga, a new glutaraldehyde-preserved bovine jugular vein conduit with its native trileaflet venous valve.

Methods. Between April 2000 and December 2004, 25 consecutive patients (16 males, 9 females) underwent right ventricular outflow tract reconstruction with Conterga at our Institution. Mean age at operation was 19±29 months (range: 5 days -10 years); 6 patients were neonates. Mean body weight was 9.1±8 kg (range: 2.2-35 kg). Tetrology of Fallot with pulmonary atresia (13) and pulmonary stenosis (1) was the most common diagnosis, followed by truncus arteriosus conus (8), pulmonary valve regurgitation (2) and pulmonary arteries balloon angioplasty and cusp thrombosis, after: 38, 3 and 2 months from implantation, respectively. Nevertheless, only 1 patient required conduit replacement with an homograft after 5 months for aneurism compression of the airway. The remaining patients are currently free from reoperation. At the last echocardiographic evaluation valve regurgitation was absent or trivial in 13 cases, mild in 7, moderate in 3 and severe in 2. No echocardiographic signs of gross calcifications were noticed either in the valve or in the conduit wall of each patient. Mean peak gradient across the conduit was significant (above 50 mmHg) in 6 patients who underwent conduit or pulmonary arteries balloon angioplasty with significant reduction of the gradient in 5 cases. Freedom from catheter intervention for conduit obstruction was 94, 72 and 62 % at 12, 18 and 24 months, respectively. Freedom from conduit replacement was 94 % at 24 months.

Conclusion. Conterga conduit represent a valid alternative for the right ventricular outflow tract reconstruction of pediatric patients offering various size availability, easy adaptability to anatomic circumstances, acceptable hemodynamic and promising durability.

P019
Surgical repair of interrupted aortic arch – a 30-year experience of 63 patients from one institution
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Aim. The management of the interrupted aortic arch (IAA) has evolved from the initial aortic interposition graft (IG) and pulmonary artery banding to the current practice of primary repair (PR) of the arch and all associated cardiac defects. This review was undertaken to determine the impact of this strategy on survival and recurrence of left ventricular outflow tract obstruction (LVOTO).

Methods. We reviewed the medical records of 63 consecutive patients with IAA admitted to a single institution from 1975 to 2004. Type A defect was present in 22 patients, type B in 37, and type C in 4. Associated cardiac defects included isolated ventricular septal defect (n=39), single ventricle (n=9), truncus arteriosus (n=8), aortopulmonary window (n=3), and transposition of great arteries (n=2). Primary repair of the arch was performed in 51% (9/22) of patients during the 1975-1990 time period and in 91% (31/34) during the 1990-2004 period.

Results. Early mortality was 20.6% (13/63) overall and 0% (0/14) since 1999. In patients with an associated truncus arteriosus or single ventricle the mortality was 57% (8/14) compared to 10% (5/49) for the rest of the group. Early mortality was similar for PR and IG groups (17% [7/40] vs 26% [6/23]). The 10-yrs survival was 71±7% and 45±10% (p=0.07), and the freedom from reintervention for recurrent LVOTO at 6-yrs follow-up was 6±10% and 26±15% for PR and IG groups, respectively.

Conclusion. Early mortality following repair of IAA complex has improved over time. There is a late survival benefit to primary repair of the aortic arch. There remains a significant risk for developing recurrent LVOTO following repair, irrespective of the type of arch repair used.

P020
Aortic arch reconstruction via median sternotomy in newborns weighing less than 2 500 grams
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Aim. Small infants are considered to bare higher risk of morbidity, mortality and recurrence of arch obstruction, after aortic arch surgery. We retrospectively reviewed our experience with newborns and infants, less than 2.5 kilograms, undergone end to end extended aortic arch reconstruction via median sternotomy, with the aim of evaluating safety and efficacy of this technique on the smaller patients.

Methods. Between January 1992 and December 2004 a total of 24 consecutive low birth weight or premature babies, 12 males, underwent aortic arch repair for aortic coarctation with severe diffuse hypoplasia 11 or interruption 13. Mean age at operation was 12.6 days (range 4 - 40 days). Mean weight was 2179±360 grams (range 900 _ 2500 g). Twelve patients were born before the 37th week of gestation. Aortic arch interruption or hypoplasia was associated with ventricular septal defect alone in 11 patients (group A), whether was part of more complex congenital cardiac malformations in 13 (group B). All patients underwent end to end extended anastomosis under cardio-pulmonary bypass without prosthetic material interposition or patch augmentation. Deep hypothermia with circulatory arrest was utilised in 11 patients, whether low flow selective cerebral perfusion was preferred, after 1996, in the remaining 13 patients.

Results. There were 5 early deaths (20.8%). At follow-up (mean 49.2 months) 3 late deaths occurred (15.7 %). Kaplan-Maier survival at 12, 36 and 60 months was 75% 70% and 70%, respectively. Seven months after operation one patient required aortic arch patch augmentation for recurrent arch obstruction. None of the patients underwent balloon aortoplasty. Freedom from aortic arch recurrent obstruction at 6, 36 and 60 months was 100%, 94% and 94%, respectively.

Conclusion. Despite reduced early and mid-term survival of low body weight infants, undergoing aortic arch reconstruction via median sternotomy with end to end extended anastomosis, excellent results can be obtained in terms of freedom from aortic arch recurrent obstruction.

P021
Repair of recurrent coarctation using an ascending aortic autograft
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Aim. Results of aortic arch repair for interrupted aortic arch or aortic coarctation have considerably improved. However, restenosis
Experience of surgical treatment of cardiac arrhythmias in patients with congenital heart diseases

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Aim. Our aim is to assess efficacy of simultaneous correction of congenital heart disease (CHD) and tachyarrhythmias (TA).

Methods. In 1981-2004 were operated 277 patients with CHD combined with TA at the age of 2.5 - 55 yrs. All patients underwent simultaneous surgical correction of CHD (septum defects, Ebstein's anomaly, pulmonary veins anomalous drainage, atrioventricular canal) and TA (Wolff-Parkinson-White syndrome, ectopic supraventricular and ventricular rhythm disorders, atrial fibrillation, nodal tachycardias). All patients underwent routine examination methods, electrophysiological studies and radioangiography. Anatomopathological substrate elimination was performed as a first stage of simultaneous surgery, and CHD correction as a second stage of surgery. For surgical elimination of TA in patients with CHD were used same techniques as for the removal of isolated cardiac arrhythmias: cryoablation, DC/RF ablation, surgical isolation, epicardial electrodestruction, laser isolation.

Results. Total hospital mortality was 6.6%, herewith it was mentioned its decrease and for the last 3 years it was 0%. In early postoperative period efficacy of surgery was 85.7%. Positive results were obtained in 12.5% of patients, negative results - in 1.8% of patients. Long-term results were assessed in 164 patients in 1-20 years after surgery (mean follow-up period was 10.5±5.2). There was only 1 case of death. In long-term follow-up positive results were obtained in 70.5% of patients.

Conclusion. Based on the analysis of short and long-term outcomes, it can be assumed that simultaneous surgery of CHD and TA is efficient method of treatment of combined pathology. It substantially prolongs patients' lives and provides recovery.
years and 82% at 20 years. 80% of the patients were in NYHA class I or II. Left ventricular ejection fraction assessed by computerized tomography disclosed an improvement: preoperative 56.9% - postoperative 66% due to increasing of the LV pre-load. Postoperative TV function assessed by echocardiography was normal or 1/4 + TV insufficiency in 80% and 2/4 + in 10%. Reoperations were performed in 19 patients (8%) with a delay of 2.5±1.6 yrs (1 day to 9.4 yrs). A second repair was possible in 11 patients. Residual TV insufficiency was due to residual leaflet restriction. An extensive mobilization could be performed. Freedom from reoperation was 89% at 20 years. The incidence of supraventricular tachyarrhythmia was reduced from 23% to 5% without any specific surgery on the accessory pathways. The decreased incidence of atrial fibrillation is not significant.

**Conclusion.** Conservative surgery for Ebstein's anomaly is indicated for all symptomatic patients. Life expectancy is increased and functional improvement is constant, associated with improvement of left ventricular contractility.

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**P025**

**Surgical correction of hocm in children by a new approach**

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**Aim.** Treatment of children with HOCM is complicated by several factors including noncompliance medications and an increased risk of sudden death. The classic Morrow technique is not effective for HOCM children with midventricular and RVOT obstruction and extreme left ventricular hypertrophy.

**Methods.** The presented excision of the asymmetrical hypertrophied area of the interventricular septum causing obstruction of LVOT and RVOT simultaneously and midventricular obstruction is made from conal part of right ventricle transversely and anteriorly of the Lancisi muscle and moderator band but not through the whole thickness of IVS, that is, without penetration into the left ventricular cavity. 25 pediatric patients underwent this procedure. Ages ranged from 10 to 15 years (mean, 12.5). The midventricular obstruction was noted in 14 children, isolated RV obstruction in 1 patient. In 8 operated children the obstruction of LVOT and RVOT was noted simultaneously. The follow-up period was 26±7 months.

**Results.** The mean echocardiographic intraventricular gradient in LV decreased from 78.9±5.9 to 12.7±5.2 mmHg, the mean value of gradient in RVOT also reduced. In patient with isolated RVOT obstruction gradient decreased from 60 to 8.7 mmHg. Echocardiographically determined septal thickness was reduced 31.7±6.5 versus 16.1±1.6 mm. Follow-up echocardiography showed reduction of left atrial size from 46.7±7.1 to 38.5±6.2 mm. Magnetic resonance imaging showed an increase of the diastolic volume of RV and stroke volume. Sinus rhythm was noted in all children.

**Conclusion.** This method is a safe and effective technique for surgical treatment of pediatric patients with severe hypertrophic obstructive cardiomyopathy unresponsive to medical management.

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**P026**

**First experience of the konno aortoventriculoplasty for repair of left ventricular outflow tract obstruction**

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**Aim.** Aortoventriculoplasty (the Konno procedure) in different variety has been used successfully in the treatment of diffuse or unresectable left ventricular outflow tract obstruction. We evaluated the early and medium-term single-center results for the Konno-Rastan procedure, the Ross-Konno procedure and the modified Yamaguchi procedure in both adults and children.

**Methods.** Between April 2001 and February 2005, 21 patients (10 males and 11 females) underwent the variety of Konno aortoventriculoplasty: the Konno-Rastan procedure with prosthetic valve (n=4), the modified Konno procedure with preservation of the native aortic valve (n=1), the Ross-Konno procedure (n=10), the modified Yamaguchi procedure (n=6). The patients’ ages ranged from 10 to 56 years (mean, 30 years). Indication for operation was hypertrophic obstructive cardiomyopathy and tunnel stenosis of left ventricular outflow tract associated with severe isolated aortic stenosis (n=9), severe aortic insufficiency (n=1), combined aortic stenosis and insufficiency (n=10) and recurrent subaortic stenosis (n=1). All patients in the Konno-Rastan and Yamaguchi groups underwent the aortic valve replacement with mechanical prostheses, 4 patient underwent the accompanied mitral valve replacement as well. For reconstruction of right ventricular outflow tract in the Ross-Konno group, porcine epoxy compound fixed xenografts were used.

**Results.** There were 2 perioperative and 2 early postoperative deaths caused by the patients' severe condition before operation. Postoperative complications also included permanent heart block (n=4), rhythm disorders (n=3), mediastinal bleeding (n=1). Follow-up ranged from 5 months to 3.7 years (mean, 2.1 years). Estimated left ventricle outflow tract peak gradients by echocardiogram were 89±25.5 mm Hg (preoperative) and 16.9±8.1 mm Hg (postoperative). In the Ross-Konno group neo-aortic regurgitation were none in 3 patients and trivial in 4 patients. All patients were in NYHA class I-II.

**Conclusion.** Early operative results with the Ross-Konno procedure and the modified Yamaguchi procedure seem promising in repair of left ventricular outflow tract obstruction.
P028

Primary heart tumours in children. What to do?
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Aim. Cardiac tumours in newborn, early and late childhood are commonly different from heart neoplasms in adults according to etiology, pathology, histomorphological and clinical features. Disontogenetical hamartomas (rhabdomyomas, fibromas et al) are predominantly present in children. It is a challenge for pediatric cardiologists and surgeons to ascertain which patients need surgery and which will benefit from conservative follow-up.

Methods. From 1962 to October 2004 there are observed 89 children and teenagers (from 2 days to 18 years) with heart neoplasms in our Centre. Seventy of them had primary benign cardiac tumours. 43 (48.3%) patients were operated on. 39 (55.7%) of them with primary cardiac tumours (16 myxomas, 10 rhabdomyomas, 7 fibromas, 2 angiofibromas, 2 haemangiomas, 1 mesenchimoma and 1 papillary fibroelastoma). Analysis was by presentation, location, associated findings, radiological features, clinical course, interventions and histological findings. 83.9% of nonoperated children (24 with rhabdomyomas and 2 with fibromas) were observed on long-term follow-up.

Results. The symptoms varied between abnormal heart murmur (n=65 (92.9%), obstruction of the outflow tract >30 mmHg (n=48 (68.6%)), arrhythmia and conduction abnormalities (n=21 (30.0%), spontaneous regression (n=19 (27.1%), congestive heart failure (n=15 (21.4%) and extracardiac features of tuberous sclerosis (n=14 (20.0%)). The right-sided heart (n=48) was more frequently involved then the left-sided heart (n=29). Hospital mortality within operated patients was 13.1%. Recurrences n=5 were found only on myxomas. Among nonoperated children common causes of long-term death n=5 (19.2%) were extracardiac complications of tuberous sclerosis. To optimize the choice of treatment for cardiac tumours in children we worked out a new, clinical-histo-anatomical classification of heart neoplasms for children and teenagers. Radio-histological correlation was carried out for primary heart tumours in children.

Conclusion. The most effective surgical treatment for obstructive single extramural rhabdomyoma is subtotal ‘relief’ excision of the tumour and also resection of arrhythmogenical rhabdomyoma with crioablation afterwards. The most successful intervention for fibroma is subtotal resection. The treatment chosen for cardiac fibromas in children under 2 years old would be more aggressive for reason of tumour growth and sudden death. In presence of rhabdomyoma in newborn without severe obstruction and life-threating arrhythmia it is indicated conservative follow-up causing by probable spontaneous regression. The most arrhythmogenical are free wall rhabdomyoma of right atrium and rhabdomyoma of posterior part of mitral valve annulus.

P029

Cardiac tumors in infants and children. Four years experience in the latvian state cardiology centre for children
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Aim. We would like to present incidence of primary tumors diagnosed in the Latvian State Cardiology Centre for children from December 2000 until December 2004.

Methods. A total of 13 patients were selected retrospectively (male - female ratio, 7.5:1, age range one day to 13 years). Patients underwent cardiothoracic surgery primary cardiac tumor established by clinical, echocardiographic and computer tomography parameters with histopathologic corroboration.

Results. Eight patients were asymptomatic. One newborn with left ventricular giant rhabdomyoma was presented with severe cardiac failure in first day of life. Reasons for paediatric cardiologist evaluation were rhythm disturbances (2), murmur (2), signs of tuberculosis sclerosis (4), and abnormal chest X-ray (2). Six patients (46%) underwent cardiac surgery due to cardiac failure. Two patients had right ventricular fibroma both successfully operated (in one case Batista procedure was used); one infant with right atrial myxoma and one child with epicardial lymphoma both successfully treated. One newborn had left ventricular giant rhabdomyoma died during operation. Only one from this group had malignant epicardial mesothelioma with methastasis in the lungs after 18 months after successful surgery. Seven (54%) patients did not undergo cardiac surgery due to asymptomatic and dynamically regressive multiple rhabdomyomas associated with tuberous sclerosis.

Conclusion. Based on our experience, we conclude that: prevalence of benign primary cardiac tumors in children; rhabdomyoma is the most common primary cardiac tumor in children; most of the cases are without clinical manifestation; there is slight male prevail over female.

P030

Scoliosis and median sternotomy in children with congenital heart disease: a frequent association
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Aim. Congenital heart disease (CHD) seem to have a prevalence of scoliosis but etiology is unknown. Thoracotomy causes spinal deformities but median sternotomy(MS) has not been yet identified as a potential causal agent. The aim of this study is to determine if MS presents a higher prevalence of scoliosis.

Methods. Retrospective review of 248 children operated upon through MS to repair CHD (1978-1984),128 of them less than 8 yrs old at time of surgery and without costal or spinal deformity. Chest roentgenograms done after skeletal maturity were studied.

