Najaarsvergadering Nederlandse Vereniging voor Thoraxchirurgie

Nieuwegein, 28 september 2001

De wetenschappelijke najaarsvergadering van de Nederlandse Vereniging voor Thoraxchirurgie (NVT) werd op 28 september 2001 gehouden in de blokhoeve in Nieuwegein. Op deze eerste maal van de jaarlijkse vergadering, waar de laatste bouw- en werkzaamheden nog in volle gang waren, was de NVT voor de eerste maal te gast.

De vergadering werd goed bezocht door 47 gewone leden en een aanzienlijk aantal assistenten, studenten en andere belangstellenden. Het lijkt duidelijk dat het een goede beslissing is geweest deze bijeenkomsten van de zaterdag tot de vrijdag te verplaatsen. Maar liefst 11 sponsors waren vertegenwoordigd en droegen bij aan het welslagen van deze dag.

Het wetenschappelijk programma bestond uit 14 voordrachten waarin alle aspecten van de cardiothoracale chirurgie aan bod kwamen. Opvallend waren de 9 voordrachten gehouden door assistenten en studenten.


J.A. Bekkers

Abstracts Nederlandse Vereniging voor Thoraxchirurgie

Patient perception of closing sounds of mechanical bileaflet heart valves.
A report from the MEVAS working group
Lek J.T., et al.
Departments of Cardio-Thoracic Surgery of the Erasmus Medical Centre Rotterdam, Catharina Ziekenhuis Eindhoven, AZ Nijmegen St. Radboud, and Isala Lovede Zwolle.

Background. Comparative analyses show that the level of noise from the closing sound in bileaflet valves may differ between valve types. This may have an important influence on the quality of life after operation. It is suggested that the ATS-valve has an improved performance with regard to sound level. Data from the prospective multicenter MEVAS-study were used to compare patient perception of valvular sound between ATS, SJM and Carbomedics (CM; used in 2 of the 4 centers) bileaflet valves.

Methods. The MEVAS-population included 637 patients who were allocated to and received bileaflet heart valves. From the 622 hospital survivors, 585 patients had at least one annual standardized telephone interview. The patients classified the perception of the valve sound on a scale from 1 to 5, with 1 = never audible, 2 = sporadic audible, 3 = sporadic disturbing, 4 = often disturbing, and 5 = seriously disturbing. Chi-square-testing was used to investigate potential determinants of sound perception at 1 year postoperative. In addition, a multilevel linear model (MLM) was used to investigate sound perception over time and the effect of potential determinants in those patients with at least 2 interviews (N=464).

Results. Mean age of the 585 patients who had at least one annual interview was 61 years, male/female ratio was 1.47. Allocation was to ATS in 243, SJM in 273, and CM in 69 patients, and included 444 aortic, 111 mitral, 1 tricuspid and 29 double valve replacements. No differences in pre-operative patient characteristics and type of valve replacement were observed between the three groups. The table shows the 1 year postoperative patient valve sound perception by valve manufacturer:

<table>
<thead>
<tr>
<th>Valve</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATS</td>
<td>26%</td>
<td>24%</td>
<td>42%</td>
<td>7%</td>
<td>1%</td>
</tr>
<tr>
<td>SJM</td>
<td>15%</td>
<td>24%</td>
<td>50%</td>
<td>10%</td>
<td>1%</td>
</tr>
<tr>
<td>CM</td>
<td>19%</td>
<td>17%</td>
<td>58%</td>
<td>6%</td>
<td>0%</td>
</tr>
</tbody>
</table>

No differences in valve sound perception were found at 1 year between the manufacturers (p=0.11) or when comparing aortic versus mitral valve replacement (p=0.50). However, younger patient age was a predictor of increased valve sound perception at 1 year. Using MLM, no change in valve sound perception was noted over time. Younger patient age and sinus rhythm at the time of the interview were associated with increased sound perception levels, while the ATS valve was associated with lower sound perception compared to the other 2 brands (p=0.05).

