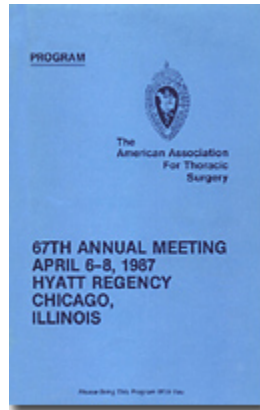


# 1987 ANNUAL MEETING PROGRAM



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1987 Annual Meeting  
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Timothy J. Gardner, M.D., Baltimore, Maryland

**SIMULTANEOUS BREAKFAST SESSIONS\*\***

**TUESDAY MORNING, April 7, 1987**

**6:45-8:30 a.m.**

**(A) CONTROVERSIES IN HEART VALVE SURGERY - Columbus Hall**

*Moderator:* Lawrence H. Cohn, M.D., Boston, Massachusetts

**"Surgery on the Small Aortic Root**

Albert D. Pacifico, M.D., Birmingham, Alabama

**"Mitral Valve Repair"**

Delos M. Cosgrove, M.D., Cleveland, Ohio

**"Balloon Valvuloplasty"**

William Grossman, M.D.\*, Boston, Massachusetts

**(B) ADJUVANT CHEMOTHERAPY FOR LUNG AND ESOPHAGEAL CANCER: EXPERIMENTAL VS. ESTABLISHED - Columbus Hall**

*Moderator:* David B. Skinner, M.D., Chicago, Illinois

Tom R. DeMeester, M.D., Omaha, Nebraska  
E. Carmack Holmes, M.D., Los Angeles, California  
Nael Martini, M.D., New York, New York

**WEDNESDAY, April 8, 1987**

**(C) ACUTE MYOCARDIAL INFARCTION: CATH LAB, SURGERY OR NO INTERVENTION? - Columbus Hall**

*Moderator:* Mortimer J. Buckley, M.D., Boston, Massachusetts

**(D) TRANSPLANTATION: PRACTICAL ASPECTS - Columbus Hall**

*Moderator:* Edward B. Stinson, M.D., Stanford, California

**"Heart"**

Jack G. Copeland, M.D., Tucson, Arizona

**"Heart-Lung"**

Bruce A. Reitz, M.D., Baltimore, Maryland

**"Lung"**

Joel D. Cooper, M.D., Toronto, Ontario

\*By Invitation

\*\*Admission will be by ticket only and will be limited. Tickets must be obtained in Registration Area of the Hyatt Regency Chicago prior to 2:00 p.m. on Monday, April 6. There are no provisions for pre-registration. Breakfast will be served u 7:00 a.m. only.

**American Association for Thoracic Surgery  
67TH ANNUAL MEETING  
Scientific Program**

**MONDAY MORNING, April 6, 1987**

**8:30 a.m. Business Session (Limited to Members)**

**8:45 a.m. Scientific Session - Grand Ballroom**

**1. New Approaches to the Management of Acute Ischemic Mitral Regurgitation**

*J. SCOTT RANKIN\*, MICHAEL P. FENELEY\*,*

*RICHARD D. FLOYD\*, J. G. REYES\**

*and ROBERT M. CALIFF\**

*Durham, North Carolina*

*Sponsored by: DAVID C. SABISTON, JR.*

*Durham, North Carolina*

Severe mitral regurgitation (MR) secondary to acute myocardial infarction has been a particularly difficult management problem with disappointing clinical results. Over a 20 month period, 15 patients were admitted with acute myocardial infarction and severe MR associated with: acute pulmonary edema in 14, low cardiac output requiring balloon pump placement in 10, and acute renal dysfunction in 7. The infarcts were posterior in 14 patients and anterior in 1; 3 had ruptured papillary muscles. Six patients underwent thrombolysis or angioplasty reperfusion within 6 hours of coronary occlusion, and the degree of MR then was monitored serially with Doppler echo-cardiography. In 5 patients (Group I), reperfusion was associated

with resolution of MR to 1 + levels or less over 48-72 hours. Four of these patients underwent conventional coronary revascularization, and 1 received percutaneous angioplasty, with 4 long-term survivors (>6 months). In 10 patients (Group II), the MR persisted at severe levels, and all 10 underwent complete coronary revascularization, transventricular mitral valvuloplasty through the infarcted area, and infarct exclusion/plication. The valve repairs included posterior commissural annuloplasty in 8, papillary muscle shortening procedures in 7, reimplantation of ruptured papillary muscles in 3, and chorda! transfer in 1. Valve function was monitored intraoperatively with transesophageal echocardiography. One acute failure of repair necessitated transventricular mitral valve replacement, and 8 Group II patients have survived long-term. All survivors are Class I for angina and heart failure. Late postoperative color-flow Doppler studies of both groups revealed 0-1 + MR in 9 and 2+ MR in 3. Thus, in severe acute ischemic MR, a policy of early reperfusion when feasible, followed by 1) serial Doppler assessment of valve competence, 2) subsequent coronary revascularization, and 3) a uniform application of transventricular mitral valve repair when necessary resulted in an 80% long-term survival. Late symptomatic status and valve function appear satisfactory, and this approach offers the potential for improving therapeutic results in this difficult clinical subgroup.

\*By Invitation

## **2. Aortic Valve Replacement with Cryopreserved Homograft Valves and with Antibiotic 4°C Stored Valves: A Comparative Follow-Up Study**

*MARK F. O'BRIEN\*, E.G. STAFFORD\*,*

*P.G. POHLNER\*, M.A.H. GARDNER\**

*and D.D. McGIFFIN\**

*Chermside, Brisbane, Australia*

*Sponsored by: JOHN W. KIRKLIN*

*Birmingham, Alabama*

Aortic valve replacement, with or without associated procedures, was performed in 304 patients with allograft (homograft) aortic valves; the allografts were Cryopreserved between 1975 and August 1986 (n = 184) and antibiotic sterilized and stored at 4°C between 1969 and 1975 (n = 120). All patients have follow-up, with date of inquiry of August 1986. The 10 year actuarial survival, including hospital deaths, of patients with the Cryopreserved valves and with the 4°C stored valves was 70% ( $\pm$  5% SD) and 67% ( $\pm$  5% SD) respectively. With the 4°C stored allografts, the 14 year survival was 51%.

Ten year actuarial freedom from homograft valve reoperation in surviving patients with Cryopreserved allografts and 4°C stored valves was 92% ( $\pm$  3% SD) and 85% ( $\pm$  4% SD) respectively. The 14 year actuarial freedom in the case of 4°C stored allografts was 62%. The longest follow-up in patients with Cryopreserved allografts was 12 years and in those with 4°C stored allografts was 16 years. Within these periods, no patients with Cryopreserved allografts (0% of 30 day survivors) underwent reoperation for cusp perforation while 15 patients with 4°C stored allografts (14% of 30 day survivors) underwent reoperation for cusp perforation (p for difference <.0001).

Multivariate analysis demonstrated the dominant effect of the homograft valve preservation technique on the prevalence of reoperation for cusp rupture. Earlier studies showed fibroblast viability in Cryopreserved allografts and lack of fibroblast viability in

antibiotic sterilized 4 °C stored allografts. These considerations, plus the low prevalence of thromboembolism (2% of 30 day survivors) and valve endocarditis (3% of 30 day survivors) in the patients receiving Cryopreserved allograft aortic valves, indicate the superiority of this method of storage.

\*By Invitation

### **3. The Carpentier-Edwards Supra-Annular Porcine Bioprosthesis - A New Generation Tissue Valve with Excellent Clinical Performance**

*W.R. ERIC JAMIESON, ALFRED N. GEREIN\*,  
A. IAN MUNROE\*, ROBERT T. MIYAGISHIMA\*,  
MICHAEL T. JANUSZ\* and G. FRANK O. TYERS*

*Vancouver, British Columbia*

This investigational valve was implanted in 1176 patients (1185 operations, 1270 valves) November 1981-December 1985 (age 13-85 years, mean 61 years). Early mortality was 7.0% (with concomitant procedures 10.6%, without 4.7%); (previous operation 10.2%, without 6.4%). Late mortality was 4.5%/patient year (AYR 4.0%, MVR 4.8%, MR 0.4%). Total cumulative follow-up was 2288 years. Thromboembolism (TE) 2.6%/patient year (fatal 0.3%/patient year), (major 1.4%, minor 1.2%). Anticoagulant hemorrhage (ACH) 0.7% (fatal 0.04%). Hemolyses 0.04%. Prosthetic valve endocarditis (PVE) 0.3% (fatal 0.1%) Periprosthetic leak (PPL) 0.3% (fatal 0.04%). Structural failure (SF) (primary tissue failure/structural failure) 0.09%/patient year. Hemodynamic valve dysfunction (HVD) 1% (0.7). Re-operation 0.6%/patient year (TE 0.09%, hemolysis 0.04%, PVE 0.04%, PPL 0.3%, SF 0.09%). TE incidence reduced after 2 years, ACH throughout observation, PVE early, PPL throughout, SF late. Survival  $79.2 \pm 3.3\%$  (5 years). Freedom from (5 years) TE  $91.8 \pm 2.5\%$  ACH  $96.5 \pm 2.4\%$  (4 years), PVE  $95.7 \pm 6.1\%$ , PPL  $88.5 \pm 8.2\%$ , SF  $98.8 \pm 1.6\%$ , reoperation  $97.6 \pm 1.8\%$ . Freedom from all complications (5 years)  $85.5 \pm 3.7\%$ , complication mortality  $98.8 \pm 0.8\%$  and valve failure (mortality and reoperation)  $96.7 \pm 1.6\%$ . This investigational Carpentier-Edwards, supra-annular porcine bioprosthetic valve has provided excellent clinical performance and remains our overall prosthesis of choice.