Results. Mean follow-up was 19.9 yrs (9.3-24.9) and mean age at surgery 2.2 yrs (28 days-7.9 yrs). 34.3% had scoliosis greater than 10° (10°-42°) and 16 of them (12.5%) greater than 20°. In addition, 25.8% presented hypokypnosis.Presence of scoliosis was the same among males and females and cyanotic an acyanotic disease. Children operated upon before 16 months of age had an increased risk to present scoliosis (odds ratio: 3.48; p=0.016).

Conclusion. The study proves that children with CHD operated through MS have a high prevalence of scoliosis,which increases in those repaired at earlier age. No relationship with the type of cardiac malformation was found.Genetic origin and physiopathological changes related to the CHD were also discarded.Other etiological hypothesis are considered and discussed.

P031

Possibilities and limitations of minimal thoracotomy and sternotomy approaches in congenital septal defects surgery
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Aim. In this report we present our experience with different types of minimal thoracotomies and ministernotomy for closure of atrial septal defect (ASD) and ventricular septal defect (VSD).

Methods. One hundred seventy-two patients underwent atrial septal defect (ASD) closure (direct suture, pericardial patch, partial anomalous pulmonary venous return correction, primary ASD closure) through limited access: right anterolateral thoracotomy (RALT), right posterolateral thoracotomy (RPLT), partial inferior sternotomy.
Conclusions. Analysis of perioperative data demonstrated, that patients tolerated RALT better, than MS. We predict that the difference in operative time between two groups will decrease as experience with RALT grows. Being a safe and reproducible approach for proper repair of malformation and, considering on its superior cosmetic effect, RALT may be preferred for surgical correction of selected simple congenital heart defects.

P033
Simultaneous repair of congenital heart malformations and associated aortic obstruction in infants
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Aim. Retrospective study of the outcomes for surgical repair performed between 01.01.01 and 31.12.04.

Methods. Our cohort includes 31 patients whose age varied between 4 days and 12 (mean 6.3) months and weight between 2.5 and 7.7 (mean 4.5) Kg. The 1st group included 21 patients with: VSD (17), DORV with subaortic VSD (2), ASD (1), partial AVSD (1). Nineteen patients in this group were found to have an associated coarctation of the aorta (CoAo) and 2 patients had an IAA. Second group consisted of 10 patients diagnosed with TGA (7) and Tausig-Bing anomaly (3), combined with the CoAo in 9 and IAA in 1 case. Twenty patients underwent surgical repair from 2 different approaches with full flow perfusion, bicaval cannulation and a period of aortic crossclamping under crystalloid cardioplegia. Nine patients had all of the malformations repaired from the median sternotomy under profound hypothermia (16-20°C) and a period of circulatory arrest lasting 36-75 (mean 47) min in 4 cases or with the selective cerebral hypothermic perfusion in 5. Twenty-five children were subsequently followed up 3 - 36 (mean 19.5) months after surgery.

Results. Operative mortality was 9.7% (3/31) and all three cases belonged to the 1st group. Cause of death: low cardiac output (2) and multiorgan failure (1). Two out of 3 deceased patients were operated with the circulatory arrest. Out of 25 patients in the follow-up 21 were placed in NYHA Class I and 3 patients in class II. Systolic blood pressure gradient between upper and lower limbs was absent in 13, 10-30 mm Hg in 11 and higher than 30 mm in 1 patient. One patient underwent transcatheter balloon dilatation of re-coarctation. No-one in the follow-up group needed a reoperation.

Conclusion. Simultaneous surgical repair of congenital cardiac malformations associated with the aortic obstruction in infants is feasible with good functional results and acceptable surgical mortality, which undoubtedly can be reduced further. Repair using two different approaches allowed surgeon to use the simple technique of continuous perfusion avoiding circulatory arrest, which in our experience decreased the incidence of fatal complications. We need to gain further experience to reveal all advantages of selective cerebral perfusion.

P034
Surgical treatment of ventricular septal defects associated with aortic insufficiency
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Aim. Ventricular septal defects associated with aortic insufficiency (VSD+AI) are rare: they constitute 2-12% of total VSDs in morbidity. Despite the large number of operations proposed, surgical treatment of VSD+AI is a difficult problem of pediatric cardiac surgery. Closure of the VSD with aortic valve repair is feasible in certain group of patients with good mid-term and long-term results. The indications to aortic valve repair should be considered critically. To evaluate the optimal indications to aortic prosthesis and aortic valve repair on closing the VSD.

Conclusion. Analysis of perioperative data demonstrated, that patients tolerated RALT better, than MS. We predict that the difference in operative time between two groups will decrease as experience with RALT grows. Being a safe and reproducible approach for proper repair of malformation and, considering on its superior cosmetic effect, RALT may be preferred for surgical correction of selected simple congenital heart defects.
Methods. Between 1984 and 2004, nineteen patients with VSD+AI were operated on at the clinic. The patients' age ranged from 8 to 28 years (mean 14.6 ± 1.07 years). Twelve patients were males, 7 were females. Seven patients had associated anomalies such as PDA (5 patients), pulmonary artery stenosis (4 patients) and sinus of Valsalva (2 patients). One patient presented dynamic pulmonary hypertension and 1 patient had infectious endocarditis. Indications to the surgical treatment were set taking into account hemodynamic disorders, aortic valve incompetence and associated anomalies. As the 1st of the treatment, PDA ligation was performed in 4 cases. Eleven patients underwent adequate aortic valve repair. Aortic valve mechanical prosthesis was performed in 3 patients because of impossibility of salvage operation. Associated defects such as PDA, pulmonary artery stenosis and sinus of Valsalva were corrected during the surgery simultaneously.

Results. There was no mortality in our series. The results of aortic valve repair were evaluated by two-dimensional echocardiography and dopplerography measuring end-diastolic volume, aortic valve area and residual aortic regurgitation. All patients demonstrated decrease in end-diastolic and end-systolic volume. Residual aortic regurgitation was minimal or of the 1st degree.

Conclusion. Aortic valve repair for VSD+AI can be used in children under 15 years old without severe changes in the aortic valve. Commisural plication, annuloplasty and aortic cusp suspension are performed for mild or moderate incompetence of the aortic valve (one or two cusps prolapse, aortic annulus ectasia). Mechanical prosthesis is indicated in cases when aortic salvage is impossible and in patients older than 15 years.

P035 Surgical repair of ventricular septal defects in first year of life. Early and long time results

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Aim. Improved method of repairing ventricular septal defects was introduced to reduced hospital and late mortality.

Methods. Between January 1998 and December 2004 eighty-nine infants (mean age 5.2 months and mean weight 6kg) underwent primary closure of a VSD. Two periods had been compared: first - between January 1998 and December 2000 (33 operations), second - between January 2001 and December 2004 (56 operations). The maximal period of follow-up after the surgical repair of VSD was 6 years (a mean period 36 months). VSDs were operated on using the following method, as complete cardiopulmonary bypass with mild hypothermia, local miocardial hypothermia, transaortic cardioplegia (sol. St. Thomas), cannulation of both-SVC and IVC, not using of any kind of retractors, only situation stiches to hold the right atrium opened for better exposure of VSD rims. The repairs were done 95% through right atriotomy and 5% through right ventriculotomy and sewing the Gore TEx patch using the polypropylene 4/0 running suture. In 15% of cases the tricuspid valve was temporarily detached close to annulus, to improve operative exposure. Concomitant procedures were required in 48% of children.

Results. Early postoperative and follow-up period echocardiography showed a trivial VSD in 28% (25 of 89) of patients and 50% of them the trivial shunting disappeared spontaneously and 4.5% (5 of 89) with significant VSD. One patient with conduction disturbances needed a permanent VVI pacemaker and 35% of patients in electrocardiography showed a right bundle branch block pattern. One patient died one year after the surgery due to bronchopulmonary complications. The hospital mortality of the first period (1998-2000) was 6%, but the experience during the last four years (the second period 2001-2004) acknowledges successful outcome of all operations performed.

Conclusion. The worked out strategy opens up opportunities for successful and early surgical repair of VSD under cardiopulmonary bypass.

P036 Successfully operated adult cor triatrium

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Background. The incidence of Cor Triatrium among the neonates with CHD is 0.1-0.4%. Adult diagnoses are extremely rare. Recent classification is described by Lucas1 Our case was Type 1A.

Case Report. A 25 years old patient administered with the complaints continued for six months as an atypical chest pain and discomfort discorrelated with exercise. Medical history was uneventful, he was a licenced scuba diver and a smoking history for 4 years. Exercise capacity was NYHA Class I. Physical examination was normal but S1 was austerer without any murmur. EKG; 100/min AF. Chest X-Ray; cardiovascular silhouette and the lungs were bilaterally natural. Artery blood gases; Ph 7.429, PO2 82.7 mmHg, PCO2 47.1 mmHg, O2 Saturation % 96.2. Ventilation tests showed FVC %61 and FEV1 %73. Preoperative haematology, biochemistry and thyroid parameters including HIV and hepatitis markers were normal. Echocardiography; EF %66, Aortic root 27 mm, LA 48 mm, LVEDV 44 mm, LVESV 28 mm, mitral peak gradient 4 mmHg. Valvular morphologies were natural. Superposed to LA with a pathologoical color doppler flow Cor Triatrium. L/R Cardiac Catheter and Pulmonary Angiography; pressure measurements were LV 95/6 mmHg, Ao 96/60 mmHg, RV 27/4 mmHg, PA 27/13 mmHg, PCWP 15 mmHg, RAP 4 mmHg. Pulmonary angiography views showed membrane in LA. Cor Triatriatum. A pressure gradient measured 9-10 mmHg caused by the membrane between LA-LV. Under general anesthesia median sternotomy and pericardectomy performed. Cardiovascular anatomy observed. Following the aorto-bicalval cannullation and aortic cross clamp, cardioplegic moderate hypothermia in 28 dc cardiac arrest succeeded. Intratrarial septum visualised with right atriotomy. Intertrarial septum incised. The fenestrated membrane dividing the right atria into two chambers observed and excised transeptal. Pulmonary vein orifices controlled interiorly. Septal incision and atriotomy repaired primarily with propylene 4/0 suture. Operation completed conventionalally with sinus rhythm 2-3 Postoperative echocardiography proved the success. Without any complication the patient discharged at the 5th day. Cor Triatriatum treatment is surgery. Accepted life quality after surgery is NYHA Class I.

References

P037 Mitral annular tumors: report of two cases in childhood

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Primary tumors of the mitral valve are extremely rare especially in pediatric age group, only a few cases have been reported previously. The clinical appearance of the tumor may mimic other pathological findings of heart structures or remain asymptomatic. We describe two different benign primary cardiac tumors which were hemangioma and myxoma originating from anterior annulus of the mitral valve presenting with unusual clinical course in 2 children. Both of tumors were resected successfully with mitral valve conservation and there was no recurrence at 6 months and 1 year follow-up. Since intracardiac tumors especially those involving heart valves carry a significant risk of embolic events an early diagnosis and prompt surgical intervention can significantly reduce the possibility of complications.
Multiple rhabdomyomas, surgically resected from the right and left ventricles: a case report
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Background. Rhabdomyomas are the most common primary cardiac tumors in children. Diagnosis can best be obtained by pre-cordial and transesophageal echocardiography. These tumors tend to regress spontaneously although a significant percentage requires surgical extirpation to alleviate dysrhythmias or outflow obstruction.

Case Report. A case of the rhabdomyomas of the right and left ventricles is described. The tumor in right ventricle cavity was large causing outflow obstruction. The rhabdomyoma in left ventricle was near aortic valve. The multiple rhabdomyomas in right and left ventricles were removed surgically using cardiopulmonary bypass. Complete relief of the both ventricles cavities was achieved with preservation tricuspid and aortic valves. The patient recovered well. Surgical treatment can be successfully applied when rhabdomyoma results in homodynamic problems or arrhythmias.

Congenital coronary artery fistulas in children: diagnosis, surgical technique and results
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Aim. Coronary artery fistula (CAF) is very rare lesion occurring in approximately 1 in every 50,000 patients with congenital heart disease but in the same time CAF are the most common congenital anomalies of the coronary artery. CAF are characterized by normal aortic origin of the coronary artery involved but with a fistulous communication with the atria, ventricles or with the pulmonary artery, coronary sinus or vena cava. We present our three years experience with 11 patients (mean age 3.6 years, ranging from 2 weeks to 15 years); 3 of them were treated surgically. Spontaneous closure of the fistula was observed in 5 patients and 3 patients are still under observation.

Methods. Congestive heart failure was found in three patients. CAF was diagnosed on the basis of color Doppler echocardiography in all patients. The following arteriovenous fistulous connections were found: from right coronary artery to right ventricle (3 patients), from left coronary artery to right ventricle (6 patients), from left coronary artery to pulmonary artery (2 patients). Most of the affected coronary arteries were dilated and tortuous. Under cardiopulmonary bypass, fistulous terminations were sutured in 3 patients, 1 of whom was found to have multiple fistulous openings.

Results. There were no operative or late deaths. Follow-up evaluation by physical examination, echocardiography showed no evidence of residual or recurrent CAF.

Conclusion. Considering the low perioperative morbidity, we recommend surgical closure of CAF with significant shunt and increased coronary artery diameter.

Anomalous origin of left coronary artery from the pulmonary trunk in a mildly symptomatic adult female: a case report
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Background. Anomalous origin of the left coronary artery from the pulmonary trunk, also known as Garland-Heard-White Syndrome, is an extremely rare but potentially fatal congenital cardiovascular anomaly and it often exists as an isolated condition.

Case Report. We hereby report an adult female who was admitted for mild chest discomfort and was accidentally diagnosed to have anomalous origin of the left coronary artery from the pulmonary trunk. This anomaly was simply repaired by using a bovine pericardial patch to obliterate the anomalous opening in the pulmonary trunk and a single coronary artery bypass graft. This report highlights the characteristic events of the anomaly in an adult with only mild symptoms.
**P042**

**Extreme destruction of mitral valve by brucella endocarditis in an adolescent**

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**Background.** Brucella endocarditis is a rarely seen but serious complication of brucellosis. It involves predominantly the aortic valve and the main cause of mortality by this zoonosis is complicated valvular lesions such as perforation, vegetation or abscess formations that required valvular replacement.

**Case Report.** The diagnosis of brucella endocarditis was established serologically and clinically in an 16-year-old girl with congestive heart failure and left hemiparesis. The patient had severe mitral insufficiency due to completely destroyed of anterior leaflet with multiple large vegetations that required urgent surgical treatment. Intraoperatively, ulcerated valve tissues, vegetations and annular abscess were resected radically and replacement of the prosthetic mitral valve was performed as urgently. During one year of uneventful postoperative period, the patient was kept under antibiotic therapy. The optimal treatment of complicated brucella endocarditis can be achieved by extensive surgical debridement of infected tissues without delay followed by multiple bactericidal antibiotics.

**P043**

**Pediatric cervical rib: case report.**  
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**Background.** Cervical rib is a well-documented congenital anomaly, which plays major role in the etiology of thoracic outlet syndrome. A rare case of thoracic outlet syndrome (TOS) necessitating rib resection in childhood is presented.

**Case Report.** An eight year old boy was admitted for a 4x4 cm size pulsatile mass located in the supraclavicular region. Chest X-ray revealed a type IV cervical rib articulated to first thoracic rib in the right side (Figure 1). This anomaly was associated with a poststenotic dilatation of subclavian artery seen with Doppler ultrasound and confirmed with angiography (Figure 2). The patient underwent transaxillary resection of first thoracic and cervical rib. The pulsatile mass disappeared following the relief of subclavian artery with this procedure. The patient was symptom free in his three-year follow-up.

**I001**

**Surgical or transcatheter closure of the most common cardiovascular defects with left to right shunt**

Silesian Centre for Heart Disease, Zabrze, Poland

**Aim.** The purpose of this study was to compare application of surgical and interventional closure of the left to right shunt in patients with patent ductus arteriosus (PDA), atrial septal defect type II (ASD) and ventricular septal defect (VSD).  