Conclusions. The majority of mechanical heart valve patients do hear the closing sound of their valve(s), although only a few are seriously disturbed by this sound. In the first 3 years after implantation no change in the perception of the valve sound is observed. With regard to patient perception of sound the ATS valve indeed has a significantly better performance.

Does Troponin-I really predict length of intensive care stay after congenital cardiac surgery?
Children's Heart Center, Wilhelmina Children's Hospital/UMC Utrecht

Introduction. Cardiac Troponin I (cTnI) may identify patients at risk for postoperative complications. This study establishes normal values of cTnI after uncomplicated congenital cardiac surgery and questions its additive predictive value for intensive care length of stay (LOS).

Netherlands Heart Journal, Volume 9, Number 8, November 2001
Methods. cTnI values were obtained pre-operatively and at 0, 4, 8, 12 and 24 hrs after repair in 65 consecutive patients with congenital heart defects. Univariate and multivariate analysis were used to determine the predictive value of cTnI for LOS compared to age, cardiopulmonary bypass (CBP), arterial crossclamp (ACC) and intubation times, renal function, lactate, inotropic support and CK-MB levels.

Results. Intensive care stay ranged from 18.5-73 hours (mean 89±131), and cTnI concentrations from 4.9 to 250 ng/ml (median 32.06). Three significantly different levels (p<0.001) were observed: low range (2.13 - 37.11, mean 14.54; ASD, valve surgery, PCIP), middle (range 11.08 - 58.08, mean 38.48; arterial switch, VSD, TCCP) and high range (37.32 - 174.29, mean 104.72; tetralogy of Fallot, AVSD). Multivariate analysis was performed after univariate preselection (p<0.05). Independent predictors for LOS were age, weight, aortic crossclamp and bypass times, inotropic support, creatinin, diuresis, lactate and CK-MB levels. cTnI values showed no additional significance for each time interval.

Conclusion. Tropin levels are related to the complexity of intracardiac repair and significant differences exist between the surgical groups. Like other troponin levels, cTnI levels correlate significantly with LOS and could be used as an independent predictor. However, multivariate analysis shows no added predictive value for Tropin levels at every interval postoperatively.

Neurologic monitoring during arterial switch operation

Geerts C.C., Sims C.E.M., Schoonhoven A.N., Toet M.C., Hutter P.A., Turner N.M., Dodge-Khatami A., Meijboom E.J., Bennink G.B.W.E. Children's Heart Center, Wilhelmina Children's Hospital/UMC Utrecht

Introduction. Cerebral function monitoring (CFM) has proved to be of prognostic value in neonatal care management. This study describes the use of CFM in transposition of the great arteries (TGA), during and after the arterial switch operation (ASS). Method. Routine monitoring was supplemented with the CFM for 4-12 hrs before, until 24 hours after cardiopulmonary bypass (CPB) in 16 neonates undergoing the arterial switch. The CFM records a filtered and amplitude integrated single-channel EEG from a biparietal placed electrodes. Specifically, different amplitude integrated EEG patterns by means of pattern recognition were looked at: Flat tracing (FT): very low voltage, below 5 μV; continuous normal voltage (CNV): 10-50 μV; discontinuous normal voltage (DNV): predominantly above 5 μV.

Results. Peri-operative course in all patients was normal and the CFM showed pre-operative a CNV pattern and during hypothermic CPB a FT pattern. After rewarming, this recovered to a DNV pattern, and several hours post-surgery to a CNV pattern with sleep-wake cycling. Despite these normal findings one of the patients developed an E. coli sepsis/ meningitis. No differences were observed between the mean period of 22 (1-252) months and for non-reversible perjury was 78%.

Conclusion. This investigation examines whether myocardial SPECT studies can detect patients requiring coronary angiography.