\*By Invitation

### **4. Do Heart Valve Bioprostheses "Degenerate" Metabolically? Or Just "Wear and Tear" (Forum)**

*SHLOMO GABBAY\*, PANKESH KADAM\*,  
STEPHEN FACTOR\* and TAK KE CHEUNG\**

*Newark and Piscataway, New Jersey and Bronx, New York*

*Sponsored by: WILLIAM E. NEVILLE*

*Newark, New Jersey*

The ideal substitute for diseased cardiac valves has yet to be found, dissatisfaction exist with currently available valvular prostheses, due to the still high rate of thromboembolic complications

of mechanical valves, and the limited durability of bioprostheses. Failure of bioprostheses is defined as "degeneration," which is a broad term, and considered as metabolic consequences, while most of the valves just 'wear and tear." (Except the calcification in children). We have tested a large number of heart valves, porcine and pericardial bioprostheses, using a Fatigue Test System with a high degree of reproducible test conditions. The results have allowed us to define causes of "wear and tear," previously insufficiently stressed, in each type of valve tested. There is a clear difference in factors influencing tissue disruption between porcine and pericardial valves. We have compared these in vitro results with in vivo clinical findings. The main conclusions are: 1) Bioprostheses rupture and fail in the same fashion in vitro as in vivo, 2) Mechanical and design factors are involved in tissue failure, 3) The ratio in vivo/vitro in durability is not 1:1. The ratio depends on the test conditions, 4) Pericardial valves fail by damage at time of closure, while porcine valves wear and tear in both opening and closing (mostly opening sequence) because of design features, 5) There is a wide variability in durability of similar valve types. Design improvement can minimize the variability. (Valves can fail as early as 2-3 million cycles or more than 100 million cycles). Similarly bioprostheses can be explanted in few months or last 10-13 years in patients, 6) "Domino effect" exist in tissue disruption: once one cusp fail and prolapse, the other cusps will fail in an accelerated fashion, 7) Most valves that last less than  $40$  to  $50 \times 10^6$  cycles under our test conditions, probably will not last in patients for a period of 10 years. Durability of  $100 \times 10^6$  cycles can be considered excellent. Very few bioprostheses reach this record, 8) Fatigue Testing is an excellent and valuable tool in developing heart valves. This study definitely shows that design improvement can prolong the durability of bioprostheses.

**9:55 a.m. Intermission - Visit Exhibits - Wacker Hall**

**Complimentary coffee available**

\*By Invitation

**10:40 a.m. Scientific Session - Grand Ballroom**

**5. Cerebral Microembolism During Cardiopulmonary Bypass: Retinal Microvascular Studies In Vivo Using Fluorescein Angiography**

*CHRISTOPHER I. BLAUTH\*, JOHN V. ARNOLD\*  
EDWARD W. SCHULENBURG\*,*

*ALISON C. MCCARTNEY\*,*

*and KENNETH M. TAYLOR\* London, England*

*Sponsored by: FLOYD D. LOOP*

*Cleveland, Ohio*

We have recently reported the use of retinal fluorescein angiography to demonstrate the occurrence of occlusions in the cerebrovascular micro-circulation during cardiopulmonary bypass (CPB). In the present study, 21 patients undergoing elective coronary artery surgery had retinal fluorescein angiography 5 minutes before the end of CPB. Patients with diabetes or known cerebrovascular disease were excluded. Anaesthetic and perfusion protocols were standardised in all cases, with non-pulsatile flow and a bubble oxygenator (Harvey H1700). After 31-167 minutes of CPB, 21/21 (100%) of patients had retinal microvascular occlusions consistent with microembolism. Control fluorescein angiograms obtained in 5 patients immediately before CPB but after heparinisation and aortic cannulation showed normal retinal perfusion. During CPB there were a mean of  $3 \pm 5$  (range 1-7) blocked arteries of less than  $50 \mu\text{m}$  caliber, and a mean of  $6 \pm 3$  (range 1-



10) focal areas of capillary non-perfusion per 30° field of retina centered on the macula per patient. The microembolic count did not correlate with bypass time ( $r = 0.14$ ). Repeat studies 30 minutes after discontinuation of CPB showed partial resolution with occlusions in 4/5 (80%) of patients. In later studies at a median of 8 days (range 5-11) postoperatively, only 2/16 (12½%) patients had persistently occluded retinal vessels, in both cases single areas of capillary non-perfusion. Psychometric testing with 4 standardised tests was performed in 18 patients. The mean total microembolic count in patients with psychometric deficit was 11\*1 occlusions per field ( $n = 7$ ), compared to 8½6 occlusions per field in patients with no deficit ( $n = 11$ ). In a parallel study of 15 dogs, 8/9 (88½9%) had retinal microvascular occlusions during CPB after 10-90 minutes of perfusion, and retinal histology revealed platelet-fibrin microemboli 20-70  $\mu$ m diameter in 7 of the 8 dogs (87½5%) with angiographic occlusions. 6 dogs undergoing sham CPB with heparinisation and aortic cannulation had normal retinal perfusion. This study demonstrates a very high incidence of microvascular occlusions in the territory of the internal carotid artery during CPB consistent with microembolism.

\*By Invitation

## 6. Reconstruction of Left Ventricular Wall with Autologous Pericardium

*TIRONE E. DAVID, CHRISTOPHER M. FEINDEL\*  
and GLORIANNE ROPCHAN\**

*Toronto, Ontario*

Autologous pericardium has been used to reconstruct different areas of the left ventricle in 24 patients (pts). Fifteen pts had active infective endocarditis with abscess formation in an infarcted myocardium (3 pts), in the aortic root (5 pts), in the central fibrous body and mitral annulus (3 pts), in the central fibrous body and tricuspid annulus (1 pt) and in the mitral annulus alone (3 pts). The remaining patients had acute ventricular septal defect (5 pts), acute rupture of the posterior wall of the left ventricle following mitral valve replacement (1 pt) or excessive calcification of the mitral annulus to properly secure a prosthesis (3 pts).

The diseased portion of the myocardium and or fibrous skeleton of the heart was excised when indicated, and reconstruction was accomplished by suturing an appropriately tailored autologous pericardial patch directly to the endocardium. A double patch was used in pts with acute ventricular septal defect (one on each side of the septum). All other pts had a single patch sutured directly to the endocardium with running polypropylene suture. In cases of valvular disease, a prosthetic valve was secured to the patch in those areas where the pericardium replaced the fibrous skeleton.

There were 3 hospital deaths (one pt had acute VSD and 2 pts had annular abscesses) but none were related to the technique or patch material. All survivors have been followed from 3 to 61 months, mean of 32. There has been no late death and every patient has had at least one non-invasive assessment test of the pericardial patch. No patient has had patch or valve dehiscence or pericardial patch aneurysm.

Autologous pericardium can be safely used to reconstruct left ventricular wall. It handles very well and problems with suture line bleeding is practically non-existent. Autologous pericardial patch is particularly useful in pts with myocardial and or annular abscess secondary to infective endocarditis.

\*By Invitation

**7. Identification of Free Radicals Produced During Myocardial Ischemia and Reperfusion Using Electron Paramagnetic Resonance Spectroscopy and High Precision Liquid Chromatography (Forum)**

*JOHN M. LUBER\*, PARINAM S. RAO\*  
and MARK S. CROWDER\**

*New Hyde Park, New York and Danbury, Connecticut*

*Sponsored by: DENIS H. TYRAS*

*New Hyde Park, New York*

The presence of free radicals (FR) were assessed in left ventricular myocardium (LV) of 1 month old swine (N = 5) during cardiopulmonary bypass pre crossclamp (C), with 30 minutes of normothermic ischemia (I) and after 10 minutes of reperfusion (R). LV biopsies were quick frozen in liquid N<sub>2</sub> and examined by EPR at 10°K and by high precision liquid chromatography (HPLC) using electrochemical (EC) and UV detectors. The EPR difference spectra between C and I revealed a 3 line spectrum (g = 2.015, 2.005, 1.988) with splitting between lines of 2.25 m Tesla. Power saturation studies revealed g = 2 signal saturation at lower microwave powers than the 3 line EPR signal. This suggests a nitrogen triplet or an organic biradical. EPR signals with I were irreversibly lost at 200°K. With R the 3 line spectrum was present but diminished.

HPLC verification of FR was accomplished by incubating the LV homogenate (50 mg) with a spin trap (5.5-dimethyl-1-pyrroline-n-oxide [DMPO]); 50 ul, 10mM at pH = 7.8 in 50 mM phosphate buffer using a 5 u resolve C<sub>18</sub> column and EC. A DMPO adduct signal was noted. This could not be modified by superoxide dismutase (SOD), or dimethylthiourea indicating that it is not an oxy derived species. Lipid peroxidation measured by tissue malondialdehyde (MDA) with UV absorbance at 254 nm and catechol levels using EC revealed the following:

	MDA (nm/mg protein)	Catechols (ng/mg protein)		
		Norepinephrine	Epinephrine	Dopamine
C	0.52 ± .01	3.3 ± .38	.04 ± .01	.017 ± .008
I	0.63 ± .05	1.7 ± .98	.02 ± .01	.01 ± .005
R	0.58 ± .02	3.0 ± .56	.04 ± .01	.018 ± .008

These data indicate that (1) with 30 minutes of normothermic ischemia there are directly measurable FR by EPR and HPLC (2) these FR do not seem to be oxygen derived species and, therefore, cannot be effected by SOD or catalase (3) lipid peroxidation and catechol oxidation may play a role in cellular damage during I but not R. (4) The FR concentration does not increase with R and, therefore, efforts at free radical scavenging emphasizing the reperfusion period may be in error.

**11:30 a.m. Presidential Address - Grand Ballroom**

**"Some Thoughts From The Other Side of The Table, or The Last Presidential Address"**

**Norman E. Shumway, M.D., Stanford, California**

**12:15 p.m. Adjourn for Lunch**

**Luncheon Service available in Exhibit Area - Wacker Hall**

\*By Invitation

**MONDAY AFTERNOON, APRIL 6, 1987**

**2:00 p.m. Scientific Session - Grand Ballroom**

**8. Hypothermic Circulatory Arrest and Posterolateral Exposure for Aortic Operation**

*E. STANLEY CRAWFORD, JOSEPH S. COSELLI\*  
and HAZIM J. SAFI\**

*Houston, Texas*

Hypothermic circulatory arrest using total cardiopulmonary bypass has proven useful for cerebral protection during operation for disease of the heart and great vessels performed through anterior incisions. Hypothermic arrest using partial femoro-femoral bypass and postero-lateral incisions in the treatment of arch and descending thoracic aortic problems has been generally overlooked. The purpose of this report is to present its application in 17 patients either electively or for unexpected events or findings occurring during operations in the posterolateral position. These include (group 1) aneurysms of the transverse arch and thoraco-abdominal aorta for reasons of exposure, 2; (group 2) to avoid distal cross clamping to prevent lacerations and cerebral emboli in patients with atherosclerotic disease, 6; (group 3) inability to isolate distal arch or proximal descending thoracic aorta for clamping, 4; (group 4) accidental entry into pulmonary artery or aorta at site of clamping, 3; (group 5), descending thoracic aneurysm too large for proximal exposure needed for clamping, 1; (group 6), unusual congenital malfunctions of aorta, 1. There were 14 survivors (82%). One death from hemorrhage occurred in group 3. Two patients in group 2 died, one from heart failure and one from pulmonary embolus. The method has proved protective of neurologic function, was life-saving in some instances, and permitted operation in others that would have been inoperable by other methods.