**Methods.** Clinical data of 840 patients (aged 19.4±17 years) with significant left to right shunt (Qp/Qs>1.5) treated in our center between 2001 and 2004 were analyzed retrospectively: 475 patients with ASD, 195 with PDA and 170 with VSD. For transcatheter treatment there were qualified patients with ASD and sufficient rims of interatrial septum, more than 6 months old patients with PDA and patients with VSD and its adequate morphology. Surgical closure of ASD and VSD was performed on cardiopulmonary bypass with dacron/pericardial patch or direct suture. Transcatheter closure of ASD was performed with Amplatz Septal Occluder in 273 cases and with Starflex (SF) device in 12. PDA was embolized with detachable coils in 133 patients, with Amplatz Duct Occluder in 31 patients and with SF double umbrella in 3 patients. Different Amplatz occluders were applied in congenital and acquired (postinfarct) VSD. In all patients pulmonary hypertension was excluded prior to surgical or transcatheter treatment.

**Results.** Standard surgical treatment was applied in 191/475 ASD patients (40.2%), 28/195 PDA patients (14.4%) and 146/170 VSD patients.  

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Figure 1. – Recontruction of the resection material.

Figure 2. – Subclavian angiography screening.
patients (85.9%). Transcatheter closure was performed in the rest of patients. All but 3 procedures were finished successfully. In 3 patients (1 with ASD and 2 with muscular VSD) embolization of implant occurred; all were retrieved without any complications. There were no mortality related to the procedures. In all cases occlusion of undesirable shunt occurred after treatment. Residual shunts were rare and trivial in both surgical and transcatheter groups (with no significant difference).

**Conclusion.** Transcatheter closure of ASD, VSD and PDA with different devices is a safe and efficient method of treatment and has the advantage of shorter hospitalization, less discomfort for patient and no scar on the chest. In our opinion this method should be a treatment of choice in selected patients. The occlusion technique depends on the anatomy of the defect. Nevertheless, the surgeon should be able to close any defect regardless of their anatomy and age of the patient, remains an important advantage of surgery.

### 1002

**Surgical ASD closure in the era of interventional procedures.**

University Hospital Schleswig-Holstein, Kiel, Germany

**Aim.** In the era of interventional closure of the atrial septum secundum defect, only few patients are still referred for surgical ASD closure. The data of these patients undergoing ASD surgery were analyzed and compared with the data of patients undergoing intervention during the same time period.

**Methods.** Between 1997 and 2001, 200 consecutive patients (median age 4.9 years, Range 6 months—99 years) had interventional ASD closure with the Amplatzer septal occluder device. During the same time period, 30 patients (median age 10.5 years, Range 6 months—73 years) had surgical closure with extracorporeal circulation (ECC time 55±9 min).

**Results.** The majority of patients admitted for surgical ASD closure had defects that could not be treated interventionaly. There were 11 patients with an infero-posterior ASD with no rim towards the coronary sinus or the inferior vena cava, 3 patients with anomalous pulmonary venous connection, and 1 patient with unroofed coronary sinus or azyzes vein continuity, each. While the median procedure time for intervention was 66 min, the median procedure time for surgery was 140 min with aortic clamping in 17 and ventricular asystole in 13 patients. Limited incisions were carried out in 15/30 patients. There was no periprocedural mortality in both groups, morbidity included one wound infection after surgery and one retroperitoneal hematoma after intervention.

**Conclusion.** Facing success of interventional procedures, less than 15% of ASD II patients are admitted for surgery, especially when the defect is not suitable for device closure. While interventional closure is less invasive, periprocedural mortality and morbidity are similar, even though the surgical patients had the more difficult lesions.

### 1003

**Percutaneous interventional closure of large pulmonary arterio-venous fistulae with the Amplatzer duct occluder.**

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1Silesian Centre for Heart Disease, Zabrze, Poland; 2National Institute of Cardiology, Mexico, Mexico.

**Aim.** Pulmonary arteriovenous fistulae (PAVF) are infrequent vascular anomalies, which are difficult for transcatheter treatment. Our experience in such therapy with Amplatzer Duct Occluders (ADO) designed for occlusion of Patent Duct Arteriosus is presented.

**Methods.** Five patients with PAVF are presented. Their mean age was 25 (ranged from 5 to 73 years). All patients suffered from easy fatigability and central cyanosis. In all but one pt the PAVF were congenital. In one 73 y pt PAVF was likely caused by car accident 5 years earlier. PAVF was in that case certainly posttraumatic. Pulmonary angiography revealed in all cases large PAVF with mean diameter of 10 mm (from 7.2 to 14 mm). All congenital PAVF were located at the basilar part of the right lung. In the case of acquired PAVF, the lesion was located at the left lower lobe pulmonary artery. In all cases, transcatheter interventional closure of PAVF with ADO was performed. In one tall pt (186 cm height) the sheath provided too short (80 cm) and procedure was successfully repeated through a right jugular vein.

**Results.** Nine ADO with dimensions ranging from 8/6 to 16/14 were implanted (in 2 patients 3 ASOs were used to close different defects). There were no complications during the procedure. Immediately after intervention the closure of PAVF was achieved in all but one patient. In that child new feeder had developed at follow-up and was successfully closed 1.2 yr later with coils. As a result of the procedure the oxygen saturations returned to normal permanently and the patients exercise tolerance was markedly improved.

**Conclusion.** Transcatheter closure of large PAVF with Amplatzer Duct Occluder is effective and can avoid surgery intervention. Probably the better alternative for such treatment is recently proposed Amplatzer vascular plug, unfortunately not available in earlier period.

### 1004

**Coil embolization replaces surgical resection in pulmonary AVMs.**

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**Aim.** Pulmonary artery coil embolization (PACE) has been done to pulmonary AVMs, but long term results of it are to be evaluated.

**Methods.** To see if PACE is secure enough to replace surgical resection of AVMs. Patients and Methods. 9 consecutive patients, 16 to 67 year-old, with mean of 46.4, were reviewed. Four of these were male. Procedure was carried out under local anesthesia per fluoroscopy. By Seldinger’s method each patient received a steel coil having a slightly larger diameter than that of the feeding artery measured on Pulmonary artery angiogram, or micro-coil embolization.

**Results.** The procedure has carried out without undue complications, although in one patient the coil dislodged to the right ventricle. Two other patients required re-embolization in terms of micro-coil embolization to completely abolish blood flow. One patient has been lost from follow-up 4 years following the embolization. All surviving patients have with PS 0, and free from cyanosis with no evidence of patients showed no recurrence after embolization for 1 to 11 years thereafter.

**Conclusion.** PACE has replaced surgical resection to AVMs, being less invasive and with satisfactory result. PACE seems to be the first line treatment of AVMs.

### 1005

**Multiple pulmonary arteriovenous fistulas: osler-weber-rendu syndrome. Successful combined treatment.**

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**Case Report.** We present the case of 16 year old girl, admitted to ICU because of severe bleeding from lungs. Arterial blood saturation was 80%, cyanotic lips and nails. Angiography showed multiple pulmonary arteriovenous fistulas in both lungs-mainly in S6 right lobe and S10 left lobe. As the first step we decided to perform lobectomy of lower left lobe. After words coil embolization of right lobe was performed. Bleeding from lungs reoccurred in 1 month. In 3 intracardiac procedures four arteriovenous fistulas were embolized using
Rescue stenting of thoracic aorta in three adult patients with severe complications of coarctation of aorta

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Background. Primary stenting is becoming the treatment of choice in cases of teenagers and adult patients with coarctation of aorta (CoA). Three adult patients with CoA are presented in whom such treatment was performed as an urgent procedure because of life threatening complications.

Case Report. Patient 1 and 2: 52 years old male and 54 years old female, with native CoA, both in NYHA IV functional class admitted in pre pulmonary oedema state, with significant disfunction of LV and mitral regurgitation (because of heart failure and dilatation of LV). Both of them previously refused surgical treatment. Cardiologist treatment with inotropic support and nitroglycerine were introduced. Diagnosis was confirmed in transthoracic ECHO (gradient through the aortic isthmus 60 mm Hg, and 55 mmHg respectively. After consultations with cardiac surgeons urgent interventional catheterization was performed (accepted by both patients). Patient 3: 36 yrs old male was operated on at the age of 10 yrs with end to end anastomosis. His clinical problem was recurrent massive haemoptysis with only mild arterial hypertension. He was relatively stable during admission, but short hemoptysis occured again. In diagnostic catheterization huge aneurysm in the place of previous coarctation was diagnosed with the presence of aorto-branchial fistula. Implantation of stent-graft was proposed and accepted by the patient. In both patients with native CoA 4014 Palmaz stent was implanted with immediate decrease of pressure gradient to 7 and 2 mmHg respectively. After the procedure, Dopamine infusion was withdrawn and significant improvement was achieved. After 2.3 and 0.7 years of follow-up (respectively) both patients are in NYHA II functional class. In the third patient, with aorto-branchial fistula specifically designed stentgraft was implanted to the aorta covering the entrance of aortic aneurism. In that patient complete relief of symptoms occurred and after 0.8 yrs of follow-up he is doing well in NYHA functional class. In severe coarctation of aorta in older patients with compromised left ventricular function or postsurgical aneurysm of aorta with aorto-branchial fistula, rescue interventional catheterization (stent or stent-graft implantation) can be a better option than surgery.

Stenting of the arterial duct in infants with duct-dependent pulmonary circulation

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Aim. The aim of the study was the analysis of the first institutional experience with stent implantation in the patent arterial duct (PDA) in infants with a duct-dependent pulmonary circulation.

Methods. In 2004 year 12 ductal stenting were performed in 10 neonates and infants (6 males/4 females) to maintain pulmonary blood supply in cyanotic congenital heart disease. The mean age of the patients was 45.8±57 days (3-185) and the weight – 3.7±1 kg (2.2-5.4). The profiled pathology was pulmonary atresia: with intact ventricular septum (n=4) and with ventricular septal defect (n=5). The other cardiac defects were transposition of the great arteries (n=2), double outlet right ventricle (n=1), atrial septal defect and PDA in all the patients. The mean arterial oxygen saturation was 41.7±16.9 % (25-68). Balloon-expandable coronary stents were implanted in the PDA with a final diameter of 3.5-5 mm and initial length from 8 to 18 mm. Additional stent was required in 2 children in order to stent the entire length of the duct.

Results. PDA stenting was successful in all the patients. The mean arterial oxygen saturation increased to 85.7±6.2% (76-92). There were no procedure-related complications and mortality. In all the patients the procedure allowed prostaglandin and inotropic withdrawal and hospital discharge.

Conclusion. Stenting of a PDA is a safe and effective procedure, allowing increased pulmonary circulation and adequate growth of the pulmonary arteries.
Methods. Thirty-four patients with triple vessel disease and reduced LVEF were treated with CABG & intramyocardial CD133+ bone marrow cell (EPC) injection, 15 in phase-I and 19 in an ongoing controlled phase-II study. Furthermore, 18 patients were assigned to the phase-II-control group (CABG only). Preoperative LVEF was 39±8%, 2.8±0.7 bypass grafts were constructed, and up to 1x10E7 cells were injected. The change in LV function (dLVEF & dLVEDV) was tested for correlation with patient- and procedure-related variables.

Results. There were no major procedural complications and no evidence of ventricular arrhythmia or neoplasia in 350 patient months. LVEF increased to 74±7% (2wks) and 49±7% (6mths) (p=0.004). LVEDV decreased (p=0.01), and perfusion in the infarct area increased significantly (p=0.001). In phase-II, LVEF increased (p=0.005) and LVEDV decreased (p=0.004) in CABG&EPC patients, while there was no change in LVEF (p=0.2) or LVEDV (p=0.6) in CABG-only patients. In CABG&EPC patients, there was no association between dLVEF and EPC dose, patient age, or infarct-to-surgery interval, but an inverse correlation between preoperative LVEF and dLVEF was identified (R=0.53, p<0.05). Moreover, there was a significant difference in dLVEF between CABG&EPC patients with a preop LVEF<30% and those with LVEF>30% (11±8% vs. 3±4%, p=0.005). In CABG-only patients, there was no such association.

Conclusion. CABG&EPC injection appears to be more effective in patients with severely impaired LV contractility. Future study designs should focus on this group of patients.

Y003

Percutaneous stem cells transplantation. An update
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Aim. Since numerous experimental studies have suggested the benefit of Stem Cell therapy to the treatment of cardiovascular diseases, several techniques of administration have been investigated. We report our results concerning the safety, feasibility and efficacy of percutaneous intracoronary transplantation of bone-marrow stem cells (BMSCs) after acute myocardial infarction (AMI).

Methods. Fifty-two patients with AMI and culprit lesion stenting, received intracoronary infusion 94±54 million of autologous BMSCs through an angioplasty balloon catheter within infarct related artery 11±5 days after the onset of symptoms. To assess the safety of the procedure, microvascular perfusion studies (CFR and FFR), intracoronary IVUS, ECG monitoring and serial determination of serum CK, CK-MB and troponin during 24 h were performed. Efficacy in terms of ventricular function was assessed by cardiac magnetic resonance imaging studies (MRI).

Results. The procedure was carried out without complications. Cardiac injury markers did not rise in any patients, and perfusion studies showed no impairment of coronary flow after transplant (Table I). Intracoronary IVUS showed no damage of the stented segment after cell infusion. These results are in concordance with previous evidence of other groups of investigators. By March 2005, 26 patients have completed imaging follow-up (cardiac MRI before discharge and 6 to 9 months after AMI), showing a significant increase in LVEF (49±7.7 vs. 53±12.0%, p=0.007), and decrease in LV end-systolic volume (83±31.0 mL vs. 75±36.8 mL, p=0.034). In June 2005 up-dated results will be reported.

Table I.

<table>
<thead>
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<th>Before procedure</th>
<th>24th post-procedure</th>
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<td>CK (IU)</td>
<td>118±6103.3</td>
<td>12.4±7164.6</td>
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<tr>
<td>CK-MB (IU)</td>
<td>14±6.7</td>
<td>13±2.5</td>
<td>0.22</td>
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<td>T troponin (ng/mL)</td>
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<td>Fractional Flow Reserve (FFR)</td>
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<td>0.92±0.04</td>
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<tr>
<td>Coronary Flow Reserve (CFR)</td>
<td>1.8±0.79</td>
<td>1.92±0.94</td>
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</table>

Conclusion. Percutaneous intracoronary autologous Bone Marrow Stem Cells transplantation after acute myocardial infarction is safe. Mid size randomized clinical studies are needed to elucidate its effect on ventricular remodelling.

Y004

Surgical and percutaneous autologous skeletal myoblast transplantation in patients with postinfarction heart failure-safety issues
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Aim. Transplantation of autologous skeletal myoblasts (ASM) has been evidenced by experimental data and suggested by initial clinical observations to improve both systolic and diastolic function after MI. Disturbing the postinfarction scar electromechanical homogeneity by cell injection as well as lack of connexin 43 expression by skeletal myoblasts could both induce arrhythmias. Therefore the safety of ASM transplantation with special focus on arrhythmias remains a crucial issue.

Methods. We summarized data from two Phase I clinical trials performed by non-profit research academic institutions to evaluating the use of ASM transplantation performed during coronary artery bypass grafting (CABG) and by percutaneous approach as a sole therapy. In both studies patients with postinfarction heart failure and an akinetic or dyskinetic area of the left ventricle, were screened by means of dobutamine stress echocardiography and included into the studies when no viable myocardium was detected. The skeletal myobaloid biopsy specimens were obtained from vastus lateralis. After isolation the cells were cultured for 3-4 weeks and up to 100 million myoblasts per patient were grown. In surgical study (A), including 10 patients scheduled for CABG, myoblast injection into the akinetic area was done after constriction of the anastomoses during CABG procedure. In percutaneous study (B) myoblast injections were performed in 9 patients via trans-coronary-venous approach under IVUS guidance using TransVascular catheter system.

Results. In study A, sustained ventricular tachycardia (sVT) was observed in two patients in early postoperative period and in other two patients during Holter monitoring at 2 weeks follow-up visit. Amiodarone administration prevented recurrance of sVT episodes and no amiodarone treatment was needed 3 months after ASM transplantation, since all patients remained in Lown class 0 or 1 throughout 12 months follow-up. In study B, patients were treated with prophylactic amiodarone infusion before and during the procedure, except one patient reporting allergic reaction to amiodarone in the past. All patients were free from VT throughout 10-16 days of continuous ecg monitoring except of one patient, not receiving prophylactic amiodarone, who had episodes of sVT and experienced 3 shots from his internal defibrillator at day 8th post procedure.

Conclusion. The data suggest possible arrhythmogenic effect of ASM transplantation, however, ventricular arrhythmias post procedure seem to be well controlled by amiodarone. Large-scale trials are needed to fully elucidate the risk of arrhythmias after ASM transplantation.