SPECT analysis of the myocardial perfusion after the arterial switch operation

Hutter P.A., Mantel S.F., Kreh D.L., Insel H.W. van*; Hitchcock J.F., Rijk P.P. van*; Meijboom E.J., Bennink G.B.W.E. Children’s Heart Center, Wilhelmina Children's Hospital/UMC Utrecht

Introduction. Coronary re-implantation is a crucial part of the arterial switch operation. Late coronary obstruction has been reported in 3-10%. This investigation examines whether myocardial SPECT studies can detect patients requiring coronary angiography.

Methods. Forty-four patients, aged 6-18, had resting and stress myocardial SPECT with technetium-99m-tetrofosmin and coronary angiography (group A). Twelve patients had SPECT studies, without angiography (group B).

Results. In group A, SPECT studies were normal in 34 patients. Large non-reversible perfusion defects were seen in 2 patients with myocardial infarction peri-operatively. Both had occluded left coronary ostium. Reversible defects on SPECT were found in 5 patients, all with normal
Conclusion. The use of Goretex® neochordae in mitral and tricuspid valve repair is an alternative method that has especially demonstrated its usefulness for correction of leaflet prolapse, both of anterior and posterior mitral leaflets and of tricuspid leaflets.

Long-term follow-up of mitral valve plasties
Shahin G.M.M.1, Six AJ.2, Belder H.C., Swieten H.A. van1, Brulet de la Riviere A.3
1 Heart Lung Centre Utrecht, loc. St. Antonius Hospital Nieuwegein dept. of Cardio-thoracic Surgery, 2 Heart Lung Centre Utrecht, loc. St. Antonius Hospital Nieuwegein dept. of Cardiology, 3 Heart Lung Centre Utrecht, loc. University Hospital of Utrecht dept. of Cardio-thoracic Surgery

Introduction. The aim of this study was to evaluate the long-term results of mitral valve plasty (MVP). Patient survival and freedom from failure of the MVP, were analysed.

Methods. One hundred consecutive patients suffering from mitral incompetence were operated at our institution from March 1976 to February 1981. All patients underwent MVP with or without concomitant cardiac procedures. Data were collected and entered in an Access database. Follow-up with a mean duration of 11.6 years (±8.0 years) is complete in 99%. An actuarial survival analysis is performed.

Results. Mean age of the patients was 47 years (range 9-72 years, SD 14.1). Sixty-one percent of the patients was male and 39% female, 56% of the patients was in NYHA III and 40% was in either chronic or paroxysmal atrial fibrillation. The predominant etiologies were rheumatic and degenerative valve disease (55% and 34% respectively). MVP without concomitant procedures was performed in 27% of the cases. Survival twenty years postoperatively is 53.5% (n=53). Twenty-three patients (23.3%) needed mitral valve replacement. This results in 75.7% of the cases with a functional MVP. Linear correlation with survival is age (p=0.002), coronary artery disease (p=0.001), ischemic etiology (p=0.003) and concomitant CABG (p=0.001). Failure of MVP was predicted only by elevated (>50/20 mmHg) systolic and diastolic pulmonary artery pressures (p=0.0097 and 0.0003 respectively).

Conclusion. Long-term freedom from failure of MVP is 75%, of patients still in life or at time of death. Mitral valve repair is beneficial in particular when pulmonary artery pressures are normal.

Beating-heart surgical treatment of atrial fibrillation with Microwave ablation
Maessen J.G., Mochtar B.
Department of Cardiotoracic Surgery, University of Maastricht, Maastricht

Introduction. Recent favorable results of surgically treated atrial fibrillation (AF) with a new generation ablation devices, allow the development of less invasive surgical approaches. In this study, early results are presented of our first series of patients with microwave ablation for AF on beating-heart.

Methods. From June 2001 until August 2001, 9 patients underwent beating-heart epicardial ablation of AF. With a 4 cm shielded microwave antenna, linear lesions were created during 120 sec at 65 Watt. Left and right pulmonary veins were isolated and connected to each other followed by amputation of the left atrial appendage. Electrical isolation was tested with pacing and EKG recordings. Subsequently, patients underwent either offpump CABG or valve surgery onpump.