\*By Invitation

**9. Surgical Treatment of Coarctation of the Aorta Following Balloon Angioplasty**

*BERKELEY BRANDT, III, WILLIAM J. MARVIN, JR.\*  
and EARL F. ROSE\**

*Iowa City, Iowa*

This study was designed to assess the long-term effects of balloon angioplasty (BDA) for coarctation of the aorta. Eleven asymptomatic children, age four to six years, underwent BDA. Mean peak gradient fell from  $50.5 \pm 4.7$  mm. Hg. prior to BDA to  $21.7 \pm 3.1$  immediately post BDA. Children were then followed at three to six month intervals and were recatheterized five to fourteen months post BDA. Based on this catheterization, patients were divided into three groups: Group I - four patients, residual gradient less than 10 and minor anatomic abnormalities; Group II - three patients, the gradient had increased to near pre-angioplasty level, mean 43 mm. Hg; Group III - four patients, developed aneurysmal dilatation in the area of the BDA.

The seven patients in Group II and III underwent elective resection of their coarctation at seven to twenty-eight months following BDA with end-to-end anastomosis. Spinal cord evoked potentials were monitored during operation. There were no operative deaths and all patients had no gradient between arm and leg pressures postoperatively. One patient had mild paresis of the lower extremities. Pathological examination of the specimens revealed an absence of muscle and elastic lamella in the area of the aneurysms. This finding was present in all specimens regardless of whether there was aneurysmal dilatation. Neofibroelastic proliferation at the site of the tear was responsible for persistent gradients.

BDA may result in aneurysmal formation and/or recurrent stenosis in the area of the tear requiring elective surgical repair. Surgical treatment is the same as for native coarctation when done early following BDA, but may be associated with increased risk because of the lack of collateral circulation. Continued follow-up of these lesions is necessary.

\*By Invitation

#### **10. Pathogenesis of Aneurysm Formation Opposite Prosthetic Patches Used for Coarctation Repair: An Experimental Study (Forum)**

*ANNEMARIE P. DESANTO\*, RANDALL BILLS\*,*

*HAROLD KING and JOHN W. BROWN*

*Indianapolis, Indiana*

Patch graft angioplasty for coarctation repair has been associated with late aneurysm formation opposite the prosthetic patch in a high percentage of patients. The etiologic possibilities include congenital abnormality of the aortic wall, surgical interruption of the vasa vasorum, intimal disruption secondary to extensive excision of the coarctation web and rigidity of the prosthetic patch. To assess the effect of extensive intimal excision on the development of aneurysms, twelve dogs underwent a left thoracotomy and patch aortoplasty with either Dacron (n = 6) or PTFE (n = 6) and concomitant intimal excision opposite the patch. Ten dogs underwent patch angioplasty with Dacron (n = 5) and PTFE (n = 5) without excision of the in-tima and served as controls. All animals were studied with serial aortograms which demonstrated aneurysmal formation of the aorta opposite the patch in seven of the twelve dogs undergoing intimal excision. In contrast, no aneurysms developed in the control dogs (p<.003). An additional five dogs underwent longitudinal aortotomy, intimal excision and primary closure. One dog in this group demonstrated an aneurysm angiography (p<.05). Histologic analysis of the aneurysms and the control aortas is in progress.

We conclude that the extensive resection of the intima with or without patch angioplasty predisposes to aneurysm formation opposite the aortotomy and should be avoided when performing coarctation repair.

\*By Invitation

#### **11. Treatment of Extensive Aortic Aneurysms by a New Multiple-Stage Approach (Forum)**

*HANS G. BORST, GUNTER FRANK\**

*and DAGMAR SCHAPS\**

*Hannover, West Germany*

Aortic replacement in polyaneurysmatic disease may pose considerable technical difficulties and can exceed the physical tolerance of older and/or debilitated patients. We therefore devised a multiple-stage approach whereby during primary replacement of the arch or the descending aorta subsequent procedures are prepared and thereby simplified. Briefly, instead of performing a conventional distal anastomosis between graft and aorta the downstream portion of the graft is sutured into the aortic lumen in such a manner as to allow it to float freely in the distal aneurysm in "elephant trunk" fashion. During the subsequent replacement procedure, only one (distal) graft-to-aorta anastomosis is required and aortic cross-clamp time thus is reduced.

Since 1982, 15 such operations were completed in 7 patients without fatality. In 4, the primary procedures involved the aortic arch, in 3 patients the proximal descending thoracic aorta. Simple cross-clamping of the descending aorta was employed throughout. The "elephant trunk" technique is considered a helpful variant for dealing with aneurysmatic disease involving extensive or multiple sections of the aorta.

\*By Invitation

## **12. Implantable Extra-Aortic Balloon Assist Powered by Transformed Fatigue Resistant Skeletal Muscle (Forum)**

*RAY C.-J. CHIU, GARRETT L. WALSH\*,*

*MICHAEL L. DEWAR\*, JEAN H. DESIMON\*,*

*AIDA S. KHALAFALLA\* and DAVID IANUZZO\**

*Montreal, Quebec*

The hypothesis tested in this study was whether a skeletal muscle could be transformed to be fatigue resistant, and used to power an implantable extra-aortic balloon assist (EABA) device, achieving hemodynamically significant cardiac assist.

Eight dogs underwent implantation of Irel pacemaker to stimulate thoraco-dorsal nerves over 8-18 weeks in order to transform their latissimus dorsi muscles (LDM). Biopsies of these muscles confirmed near complete (up to 98%) transformation into fatigue resistant Type I muscle fibers, identified by the ATPase histochemical technique. Biochemical assays showed successful conversion of myosin isoforms to that of myocardial V<sub>3</sub> genotype, decreased anaerobic glycolytic (phosphofructokinase) and increased aerobic (citrate sythase) enzyme markers, all indicating greater resemblance of such muscle to the myocardial fibers. Then, using a force transducer and a burst "pulse-train" stimulator, the latter designed to synchronize and optimize skeletal muscle contraction for cardiac assist, we identified in 4 dogs the optimal stimulation parameters for the transformed LDM as follows: Pulse-train duration 250 msec., pulse width 230 □sec., frequency 50 Hertz. Fatigue tests over 45 minutes with 3,600 repetitive contractions resulted in 65% force reduction in non-transformed LDM, while transformed LDM lost less than 5% of force.

In the remaining 4 dogs, a 100 ml. balloon, made of thrombo-resistant Biomer, was placed beneath the transformed LDM. A 1 cm. Dacron graft was anastomosed end-to-side to the thoracic aorta, then connected to the balloon. Using our burst stimulator and the stimulation parameters listed above, the LDM was stimulated to contract during diastole, compressing the balloon to achieve diastolic augmentation. The balloon filled during systole. Using the pressure tracings obtained from the ascending aorta, we calculated the subendocardial viability index (SEVI = DPTI/TTI). In a series of on-off studies, we observed a significant  $39.5 \pm 4.2$  (SEM) % ( $p < 0.001$ )

increase in SEVI when EABA was activated. Chronic sheep studies with Theologically improved, totally implantable device is in progress.

We conclude that the skeletal muscle can be transformed to resemble myocardium, and it can be used as an endogenous energy source to provide hemodynamically significant cardiac assist.

\*By Invitation

### **13. Oxygen Consumption of Fatigue-Resistant Muscle (Forum)**

*MICHAEL A. ACKER\**, *WILLIAM A. ANDERSON\**,  
*ROBERT L. HAMMOND\**, *MICHAEL VELCHIK\**,  
*STANLEY SALMONS\** and *LARRY W. STEPHENSON*  
*Philadelphia, Pennsylvania*

Skeletal muscle can be made fatigue-resistant by chronic electrical conditioning. We have constructed non-fatiguing pump motors from such muscle which augment cardiac function and by P-NMR spectroscopy showed high energy phosphate metabolism similar to cardiac muscle.

This study examines directly O<sub>2</sub> consumption for this muscle during exercise. The latissimus dorsi (LD) muscles of 5 dogs were electrically conditioned for eight weeks using the same type of electrical burst stimulation needed for activation of cardiac work. Isometric tension, blood flow (radioactive micro-spheres) and O<sub>2</sub> consumption were then measured for each dog's conditioned and contra-lateral control LD during rest and two successive 11 minute periods of stimulation - 25 Hz burst for 300 msec and then 800 msec (1100 msec duty cycle).

Histologically, the muscle was transformed to fatigue-resistant Type I fibers. Fatigue rates were 54 and then 60% for control vs. 18 and then 27% for conditioned. The ratio of the developed time-tension product to O<sub>2</sub> consumed for the control muscle at 300 msec and 800 msec respectively was  $27 \pm 2.2$  (S.E.M.) and  $18.6 \pm 2.3$ . In contrast, the ratio for the conditioned muscle was  $38.4 \pm 5.8$  and  $50.5 \pm 2.1$ .

Results, depicted graphically below, indicate fatigue resistance of conditioned muscle is related to increased efficiency of O<sub>2</sub> utilization, thus making transformed muscle capable of cardiac-type work.

\*By Invitation

#### 14. Dramatic Recovery of the Failing Canine Heart with Biventricular Support in a Previously Fatal Experimental Model (Forum)

GEORGE J. MAGOVERN, JR.\* , RACE L. KAO\* ,

IGNACIO Y. CHRISTLIEB\* , GEORGE LIEBLER\* ,

SANG PARK\* , JOHN BURKHOLDER ,

THOMAS MAHER\* , DANIEL BENCKART\* ,

and GEORGE J. MAGOVERN

*Pittsburgh, Pennsylvania*

The clinical use of the vortex pump (Bio-Medicus) for cardiogenic shock following open heart surgery has led to dramatic functional recovery. The present study was undertaken to elucidate the mechanisms and time course of ventricular recovery following prolonged global ischemia.

Ten dogs underwent 45 minutes of normothermic aortic cross-clamping followed by 24 hours of biventricular support. No heparin was given. Developed pressure (DP), dp/dt, ATP, and electron microscopic biopsies were obtained at control and serially measured at end ischemia, at 20 minutes of reperfusion, and after 12 and 24 hours of biventricular support. Results are expressed as mean  $\pm$  SEM.

Time	EKG	DP (mmHg)	+ dp/dt	ATP*	LV Biopsy
Control	NSR	90.4 $\pm$ 6.4	4264 $\pm$ 366	3 1.47 $\pm$ 0.77	Normal
45 Min	VF	0**	0**	14. 63 $\pm$ 0.91**	Moderate
20Min	VF	0**	0**	17.72 $\pm$ 1.18**	Severe
12Hrs	NSR	68.0 $\pm$ 10.1	2649 $\pm$ 412**	25.21 $\pm$ 1.73**	Moderate
24Hrs	NSR	76.3 $\pm$ 8.9	4282 $\pm$ 585	31.48 $\pm$ 1.74	Mild

(\*  $\mu$ moles/g heart protein, \*\*p<.01 vs control)

After 45 min of normothermic ischemia, none of the hearts were able to generate a pressure or sustain a stable rhythm. This hemodynamic instability correlated with significantly lower ATP levels and with marked ultrastructural swelling and organelle disruption. Importantly, after 24 hours of biventricular support, ATP levels returned to control levels, ultrastructural changes were reversed, and left ventricular function significantly improved. Six of ten hearts were successfully weaned from biventricular support, and all hearts were weaned from left heart assist without pressor support. Thus, temporary circulatory support with left and right heart assist can permit recovery of ventricular function from profound normothermic ischemia.