Y005

Embryonic stem cell therapy for non revascularizable myocardium
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Background. Use of embryonic stem cells for improving myocardial function for ischemic heart disease, which is not amenable to revascularization.
Development of muscle-derived primary cell lines for heart repair

V. Bulekskeni et al.

Aim. Cellular therapy is a new and promising strategy for treatment of heart failure. Various stem cell types, ranging from embryonic to various kinds of autologous adult stem cells, are studied to improve functioning of heart under experimental conditions. We suggest using autologous skeletal muscle stem cells to repair damaged myocardium. However, before this method can be applied in humans, many questions should be resolved, such as proliferative and survival capacities of transplantable cells. Our aim is to study the relevancy of long-term cultured stem cells for transplantation and to evaluate the sensitivity of muscle derived stem cells to apoptotic inducers depending on their aging in culture.

Methods. Adult rabbits of both sexes were used in experiments. General anaesthesia was induced with ketamin and diazepam. The muscle tissue was removed from tibialis anterior. After the explantation, the tissue was minced and digested with collagenase and hyaluronidase prepared in trypsin/EDTA solution. Isolated cells were maintained in IMD medium enriched with FCS and passaged by treating with trypsin. Cardiotoxic agents - cisplatin and doxorubicin were used as apoptotic inducers.

Results. We optimised rabbit muscle-derived cells growth, frozen storage, and differentiation conditions and established eighth primary cell lines expressing desmin and capable to differentiate into myosin skeletal (fast) positive cells. We did show that skeletal muscle stem cells could exponentially grow in tissue culture for many months without reduction of proliferation. One of these cell lines is already growing for more than 8 months, the others 5, 3, and 1 month, respectively. Our results showed that those myogenic cells from early and late passages did not differ in expression of desmin, a marker of muscle origin. We have also found that cells with different passage number have the same dose and time dependence of apoptotic response after the exposure to cardiotoxic drugs, doxorubicin and cisplatin. In addition, the apoptotic features of frozen-thawed myogenic cells did not differ greatly from primary not frozen cells. The myogenic cells cultivated in vitro for various periods of time were stained with DAPI and PKH26 membrane label and injected into rabbit hearts after the artificial infant. Their integration into damaged tissue was proved histologically by fluorescence microscope after 1 month.

Conclusion. Prolonged cultivation and the frozen storage of rabbit muscle stem cells demonstrate cultures without the loss of proliferation potential and changes in their apoptotic behaviour. Our findings extend the possibility of therapeutic transplantation of myogenic cell lines. The long-term replication of myoblasts in culture makes this system convenient for ex vivo gene transfer.
Results of omentoplasty in treatment of postpneumonectomy pleural empyema and bronchial stump fistula

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Aim. Postpneumonectomy pleural empyema is a serious complication in thoracic surgery. Aim of this study was to analyse early and long-term results of omentoplasty as a treatment option for postpneumonectomy empyema and bronchial stump fistula.

Methods. During 1996-2003 omentoplasty was performed in 11 male patients with mean age 59.4 years (range 50-67). In seven of them right and in four left pneumonectomy (incl. 1 sleeve pneumonectomy) had been performed earlier, in 9 cases for lung cancer (III-IVB) and in 2 cases for destructive pneumonia. Empyema or a fistula had occurred 7 days to 2.5 years (median 1 month) after the first operation. Initially omentoplasty was combined with partial thoracoplasty to obliterate or diminish the residual pleural space; in last three cases omentoplasty alone was performed.

Results. Postoperative early recurrence of fistula occurred in one patient, who needed prolonged mechanical ventilation. The fistula healed spontaneously. One patient died due to haemolytic syndrome. Other patients recovered without major complications. Mean postoperative pleural drainage was 3.4 days (range 0-5 days). Mean duration of postoperative hospitalisation was 22.5 days (range 10-46 days). One late recurrence of fistula occurred 4 months after omentoplasty and was treated with open-window thoracostomy. Median postoperative survival was 28 months.

Conclusion. Omentoplasty is an efficient treatment option for postpneumonectomy empyema and bronchial stump fistula, ensuring fast postoperative recovery. Leaving residual pleural space after omentoplasty allows to avoid thoracoplasty, does not influence the outcome, but gives a cosmetically better result.

Surgical treatment of chronic postpneumonectomy empyema with bronchopleural fistula

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Aim. A retrospective study to evaluate effectiveness of transpleural approach to postpneumonectomy empyema with bronchopleural fistula.

Methods. Two hundred twenty-seven patients (55 females and 172 males, aged from 19 to 63 years) underwent surgery for chronic postpneumonectomy empyema caused by bronchopleural fistula between April 1975 and February 2005. Indications for previous pneumonectomy were: pulmonary tuberculosis - in 104 cases, COPD - in 76, lung cancer - in 39, traumatic injury - in 5, and pulmonary aspergillosis - in 3. Right pneumonectomy was performed in 131 (57.7%) cases, left pneumonectomy - in 96 (42.3%). Duration of empyemas ranged from 2 month to 18 years. Bronchopleural fistulae were present in all the patients, esophago-pleural fistulae - in 14, pleuro-cutaneous fistulae - in 86. 40 patients previously underwent Clagett procedure with resection of 2-4 ribs and had large open-window thoracostomies. In 45 patients there was a history of previous unsuccessful attempts of surgery, resuturing of bronchial stumps plus thoracomyoplasty with resection of 8 to 10 ribs (39 cases), or Abruzzini procedure - transternal transpericardial occlusion of the main bronchus (6 cases). In all 227 cases, transpleural reamputation of bronchial stumps and debridement of empyema cavity was performed. In 14 patients esophago-pleural fistulae were closed simultaneously. In all cases bronchial suture line was reinforced plus thoracomyoplasty with resection of 8 to 10 ribs (39 cases), or unsuccessful attempts of surgery: resuturing of bronchial stumps plus thoracomyoplasty alone was performed.

Results. Intraoperative morbidity made up 12.3% (28 complications - mostly bleeding), intraoperative mortality - 0.4% (1 case). Postoperative morbidity made up 17.7%, postoperative mortality - 10.2%, overall mortality - 10.6%. Duration of follow-up period ranged from 3 month to 20 years. Excellent results (no bronchial fistula, no empyema, no chest wall defect) were achieved in 200 patients (88.1% overall, or 98.5% of those who survived surgery). Bronchopleural fistulae and/or empyema recurred in 3 cases (1.3% overall, or 1.5% survivors).

Conclusion. Transpleural bronchial stump reamputation with debridement of empyema cavity is a fast and highly effective method of treatment for chronic postpneumonectomy empyema caused by bronchopleural fistulae, with acceptable mortality and morbidity rates.

Pulmonary resection for multi-drug resistant pulmonary tuberculosis

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Between 2000 and 2003 a total of 11 patients underwent surgery for multi-drug resistant pulmonary tuberculosis (MDR-PTB). They were 4 female and 7 male with mean age of 52.2 years. Chest CT scan revealed localised unilateral cavitation in all patients. MDR-PTB was verified by BACTEC TB 460 and Quantiferon test. Mean preoperative treatment duration (at least 4 drugs) was 4.9 months. The indications for surgery wNunN chemotherapy failure in 10 (90.9%) patients and haemoptysis in 1 (9.1%) case. Positive sputum at the time of operation was found in 8 (72.7%) patients. The operative methods included 8 (72.7%) lobectomies, 1 (9.1%) lobectomy combined with resection of S6 and 2 (18.2%) pneumonectomies. No 30-day postoperative death was experienced. Residual pleural cavity and prolonged air leakage were found in 2 (18.2%) of the cases. The postoperative chemotherapy varied from 8 to 18 months. Mean follow-up period was 29 months. Relapses were found in 2 (18.2%) patients, 6 and 14 months postoperatively. Four (36.4%) patients are under follow-up program without medication. Five (45.5%) of them are still on re-treatment with negative culture. In conclusion, surgery for MDR-PTB as an adjunct to chemotherapy is followed by acceptable postoperative complications and good long-term results after radical operation.

Morphological evaluation of healing processes in experimental bronchopleural fistula treated with use of myoplasty surgery

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Methods. Twenty sheep of both sexes, aged 2-3, weighing 35-68 kilograms, were included in this study. In order to perform myoplasty treatment, experimental author’s animal model of bronchopleural fistula had been formed in these animals. Fistula was closed with the use of latissimus dorsi muscle flap, transplanted into the pleural cavity. The efficiency of this procedure was verified with histological autopsy examinations. Tissue samples- fragments of the operated bronchus with transplanted muscle flap and surrounding lung tissue were examined in one - week intervals during 2 - 6 weeks period after surgery. Histological changes were assessed with use of two types of microscopes: light and electron.
Non-small cell lung cancer and pulmonary tuberculosis

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Aim. A non-randomized concurrent cohort comparison study to reveal influence of tuberculosis on diagnosis and treatment of lung cancer and outcome.

Methods. Two hundred twenty-seven patients patients with non-small-cell lung cancer and pulmonary tuberculosis were divided into 2 groups. Group 1 included 111 patients with either previous or concurrent active pulmonary tuberculosis; 80.2% patients had chronic pulmonary tuberculosis with a history of more than 2 years; 65.8% had active concomitant tuberculosis; 13.7% discharged Mycobacteria tuberculosis. Group 2 included 116 patients with non-small-cell lung cancer only. There was no statistically significant difference in age, sex, and stage of disease between the two groups. Patients complaints, efficiency of diagnostic procedures, operability, intra- and postsurgical morbidity, and long-term results were compared in both groups.

Results. Generally, there were more complaints in Group 1 than in Group 2. Occurrence of cough and asthenia was greater in Group 1, while chest pain was more frequent in Group 2. 21.6% patients of Group 1 were considered functionally inoperable, in 35.1% cases the tumors were found unresectable. In Group 2, functional inoperability and unresectability made up 6.9% and 38.8%, respectively. This major difference in functional operability was due mostly to prevalence of cor pulmonary: 40% in Group 1 versus 25% in Group 2. Previous or concomitant pulmonary tuberculosis in most cases decreased sensitivity, specificity and accuracy of radiological methods in staging of N criterion: detection of involvement of mediastinal and hilar lymph nodes (Table I). 34 (30.6%) patients of Group 1 and 49 (42.2%) patients of Group 2 underwent radical surgery. Extended procedures with intrapericardial pulmonary vessel division were needed only in Group 1 due to severe hilar fibrosis (2 cases), while chest wall resection was necessary only in Group 2 (2 cases). Intraoperative morbidity (mostly massive hemorrhages as a result of severe scarring in the pleural cavity) was detected only in Group 1 (2 cases or 5.9%). Bronchial stump dehiscence was also more likely to develop in Group 1 (6.1% versus 4.1% in Group 2); patients with concomitant active TBC being at most risk. Postoperative survival evaluated by Kaplan-Meier model was lower in Group 1 (2 cases or 5.9%). Bronchial stump dehiscence was also more likely to develop in Group 1 (6.1% versus 4.1% in Group 2); patients with concomitant active TBC being at most risk. Postoperative survival evaluated by Kaplan-Meier model was lower in Group 1 than in Group 2 (median survival 37.6±6.7 and 45.9±5.4 months, respectively).

Conclusion. In patients with non-small-cell lung cancer, concomitant or previous pulmonary tuberculosis deteriorates detection of lymph node involvement, decreases patients functional operability, intra- and postoperative morbidity, decreases postoperative survival time.

Table 1. Sensitivity, specificity, accuracy of radiological methods in staging of N criterion

<table>
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<tr>
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<th>Mediastinal lymph nodes</th>
<th>Hilar lymph nodes</th>
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<tr>
<td><strong>Group 1</strong></td>
<td><strong>sensitivity (%)</strong></td>
<td><strong>specificity (%)</strong></td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>63</td>
</tr>
<tr>
<td><strong>Group 2</strong></td>
<td>54</td>
<td>71</td>
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right anterolateral torakotomi was applied, to 1 patient median sternotomiy was applied.

Results. We saw that the most common injury area was right ventricle. Injured sites were sutured primarily with pledgedget sutures, two large injuries at the left ventricle were repaired by using pericardial patch. Also the injuries of the other organs were very common and they were repaired, too. The mortality in first group has 6 patients and in the second group was 1 patient and totally seven patients at all. (mortality rate 98.7%) At 2 cases in first group, neurological problems were observed. The all of the other patients were discharged and no problem was observed during their external observations.

Conclusion. If the patient has clinical findlings, thorakotomy must be done immediately. Diagnostic tests must be done to the patients with stable general condition. The criteria that saves lifes in cardiac injuries, are evaluation of the patient carefully, if necessary with echocardiography, PA telegraphy and emergent intervention.

T009

Gun shot wounds of the chest. Data and experience of twenty years

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Aim. We analyse the data and experience of treatment of the gun shot wounded patients during the last 20 years in the Center of General Thoracic Surgery. We analyse the patients treated due to chest trauma.

Methods. During the last 20 years (1984-2004) there were treated 85 patients with chest injuries by a gun shot in our department. 78 (91.8%) of them were male and 7 (8.2%) were female. The age average was 34 years. 8 (9.4 %) patients were just observed. Close tub thoracostomy was performed in 4 (4.7 %) cases. 73 (85.9 %) patients were operated. For 18 of them we removed foreign body from the thoracic wall and no penetrating injury was found. For the rest 55 open thoracotomy or sternotomy was performed. There were performed 18 (32.7 % of the operated patients) lung resections due to massive bleeding. (11 patients had thoracoabdominal injury for them laparotomy was performed as well), 2 – injured larynx, 3 – injured heart, 2 – injured thoracic aorta, 3 – injured thoracic part of esophagus. 2 patients underwent rethoracotomy due to the bleeding.

Results. Four operated patients (4, 7%) were died; 2 during operation due to the massive haemorhage and shock, 1 due to thoracoabdominal and head gun shot injury as well, 1 due to poliorganic insufficiency on the 5 Th postoperative day. Actually we did not mean patients which died before reaching a hospital due to fatal injuries. As a complication in postoperative period there were a bronchopleural junction in 3 (3.5%) patients (all of them had also empiema), suppuration of the wound in 4 (4.7%) patients, retropharyngeal abscess (in 1 patient). The average of hospitalisation time was 12.4 days.

Conclusion. Open thoracotomy is the way of choice in shock developing patients when the thoracic surgeon can be reached. It maintains a low number of complications and death. A possibility to make an ultrasound examination as well as X-ray examination just in the operating room can help choose the way of the treatment.

T010

Reasonable systematic nodal dissection for clinical tino-
mo adenocarcinoma of the lung

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Aim. Systematic lymph node dissection is an operation to enable an accurate staging and to improve local control for potentially curative lung cancer. To study the most effective method of lymph node dissection or sampling for T1 adenocarcinoma.

Methods. A retrospective study was done on 469 adenocarcinommas tumor size less 3cm without pleural involvement (T1) who underwent complete resection. Lobe specific lymph node metastasis and which node(s) had the most likelihood of metastasis (sentinel node were studied). As the result, sampling of sentinel node(s) was done to investigate the prevalence of lymph node metastasis remaining in the upper mediastinum.

Results. In the 192 cases of right upper lobe tumor, the main metastatic frequency of mediastinal lymph nodes appears #2, #3 and/or #4 and, apart from from #2, #3 and #4, the metastasized cases include (but not including the ones with multiple metastasis in either #3 and/or #4) two cases (or 1.0%) was with metastasis in other lymph node. Similarly, of a total 30 cases of the right middle lobe tumor, the wholly metastasized cases were found in #3 and/or #7. Of the 85 cases of right lower lobe tumor, metastasis was found mainly in #7 and/or #9 and one case (or 1.2%) was with metastasis in other lymph node. Of the total 117 cases of left upper lobe tumor, metastasis was found mainly in #4, #5 and/or #6 and five cases (or 4.3%) were found in other locations. And of the total 45 cases of left lower lobe tumor, metastasis was found mainly in #7 and/or #9, and one case (or 2.2%) was found in other locations. And finally, of a total 9 cases of those with metastasis in the location other than those which require lobe specific mediastinal node sampling, 6 cases were in the r1 lesion and the 3 cases were of skip cases with a risk rate (false negative) of 0.6% (or 3/360).

Conclusion. Patient with clinical T1N0M0 lesion and patient with biopsy negative hilar lymph nodes, sampling should be done as follows - in the case of a right upper lobe tumor: #2, #3 and/or #4, right middle lobe: #3 and #7, right lower lobe: #7 and/or #9, and one case (or 2.2%) was found in other locations. And, in the case of a left upper lobe: #4, #5 and #6 and left lower lobe: #7 and/or #9. If no metastasis was found in those nodes, mediastinal lymph node dissection could be omitted.