Results. Mean age was 74±6 years. Two patients suffered from PAF, all others were in chronic AF. Mean left atrial diameter was 5.5±0.6 cm. Mean ablation time was 20±5 min. All procedures could be completed successfully offpump. All patients were in sinus rhythm following the procedure. 5 patients experienced periods with postoperative AF during hospital stay. Two of them were discharged with AF. All patients received either sotalol or amiodarone and left the hospital without procedure related complications.

Conclusion. With the use of a shielded microwave ablation catheter for treatment of AF, electrical isolation of the pulmonary veins can be achieved epicardially without CPB support. Awaiting the long term
results, our studies are continued in an experimental animal model to achieve a similar ablation without sternotomy.

**Risk factors for neurological complications after coronary artery bypass grafting in relation to the performance of cardio-pulmonary bypass**

Dept. of Extra- Corporal Circulation, Dept. of Cardiothoracic Surgery, University Hospital Maastricht, Maastricht

**Introduction.** Neurological disorders are among the most serious complications of cardiac surgery. We tested the hypothesis that certain combinations of hemodynamic events from apparently normal cardio-pulmonary bypass procedures (CPB), correlate to the development of neurological complications and affect the impact of clinical risk factors.

**Methods.** Statistics using cluster analysis were applied to a data set of automatically recorded perfusions from 1395 patients. ANOVA was used to select 5 parameters among 32 initially chosen variables, with the strongest significant correlation to neurological complications for further analysis. The dependency of correlations found by cluster analysis was tested against common clinical risk factors.

**Results.** 5 parameters emerged for cluster analysis: mean and dispersion of MAP, dispersion of SVR, dispersion of pulse pressure and mean venous pressure. With these parameters we found 4 clusters that were significantly different by CPB performance containing 389, 431, 348, and 229 patients in each cluster, respectively. The frequency of neurological complications was 0.8% in the first cluster and increased up to more than ten times (3.9%) in the fourth cluster. The impact of most clinical risk factors was affected by the performance of the CPB procedure. For example, the frequency of neurological complications among patients with cerebrovascular disease was 22% in the fourth cluster and zero in the second cluster.

**Conclusion.** Clustering of hemodynamic parameters from apparently normal CPB procedures reveals a strong correlation with the frequency of neurological complications. In addition, the impact of clinical risk factors appears to be significantly affected by CPB performance.

**Results of coronary artery bypass surgery in patients with impaired left ventricular function**

Son J.A.M. van, Soliman M, Straten R.H.M. van, Woorst J. ter, Penn O.C.K.M., Berrekkou E, Schönberger J.P.A.M. 
Department of Cardiothoracic Surgery, Catharina Hospital, Eindhoven

**Introduction.** This study evaluates in a prospective fashion the surgical outcome of 75 consecutive patients with impaired left ventricular dysfunction, including an analysis of predictors of a favorable outcome for coronary artery bypass grafting (CABG).

**Methods.** Seventy five patients (age 64±13 years) with coronary artery disease and impaired left ventricular function (left ventricular ejection fraction [EF] 0.37±0.11) who underwent a CABG between July 1997 and March 1999 were prospectively studied.

**Results.** Three patients (4%) died early. The left ventricular wall motion score improved significantly at late follow-up (from 10.4±1.1 preoperatively to 7.4±2.0, p= 0.03). At late follow-up, 65 patients (90%) were free of angina and 24 patients (31%) had improved one or two functional classes. Fifty-four patients (75%) had a cardiac event-free survival and a significant improvement in EF, which outcome had a significant correlation with the presence of extensive reversible defects on thallium-201 scintigraphy. Two patients died late (3%) and 16 patients (22%) had no significant improvement in EF. This poor outcome had a significant correlation with a pathological Q wave in the postoperative electrocardiogram (ECG) and with an increased left ventricular endystolic volume index (>100ml/m²).