\*By Invitation

**15. In Vivo Evaluation of a New Thromboresistant Polyurethane for Artificial Heart Blood Pumps (Forum)**

*DAVID J. FARRAR\**, *PHILIP LITWAK\**,  
*JOHN H. LAWSON\**, *ROBERTS. WARD\**,  
*KATHLEEN A. WHITE\**, *A. J. ROBINSON\**  
*and J. DONALD HILL*  
*Berkeley and San Francisco, California*

To reduce the risk from thromboembolic complications in prosthetic blood pumps we have developed a new segmented polyurethaneurea elastomer (BPS-215M). This material is unique because its bulk properties, for proven long term durability, and surface properties, for biocompatibility, have been separated and developed in two distinct materials. Blending of the two components resulted in a single material incorporating the properties of each.

To evaluate this material *in vivo*, we performed 10 calf implants of the Pierce-Donachy prosthetic ventricle with blood pumping sacs fabricated from BPS-215M, and four control implants with blood sacs fabricated from Biomer® which is the present clinical standard. The blood pumps were connected from the apex of the left ventricle to the descending aorta in 82-108 kg male Holstein calves, and they were driven pneumatically in the full-to-empty mode with flows averaging 5 to 6 l/min. Each calf was medicated with aspirin and persantine throughout the study period and electively sacrificed after 4 weeks for evaluation of explanted blood sacs and for renal infarction.

All ten BPS-215M blood sacs were shiny and completely free of any thrombus. Two of the four explanted Biomer blood sacs showed visible moderate sized areas of red thrombus, and one showed very minor white thrombus. Use of a quantitative scale to assess renal infarction demonstrated that three animals with Biomer blood sacs had the greatest number and size of infarcts ranging from 1 to 20 mm, while one Biomer animal and all ten BPS-215M animals showed little infarction. Based on these experiments, we conclude that for use in artificial heart blood pumps BPS-215M is superior to Biomer in blood compatibility and in freedom from thromboembolic risk. BPS-215M is now ready for clinical evaluation.

**3:40 p.m. Intermission - Visit Exhibits - Wacker Hall**

**Complimentary coffee available**

\*By Invitation

**4:15 p.m. Scientific Session - Grand Ballroom**

**16. A Prospective Study Comparing Magnetic Resonance Imaging Computed Tomography  
in the Preoperative Evaluation of Mediastinal Node Status in Patients with Lung  
Cancer**

*ALEC G. PATTERSON\**, *ROBERT J. GINSBERG*,  
*PETER POON\** *PAUL F. WATERS\**, *MELVYN GOLDBERG*,



FREDERICK G. PEARSON, THOMAS R. TODD,

JOEL D. COOPER and DONALD P. JONES\*

Toronto, Ontario

We have carried out a prospective study in 124 patients to compare the accuracy of computed tomography (CT) to magnetic resonance imaging (MR) in the detection of mediastinal lymphadenopathy in patients with potentially resectable bronchogenic carcinoma. A prototype 0.15 Tessler resistive imager provided the MRI scans. CT scanning utilized a fourth generation machine. Following these non-invasive procedures, all patients had mediastinal node status surgically assessed by mediastinoscopy (and anterior mediastinotomy for left upper lobe tumours). In 23 patients, despite negative mediastinoscopy, no thoracotomy was performed. Since the "negative" mediastinoscopy was not confirmed at thoracotomy, these patients were eliminated from further analysis. Seventy-six "negative" mediastinoscopy patients and 6 of 25 "positive" mediastinoscopy patients had further nodal staging at the time of resectional surgery. In these 101 patients, with absolute confirmation of nodal status, the efficacy of CT and MRI are demonstrated in the following results:

	Sensitivity	Specificity	Accuracy
CT	72	93	86
MRI	72	94	87

Mediastinoscopy had a higher sensitivity (86%), specificity (100%) and accuracy (96%), than either non-invasive modality.

Our results suggest that in preoperatively assessing mediastinal node status, fourth generation CT scans offer the same sensitivity, specificity and accuracy as a prototype 0.15 T Tessler resistive imager. Higher Tessler imagers are not anticipated to improve the accuracy unless innovative developments occur to improve tissue specificity, allowing one to distinguish malignant from benign lymphadenopathy and to detect microscopic tumour in normal sized nodes.

CT scans offer the same sensitivity, specificity and accuracy as magnetic resonance imaging. Both non-invasive techniques continue to have a significant error rate when compared to invasive surgical staging.

\*By Invitation

### 17. Extended Cervical Mediastinoscopy - The Best Procedure for Staging Left Upper Lobe Tumours

ROBERT J. GINSBERG, THOMAS RICE\*,

MELVYN GOLDBERG, PAUL F. WATERS

and BARBARA J. SCHOMOCKER\*

Toronto, Ontario and Cleveland, Ohio

Despite a common misconception, left upper node carcinoma frequently metastasizes lymph nodes not only in the anterior mediastinum (paraaortic and subaortic) but also to the superior mediastinum. Anterior mediastinotomy can only assess the former compartment. This procedure alone, if not done in conjunction with standard cervical mediastinoscopy, will fail to recognize

technically unresectable left upper lobe N<sub>2</sub> disease involving the superior mediastinum. We have developed a technique to explore both regions by extending a standard cervical mediastinoscopy, eliminating the need for a second incision when this compartment requires assessment.

At the time of mediastinoscopy, the window between the left carotid and right innominate arteries, bounded anteriorly by the left innominate vein and posteriorly by the aorta, is opened by blunt digital dissection, producing a subpleural tunnel anterolateral to the aortic arch. The mediastinoscopy was passed through this tunnel allowing full inspection and nodal biopsies of the paraaortic and aortopulmonary window nodes. On completion of this procedure, both the superior mediastinum and anterior mediastinum draining the left upper lobe have been completely staged.

Over 125 extended cervical mediastinoscopies have now been performed. We have found the procedure to be exceptionally safe with one superficial wound infection as the only complication.

Anterior mediastinotomy has many disadvantages including: poor visualization, difficulty obtaining nodal biopsies, injury to internal mammary vessels, wound complications including pain and infection, and the necessity of a second incision for complete staging of left upper lobe tumors. All of these problems are obviated with the use of the extended cervical mediastinoscopy. The sensitivity (74%) specificity (100%) positive predictive value (100%) and negative predictive value (89%) of extended cervical mediastinoscopy is far superior to that found with anterior mediastinotomy alone.

\*By Invitation

### 18. Mediastinal Node Evaluation by Computed Tomography in Lung Cancer: An Analysis of 345 Patients Grouped by TNM Staging, Tumor Size, and Tumor Location

*BENEDICT D. T. DALY, L. JACK PALING\**,

*GUNARS BITE\*, M. ELON GALE\**,

*MARK S. BANKOFF\*, YUNGJA JUNG-LEGG\**,

*AMIEL G. COOPER\* and GORDON L. SNIDER\**

*Boston, Massachusetts*

The precise role of computed tomography (CT) in staging the mediastinal lymph nodes of patients with lung cancer remains controversial. In order to more clearly define its value, we analyzed chest CT and surgical findings in 345 consecutive patients who underwent operative staging. Patients were grouped according to: (1) the TNM staging system of the American Joint Commission, (2) maximum tumor diameter as determined by CT or gross pathologic examination, and (3) central or peripheral location of the tumor. Tumors visible bronchoscopically or within the central 1/3 of the plain chest x-ray were classified as central. Seven patients, in whom the status of the mediastinal lymph nodes could not be determined, were excluded. The incidence of mediastinal metastases, i.e., percent true-positive scans (T + ) plus false-negative scans (F -) as well as the predictive value of a negative scan (NPI) and positive scan (PPI) are presented in the following table:

	CENTRAL TUMORS					#Pts.	PERIPHERAL TUMORS					#Pts.	
	T1	T2	T3	Tx	□		T1	T2	T3	Tx	%≥2cm		%≥2cm
#Pts.	13	76	36	22	147		84	77	26	4	191	64	108
T+ (%)	23	20	20	91	31	T+ (%)	6	0	12	100	10	0	5

F-(%)	0	4	20	0	7	F-(%)	6	3	0	0	4	3	4
NPI (<%)	100	93	72	100	88	NPI(%)	93	97	100	100	96	97	96
PPI(%)	75	48	64	100	68	PPI(%)	63	67	43	100	0	0	42

These data demonstrate a significant incidence of mediastinal metastases in patients with central tumors (38%). The predictive value of a negative CT for central tumors was high (93-100%), except in the T<sub>3</sub> group (72%). The PPI was relatively low (68%). The incidence of mediastinal metastases in patients with peripheral tumors was 14%. Twenty of 191 (10%) were identified by CT, and the NPI was high (93-100%). The PPI was relatively low (66%). However, there were no T + scans for lesions  $\geq 2$  cm in size. These data demonstrate CT is useful for staging the mediastinum in all potentially operable patients with lung cancer except those with small peripheral lesions  $\geq 2$  cm in size. Invasive staging is indicated for patients with positive scans and all patients with central T<sub>3</sub> lesions.

\*By Invitation

## TUESDAY MORNING, APRIL 7, 1987

**6:45-8:30 a.m.**

### **SIMULTANEOUS BREAKFAST SESSIONS\*\***

(See Page 16)

**A. CONTROVERSIES IN HEART VALVE SURGERY-Columbus Hall**

*Moderator:* Lawrence H. Cohn, M.D., Boston, Massachusetts

**B. ADJUVANT CHEMOTHERAPY FOR LUNG AND ESOPHAGEAL CANCER:  
EXPERIMENTAL VS. ESTABLISHED-Columbus Hall**

*Moderator:* David B. Skinner, M.D., Chicago, Illinois

**8:30 a.m. SCIENTIFIC SESSION - Grand Ballroom**

**19. The Management of Penetrating Lung Injuries in Civilian Practice**

*PAUL D. ROBISON\*, P. KENTHARMAN\*,*

*J. KENT TRINKLE and FREDERICK L. GROVER*

*San Antonio, Texas*

Recent reports of military thoracic injuries have advocated early thoracotomy and aggressive management of pulmonary injuries with resection, as opposed to the more conservative and traditional treatment with chest tube thoracostomy. The following retrospective study was performed to determine the incidence of thoracotomy and lung resection in civilian injuries, and to evaluate the effectiveness of treatment of these injuries.

**Methods:** The records of patients admitted from 1973 to 1985 with penetrating thoracic trauma were reviewed. 1168 patients suffered 384 gunshot (GSW) and 784 stab wounds (SW) to the thorax.