T011

Side of resection is an important predictor of mortality after pneumonectomy

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Aim. Age is a risk factor for lung resection. There is also evidence that a right pneumonectomy is a higher risk operation than on the left. It is not known if an increased post-operative mortality with advanced age is due side of procedure. We set out to answer this question.

Methods. Prospective data was collected from all pneumonectomies performed between 1991 and 2004 in a single institution. Factors, which approached significance on univariate analysis, were put into a multivariate model to determine risk factors for in-hospital (inclusive 30-day) mortality.

Results. Of 417 pneumonectomies, 202 (48.4%) were right sided, 94 (23.1%) were female and median age was 65 (26-84). Preoperative variables were equal between age groups. There was a trend for more women in the younger group (p=0.001). In-hospital mortality was 45 (10.7%) patients, 27 (13.4%) on the right (p=0.14). Only on the right did in-hospital mortality increase with age 14 (26.9%) compared with 6 (10.7%) on the left, p=0.002 (C.I. 1.35-3.85). Compared to a young patient having a left-sided pneumonectomy, an elderly patient having a right pneumonectomy has an increased risk of death (O.R.=1.90 (1.23-2.95), p<0.01) but an elderly patient having a right pneumonectomy has an increased risk of death (O.R.=1.31 (0.81-2.11), p=0.3).

Conclusion. Risk of death from pneumonectomy rises only modestly with age, but the combination of age and side poses a significant increased risk to the patient. Right pneumonectomy is a higher risk operation than a left pneumonectomy only in the elderly patient. More research needs to be conducted to understand the mechanisms of this finding.
Surgery in high-risk patients: fiction or reality?
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Background. General Thoracic Surgery has been traditionally done following criteria of operability that have lead to a severe restriction of operative indications in high-risk patients. Minimally-invasive techniques have been developed and its use in these patients is increasing. The initial experience in a Thoracic Surgery Unit is presented

Case Report. Patient 1 - A 59-year old man, with a previous pneumonectomy for lung cancer, presented with a solitary nodule on the upper left lobe. The nodule was studied for one year, without diagnosis with any method. The patient underwent resection with Video-Assisted Thoracic Surgery (VATS), being the nodule a malignant neoplasm. Patient 2 - A 53-year old man started with progressive dyspnea. After diagnosis of diffuse pulmonary interstitial pathology, he was considered for lung transplantation. Lung biopsy using VATS revealed carcinomatous lymphangitis of digestive origin, changing the therapeutic orientation. Patient 3 - A 75-year old man, previously operated for lung cancer with a upper left lobectomy, active smoker, was admitted for haemoptysis. Thoracic Computer Tography (CT) revealed a mass in the lower right lobe. No diagnosis could be obtained by any method. The patient underwent resection by VATS. Patient 4 - A 81-year old man with a previous total laryngectomy was admitted for repeated pneumonia. The Thorax CT revealed a lesion in the lower right lobe. The patient was intubated through the tracheotomy, achieving selective blockade of the main right bronchus, which permitted pulmonary biopsy using VATS. Patient 5 - A 69-year old man with a total laryngectomy presented a small lesion in the lower right lobe. The patient was intubated through the tracheotomy, achieving selective blockade of the main right bronchus, which permitted pulmonary biopsy using VATS. Patient 6 - A 71-year old man operated one year earlier of left pneumonectomy for lung cancer, presented in the follow-up two nodules in the upper right lobe. The patient underwent resection of the nodules using VATS. General Thoracic Surgery has been developed minimally invasive techniques that can be applied to patients formerly excluded from surgical option. It is also possible to shorten clinical study times in patients by submitting them directly for surgical biopsy or resection, avoiding repeated and unsuccessful blinded methods.

Sleeve resections: technical experience in seventy-seven patients
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Objective. We retrospectively analyzed the data of patients with lung tumors who underwent sleeve resections because of different pathology in the department of general thoracic surgery of Istanbul Medical School. The patients were evaluated in terms of indications, surgical techniques, morbidity, mortality and survival.

Patients and Methods. From January 1992 to December 2004, Seventyseven (58 male, 19 female) patients with the mean age of 57.03 (7-82) underwent pulmonary sleeve resections because of different pathologies in the department of general thoracic surgery of Istanbul Medical School. The patients were evaluated in terms of indications, surgical techniques, morbidity, mortality and survival.

Results. The etiologies of the resections were as follows: 58 primary lung cancer, 4 metastatic lung cancer, 9 carcinoid tumor, 6 benign diseases. Sixtyfour patients had bronchial sleeve lobectomy, 5 patients had isolated arterial sleeve resections, 6 patients had double sleeve resections. One of the carinal resection was right carinal sleeve resection and the other one was an isolated carinal resection. Postoperative complications were occured in 17 (22.07) patients. The mortality rate was 2.59 (2/77).

Conclusion. Sleeve resections do not have different mortality and morbidity when compared to conventional pulmonary resections. This technique has lower morbidity and mortality when compared to pneumonectomy and almost the same with lobectomy operations. Sleeve resections should be considered as an alternative resections in malignant and benign pulmonary pathologies requiring pneumonectomy.

Surgical treatment of T4 non small cell lung cancer
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Aim. To show the experience and the survival rate of the Thoracic Surgery Operative Unit of Verona Italy in the surgical treatment of T4 non small cell lung cancer (NSCLC) patients.

Methods. From 1988 through 2004, 102 patients underwent resection with the aim of being cured for primary T4 NSCLC. It was not possible to obtain a homogeneous group of patients treated with radio-chemio because of their inconsistencies. Actuarial survival rate was calculated.

Results. Overall 60 days mortality was 10.7% (n.11). In our 102 patients we saw in term of survival a difference (P=0.01) between pN2 and pN0-1and between radical and no radical surgery (P=0.03). The cumulative actuarial 5 years survival was 24% but, if we consider pN0-1 patients with organ involved like carina, cava vein and atrium that obtained radical resections we observe a 5 years survival respectively of 47%, 38% and 27%. There is a difference (P=0.05) between this group (carina cava atrium) and the other radical surgery treated patients. Patients (n.18 pN0-1) with two or more nodules within the same lobe obtain a 4 years survival of 22%.

Conclusion. We agree with some authors in the need to divide T4 in 'surgical' and 'no surgical' groups. In our experience you can obtain good results with radical surgery in selected organ involved patients. No mediastinal node involvement is mandatory. While in N3 patients prognosis is not favourable for whatever therapy is followed, in selected IIIB stage (surgical T4) can be obtained, with radical surgery, a survival rate comparable to an earlier stage.

How should we manage a small lung lesion of 1cm or less?
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Aim. With the spread of high resolution CT scan (HRCT), the small lesion in lung has been often found. Although some of these small lesions may be followed up, there exists lung cancer that should be resected among them, and treatment strategy for these is still controversial. In order to clarify the rate of malignancy, its histological type, and to verify our indication for surgical approach, we retrospectively analyzed the data of patients with lung tumors who underwent resection in our hospital.

Methods. Between January 2000 and December 2004, there were 54 patients with a lesion that was pathologically confirmed to be 1 cm or less in diameter out of 621 patients. We classified its HRCT image into 5 groups; A) pure ground grass opacity, B) partially solid and C) solid. Then its histological result was compared. Our basic strategy for a small lesion of 1 cm or less is as follows. 1) If the lesion is pure ground grass opacity, course observation would be chosen. 2) If the lesion is partially solid, solid or enlarging pure ground grass opacity, thoracoscopic partial resection followed by frozen section would be selected. 3) If the lesion is histologically confirmed to be carcinoma, partial resection would be switched to lobectomy, except localized bronchiole-alveolar carcinoma (BAC) case. Benign tumor and BAC would end up with partial resection.
Results. There were 28 male and 26 female patients. The average tumor size was 0.8+/-0.2 cm. Thirty three (61.1%) patients were detected by mass screening including CT scan. Histology: adenocarcinoma= 48 (88.9%), squamous cell carcinoma = 3 (5.0%), atypical adenoomatous hyperplasia (AAH), large cell carcinoma and metastatic tumor = 1 each. In comparison of the CT image groups with histology, 20 of 21 pure ground glass opacity were adenocarcinoma including 19 (95.0%) of localized BAC. As for our operative method, 23 patients underwent thoracoscopic partial resection, 26 underwent lobectomy mostly by video assisted thoracic surgery, and 5 underwent segmentectomy in the same manner.

Conclusion. Although these results analyzed were consequent of our patient selection criteria, it is outstanding that all resected cases, except one case of AAH, were malignant. We conclude that even a small lesion in lung could potentially be malignant, and that aggressive thoracoscopic resection should be considered especially when solid or partially solid change was seen in HRCT image.

T016
What tendencies are in the surgical treatment of lung cancer during 1950-2003 years
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Aim. To analyse the results and tactics of surgical treatment for lung cancer in the period 1950-2003 years.

Methods. There were 2535 patients with lung cancer surgically treated in the course 54 years. We have analysed the patients in three periods: 1) 1950-1979 years, 2) 1980-1999, 3) 2000-2003 years. Second period was divided into two subgroups: a) 1980-1993 years and b) 1994-1999 years. 410 patients were operated in the first period, 785 patients- in 1980-1993 years, 690 patients in 1994-1999 and 650 patients in 2000-2003 years. Pneumonectomy was the most common operation in the first period, it performed in 175(42.7%) cases, bi-lobectomy - to 105 (25.6%) patients. The second period: in a) subgroup pneumonectomy was performed in 261 (33.2%) cases, bi-lobectomy - to 418 (53.2%) patients, in b) subgroup - 200 (29.0%) and 329 (47.7%) patients were treated with the same type of operations. In the third period pneumonectomy was performed in 146 (22.5%) cases, bi-lobectomy remained the most common surgery intervention: in 273 (42.0%) cases. Segmentectomy and wedge resection were performed rarely in I and II periods: 16 (3.9%), 27 (3.4%), 27 (3.9%), but in III period such type of operation was increased to 87 (13.4%) cases. Exploratory thoracotomy was performed in I period to113 (27.6%) patients, in II period -a)subgroup -78 (9.9%), in b) subgroup _ 129 (18.7%), in III period in 105 (16.2%) cases. New surgical intervention as VATS surgery was introduced in third period. It was performed to 22 (3.4%) patients who had unsatisfactory spirometry data. The patients in the stage IIB and stage IIIA of disease were treated with adjuvant therapy (chemotherapy, radiotherapy).

Results. In the I and II periods (with a,b subgroups) the biggest hospital mortality was after pneumonectomy: 12.5%,11.4% and 11.0%. In the third period the hospital mortality was reduced till 4.1%. The mortality after lobectomy was low: 2.2%,1.6%,2.9% and 1.1% according to all the periods. The most serious complications were bronchial fistula, pneumonia and thrombembolism.

Conclusion. In the twenty four years lobectomy was the most common operation for the surgical treatment of lung cancer. In last four years increased the number of segmentectomy, wedge resection for surgical treatment of lung cancer Bronchial fistula, pneumonia and thrombembolism are the most serious complications after radical operations.

T017
Evaluation of topoisomerase iiA correlating with molecular detection of the specific gene alteration and chromosome 17 instability in intraoperative imprints and surgical specimen of nscLc
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Aim. Intraoperative imprints and FNAS offer a fast and accurate method of diagnosis and also a qualitative substrate for immuno-technochemical and molecular studies. Aberrations of chromosome 17 are common in many cancers including NSCLC. Topoisomerase family which includes Topo I (20q11), Topo IIa (17q21) and Topo IIb (3p24) is a class of enzymes in the nucleus of all living cells, which affect the topological structure of DNA.

Methods. Using Tissue Microarray Technology (Chemicon TMAr rayer AT100), we created a 40-tumor TMA. 40 NSCLC and 10 normal lung epithelia were obtained and embedded into a single paraffin block. Immunohistochemistry for Topo IIa (AB1650) was performed in 2 and 5 E m sections and in intraoperative imprints. Finally using a semi-automated Image Analysis System we evaluated the nuclear features of number and optical density and the number of signals of chromosome 17 centromeres and gene copies per nucleus.

Results. A significant proportion of NSCLC showed over expression of the marker (18/40) and CISH application showed topo IIa amplification or deletion of one allele in 11/18 cases. Co-evaluating chromosome 17 instability we observed that 10/18 cases displayed aneuploidy and 4/18 only amplification while the last 4/18 displayed deletion. We observed that chr 17 instability co-appearing with Topo IIa amplification correlates with low differentiation and poor prognosis (p<0,001).

Conclusion. The results indicate that topo IIa amplification or deletion is a critical genetic event correlating with biological behavior in NSCLC and determining chemosensitivity. Also intraoperative imprints and FNAS appeared to be more accurate at the evaluation of centromeric and specific gene signals because of the nucleus integrity.
The control of aeroystasis and haemostasis in iterative thoracic surgery. The use of fibrin glue versus standard techniques in a series of 150 patients

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Aim. The main postoperative complications in high risk thoracic operations such as iterative surgery are air leakage and bleeding. In fact in reoperations strong adhesions are always present, and during adhesiolysis rTAs easy to cause visceral pleura or pulmonary parenchymal lacerations causing air leak and/or haemorrhax. The aim of our study is to evaluate the fibrin glue use and rTAs effectiveness in preventing postoperative air leak and bleeding.

Methods. We performed a case-control study on 150 patients underwent iterative surgery for primary or metastatic lung diseases. Group 1 was composed of 75 subjects treated with fibrin glue apposition (with a mean of 5 ml) on air-leaking zones or on parenchyma lacerations with spray or manual technique; the 75 patients belonging to group 2 have been treated with standard techniques such as electrocauterization and suture of the widest air-leaking zones or on parenchymal lacerations. We considered as evaluation parameters: air leak duration, thoracic drain time and postoperative complications.

Results. Air leak duration was 2.47±0.89 days, (median: 2, range: 1-11), while in group 2 it was 6.88±5.78 days (median: 5, range: 1-25) [p<0.001]; drain time was 4.05±1.46 days, (median: 4, range: 3-12) in group 1, and 8.50±5.75 days (median: 7, range: 2-26) in group 2 [p<0.001]; In group 1 we had 1 complication (prolonged air leaks >10 days), while in group 2 we had a prolonged air leak in 12 cases, and haemorrhax in 4 [p<0.001]; in-hospital stay was 6.87±1.38 days (median: 6, range: 5-13) in group 1, and 10.35±5.64 days (median: 9, range: 4-26) in group 2 [p<0.001]. About costs, we have a saving of 28% in group 1.

Conclusion. If wide air leaking and bleeding zones, not controllable with standard techniques, are present in iterative surgery, the apposition of fibrin glue seems to cause an important reduction of expected complications. By our analysis, fibrin sealant led to a significant reduction of air leak duration, drain time, in-hospital stay and hospital charge in patients undergone redosurgery.

The effect of transcutaneous electrical nerve stimulation in post-thoracotomy pain control

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Aim. We investigate efficacy of Transcutaneous Electrical Nerve Stimulation (TENS) for post-thoracotomy pain control by randomized case-control study.

Methods. We studied 2 groups of patients undergoing posterolateral thoracotomy. First group: Sixty patients with TENS, which was used postoperatively for 5 days. Second group: Fifty-six patients, without TENS. In 2 groups, Visual Analogue Scale (VAS) was used to indicate if analgesia is needed. When VAS was higher than 4, analgesia was used. We observed the forced expiratory volume in 1 second (FEV1), the forced vital capacity (FVC), partial oxygen pressure (PaO2), partial carbon dioxide pressure (PaCO2), and how many doses of analgesia were given in postoperative 0 (extubation time), 2, 6, 12, 24, 48, 72, 120 hours respectively. TENS was not used in patients with cardiac disease or neurological disease.

Results. In the 1st group, TENS lessened the need of opioid during postoperative 5 days; this result is valuable statistically (p=0.013). Additionally, following postoperative 6th hour, as TENS increased the spirometric breath function, intensive care necessity was decreased. The results of FEV1, FVC, and PaO2 were high, and PaCO2 was low in the 1st group compared to the 2nd. All results are valuable statistically (p=0.012, p=0.01, p=0.024, and p=0.02 respectively). We observed that TENS had neither side effect nor intolerance.