**Conclusions.** The presence of extensive reversible defects on preoperative thallium-201 scintigraphy is a strong predictor of postoperative recovery of myocardial function. A poor outcome of surgery is expected in the presence of pathological Q waves in the postoperative ECG or when the left ventricular endystolic volume index exceeds 100ml/m².

**Pulmonary endarterectomy for chronic thromboembolic pulmonary hypertension**

Heijmen R.H., Haarlem S.W.A. van, Snijder R.J., Jansen E.W.L., Morshuis W.J. 
Departments of Cardiothoracic Surgery and Pulmonology, HLCU, St. Antonius Hospital Nieuwegein

**Introduction.** Chronic unresolved pulmonary embolism may result in significant pulmonary hypertension and cor pulmonale. Pulmonary endarterectomy (PE) may restore pulmonary hemodynamics and improve functional outcome. In this study, we evaluated our initial results with PE for chronic thromboembolic pulmonary hypertension.

**Methods.** From 1996 to 2001, 15 patients (10 male, mean age 55 years, preoperative pulmonary vascular resistance of 373±217 dynes/s per cm² with a NYHA functional class III or IV) were operated using a standardized technique using extracorporeal circulation, deep hypothermia and intermittent periods of circulatory arrest.

**Results.** In all patients PE could be successfully performed with a mean circulatory arrest time of 62±29 minutes. There was no mortality. In our early experience, the procedure was performed unilaterally in 7 patients. Although clinical status improved considerably, pulmonary hemodynamics remained mostly unchanged. After a bilateral approach in the last 8 patients, however, mean pulmonary artery pressure significantly decreased from preoperatively 49±10 to 31±8 mmHg postoperatively (p=0.006). In 8 patients reperfusion edema occurred requiring prolonged ventilation. At a median follow-up of 16 months (range, 5 to 64 months) there were no late deaths, and all but one patient were in NYHA functional class I or II. Echocardiography demonstrated an improved right ventricular function without severe tricuspid valve incompetence in 14 of 15 patients.

**Conclusion.** Pulmonary endarterectomy for the treatment of chronic thromboembolic pulmonary hypertension proved to be technically feasible with low morbidity and mortality, and resulted in symptomatic and pulmonary hemodynamic improvement.

**Promising initial results of the minimally invasive procedure (Nuss) for correction of pectus excavatum**

Hasan S.H., Brandon Bravo Bruinsma G.J., Leicher F.G., Haalebos M.M.P. 
Department of Cardiothoracic Surgery, De Wezzenlanden, Zwolle

**Introduction.** Pectus excavatum is the most common congenital deformity of the sternum. Surgical correction can be achieved by several invasive techniques. Recently, a minimally invasive surgical procedure (Nuss) was introduced, enabling chest wall remodeling by applying the Lorenz Pectus Bar.

**Methods.** From March 2000 till August 2001, 6 healthy children (1F: 5m, mean age 13.2 years, range 6-20 years) were operated on for correction of pectus excavatum; 4 for purely cosmetic reasons and 2 in coexistence with shortness of breath. After preoperative screening the patients were operated under general endotracheal anesthesia with muscle relaxation and an epidural block. The curved Bar was inserted into the chest through the selected lateral intercostal space and guided manually to the other side. Subsequently, it was turned over and stabilized to the thoracic wall muscles of both sides. The patient was monitored at the ICU for 24 h. An ambulation protocol at the ward was followed by outdoor-clinic visits.

**Results.** All insertions of the Lorenz Bar were successful. A pneumothorax was drained and a dislocated pectus stabilizer was surgically repositioned at the 8th day postop. All patients were satisfied with the immediate cosmetic result and discharged within 8 to 10 days (mean 8.5 days) after follow-up. Follow-up of ± 1.5 years shows excellent cosmetic results and no physical retrain. Explantation of the Bar will follow within 2 to 3 years postimplant.

**Conclusion.** The promising initial results of this small series of patients encourage the use of the Nuss technique and the Lorenz Pectus Bar as a safe and structural correction of pectus excavatum in children and young adults.