**Results:** 283 patients with GSW (74%) and 602 SW (77%) were treated with chest tubes alone. Patients without penetration of the chest wall and patients with mediastinal injuries without pulmonary injury were excluded. 68 patients (6% of the total) required operative repair of pulmonary hilar or parenchymal injury; 64 patients underwent thoracotomy (40 GSW, 24 SW), and 4 patients required repair of lung injury during median sternotomy for heart or great vessel injury (2 GSW, 2 SW). Procedures performed at operation for lung injury in 31 (18 GSW, 13 SW), pulmonary resection in 18 (9 GSW, 9 SW), and repair or attempted control of hilar vessels in 10 (9 GSW, 1 SW). Of patients requiring pulmonary resection, 9 required wedge or segmental resection (2 GSW, 7 SW), 6 required lobectomy (4 GSW, 2 SW), and 3 patients required pneumonectomy (all GSW). Indications for lung resection were bleeding in 14 patients, severe parenchymal destruction in 4, hemoptysis in 3, and central location of injury in 2 (some had more than one indication). Mortality for all thoracic injuries was 2.3% (18 of 384 GSW, 10 of 784 SW), for those treated with chest tube alone 0.7% for pulmonary hilar-injuries - 30% (3 of 10), for pts. with pulmonary parenchymal injuries - 8.6% (5 of 58), and for patients requiring lung resection 28% (4 GSW, 1 SW of 18).

**Conclusion:** Most civilian lung injuries can be treated by tube thoracostomy alone. Although relatively few patients with primary pulmonary injury require thoracotomy, those that do are at significant risk and may require lung resection to control bleeding, hemoptysis, or to remove destroyed or devitalized lung tissue.

\*By Invitation

\*\*Admission will be ticket only and will be limited. Tickets must be obtained in the Registration Area of the Hyatt Regency Chicago prior to 2:00 p.m. on Monday, April 6. There are no provisions for pre-registration. Breakfast will be served until 7:00 a.m. only.

## 20. Management of Complicated Cardiothoracic Problems with Pedicled Omental Grafts

DOUGLAS J. MATHISEN\*, HERMES C. GRILLO  
GUS VLAHAKES\* and WILLARD M. DAGGETT

Boston, Massachusetts

The *pedicled omentum* finds use in cardiothoracic surgery for management of complicated problems and prevention of serious complications. Its blood supply is excellent, and it provides vigorous fibroplasia. Based on the right gastro-epiploic artery, it reaches anywhere in the thorax or neck. Its bulk helps to fill infected spaces.

Twenty-five patients have been treated with the pedicled omentum. In 11 patients the goal was *preventative*, to avoid bleeding, leakage, and infection or to provide a source of fibroplasia. In 7 patients with cervical exenteration the flap protected against innominate artery erosion and esophageal leakage, generally in an irradiated field. In 2 patients it permitted primary healing of heavily irradiated trachea following a reconstruction - formerly unlikely. It was also used to provide coverage of a chest wall prosthesis and to buttress an iatrogenic esophageal perforation.

In 14 the omentum was used to *obtain healing in the presence of infection*. Bronchopleural fistulas were successfully closed in 4 of 5 patients. Four post-cardiac surgical mediastinal infections were successfully treated after prior debridements failed. One chronic esophago-pleuro-cutaneous fistula, 1 infected thoracoabdominal aortic graft, 1 tracheo-innominate arterial fistula, and 1 aorto-empyema fistula were successfully managed. One patient with an esophago-tracheo-carotic fistula had omentum placed to cover the esophageal fistula and the carotid artery stumps.

This series demonstrates the efficacy of pedicled omental grafts in management of complex cardiac, vascular, esophageal, tracheal, bronchial, pleural and chest wall problems.

\*By Invitation

## **21. "Maximum" Thymectomy for Myasthenia Gravis: Surgical Anatomy, Operative Technique and Results**

*ALFRED JARETZKI, III, AUDREYS. PENN\*,  
MARIANNE WOLFF\*, DAVID S. YOUNGER\*,  
ROBERT S. LOVELACE\*, MARCELO OLARTE\*  
and LEWIS P. ROWLAND\*  
New York, New York*

Complete removal of the thymus is the goal of surgery in the treatment of myasthenia gravis (M.G.). We have performed surgical-anatomical studies in 50 consecutive resections which demonstrate as many as 10 distinct lobes and foci of thymic tissue anywhere in the cervical-mediastinal fat. Our transcervical-transsternal-pleural en-bloc resection ("maximum" thymectomy) comes closer to complete thymectomy than any other procedure described.

95 consecutive patients with generalized M.G. operated upon using this procedure between 1978 and 1985 were followed 12-89 months - Group A (N-72) non-thymomatous M.G.; Group B (N-8) non-thymomatous M.G. re-explored for severe, incapacitating weakness after earlier transcervical or transsternal submaximal operations; and Group C (N-15) M.G. with thymoma. 79% (57) of Group A are markedly improved; 46% (33) in remission (clinically normal, no medications), 33% (24) asymptomatic on minimal doses of pyridostigmine (P); 8 asymptomatic on immunosuppression (IS); 4 improved; only 3 unchanged: none are worse. In Group B, residual thymus was found in all; none are in remission; on medication (P or IS) 5 are asymptomatic, 2 improved, 1 unchanged. In Group C, 2 are in remission, 1 asymptomatic on P, 8 asymptomatic on IS, 2 improved, and 2 failed to improve and died in crisis.

Response to thymectomy in non-thymomatous M.G. was maximum at 1-4 years and did not depend upon age, sex, severity of disease, thymic hyper-plasia, or acetylcholine receptor antibody titer. Reoperation is indicated in patients with persistent or recurrent severe symptoms after more limited thy-mectomies, even though the results are less good. Patients with thymoma may eventually do well; however, due to their severe unstable M.G., their response is usually delayed and the long-term results are less certain.

These results support the recommendation for thymectomy in the treatment of M.G. and indicate a clear superiority of the "maximum" thymectomy procedure.

**9:30 a.m. Intermission - Visit Exhibits - Wacker Hall Complimentary coffee available**

\*By Invitation

**10:15 a.m. Scientific Session - Grand Ballroom**

## **22. Care of Infants with Esophageal Atresia, Tracheoesophageal Fistula and Associated Anomalies**

*THOMAS M. HOLDER, KEITH W. ASHCRAFT*

In 100 consecutive patients with esophageal atresia and/or tracheoesophageal fistula, associated conditions were responsible for the majority of the deaths, both during the initial hospitalization and during a follow-up period of up to 10 years. The greatest risks were posed by cardiac, respiratory and gastrointestinal anomalies.

Care of the associated anomalies may take precedence over the care of the esophageal atresia. Each patient must be evaluated and a plan for therapy formulated, depending upon the type and the urgency of the associated conditions. Repair of esophageal atresia and tracheoesophageal fistula can be postponed safely by gastrostomy, upper pouch suction and parenteral nutrition while the concomitant condition is treated.

Nineteen patients required operative intervention for treatment of associated anomalies during the initial hospitalization - 11 of 17 patients with gastrointestinal anomalies, 5 of 17 for congenital heart disease and 3 of 7 for respiratory anomalies.

During initial hospitalization there were 3 pre-repair deaths from associated anomalies, 3 post repair deaths related to esophageal atresia and tracheoesophageal fistula and 2 post repair deaths related to associated anomalies. Thus 92 percent of the patients left the hospital alive. Of the 8 late deaths, 1 was related to esophageal atresia and 7 to other conditions.

\*By Invitation

### 23. Manometric and Radionuclide Assessment of Pharyngeal Emptying Before and After Cricopharyngeal Myotomy in Patients with Oculopharyngeal Muscular Dystrophy

RAYMOND TAILLEFER\* and ANDRE C. DURANCEAU  
Montreal, Quebec

Fifteen patients with OPMD underwent cricopharyngeal myotomy (CM) to palliate their dysphagia. The aim of this work was to assess the effectiveness of this operation using radionuclide pharyngeal emptying study (RPES) as a new quantitative method in addition to clinical, radiological and manometric evaluation. RPES was performed in supine position following ingestion of 15 cc of water labeled with  $^{99m}\text{Tc}$ -sulfur colloid. Computerized data were acquired at 0.5 sec. intervals for a duration of 15 minutes and hypopharyngeal time-activity curve was generated. Four quantitative parameters were evaluated: the time for pharyngeal clearance of 25%, 50% and 75% of the ingested activity and the pharyngeal stasis at 15 minutes. The median values and statistical analysis with the non parametric Wilcoxon-ranks test are summarized in the following table:

Pharyngeal Clearance	Before CM	After CM	P Value
25%	1.2 sec	0.9 sec	p<0.04
50%	4.0 sec	2.0 sec	p<0.005
75%	15.0 sec	7.0 sec	p<0.02
stasis at 15 min	10.3%	6.0%	p<0.01

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Both pharyngoesophageal and tracheobronchial symptoms were improved by CM. Manometric evaluation showed a decrease of the upper esophageal sphincter (UES) closing

pressure from 41.5 mmHg before surgery to 22.5 mmHg after CM ( $p < 0.001$ ). The UES resting pressure was 31.0 mmHg before and 12.0 mmHg ( $p < 0.0005$ ) after surgery.

CM significantly improves both symptoms and pharyngeal emptying in patients with OPMD.

\*By Invitation

## **24. Selective Therapeutic Approach to Cancer of Lower Esophagus and Cardia**

TOM R. DEMEESTER, GIOVANNI ZANINOTTO\*

*and KARL-ERIK JOHANSSON\**

*Omaha, Nebraska*

The role of radical surgery for carcinoma of the lower esophagus and cardia is still controversial. Fifty-two patients with cancer in this location were referred to the senior author from 1980 to 1986. Thirty-two were squamous cell, 13 adenocarcinomas, 7 adenocarcinomas associated to Barrett's Esophagus. In 19, the tumor was not resectable and treatment consisted of bypass operation, intubation, or non-operative therapy. All expired within one year. In 19 patients a palliative resection could be done: 5 blunt esophagectomies, 10 standard esophagectomies and 4, who had a previous resection, had a second resection. The operative mortality was 20% (1/5) for blunt esophagectomy and 21% (3/17) for standard resection. Actuarial survival was 31% at one year. Only one patient was alive after two years. Fourteen patients had noncircumferential lesions of 4 cm or less in length on endoscopy and/or no evidence of spread to mediastinal lymph nodes on CT scan. They were considered to be potentially curable and compared to others, had earlier diagnosis ( $p < 0.01$ ) from the onset of the dysphagia and in 6 occult disease was discovered during endoscopy for GER symptoms. All were  $< 75$  years old, had FEV1  $> 1,500$  cc and a resting ejection fraction  $> 40\%$ . A radical operation consisting of en bloc total esophagectomy, mediastinal lymphadenectomy and 85-90% gastric resection with abdominal lymphadenectomy was performed; the left colon was used to reestablish the gastrointestinal continuity. The mean number of lymph nodes removed was  $40.5 \pm 15.1$  (range 65-18). Absence of full wall penetration and/or four or less regional nodes involved were consistent with preoperative evaluation in 86% of the patients. Operative mortality of radical resection was 7% (1/14) and the survival rate was 83%, 73% and 44% at one, two, and five years. Karnofsky's score of those alive is  $> 90$ . Patients with tumor less than 4 cm in length and not circumferential on endoscopy and/or no evidence of spread to mediastinal nodes on CT scan can be potentially cured by radical resection with good long term prognosis and quality of life.