Conclusion. TENS is beneficial for thoracotomy pain relief, and safe with side effect. And routine use of TENS after thoracic surgery is recommendable.
Postoperative nausea and vomiting. Prevention by identifying risk patients and using patient experiences
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Aim. Postoperative nausea and vomiting (PONV) is called the big little problem. It occurs in 33% cases, and is difficult to prevent because many factors are involved in causing it. PONV increases the risk of complications, which can result in lengthened recovery period and extended hospitalisation. PONV affects the use of resources and patient satisfaction and security negatively. There is little focus on preventing PONV in spite of knowledge about risk factors and medical prevention. Nursing practice interventions consist mainly on relieving patient suffering. The purpose is to investigate patient experiences and to improve the treatment and nursing related to PONV.

Methods. Patients with lung cancer undergoing surgery are included. Nine semi structured interviews were made to describe patient experiences. VAS-score was used to make an approach to each interview. To identify risk patients (with a rate at seven or more) and establish PONV relationship between these and the occurrence of PONV, a clinical rating system were tested in a retrospective follow-up study (n=64).

Results. Related to PONV as a symptom: Discomfort and exhaustion. Related to coping with the symptom: Control, dependence and silence. Related to the situation: Embarrassment and mood. Sense of being different. 33% got PONV. There is significant relationship between the rate and the occurrence of PONV (p<0.001). 89% of the risk patients got PONV, compared with 11% of the non risk patients. 48% of the women got PONV and 20% of the men. 100% of the male risk patients got PONV (p<0.001), compared with only 82% of female risk patients (p=0.49). Men had five times higher PONV risk, related to particular risk factors, compared with women. 30% of the patients will risk improper treatment, by using the clinical rating system (p<0.001). The length of hospital stay are shorter for patients with PONV, compared with patients without PONV (p=0.049). Age did not seem to influence on the PONV risk (p=0.11).

Conclusion. Many endure PONV, few talks about it a little is done to prevent it. To identify risk patients, a clinical rating system is usable, even the gender difference must be considered. Multi disciplinary interventions must be carried out. A structured preoperative anamnesis, including identifying risk patients and legalize problems with PONV, is recommended.

Immunologic predictors of the risk of generalization in non-small cell lung cancer patients after complete resections
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Aim. Some non-small cell lung cancer (LC) patients (LCP) after complete resections are known to be rapidly progressive and fatal requiring adjuvant treatment while others are not. We examined immunologic factors associated with low- and high-risk of generalization of LC after surgery.

Methods. We analyzed data of 108 consecutive LC radically operated and monitored in 1987-2004 (males=94, females=14; pneumonectomy=45, upper/lower lobectomy=44, lower/upper lobectomy=11, upper/lower bilobectomy=7, middle lobectomy=1; stage I=34, stage II=74; squamos cell LC=56, adenocarcinoma=46, large cell=6, T1=38, T2=43, T3=23, T4=4; N0=63, N1=20, N2=25; G1=30, G2=34, G3=44). 59 LCP (54.6%) (age=56.7±9.9 years; tumor size: D=4.3±0.5 cm; life span: LS=1903.8±210.0 days) lived more than 5 years without any features of LC progressing. 49 LCP (45.4%) (age=56.6±2.1 years; D=4.6±0.3 cm; LS=542.7±55.2 days) died because of generalization of LC during the first 5 years after radical procedures. Variables selected for 5-year survival (SYS) study were input levels of 64 immunologic factors, blood parameters, sex, age, TNMG, cell type. D. Survival curves were estimated by the Kaplan-Meier method. Differences in curves between groups of LCP were evaluated using a log-rank test. Multivariate Cox modeling, multi-factor clustering, discriminant analysis, structural equation modeling, Monte Carlo, bootstrap simulation and neural networks computing were used to determine any significant dependence.

Results. Cox modeling displayed that SYS of LCP (n=108) after complete resections significantly depended on: N0-2 (P=0.000), T1-4 (P=0.005), lymphocytes (P=0.016), monocytes (P=0.018), CD19 (P=0.000), CD16 (P=0.001), CD4+2H (P=0.000), CD8VV (P=0.000), CD1 (P=0.001), CD8 (P=0.018), CD4 (P=0.001), stick nuclear neutrophils (P=0.000), NST (P=0.000), circular immune complexes (P=0.000). Neural networks computing, genetic algorithm selection and bootstrap simulation revealed relationships between SYS of LCP and CD8VV (rank=1), N0-2 (2), CD19 (3), CD+2H (4), natural antibodies (5), LC cell population (6), thymus function index (7), protein (8), ratio of monocytes to LC cell population (9), CDw26 (10), heparin tolerance (11), gender (12), LC growth (13), ratio of CDw26 to LC cell population (14), monocytes (15), hemoglobin (16), prothrombin index (17), circular immune complexes (18), G1-3 (19), D (20), weight (21), T1-4 (22), lymphocytes (23), calcification time (24), eosinophils (25), erythrocytes (26), fibrinogen-B (27), coagulation time (28), IgM (29), ratio of eosinophils to LC cell population (30).

Conclusion. Correct prediction of LCP survival after radical procedures was 88.9% by logistic regression (odds ratio=64.8), 95.4% by discriminant analysis and 100% by neural networks computing (area under ROC curve=1.0; error=0.001).

Different modalities in the management of benign corrosive esophageal stricture
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Aim. Benign corrosive esophageal stricture is a serious problem affecting our community especially children. Various methods for esophageal dilatation were tried. When esophageal dilatation failed colon interposition was performed. The aim of this work is to evaluate the efficacy and morbidity of different techniques for esophageal dilatation and to analyze the complications of colon interposition.

Methods. A total of 440 patients with benign corrosive esophageal stricture were treated by dilatation as follows: Group I: 218 patients gum elastic dilator, Group II: 48 patients retrograde Tucker's dilator, Group III: 90 patients were guided Savary's dilator, Group IV: 44 patients balloon dilator and Group V: 40 patients Nd (Y AG) laser. Patients with failure of esophageal dilatation (39 patients) were submitted to subtotal colon interposition without esophagectomy. The post operative complications were studied.

Results. Esophageal perforation following dilatation were observed in Group I,III, V (7.3%, 2.2% and 5%) respectively. On the other hand cervical fistula after colon interposition was developed in 35.3% of patients.

Conclusion. Although Savary, balloon, and laser dilatation are safe and effective procedure for benign corrosive esophageal stricture yet Savary's dilator has the advantage of being cheap and can be used by junior staff. Also we can assume that colon interposition is still one of the most gratifying operation and success of this operation lies in reducing its mortality and morbidity.
Modifying surgical approach to oesophageal cancer: one size does not fit all

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Aim. Oesophagectomy, where appropriate, is the principle curative treatment for oesophageal carcinoma. Nonetheless it is an operation associated with a significant risk of morbidity. In our institution Lewis-Tanner operations are reserved for fitter patients with mid-thoracic disease. Our results were studied to determine the impact of approach (left thoracotomy (Sweet), a left thoracolaparotomy or a Lewis-Tanner) on morbidity and survival.

Methods. Data on preoperative stage, co-morbidity, medication, physiological parameters, operation, pathology, post-operative outcomes and follow-up were prospectively collected since 1991. A total of 666 patients had a single stage subtotal intra-thoracic oesophagectomy for primary oesophageal adenocarcinoma or squamous cell carcinoma. Continuous variables were analysed by Student’s t test or Mann Whitney U test. Categorical variables were compared with Chi-squared analysis. Kaplan-Meier method was used to determine survival and log-rank test to check for differences.

Results. Demographic variables differed with more of the diabetics, hypertensives and post chemotherapy patients having thoracolaparotomies than in the other groups. In-hospital mortality was 20 (5.6%), 3 (4.3%) and 13 (7.2%) for Sweet, thoracolaparotomy and Lewis-Tanner respectively (overall 36 (5.4%) p=0.160). Tailoring the approach did not compromise surgical resection margins (R0 in 324 (91.3%), 119 (91.5%) and 156 (80.2%), p=0.46). Respiratory complications were lowest after the Sweet procedure (p=0.005), as were wound infections (p=0.004) and problems with pain control (p=0.03). The median survival for the groups were 626, 668 and 572 respectively and 663 days (95%CI 569 to 711, p=NS).

Conclusion. Selecting a left sided approach for trans-thoracic oesophagectomy, even in high-risk patients, maintains a low morbidity and a low operative risk of death. Pain, respiratory and wound complications appear to be reduced with a Sweet approach.

Surgical decision making in treatment of the late esophageal fistula, complicated by mediastinitis, empyema, following thoracic aorta grafting

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Background. The aim of the demonstration is to analyse the successful case of surgical treatment of the posttraumatic aneurism of the thoracic aorta, complicated by esophageal fistula.

Case Report. A 41 year old man experienced the blunt trauma of the chest with the formation of the pseudoaneurism of the thoracic aorta. The grafting of descending aorta was performed but the esophageal fistula, mediastinitis and empyema followed subsequenty. Extraanatomik subclavian-iliac bypass on the right side was performed, the intrathoracic esophagous was switched off, gastrostomy and esophagostomy was made. The infected graft was removed and the thoracic aorta was ligated. The stomach-derived esophagoplasty was performed and the switched-off intrathoracic esophagus was removed in 4 months. The patient gained 20 kilogramms during the first year after the operation. All laboratory parameters are in normal ranges, there is no loss in function in the organs that are supplying by the bypass. The ankle index comprises 0.9 (on the left), 0.8 (on the left). One of the fatal complications after thoracic aorta grafting is graft infection due to the late esophageal fistula. Extraanatomik bypassing and switching off the esophagus with the subsequent esphagoplasty in the long term provides a life-saving opportunity for a patient.

Malignant mediastinal masses: results of surgical intervention

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Aim. Our aim is to evaluate effectiveness of radical surgery for malignant mediastinal tumours (MRT), results of treatment and complications rate.

Methods. From 1997 to 2003, 59 patients (patients) underwent surgery for MMT in the dept. of thoracic surgery and oncology Institute of Oncology, Vilnius University. Patients morphology were: Hodgkin lymphomas 12 (20.3%), non Hodgkin lymphomas – 5 (8.4%), teratoblastomas – 27 (45.7%), malignant tymomas – 3 (5.8%), ectopical mediastinal seminomas – 2 (3.3%), angiosarcomas – 3 (5.8%), chemodeactomas - 2 (3.3%), paragangliomas – 2 (3.3%), chondrosarcomas – 3 (5.8%). We perform following surgical interventions: sternotomy – 48 (81.3%) patients, thoracotomies _ 9 (15.2%) patients, parasternal mediastinotomies – 2 (3.38%), patients. In 25 (42.3%) cases we removed big size MMT: 25x35 cm, 30x40 cm in diameter. Weight of tumours varies from 5-10 kg.

Results. During surgery we resected adjacent mediastinal organs: pericardium in 20 (33.8 %) patients, diaphragm – 10 (16.9%) cases, lungs in 10 (16.9%) cases, v. cava superior reconstructions in 5 (8.4%) cases, a. carotis communis in 5 (8.4%) cases, left atrium 1 (1.6%) case, chest wall in 5 (8.4%) cases (using marlex mesh and metalometylacrilate), sternum and clavicilar resections in 6 (10.1%) cases with bone reconstruction. Complications: bleeding in 7 (11.8%) cases, lung heart insufficiency – 7 (11.8%) cases, bronchial stump fistula – 1 (1.6%) case. 7 (11.8%) patients died after surgery more than a month after. We have no 30 days mortality. In 47 (79.6%) cases we used radiation and chemotherapy postoperatively. Median survival of operated patients varied from 2-60 months.

Conclusion. Radical surgery for operable MMT is a sufficient way of treatment. Preoperative tumour morphology is mandatory. During surgery, if necessary, adjacent mediastinal organs should be resected. Complications rate was from 11-15%, mortality _ 7.8%. Radical surgery of MMT prolongs median survival of patients, comparing to conservative treatment alone.

Survival following oesophageal resection for carcinoma: the importance of the histological cell type

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Aim. The significance of tumour cell type on survival following oesophageal resection for carcinoma is uncertain. We reviewed our experience in order to compare the outcome in the two main histological groups.

Methods. Between January 1987 and April 2000, 621 patients underwent oesophagectomy with curative intention for squamous cell carcinoma or adenocarcinoma. The post-operative outcomes of patients with adenocarcinoma and squamous cell carcinoma were compared.

Results. Of the cohort, 424 patients presented with adenocarcinoma (group A) and 197 presented with squamous cell carcinoma (group B). The commonest approach in group A was a left thoracotomy (67%), whilst in group B, it was an Ivor-Lewis resection (55%) (p <0.0001). Operative mortality was 3.5% for group A and 8.1% for group B (p = 0.03). Cardio-respiratory complication rate was similar, but anastomatic leaks occurred more frequently in group B (4.2 vs 8.6%, p = 0.04). Patients in group B tended to have earlier pTNM stage (p = 0.06). Overall, survival was significantly better for group B (p = 0.003). Group B had a significantly better survival than group A in LN negative status (0.01), and a relatively improved survival in LN positive status (p = 0.35). On multivariate analysis, squamous cell
subtype (p = 0.034), pTNM stage (p = 0.005), LN status (p = 0.008) and completeness of resection (p = 0.028) were significant predictors of survival.

Conclusion. Following oesophagectomy, patients with squamous cell carcinoma have a poorer perioperative outcome as compared with those with adenocarcinoma. However, in the longer term, squamous cell type appears to confer a significant survival advantage.

T029
Video-assisted thoracoscopic thymectomy for myasthenia gravis: single institution experience on forty-eight patients
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Aim. Thymectomy in conjunction with medical treatment, is an established therapy in the management of generalized myasthenia gravis (MG). Video assisted thoracoscopic thymectomy (VATT) is a new generation operation performed on patients who have MG.

Methods. We performed 48 VATT operation for MG from July 2002 - January 2005. Three male and 45 female patients with an average age of 28.3 (15-62 years) were operated.

Results. Preoperative medication was consisted of pyridostigmine bromide and corticosteroids with an average of 20 ± 104.2 mg and 15 ± 20.4 mg respectively. Seven patients had a cervical incision in addition to thoracoscopic resection. Mean operation time was 77 minutes. The amount of chest tube drainage was 160 ml. The mean length of chest tube duration and postoperative hospital stay was 30.1 ± 24 hours and 2.27 ± 1.4 days respectively. Visual analogue Scale for pain evaluation revealed 2.83. Complication was noticed in 2 patients (4.1%) with contralateral pneumothorax and chylothorax. Mean intensive care unit stay was 36 min. We did not experience in hospital or 30 days mortality.

Conclusion. Although time is needed to have long term results, immediate postoperative results are excellent. Safe operation with cosmetically and physiologically perfect postoperative period enables early operation confirmed by neurologists and patients.

T030
Preliminary study of tracheal scaffold using an absorbable material
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Aim. We reported an artificial trachea made by pored Dacron tube. Our artificial trachea worked well up to 3 years in the canine mediastinal trachea. But, intraluminal stenosis of the graft was observed gradually due to foreign body reaction of the Dacron. We expected that an absorbable material might prevent foreign body reaction in long term after implantation. This study was designed to evaluate the feasibility of an absorbable material as the scaffold for an artificial trachea in canine model.

Methods. An artificial tracheal graft was made of a knitted polyglactin mesh, sixteen mm in diameter and 40 mm in length, which was internally supported by a spiral stainless steel wire. Eight mongrel dogs weighing 14 to 16 kg were anesthetized and the mediastinal trachea was exposed and resected 10 cartilaginous rings long. The artificial tracheal graft was then implanted by end-to-end anastomoses, with the pedicled omental flap wrapping. The graft patency rate measurement and histological examination were done at one and two week, and every one month thereafter by bronchoscopically.

Results. There was no operative death. Tissue grew internally already in 1 week after implantation as seen broncoscopically. The entire graft coverage of the granulation tissue was observed 1 month after implantation. But all dogs developed luminal stenosis rapidly at 2 months after implantation (patency rate: less than 10%) due to ingrowing excess tissue. The graft harvested from one of the dog showed the spiral stainless steel wire stent was directly observed under the omental flap. The knitted polyglactin mesh sheet disappeared at 2 month after implantation.

Conclusion. The knitted polyglactin mesh was rapidly absorbed in the airway since it is directly exposed to the outer environment. Absorbable material seems to work as scaffold for artificial trachea but further modification of the graft is required.

T031
Results of esophageal cancer treatment. Ten years experience
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Aim. Our aim is to evaluate efficacy of surgical, radiotherapy and palliation treatments for esophageal cancer.