### **11:15 a.m. Address by Honored Speaker**

**"NEW FRONTIERS - NEW BARRIERS"**

**Professor Jean-Paul Binet, Paris, France**

### **12:00 p.m. Adjourn for Lunch**

**Luncheon Service available in Exhibit Area - Wacker Hall**

### **12:15 p.m. Cardiothoracic Residents' Luncheon†**

\*By Invitation

†Admission will be by ticket only. There are no provisions for pre-registration. Physicians in cardiothoracic residency programs must obtain a ticket at the Information/Message Desk in the Registration Area of the Hyatt Regency Chicago prior to 2:00 p.m. on Monday, April 6. Residents will be the guest of the Association.

## **TUESDAY AFTERNOON, APRIL 7, 1987**

### **2:00 p.m. Scientific Sessions - Grand Ballroom**

#### **25. Surgical Options for Patients with Sudden Death in Treatment of Ventricular Tachyarrhythmia**

*EDWARD S. YEE\*, MELVIN M. SCHIENMAN\*,*

*JERRY C. GRIFFIN\* and PAUL A. EBERT*

*San Francisco, California and Chicago, Illinois*

Ventricular tachyarrhythmias associated with sudden death often fail medical and initial surgical treatment. This high risk group of 62 patients (Pts) presented to the surgical service after failing medical (52) and surgical (10) therapy. Operative treatment by (I) direct revascularization (REV) /11 Pts, (II) endocardial resection (ER) /7 Pts, (III) automatic internal de-fibrillators (AICD) 718 Pts, and in combinations (IV) REV + ER /18 Pts, (V) REV + AICD /5 Pts, and (VI) ER + AICD /3 Pts. Reoperations included redo REV, repeated ER with mapping and mitral valve replacement or papillary muscle re-implantation. The operative risk factors include poor ventricular function with mean ejection fraction of 31%, and recent (less than 1 month) myocardial infarctions (42%, 26/62). Overall operative mortality have been acceptable (8%, 5/62) [i.e., simple procedure (I, II, III) (2.7%, 1/36) as well as combined procedures (IV, V, VI) (15.4%, 4/26)]. These operative deaths include risk factors with recent myocardial infarctions (4/5, <2 weeks) and poor ejection fraction (5/5, <25%). Late follow-up included four deaths (Pts in category (I) and (III)) for an overall 85%, 53/62 survival (mean follow-up of 28 months).

Current surgical treatment of sudden death tachyarrhythmias require a combined operative approach in this high risk group of patients since modality failure with simple REV or ER can occur. Hence, the optimal surgical approach require complete revascularization, localization of arrhythmic focus by endocardial mapping for complete resection, and/or the addition of the automatic internal defibrillator.

\*By Invitation

#### **26. The Role of Direct Operations in the Management of Life-Threatening Ischemic Ventricular Tachycardia**

*JORG OSTERMEYER\*, MARTINBORGGREFE\*,*

*GUNTER BREITHARDT\*, AXEL GOLDMAN\*,*

*JORG D. SCHOENEN\*, RALF KOLVENBACH\*,*

*ERHARD GODEHARDT\*, JOHN W. KIRKLIN,*

*EUGENE H. BLACKSTONE and WOLFGANG BIRCKS\**

*Dusseldorf, West Germany and Birmingham, Alabama*



Controversy continues concerning the most effective type of direct operation for life-threatening VT and, in an era in which amiodarone and implantable defibrillators are available, the role of direct surgery in management of patients with VT. In the absence of a randomized trial, the results of a protocol (1978-1985) of intraoperative electrophysiologic mapping and direct surgery (n = 93) have been critically evaluated.

The actuarial freedom postoperatively from spontaneous VT return or sudden death at 30 days, 1 year, and 5 years was 90%, 87%, and 77% respectively. By multivariate analysis a more-or-less encircling myotomy, rather than endocardial resection, was shown to be more effective against return of VT (p = 0.003). VT return was highly correlated with later premature death. A positive postoperative electrophysiologic study result was a powerful predictor of spontaneous VT return (p = 0.0003).

Survival at 30 days, 1 year, and 5 years postoperatively was 95%, 89%, and 70% respectively. Most patients died of cardiac failure. Endocardial resection was associated with a better survival than was encircling endocardial myotomy (p = 0.002); however, the difference was small, and 5-year survival after endocardial resection was predicted by the multivariate equation to be 88% and after myotomy 85%. Survival was also better in patients in whom an anterolateral aneurysm was present and resected (p = 0.005); in patients with an anterolateral aneurysm, predicted 5-year survival was 85% and without was 31%.

This study supports the continued use of direct operations for VT, suggests the use of encircling myotomy rather than endocardial resection, and provides equations which will facilitate subsequent comparisons with alternative forms of therapy.

\*By Invitation

## **27. Sequential Endocardial Resection for the Surgical Treatment of Refractory Ventricular Tachycardia**

*IRVING L. KRON\*, STANTON P. NOLAN,  
TERRY L. FLANAGAN\*, BRUCE LERMAN\*,  
DAVID HAINES\* and JOHN P. DiMARCO\**

*Charlottesville, Virginia*

The optimal surgical therapy for refractory ventricular tachycardia (VT) is controversial. The most frequently described operation involves VT induction and endocardial mapping, followed by induction of hypothermia, aortic cross-clamping, and resection of the identified site of VT origin. Our initial experience with this technique in 20 patients [mean age 60 ± 10, ejection fraction (EF) 29 ± 14, failed antiarrhythmic drugs (FAAD) 3 ± 1] resulted in five surgical deaths, three related to VT and two due to respiratory or heart failure. Electrophysiologic study (EPS) showed 11 of 15 survivors free from VT after operation, leaving an overall success rate of 55%. Most failures were related to multiple VT morphologies not addressed by initial resection. Our results prompted us to modify this operation by employing the technique of sequential endocardial resection. After completion of endocardial mapping, directed normothermic endocardial resection is performed; more attempts to induce VT are made and followed by further mapping and resection until VT can no longer be induced. Forty-seven patients (mean age 59 ± 10, EF 33 ± 12, FAAD 3 ± 1) were treated with this approach, with a mean of two resections per patient (range 1-6). Mean perfusion time in the sequential research group (101 ± 28 min) was not significantly different from that of the earlier cases (101 ± 40 min). There were four (8%) surgical deaths, one related to persistent arrhythmia and three due to respiratory or heart failure. EPS after operation showed 36 of 42

survivors (86%) free of VT. The six with positive EPS were well controlled on medication. These data suggest that sequential endocardial resection guided by intraoperative mapping is a superior operative approach for patients with ventricular tachycardia.

**3:00 p.m. Intermission - Visit Exhibits - Wacker Hall**

**Complimentary coffee available**

\*By Invitation

**3:40 p.m. Scientific Session - Grand Ballroom**

**28. Long Term Results of Total Coronary Artery Reconstruction**

***W. DUDLEY JOHNSON, JEROLD B. BRENOWITZ\****

*and ROBERT GESSERT\**

*Milwaukee, Wisconsin*

Myocardial revascularization has entered a new era of complex surgery. The majority of patients are entering the hospital with diffuse atherosclerotic involvement in one or more coronary arteries. An increasing number of patients are being told they are "inoperable," or offered the option of transplant. The approach of coronary artery reconstruction employed by us is applicable to all diffusely diseased arteries, including those nonvisualized angiographically. The surgical technique used involves long arteriotomies (up to 15 centimeters for the left anterior descending) with careful removal of all involved intima. Reconstruction is achieved by attaching a vein over the entire length of the arteriotomy and then connecting the vein to the aorta. Intermittent ischemic arrest is used with total ischemic time of 180-300 minutes commonly required for reconstruction of many arteries. Since 1978, 3494 procedures have been performed using this technique. Patency, early and late, is only slightly reduced from conventional grafts. There were 2496/2773 (90%) conventional vein grafts restudied within 30 days and found to be patent. A total of 788/888 (89%) endarterectomized arteries were also found to be patent. Patency rates following one year or more were similar as well; 606/807 (75%) conventional vein grafts were found to be patent, while 128/176 (73%) endarterectomized arteries were found to be patent. Multiple endarterectomies and reconstruction adds 6% to the operative risk, but is clearly preferable to failed medical therapy and is often a viable alternative to the proposed transplant.

\*By Invitation

**29. Immediate (<12 Hour) Vs. Delayed Coronary Grafting After Streptokinase; Non-Linear Time-Dependent Blood Loss and Morbidity**

*K. FRANCIS LEE\*, JONATHAN D. MANDELL\*,*

*J. SCOTT RANKIN\*, ROBERT H. JONES\**

*and ANDREWS. WECHSLER*

*Durham, North Carolina*

Little data exist concerning effects of Streptokinase (SK) on immediate (<12 hour interval) coronary bypass surgery (CBG). 44 patients underwent CBG for acute myocardial infarction. 27 patients received preoperative SK and 17 patients did not (controls). 11 SK patients had CBG <12 hours from thrombolytic therapy. 8 patients between 12-72 hours; and 8 patients >72 hours.

Average SK dose was  $1.5 \times 10^6$ . Morbidity included stroke, obtundation, respiratory or renal failure and reoperation.

	(n)	Age	E.F.	# Grafts	% IMA Use	Time CPBP	Blood Loss	Morbidity
Controls	(17)	60.0 ± 2.3	54.1 ± 2.6	2.4 ± 0.4	47%	96.2 ± 10.9	1174 ± 143	13%
SK<12	(11)	61.5 ± 3.6	44.0 ± 2.8*	2.7 ± 0.4	27%	106.1 ± 18.3	2957 ± 567*	50%*
SK 12-72	(8)	58.6 ± 5.1	45.8 ± 5.0	2.9 ± 0.4	38%	99.4 ± 8.3	1677 ± 244	13%
SK>72	(8)	54.5 ± 2.1	47.3 ± 2.7	3.8 ± 0.6*	38%	155.3 ± 20.7*	1585 ± 300	0%

(Mean ± standard error of the mean. \*= $p < 0.05$ ).

Total blood loss and blood product requirement of Streptokinase patients expressed in ratios over those of controls were as follows:

	Corrected Blood Loss	Corrected PHBC	Corrected FFP	Corrected PLT	Corrected CRYO	
SK<12	2.51*	3.07*	2.20*	2.97	10.72*	
SK 12-72	1.43	1.98*	1.19	2.57	3.40	*= $p < 0.05$
SK>72	1.35	0.62	1.08	0.72	2.44	

Variables in Table I showed only that intervals between SK and CBG <12 hours related to postoperative bleeding and morbidity. Using standard regression analysis, postoperative bleeding and morbidity were not related to age, number of grafts, % IMA usage or cardiopulmonary bypass time. However, the data were consistent with the hypothesis that the effects of SK on postoperative bleeding and morbidity were dependent on time interval between dose administration and operation. CBG >72 hours after SK had no more bleeding than controls despite significantly more grafts and cardiopulmonary bypass time ( $p < 0.05$ ). Operations <12 hours from SK resulted in significantly greater bleeding and required more blood products than the control group. Operations 12-72 hours after SK had significantly more blood product requirement than controls without significantly more bleeding, suggesting increased efficacy of bleeding control than in the < 12 hour subgroup.

Significantly increased postoperative bleeding and morbidity occurred in operations <12 hours from SK. Regression suggested that effects of SK on postoperative bleeding and morbidity decrease exponentially with respect to delay time between thrombolytic therapy and operation.

\*By Invitation

### 30. Comparative Effects of Intra-Aortic Balloon Pump, Veno-Arterial Bypass, and Left Ventricular Assist on Reducing Myocardial Ischemic Injury After Acute Coronary Occlusion and Revascularization (Forum)

HIDEO ADACHI\*, JAMES D. FONGER\*,

DAVID J. JOHNSON\*, WILLIAM A. BAUMGARTNER\*.

A. MICHAEL BORKON\* and BRUCE A. REITZ

Baltimore, Maryland

A combination of adequate circulatory support and medical or surgical re-vascularization is a potential treatment for acute coronary artery occlusion. To evaluate the clinical applicability of assist devices combined with revascularization for acute coronary occlusion, four groups of open chest dogs were studied. In controls (Group I, n = 6), the left anterior descending coronary artery (LAD) was occluded for 90 minutes followed by 180 minutes of reperfusion. In Group II dogs (n = 5), the LAD was occluded and reperfused similarly but an intra-aortic balloon pump (IABP) was activated 15 minutes after occlusion of the LAD. In Group III dogs (n = 5), veno-arterial bypass with centrifugal pump and membrane oxygenator (VAB) was activated 15 minutes after occlusion of the LAD and provided 80% of total flow. In Group IV dogs (n = 6), left ventricular assist using centrifugal pump (LVAD) was activated similarly and provided 80% of total flow. Regional myocardial function in the LAD distribution was examined by computerized pressure dimension loops using sonomicrometry, and functional recovery was calculated. Hypothermic ischemic area in the left ventricle (LV) was measured by real-time infrared imaging to evaluate the extent of ischemic myocardial injury. Following the experiment, region at risk (RR) was determined by manastle blue dye infusion and infarcted myocardium (IM) was examined by nitro blue tetrazolium chloride staining. The results (mean  $\pm$  SEM) were:

	I (Control)	II (IABP)	III (VAB)	IV (LVAD)
Functional recovery (%)	-6.6 $\pm$ 1.9	1.3 $\pm$ 3.3	5.3 $\pm$ 4.3*	9.7 $\pm$ 2.9**
Hypothermic area in LV (%)	31.6 $\pm$ 5.2	19.6 $\pm$ 4.0	18.2 $\pm$ 1.7	14.9 $\pm$ 1.8*
Region at risk in LV (%)	29.4 $\pm$ 3.6	35.3 $\pm$ 3.8	32.4 $\pm$ 3.4	29.0 $\pm$ 3.4
IM/RR (% Infarction)	57.3 $\pm$ 9.2	22.1 $\pm$ 5.0*	46.9 $\pm$ 8.8	13.0 $\pm$ 4.1**

\*p<0.05 vs Control, \*\*p<0.001 vs Control

Group IV showed best function recovery, the smallest hypothermic area, and the smallest myocardial infarction. These results suggest that the combination of revascularization and the early use of a LVAD may be a useful treatment for reducing ischemic myocardial injury after acute coronary artery occlusion.

\*By Invitation

### 31. Systemic-Pulmonary PTFE Shunts in Palliative Congenital Heart Surgery (Forum)

*JOSEPH J. AMATO, MARK L. MARBEY\**,

*JOSE ANTILLON\*, CATHERINE BRUSH\**,

*JOANNE BUSHONG\* and JOSE MARIN\**

*Newark, New Jersey and Philadelphia, Pennsylvania*

The concept of central shunting in smaller children with the Waterston Shunt was initially well accepted. It has been abandoned because of difficult estimation of lumen size, preferential flow to the right side and difficulty in the take-down of the shunt. We have replaced the Waterston Shunt with a short segment of polytetrafluoroethylene (PTFE) from the ascending aorta to the main pulmonary artery.

Since January 1979, 174 shunts have been performed in 137 patients. There were 26 classical Blalock-Taussig (B-T) shunts (14.9%), 6 Waterston shunts (3.4%), 9 Glenn Shunts (5.1%), 65 central aorto-pulmonary PTFE shunts (37.3%) and 64 modified Blalock-Taussig (MB-T) shunts (36.7%). PTFE grafts were used for 133 of the 174 (76.4%) shunts. Overall mortality was 14.36%, with 9 early deaths (5.1%) and 15 late deaths (8.6%). Deaths were due

to the complex nature of the congenital anomaly and/or definitive surgical repair. The patients weighed from 1.6 kg to 19 kg and ages ranged from one day to 4 years.

We have modified our technique so that: 1) Graft length is less than 0.5 cm and both ends are beveled. 2) The aortotomy is fashioned with a punch. 3) The center of the PTFE graft is never clamped. 4) Heparin is given during the construction of the shunt. 5) Aspirin (10mg/Kg/day) is administered daily. Patency ranges from 1 to 4 yrs.

We conclude that the PTFE shunt provides excellent palliation and that the central shunt, in the smaller child and infant, offers the benefits of shunting without distortion of the peripheral pulmonary arteries.

#### **AN HISTORICAL VIGNETTE**

Lyman A. Brewer, III, Pasadena, California

**4:40 p.m. EXECUTIVE SESSION (Members Only) - Grand Ballroom**

**7:00 p.m. PRESIDENT'S RECEPTION - Regency Ballroom**

\*By Invitation

### **WEDNESDAY MORNING, APRIL 8, 1987**

**6:45-8:30 a.m.**

#### **SIMULTANEOUS BREAKFAST SESSIONS\*\***

(See Page 16)

#### **C. ACUTE MYOCARDIAL INFARCTION: CATH LAB, SURGERY OR NO INTERVENTION? - Columbus Hall**

*Moderator:* Mortimer J. Buckley, M.D., Boston, Massachusetts

#### **D. TRANSPLANTATION: PRACTICAL ASPECTS - Columbus Hall**

*Moderator:* Edward B. Stinson, M.D., Stanford, California

**8:30 a.m. SCIENTIFIC SESSION - Grand Ballroom**

#### **32. The First Open Heart Corrections of Ventricular Septal Defect: A 26 to 32 Year Follow-Up of 254 Patients**

*C. WALTON LILLEHEI, RICHARD L. VARCO,*

*MORLEY COHEN, HERBERT E. WARDEN,*

*VINCENT L. GOTT, RICHARD A. DEWALL,*

***CECELIA PATTON\* and JAMES H. MOLLER\****

*St. Paul and Minneapolis, Minnesota; Winnipeg, Manitoba;*

*Morgantown, West Virginia; Baltimore, Maryland; Dayton,*

*Ohio and St. Louis Missouri*

Ventricular septal defects became a correctable malformation on March 26, 1954. From that date thru 1960, 254 patients (age 4 mo. to 21 yrs.) who underwent open repairs, and were

discharged, have been followed (97% complete) until death, or for 26 to 32 yrs. (mean 23.2 yrs., 5408 pt. yrs.)

The purposes of this study were to determine: survival, morbidity, hemodynamics, educational/employment attainments, and relation of these to surgical technics.

Operations were done by cross circulation (19 pts.), arterial reservoir (2 pts.), and bubble oxygenator (233 pts.). Forty-five patients were under 2 yrs. of age at operation. This group had the first uses of patch VSD closure, ischemic arrest, and pacemakers amongst other innovations. Forty-seven (late deaths) have occurred: 27 within 10 yrs., 9 between 10 and 20 yrs., and 11 beyond 20 yrs. The major causes of deaths were: pulmonary vascular disease (9), reoperation (7); sudden and unexpected (7), accidents (4), complete heart block (4), only 1 had a pacemaker, and 4 died of congestive heart failure. Five other deaths were due to a variety of single causes. There were 7 deaths from unknown causes. Late complications were reoperations in (14); arrhythmias in (10), five of whom are on treatment. Bacterial endocarditis has occurred in (3), all with closed defects. Malignancies occurred in (4). Four have required pacemakers late. Only 10 of 245 pts. (4%) have any cardiac symptoms. Cardiac cath. was performed in 138 of 245 patients (56%), and many showed no change in pulmonary vascular resistances (PVR). Serial studies showed a fall in PVR under 2 yrs. of age, and an increase in some older patients. In 76%, there was no residual shunt. One hundred thirty-five attended education beyond high school either technical or college. Forty-seven obtained a bachelor's degree, and thirty-five attended graduate school with 16 receiving a graduate degree. Amongst the latter, were 4 PhD's and 6 physicians (one of whom is a cardiac surgeon). The 200 long term survivors have few significant medical problems, and have had excellent (above average) educational attainments. Many of the late deaths/complications are now preventable.

\*By Invitation

\*\*Admission will be by ticket only and will be limited. Tickets must be obtained in the Registration Area of the Hyatt Regency Chicago prior to 2:00 p.m. on Monday, April 6. There are no provisions for pre-registration. Breakfast will be served until 7:00 a.m. only.