Methods. From 1994 to 2003, 157 patients underwent subtotal esophageal resections in the departments of thoracic and abdominal surgery Institute of Oncology of the Vilnius University. For retrospective analysis, we included 116 operated patients (I group). 169 patients (II group), who underwent radical radiotherapy in the department of radiotherapy, and 98 patients - best supportive care patients, because of advanced disease, age or concomitant diseases (control group).

Results. Median survival after radical surgical resections of esophagus was: I st. – 370 days, II st. – 728 days, III st. – 317 days and IV st. – 160 days. Overall median survival for patients after subtotal esophageal resections was 384 days. Survival after radical radiation therapy according to stages were: II st. – 260 days, III st. – 251 days and IV st. – 183 days. Overall median survival in this group of patients was 253 days. In control group overall median survival was 96 days.

Conclusion. Median survival in the first group of patients was 384 days, in the 2nd group - 253 days and in the control group (best supportive care) - 96 days. Difference in survival after surgery, radiotherapy and best supportive care are statistically significant between stages of the disease and methods of treatment.

T032
Esophageal achalasia
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Aim. The aim of this study was to sum up results of pneumatic dilatation because of esophageal achalasia at the Department of General Thoracic Surgery of Vilnius University.

Methods. During a period of 31 yrs (1973-2004) we have treated 211 achalasia patients. In 203 patients (96.2%) pneumatic dilatation was performed.

Results. Fully recovered 178 (87.68 %). Single course of pneumatic dilatations was effective to them. Recurrence rate was 12.32% - 4 courses of pneumatic dilatations were performed to 1 (0.49%), 3 to 4 (1.97%), 2 to 20 (9.85%) patients. The major complication of pneumatic dilatation was esophageal perforation. In our study 3 (1.47%) cases of esophageal perforation occur.

Conclusion. Pneumatic dilatation is safe and effective method of treatment. In our opinion, it would be the best initial approach. If it fails, then myotomy would be treatment of choice.
Urgent bronchoscopies in lung surgery. Forty years experience
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**Aim.** Our aim is to review 40 years experience of immediate bronchoscopies in lung surgery, evaluate effectiveness and value of this procedure.

**Methods.** From 1964 to 2004, in the departments of Thoracic Surgery of Kaunas University hospital, the Surgical Clinic of Santariškių and the Tuberculosis Hospital and Oncology Institute of Vilnius University 16 500 urgent bronchoscopies (UB) were performed. 8800 (53.3%) under local anesthesia and 7 700 (46.6%) using general anesthesia. From 1994 to 2004, 13 269 (80.4%) bronchoscopies were performed in dept of thoracic surgery Oncology Institute, Vilnius University. UB were performed before operations, during and after surgery for 3 037 (22.8%) patients. 50 (1.0%) patients UB was performed before surgery: 9 (18%) patients due to bleeding, 10 (20%) UB were used to aid intubation procedure, 31 (62%) patients UB was used as palliation for bronchial occlusions. 25 (0.8%) patients UB was performed during surgery: 5 (20%) patients we removed benign trachea tumours, 20 (80%) cases UB was used after bronchoplastic operations. 60 (1.9%) patients had UB after surgery: 20 (33.3%) patients minitracheostomy was performed, 14 (23.3%) patients after pneumonectomies observing bronchical stump, 26 (43.3%) patients for lung athelectasis. 2 902 (95.5%) patients underwent sanative bronchoscopies in post operative period.

**Results.** We observed following complications. Lung-heart insufficiency: 12 (0.4%), bronchospasms: 5 (0.16%), bleeding: 6 (0.19%). We have no postbronchoscopic mortality.

**Conclusion.** UB plays very important role in before operations, during and after lung surgery periods. UB are effective: before surgery (62%) in bronchial occlusions, during surgery after bronchoplastic operations (43.3%), and for sanative purposes in post operative period (95.5%). Most common complications various from 0.16 to 0.4% of all cases.

Malignant fibrous histiocytoma in thoracic surgical practice
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**Aim.** A retrospective study of malignant fibrous histiocytes arising in the thorax was conducted to review their clinical and radiological features, as well as their early and long-term results of surgical management.

**Methods.** From 1998 through 2005, 7 patients (3 female, 4 male, aged 35-70) with malignant fibrous histiocytes were treated in our department.

**Results.** The presentation of malignant fibrous histiocytes in our series of seven patients has been varied. Two cases presented as primary chest wall tumors, one as anterior mediastinal mass, one as solitary primary intrathoracic mass, one as posterior mediastinal mass, one as posterior mediastinal mass and pleural effusion, and one tumor extending from shoulder girdle to the chest wall. Chest wall tumors underwent wide resection with tumor-free margins, and mediastinal masses underwent complete resection. There was no perioperative mortality. Four patients had radiation therapy and 1 had chemoradiation therapy postoperatively. Two patients had metastases to the lung within two months and died in the following month. One patient had local recurrence in the following 35 days.

**Conclusion.** Malignant fibrous histiocytes in the thorax generally shows a poor prognosis. Although wide resection with tumor-free margins is required in order to provide the best chance for cure in malignant fibrous histiocytes, this is not possible in tumors which originating in the mediastinum. So, combined therapy appears to be the most appropriate modality of treatment of malignant fibrous histiocytes.

Video-assisted thoroscopic surgery for the treatment of primary mediastinal tumors
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**Aim.** Recent advances in video-assisted thoroscopic surgery (VATS) have allowed this new surgical technique to be applied to a variety of thoracic diseases. The aim of this study is to clarify the usefulness and validity for the treatment for mediastinal tumors by VATS.

**Methods.** A total of 127 patients underwent resections of mediastinal tumors at our institute between January 1993 and December 2004. We retrospectively analyzed 45 patients who underwent the VATS procedure for mediastinal tumors. Our indications for VATS were location and presumed resectability of the mass without invasion to the adjacent organs on the basis of the preoperative assessment. The patients’ ages ranged from 16 to 77, with a mean of 52.9 years, including 21 males and 24 females.

**Results.** VATS resections were performed by the unilateral thoracic approach in all patients. The distribution of anatomical location was 31 anterior, 2 middle, and 12 posterior masses. The average operating time was 85 minutes (range, 35 to 155). Almost half of these resections were performed for thymic diseases, which included 14 thymomas and 10 thymic cysts. The other mediastinal tumors included 9 neurogenic tumors, 6 teratomas, 5 bronchogenic cysts and 1 hemangiomatous. In 40 patients (88.9%), the entire procedure was completed thoracoscopically. The conversion to a thoracotomy was required in two patients due to control the hemorrhage from an intercostal vessel and in three patients due to severe adhesions between the pulmonary structure and the chest wall. One patient had Horner’s syndrome after operation. There were no operative or hospital deaths and no patients required transfusion. The follow-up ranges from 2 months to 14 years and no recurrences have been discovered yet in any patient.

**Conclusion.** This study showed that VATS was an acceptable method for the therapeutic extirpation of mediastinal tumors, particularly in selected patients and that our operative indication in this series was feasible.

Reducing corticosteroid administration to lung transplant recipients decreases the incidence of opportunistic infection without increasing early rejection
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**Aim.** Advances in immunosuppressive regimens have decreased the incidence of early graft rejection following lung transplantation. Despite the common use of antimetabolites, monoclonal antibodies, calcineurin inhibitors and IL-2 inhibitors in immunosuppressive protocols, high dose corticosteroids are also routinely administered. We hypothesize that reduction in corticosteroid administration will decrease opportunistic infection following lung transplantation.

**Methods.** Two groups of lung transplant recipients were compared in a retrospective review. Group 1 (n=26) received one gram of methylprednisolone prior to reperfusion of the transplant lung followed by three doses of 125 mg each over 24 hours. Group 2...
A retrospective analysis of 75 consecutive patients who underwent tracheal resection and reconstruction procedures between 1993 and 2004 was performed. Data was collected from case notes and operative registers.

Results. Seventy-five patients with a mean age of 48 years (range 21–81 years) underwent tracheal reconstructive procedures during the observation period. There were 44 males. The procedures included tracheal resection 58 (77.3%), tracheal plication 5 (6.6%), broncho-oesophageal fistula 1 (1.3%), tracheal fistula 3 (4%), tracheal tug 2 (2.6%), subglottic resection 1 (1.3%), tracheal resection and thyroid resection 2 (2.6%), TOF 2 (2.6%), tracheal repair 1 (1.3%). Histologically there were adenoid cystic carcinoma 4, adenocarcinoma 2, leiomyoma 1, benign stricture 45, normal 2, fistulous tract 2, subcutaneous fistula 1, traumatic 2, polychondritis 1, tracheomalacia 5, Tracheo-oesophageal fistula 3. The average hospital stay was 12 days (range 3 days - 225 days). One patient needed re-operation for restenosis. Two patients had granulomas needing laser, five required dilatation and three-needed tracheostomy. Two patients needed stenting for bronchomalacia. In hospital 30 day mortality was 2.6% (one patient with tracheal resection and one patient of tracheo-oesophageal fistula repair died) long-term survival of 90.6% (68 patients).

Conclusion. Tracheal resection and reconstruction has good functional results, but require special anaesthetic techniques and stringent high dependency post-operative care. Good relief of symptoms and results are associated with the reconstruction of benign tracheal structure.

Methods.

Tracheal resection and reconstruction has good

Conclusions.

Complications occurred in eight cases (failure of vocal cords 2, larynx oedema 2, infection of sternotomy incision 2, restenosis after operation 2). There were 3 postoperative deaths: one from residual tracheomalacia, one TIF, one from dehiscence of tracheal anastomosis. All deaths and major complications occurred at the beginning of tracheal surgery at our institution, in the eighties.

Conclusion. Our experience demonstrates, that circular resection of stenotic trachea is the best method in the management the patients with postintubation tracheal narrowing. Lesions involving up to and more than 50% of the trachea may be effectively removed and in almost every case primary reconstruction may successfully be done. In patients with extensive tracheal stenosis in whom tracheal resection and reconstruction is not advisable at all, tracheal stenting with Montgomery T tube, is the best method of choice.
Subcutaneous emphysema and pneumomediatinum. A report of 410 cases

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Aim. Subcutaneous emphysema and pneumomediatinum occur frequently in critically ill patients in association with blunt or penetrating trauma, soft-tissue infections, or any condition that creates a gradient between intra-alveolar and perivascular interstitial pressures. A continuum of fascial planes connects cervical soft tissues with the mediastinum and retroperitoneum, permitting aberrant air arising in any one of these areas to spread elsewhere. The authors report their experience in diagnostic and therapeutic approach of the subcutaneous emphysema and pneumomediatinum.

Methods. Between 1999 and 2004 410 patients with subcutaneous emphysema and pneumomediatinum were observed; most were patients with trauma, a little number of patients had lung emphysema, asthma, lung cancer, in 2 cases tracheal breaking from intubation. The patients were divided in 5 categories of symptoms: I) Minor symptomatology (asthetic signs, rhinolalia, dysphagia), II) Medium symptomatology (previous plus dysphagia and dyspnea), III) Severe symptomatology (neck venous stasis, respiratory failure, enormity of the asthetic signs). The treatment was clinical observation and treatement of causes in the category I; needles collar, pectoral fasciotomy, cervicotomy with medium cervical fasciotomy and treatment of causes in the category II; cervicotomy with medium cervical fasciotomy and prompt treatment of the causes in the category III.

Results. All patients with minor symptomatology were observed for 24 hours and all had a good outcome; patients with medium and severe symptomatology needed different surgical interventions included toracotomy and VATS; 4 patients died for respiratory failure.

Conclusion. The presence of air in subcutaneous or mediastinal tissue is not dangerous in itself but patients’ observation and prompt recognition of the underlying cause is essential, in fact certain trauma-related causes may require surgical intervention for a good outcome.

Palliative treatment by endoscopic airway stenting

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Aim. Airway stenting with silicone or expandable metal stents provides reliable and durable palliation in adequately selected patients. We sought to review our experience with endoscopic airway stenting in adults with tracheobronchial obstruction.

Methods. Thirteen patients (9 female and 4 male) aged 45 to 85 years underwent tracheobronchial stenting between February 2001 and December 2004. The aetiology of tracheobronchial obstruction included squamous cell carcinoma of the lung (2); bronchial carcinoma (2); local recurrence in previous lung resection (1); external compression (3); tracheo-oesophageal fistula secondary to advanced carcinoma of the oesophagus (3); infiltration of the trachea secondary to advanced carcinoma of the oesophagus (1); tracheomalacia (1).

Results. All patients had the insertion of self-expanding metal stents. At follow-up at 8 days to 50 months, 7 of 13 patients were alive but all the deaths were secondary to the underlying disease and not related to complications following stenting. Symptomatic relief had always been achieved.

Conclusion. Tracheobronchial stenting seems a valid option for palliative treatment in adult patients with advanced malignant disease. The long-term outcome remains uncertain but it is ultimately influenced by the underlying disease.

Prognosing the life span of COPD patients: specifying indication for lung transplantation

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Aim. The majority of modern scientists has been offering FEV1 of less than 15-20% as a main and often single criterion for selection of COPD patients for lung transplantation. Our aim is to study the prognosis of lifetime of COPD patients as a step for lung transplantation.

Methods. A dynamic study of 58 patients with terminal COPD satisfying criteria for lung transplantation was performed. Twenty-seven patients died of progression of the disease. The prognostic value of clinical and functional signs (shortness of breath, FEV1, VC, pulmonary artery pressure (Ppa), blood gases, signs of cor pulmonale) was studied. The results of spirometry, bodipletismography, echodoppler effect, pulmonary angiography were analysed. We used the following statistical Methods, sample average, standard deviation, median and deviation of Chempel, criterion of Student, correlation and regression analysis.

Results. The life span of COPD patients correlated with Ppa. The correlation with shortness of breath, heart rate, hypoxemia was also noted. All patients with normal Ppa lived longer than 2 years with average lifetime of 38 months. No patients with Ppa more than 50 lived longer than 18 months. Prognostic value of pulmonary tests turned out to be of low significance. The mean period of life significantly decreased in patients with FEV1 of less than 20% or VC of less than 40%, but had no independent prognostic value.

Conclusion. Indications for lung transplantation in COPD patients are: 1) the presence of cor pulmonale signs; 2) Ppa higher than 50 mm Hg; 3) PO2 is less than 60 mm Hg; 4) unsatisfactory results of conservative measures.
almost all patients with malignant tracheal stenosis. Complications were in 2 cases: myocardial infarction in 1 patient, perforation of tracheal wall with development of mediastinitis in the other.

Conclusion. Procedures of stenting are proper choice in benign stenosis only if there are contraindications for circumferential tracheal resection. Stenting are proper method of correction of respiratory failure and 1st step of combination therapy in cases of malignant tracheal stenosis.

T044

Thoracomyoplasty: thirty-one year experience

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Aim. Chronic empyema is a challenge for thoracic surgeons. In the treatment of empyema thoracomyoplasty is still needed. We presented here our 31 year experience in thoracomyoplasty.

Methods. In 346 patients with empyema 463 thoracomyoplasty were performed. Indications for thoracomyoplasty are to close persistent pleural space in 433 operations and to tailor the thoracic cavity in 30 operations. Intrathoracic muscle transposition were combined with in 434 operations. 384 thoracomyoplasty, 49 myoplasty, 21 decortication and thoracoplasty and 8 pneumonectomy and thoracoplasty were performed.

Results. In 117 patients thoracoplasty was performed as revisions. Bronchopleural fistula was detected in 224 patients. 94 patients underwent revision and 12 of them underwent a third operation. Nonspecific pleuritis was detected in 220 patients, tuberculosis in 124, malignancy in 2 patients. 43 patients died. Mortality rate was 12.4%.

Conclusion. Few indications remain for thoracoplasty in present practise. Thoracoplasty is still necessary in the treatment of chronic empyema. In all thoracotomies extrathoracic muscles should be preserved in case thoracoplasty is needed later. If lung can not be expanded and full the thorax, chest wall should be approximated to lung.

T045

Empyemectomy-treatment of pleural empyema. First experience of ultrasound pulmonary decortication

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Aim. Empyema thoracis has been recognized as a disease entity since the time of Hippocrates and historically has been associated with high mortality. Over 30 years ago, the American Thoracic Society described 3 stages in the natural course of empyema, namely the exudative, fibrinopurulent, and organizing phases. Decortication and suction drainage usually result in lung re-expansion, otherwise pleurocutaneous window, intrathoracic transposition of skeletal muscle, or thoracoplasty remain life-saving but now uncommon options for treating a closed-space infection.

Methods. During the last 11 years (1993-2003), 132 patients underwent empyemectomy due to pleural empyema. During 2004 first 10 ultrasound pulmonary decortication were made in our clinic with specially equipped device named Sonoca-400 (Zoring). The use of low frequency ultrasound equipment in significant pulmonary cortex has been proved to be a highly effective and prospective mechanical and antibacterial method. It reduces traumatization of soft pulmonary tissue and improves the outcome of pleural empyema treatment in general.

Results. In 117 patients thoracoplasty was performed as revisions. Bronchopleural fistula was detected in 224 patients. 94 patients underwent revision and 12 of them underwent a third operation. Nonspecific pleuritis was detected in 220 patients, tuberculosis in 124, malignancy in 2 patients. 43 patients died. Mortality rate was 12.4%.

Conclusion. Few indications remain for thoracoplasty in present practise. Thoracoplasty is still necessary in the treatment of chronic empyema. In all thoracotomies extrathoracic muscles should be preserved in case thoracoplasty is needed later. If lung can not be expanded and full the thorax, chest wall should be approximated to lung.

T046

The surgical treatment of lung cancer invading the chest wall. Reconstruction with proplast

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Aim. Tumors that involve the chest wall by direct extension encompass 5% to 8% of lung cancer series. Before 1947, lung cancer that invaded the chest wall was believed to have a dismal prognosis and surgical excision was not recommended. In 1947, Coleman published a series of 5 patients, 2 of whom experienced long-term survival after surgical treatment of the lung in continuity with the chest wall. Since then, many authors have published series of patients who have undergone surgical resection of lung cancer invading the chest wall and reconstruction by placing artificial materials as Gore-Tex, Marlex mesh etc. In the present study is reported a new material, Proplast, for reconstruction of large wall defects after resection of malignant tumors.

Methods. Between March 1999 and January 2003, 24 patients (20 male and 4 female) age ranged 49-79 (mean age 64.8) with lung cancer invading the chest wall were operated for skeletal defect reconstruction. Presenting symptoms included: chest pain in 12 patients (50%), cough in 9 patients (37.5%), dyspnea in 2 patients (8.3%) and hemoptysis in 4 patients (16.6%). Ten patients (41.6%) were asymptomatic. The skeletal defect was repaired with the aid of a prosthetic new material from polytetrafluoroethylene carbon, proplast. Proplast is used because of its well-known features of being nonallergic and nonimmunogenic and having mechanical reliability and biocompatibility.

Results. The overall mortality was 14.6% (1 male); the death were due to respiratory failure. The overall postoperative morbidity was 12.5% (3 patients). The proplast, was removed in 2 patients (8.3%) because serious infection in the prosthetic material.

Conclusion. Many different types of materials have been used over the years to replace the rigid chest wall. Requirements of an ideal replacement are: availability, ease to use, adaptability, nonreactivity, resistance to infection and translucency to X-rays. The proplast is a very interesting and useful material for chest wall reconstruction.

T047

Videothoracoscopy in diagnosis and treatment of lung and pleural diseases

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Aim. Evaluate efficacy of videothoracoscopic operations in diagnosis and treatment of lung and pleura diseases.

Methods. From 1997 to 2004 in department of Thoracic Surgery of the Vilnius University Institute of Oncology, in 322 patients underwent operations using videothoracoscopic devices. Eighty-six (26.7%) patients lung resections: 6 (7%) patients lobectomies, 9 (10.5%) patients wedge resections of lungs tissue for the elderly, 30 (35%) patients removing metastases, 17 (19.8%) patients hamartomas, 3 (3.5%) patients pericardial cystectomy, 7 (8.8%) patients sympathectomies, 5 (5.8%) patients intrathoracic lipomectomies, 2 (2.4%) patients removing calcific 7 (8%) patients resections of pericardium. 256 (75.2%) patients diagnostic procedures were performed in
patients with various lung and pleura diseases: 76 (32%) patients tissue of lungs biopsies and 160 (68%) patients biopsies with chemopleurodesis.

**Results.** From an oncological point of view videothoracoscopic operations are confirmed. These operations shorten hospitalisation and combined treatment starts quicker. Middle period of hospitalization was of 5 days. We had complications: 32 (10%) patients postoperative pneumonia, 8 (2.5%) patients: short duration pneumothorax, 2 (0.6%) patients: bleeding, 1 (0.3%) patients: pleural empiema, 1 (0.3%) patients: drop of the lung. After resections margins were free of tumor invasion.

**Conclusion.** VATS surgery is effective save method of treatment for lung and pleural diseases. In some cases VATS surgery is the only way to remove tumours, and it shortens hospital stay till 5 days. Chemopleurodesis is very useful in treatment of pleural effusions. VATS surgery is very effective in elderly patients with concomitant diseases.

**T048**

**Surgical treatment of advanced lung cancer massive invading the left or both atriums**

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¹Cardiology Center Belarus, Minsk, Republic of Belarus; ²Oncology Center Belarus, Minsk, Republic of Belarus.

**Aim.** Patients with lung cancer massive invading the left or both atriums were recently not candidates to surgical treatment. The purpose of the study is to assess the outcome of surgical treatment in these cases.

**Methods.** Four operations to patients with non-small cell lung cancer massive invading left (3) or both (1) atriums (pT4N1-2M0) were performed since December 1st, 2003 to December 31st, 2004. There were 4 male, mean age was 60,5±7 years. Approach was right lateral thoracotomy. In all cases right pneumonectomy (with tracheobronchial anastomosis: 2) and partial left (3) or both (1) atriums resection with tumor and right pulmonary veins were made. Atrio-plasty was performed with xenopericardiums patches. Algorithm: mediastinal lymphodissection, resection of the right main bronchus or tracheobronchial anastomosis were the 1st step, cardiopulmonary bypass with tumor resection and atrio-plasty with xenopericardiums patches were the 2nd one.

**Results.** Mean CPB-time was 91±32 min., mean cross-clamp time was 71±50 min. The mean intraoperative bleeding was 715±210 ml. Hospital mortality: 1 patient died from pneumonia in 3 days. One patient had non-fatal major complications: massive air embolism in brain with prolonged lung ventilation of 5 days. Complete R0 resection was achieved in 3 patients, whereas 1 patient had a macroscopically residual disease. Mean follow-up was 7.5±5.5 months (range 1-15 months). Three patients are alive.

**Conclusion.** Surgical treatment of non-small cell lung cancer massive invading the left or both atriums is possible with satisfactory early Results. Follow-up is needed for results evaluation.

**T049**

**Comparison of mersilene mesh-methyl methacrylate sandwich and olytetrfluoroethylene grafts for chest wall reconstruction**

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**Aim.** The purpose of this report is to evaluate our results in patients who underwent reconstruction with MM-MM (Mersilene mesh-methyl methacrylate) and PTFE (polytetrafluoroethylene) grafts after large chest wall resection.

**Methods.** Between July 1999 and September 2001, 61 consecutive patients (38 male, 22 female; mean age, 49.08 years; range, 22-81 years) underwent large chest wall resection (<5 cm) and reconstruction with prosthetic material. Forty patients (67%) underwent reconstruction with an MM-MM sandwich graft (group 1), and 21 patients (33%) underwent reconstruction with a PTFE graft (group 2) (Table I).

**Results.** The operative morbidity ratios were 7.5% (3/41) in group I and 48% (10/21) in group 2 (P = 0.018). Chest wall instability ratio was significantly higher (P= 0.027) in group 2 (5/21: 24%) than it was in group 1 (1/40: 2.5%). The operative mortality ratio was 4.5% (1/21) in group 2 and 0% in group 1. The mean hospital stay was 10.6 days (range, 5-21 days) in group 1 and 13.3 days (range, 7-36 days) in group 2 (P= 0.015) (Table II).

**Conclusion.** We recommend use of the MM-MM sandwich graft rather than the PTFE graft for large defects of the anterolateral chest wall and sternum for successful prevention of paradoxical respiration. Additionally, the MM-MM provides better cosmetic options, is inexpensive and easy to apply, and offers minimal morbidity.

**Table I.** – Patient characteristics.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (MM-MM*)</th>
<th>Group 2 (PTFE**)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex (male/female)</td>
<td>26/14</td>
<td>13/8</td>
</tr>
<tr>
<td>Age (yrs) (range)</td>
<td>49.6 (22-81)</td>
<td>48.1 (36-67)</td>
</tr>
<tr>
<td>Indications of Chest wall resection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Lung cancer invasion</td>
<td>23</td>
<td>14</td>
</tr>
<tr>
<td>– Metastasis</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>– Chest wall instability</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>– Hydatid cyst involvement</td>
<td>–</td>
<td>1</td>
</tr>
<tr>
<td>Defect area range (cm²)</td>
<td>56-500</td>
<td>49-450</td>
</tr>
<tr>
<td>Type of resection (≤3 cm)</td>
<td>27</td>
<td>15</td>
</tr>
<tr>
<td>– Partially sternum</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>– Total sternum</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

*(MM-MM: Mersilene mesh-methyl methacrylate sandwich graft. **PTFE: polytetrafluoroethylene graft.*

**Table II.** – Comparison of the 2 prosthetic materials used for chest wall reconstruction. MM-MM was used in group 1 and PTFE in group 2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group 1 (n. 40)</th>
<th>Group 2 (n. 21)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total hospitalization time</td>
<td></td>
<td></td>
<td>0.015</td>
</tr>
<tr>
<td>(days) (range)</td>
<td>10.6 (5-21)</td>
<td>14.1(7-30)</td>
<td></td>
</tr>
<tr>
<td>Complication (n)</td>
<td>3 (7.5%)</td>
<td>10 (48%)</td>
<td>0.018</td>
</tr>
<tr>
<td>Mortality (n)</td>
<td>0 (0 %)</td>
<td>1 (4.5%)</td>
<td></td>
</tr>
<tr>
<td>Changing or addition of other materials</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Paradoxical respiration</td>
<td>1 (2.5%)</td>
<td>5 (24%)</td>
<td>0.027</td>
</tr>
<tr>
<td>Cost ($)</td>
<td>590-680</td>
<td>1680</td>
<td></td>
</tr>
</tbody>
</table>

**T050**

**Typical pneumonectomy versus bronchoplastic lobectomy for the treatment of lung cancer**

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**Aim.** To estimate the results of typical pneumonectomy (TP) and broncho(angio)plastic lobectomy (BAPL) for the treatment of NSCLC, when the location of the tumor or its invasion into the bronchi or/pulmonary vessels does not allow a typical lobectomy or bilobectomy.
Methods. Between 2003 and 2004 a total of 149 radical operations were performed for lung cancer: 124 lobectomies and 25 pneumonectomies (83.22% and 16.78%, respectively). In all cases the systemic lymphadenectomy was carried out. Twenty-five (20.16%) cases of the total 124 performed lobectomies were BAPL. Twenty-four patients underwent TP and there was 1 case of the pneumonectomy performed together with the resection of trachea bifurcation angle. We analyzed the frequency of the postoperative complications after TP and BAPL, the mortality rate and the duration of the postoperative intrahospital treatment in relation to the preoperative lung function parameters (FEV1) and the operation performed.

Results. Following BAPL (25 patients), 20 (80%) patients recovered without complications, while the rest 5 (20%) patients developed postoperative complications (pneumonia, bronchopleural fistula), 2 (8%) patients died. Patients having recovered after the operation had mean FEV1 value of 2.29 l (75.55% predicted) preoperatively and their postoperative hospitalisation lasted for an average of 8.36 days. After TP (24 patients) 17 (70.8%) patients recovered smoothly, the rates of postoperative complications (bronchopleural fistula, pneumonia, acute pulmonary cardiac failure, sepsis) and mortality were 8 (55.53%) and 4 (16.67%), respectively. In both groups, BAPL and TP, the patients who developed postoperative complications, had shown 50-60% predicted FEV1 preoperatively and their postoperative treatment lasted for nearly twice as longer period.

Conclusion. Operating patients with impaired pulmonary function with FEV1 <200 l (50-60% predicted) for NSCLC, the complications rate and fatal come outs ratio was higher both after TP and BAPL. Therefore for the treatment of NSCLC, when the location of the tumor or its invasion into the bronchi or/pulmonary vessels does not allow a typical lobectomy or bilobectomy, we suggest considering BAPL prior to TP.

Open heart surgery and simultaneous lung parenchyma resection
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Aim. The aim of this study was to retrospectively review the outcome of 14 patients, who underwent lung resection and cardiac operation at the same procedure over the last 10 years.

Methods. The patients had a mean age of 65 years (59-74 yrs, 11 male and 3 female). Nine of them had a right-sided lung tumor, 2 of them on the left side and 1 ipsilaterally. All the tumors were primary and were resected completely along with local lymph nodes. In 13 cases the median sternotomy was the incision of choice while in one case left lower lobectomy and single coronary artery bypass graft to the left anterior descending was carried out via left thoracotomy. The concomitant cardiac operations were in 13 cases coronary artery by pass graft a d in one case aortic valve replacement. The arterial revascularization was done on cardiopulmonary bypass in 6 cases and in the remaining 7 the procedure was performed off pump. In all cases coronary revascularization was done prior to lung resection, unless the other way round was more feasible.

Results. We had no operative mortality. Mean blood loss was significantly higher as compared to the to the overedge cardiac procedures (1 650 vs 750 per patient). The mean hospital stay was 13 days above the average hospital stay for either procedure above. The survival of these patients was within the expected limits and was based on the stage of the lung tumor.

Conclusion. Simultaneous lung resection and cardiac operation can be done safely, especially using on the off-pump techniques.

Isolated sternal fracture and myocardial injury
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Aim. Isolated sternal fractures are seen with an increasing frequency in traffic road accidents, especially after the introduction of the seatbelt legislation. In most cases, the victims are young, otherwise healthy individuals. Based on single center experience, practical guidelines and common knowledge, we would like to develop the attitude towards this type of injury and the need for hospitalisation.

Methods. The medical records of all patients who were treated with a diagnosis of isolated sternal fracture over the last 3 years were retrospectively reviewed. Clinical status, correlated with echocardiographic, ECG and cardiac enzyme abnormalities were the main outcome measures.

Results. Twenty-three patients with sternal fracture arrived to the emergency department in the above mentioned period, mean age 43.6 (19-80). All had a normal physical examination with 95% of them complaining of chest pain while direct pressure was applicable. All patients were hospitalised for observation with a mean stay of 2.08 days (1-5). Enzymes were measured in 16 patients, CPK in 9, CPK-MB in 3 patients and troponin levels in 14 patients All results were normal. Seven patients had no assessment of enzymes. Echocardiography was performed in 14 patients, with no trauma associated findings. Five patients had a widened mediastinum on chest x-ray and an additional chest CT-angiography performed which returned normal in all cases.

Initial chest tube management after pulmonary resection
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Aim. Tube thoracostomy management with suction or water seal following anatomical pulmonary resection remains somewhat controversial. Initial chest tube management without initial suction period may influence the duration of pleural fluid drainage, duration of tube thoracostomy, and/or hospital length of stay following pulmonary resection. Initial chest tube management with water seal without initial suction period decreases time for chest tube removal and decreases time of hospital stay.

Methods. A retrospective chart review was performed on 109 consecutive patients who underwent lobectomy or segmentectomy in The Western Pennsylvania Hospital, Pittsburgh, PA between December of 1999 and January of 2004. Comparison was made between chest tube management of water seal or suction in both patients with and without air leak.

Results. Of the 109 patients, 78 (72%) had no air leak at the completion of surgery, whereas 31 (28%) had air leak. In the group without air leak (78), water seal was used in 32 (41%) patients and suction in 46 (59%). In patients placed to water seal initially after surgery (32) removal of chest tubes was on POD 3.19±0.24 and hospital discharge was on POD 5.13±0.61 days. In patients placed to suction initially (46) chest tubes were removed on POD 4.52±0.40, hospital discharge was on POD 6.74±0.5 days. Both duration of chest tube (p<0.007) and length of hospital stay (p<0.04) were significantly lower in the water seal group. In the air leak group (31), 7 (23%) patients were managed with water seal and 24 (77%) patients with suction. Both duration of chest tube (p<0.001) and length of hospital stay (p<0.05) were significantly lower in the water seal group.

Conclusion. In patients without air leak, chest tubes should be managed with water seal following anatomical pulmonary resection, resulting in significantly shorter chest tube duration and hospital length of stay.