### 33. The Superiority of Continuous Cold Blood Cardioplegia in Achieving Metabolic Protection of the Hypertrophied Human Heart

*SHUKRI F. KHURI, MIGUEL JOSA\*  
KENNETH G. WARNER\*, MICHAEL D. BUTLER\*  
and AMY HAYES\**

*West Roxbury, Massachusetts*

Continuous measurements of intramyocardial pH and hydrogen ion concentration ( $[H^+]$ ) were obtained in 39 patients with left ventricular hypertrophy (LVH) undergoing valve replacement  $\pm$  CABG. Cardioplegia (CP) was administered through the aortic root (or the orifice of the left main coronary) and the bypass grafts. Group I (15 patients) received standard crystalloid  $K^+$  CP intermittently every 15 minutes. Group II (15 patients) received blood  $K^+$  CP intermittently in a similar fashion. Group III (9 patients) received the same blood CP but continuously throughout the period of aortic clamping (AC). The groups were computer-matched according to preop LV ejection fraction (EF) and LVEDP, AC time, and integrated mean temperature (MT) during AC. In **Table I** below (mean  $\pm$  SEM) there were no significant differences between the groups:

	Group I	Group II	Group III	P (by AOV)
EF (<%)	49 $\pm$ 2.9	43 $\pm$ 3.6	55 $\pm$ 9.1	NS

LVEDP (mm Hg)	22.6 ± 2.7	22.2 ± 7.5	27.4 ± 4.1	NS
LV mass (grams)	490 ± 36	321 ± 33	557 ± 42	NS
AC (minutes)	100 ± 5.7	102 ± 9.3	106 ± 13.4	NS
MT (°C)	12.8 ± 0.5	12.4 ± 0.6	12.7 ± 0.6	NS

In **Table II** below: pH<sub>o</sub> = pH at onset of AC; pH<sub>I</sub> = after 1 hour of AC; pH<sub>m</sub> = mean integrated pH throughout AC; pH<sub>e</sub> = pH at end of AC.

	<b>Group I</b>	<b>Group II</b>	<b>Group III</b>	<b>P (by AOV)</b>
pH <sub>o</sub>	6.86 ± .07	6.95 ± .06	6.87 ± .09	NS
pH <sub>I</sub>	6.53 ± .08	6.91 ± .07	7.17 ± .15	<.001
pH <sub>m</sub>	6.61 ± .06	6.90 ± .06	7.15 ± .12	<.001
pH <sub>e</sub>	6.44 ± .06	6.80 ± .06	7.11 ± .13	<.001

These figures represented an increase in myocardial [H<sup>+</sup>] during AC of 252 ± 57 nmoles/l in Group I, an increase of 90 ± 27 nmoles/l in Group II, and a decrease of 30 ± 16 moles/l in Group III (P<.001 between the groups). The requirements for post CPB inotropic and intraortic balloon support were significantly lower in Groups II and III compared to Group I (P<0.05). These data confirm our previous animal experimental observation regarding the superior metabolic effects of blood over crystalloid CP and indicate that continuous cold blood K<sup>+</sup> cardioplegia is the method of choice in the prevention of myocardial acidosis during prolonged aortic clamping and in achieving optimal metabolic protection of the hypertrophied heart.

\*By Invitation

#### **34. A No-Flush, Core-Cooling Technique Provides Successful Cardiopulmonary Preservation for Heart-Lung Transplantation**

*GEORGE J. KONTOS, JR.\*, HIDEO ADACHI\**

*DUKE E. CAMERON\*, WILLIAM A. BAUMGARTNER\**

*A. MICHAEL BORKON\*, GROVER M. HUTCHINS\**

*JEFFREY BRAWN\* and BRUCE A. REITZ*

*Rochester, Minnesota and Baltimore, Maryland*

One major factor restricting the growth of clinical heart-lung transplantation has been the inability to provide extended cold ischemic preservation of the lung. In order to determine whether a no-flush, core-cooling technique could provide adequate cardiopulmonary preservation, donor calves (35-50 kg) were placed on cardiopulmonary bypass (CPB) and rapidly cooled to 15°C during the continuous infusion of isoproterenol (0.02 mcg/kg/min). In the control group I (N = 5), the heart and lungs were harvested following the administration of hypothermic cardioplegia through the aortic root and orthotopically allotransplanted with a total hypothermic ischemic time of 124 ± 3 minutes. In the preserved group II (N = 5), the heart-lung blocks were similarly excised but stored in a normal saline bath at 4°C for approximately 4 hours (279 ± 6 minutes) and then transplanted. Both groups received isoproterenol (0.5-5 mcg/min) during reperfusion and were studied for 6 hours postimplantation. Myocardial function was assessed by determining the ratio of the end-

systolic pressure to end-systolic dimension (ESP/ESD), mmHg/mm) using sonomicrometry. Pulmonary preservation was evaluated by the determination of extravascular lung water with a double-indicator dilution method (EVLW, ml/kg), arterial oxygenation on 100% FiO<sub>2</sub> (PO<sub>2</sub>, mmHg), and serial lung biopsies. A blinded histologic lung injury score based upon pulmonary alveolar-capillary hemorrhage, edema, and necrosis was graded 0 to 4. The results (mean±SEM) were:

Hour	Group	ESP/ESD	EVLW	PO <sub>2</sub>	Injury
0	I	1.83 ± 0.10	8.5 ± 0.8	551 ± 18	1.6 ± 0.1
	II	2.16 ± 0.38	9.9 ± 1.0	567 ± 26	1.6 ± 0.1
2	I	1.31 ± 0.20	10.5 ± 2.1	454 ± 34*	1.6 ± 0.3
	II	1.58 ± 0.30*	12.1 ± 1.2	559 ± 26†	2.3 ± 0.3*
4	I	1.62 ± 0.20	9.8 ± 2.2	465 ± 28*	2.3 ± 0.3*
	II	1.66 ± 0.40*	12.0 ± 1.3	454 ± 44	2.8 ± 0.2*
6	I	1.64 ± 0.41	10.5 ± 1.5	442 ± 49	1.5 ± 0.4
	II	1.56 ± 0.36*	10.5 ± 0.9	362 ± 41*	2.0 ± 0.6

\*p<0.05 versus respective 0 hour; †p<0.05 I versus II at same hour.

Myocardial and pulmonary function after 4-hour static preservation were similar to controls. No-flush, core-cooling on CPB provides adequate cardiorespiratory function following acute bovine heart-lung allotransplantation. By using this technique, successful cold ischemic cardiopulmonary preservation for heart-lung transplantation may be achieved.

\*By Invitation

### 35. Proper Donor Selection for Heart-Lung Transplantation

*ARI L.J. HARJULA\*†, JOHN C. BALDWIN\*,*

*VAUGHN A. STARNES\*, EDWARD B. STINSON, PHILIP*

*E. OYER\*, STUART W. JAMIESON*

*and NORMAN E. SHUMWAY*

*Stanford, California and Minneapolis, Minnesota*

Clinical cardiopulmonary transplantation is currently limited by the availability of suitable heart-lung donors. Distant graft procurement, using intravenous prostaglandin E-1 and cooling of the graft with pulmonary arterial perfusion, is now clinically established and should increase the number of available donors. Between March 1981 and September 1986, 40 heart-lung transplantations were performed, and the characteristics of the donor pool have been analyzed. Donors were intubated for a mean period of 59 hours (15-140 hours) before harvesting. Eleven donors had abnormal chest radiographs (28%) and three donors had pulmonary contusion, noted at the time of graft excision. Gram stain of the donor tracheal aspirate revealed gram positive bacteria in 80% and gram negative bacteria in 35%. Yeast was present on fungal smear in 25% of the aspirates. Gram stain of 4 donor tracheal aspirates revealed heavy polymorphonuclear cells and heavy bacteria and/or yeast; three of these recipients expired. Staphylococci (42.5%) and Candida (22.5%) were the most common organisms found on cultures. Thirty percent (12) of the recipients



had early bacterial pulmonary infections and 12.5% (5) had Candida sepsis. Eight of the donors were serologically positive for cytomegalovirus (CMV), while their recipients were negative; three of these developed CMV pneumonitis. Donor arterial pO<sub>2</sub> was less than 100 torr (FIO<sub>2</sub>40%) in one patient; this recipient died of lung failure at operation. Severe deterioration of allograft lung function was seen in 11 recipients (27.5%). Six of them were associated with substantial post-operative bleeding; 2 were related to sepsis, 1 to acute rejection, 1 to poor lung function, and 1 to allograft heart failure. Partial HLA matching was associated with a statistically insignificant trend toward less obliterative bronchiolitis. Strict criteria observed for selection of heart-lung donors are valid, and current graft preservation is adequate. Early morbidity and mortality are principally related to recipient risk factors; the importance of appropriate recipient selection is underscored.

\*By Invitation

†36th Graham Fellow

### 36. Long-Term Neonatal Heart Preservation (Forum)

*HAKOB G. DAVTYAN\**, *ANTONIO F. CORNO\**,

*HILLEL LAKS*, *SUNITA BHUTA\**, *WILLIAM M. FLYNN\**,

*CRAIG LAIDIG\** and *DAVIS C. DRINKWATER\**

*Los Angeles, California*

Donor availability, which is a limiting factor in neonatal heart transplantation, could be expanded by prolonging safe donor heart preservation. Thirty-six neonatal (1-5 days) piglet hearts in 6 groups (Gr) were arrested with cardioplegia, stored for 12 hours at 4°C in storage solution and reperfused with blood using a support pig. Storage solutions were normal saline, Sacks II or Sacks II with 20 gm/L glucose (SacksGL). Reperfusion was carried out with normal blood (NLBL) or modified blood (ModBL) for 20 minutes with superoxide dismutase, catalase, aspartate, glutamate, CPD, K<sup>+</sup>, THAM and 50% Dextrose followed by NLBL. Evaluation of stroke work index at recovery as % of control was performed using the isolated, perfused working heart preparation after 60 minutes of NLBL perfusion in all groups.

	CARDIOPLEGIA STORAGE		REPERFUSION	RECOVERY %
Gr I	Stanford	Saline	NLBL	11 ± 8
Gr II	Stanford + Ca ++	Saline	NLBL	8 ± 4
Gr III	Stanford + Ca ++	Saline	ModBL	40 ± 8
Gr IV	Stanford + Ca ++	SacksII	ModBL	47 ± 10
Gr V	Stanford + Ca ++	SacksGL	ModBL	89 ± 10
Gr VI	SacksGL	SacksGL	ModBL	115 ± 11

Conclusions: 1) Hypothermic preservation of the neonatal heart with NLBL reperfusion is poorly tolerated (Gr I and II); 2) ModBL reperfusion results in markedly improved return of function (Gr III and IV) (p<0.05); 3) SacksGL storage solution combined with ModBL reperfusion markedly improves recovery (Gr V) (p<0.05); 4) SacksGL cardioplegia tends to further improve recovery (Gr VI); 5) Extended preservation of the neonatal heart is feasible.

**10:00 a.m. Intermission - Visit Exhibits - Wacker Hall**

\*By Invitation

**10:40 a.m. Scientific Session - Grand Ballroom**

**37. Long-Term Hemodynamic Results After Cardiac Transplantation**

*WILLIAM H. FRIST\*, EDWARD B. STINSON,*

*PHILIP E. OVER\*, JOHN C. BALDWIN\*  
and NORMAN E. SHUMWAY*

*Stanford, California*

Although survival rates after cardiac transplantation have improved since the introduction of Cyclosporine (Cyclo) to clinical practice in 1980, the long-term hemodynamic results of transplantation in Cyclo-treated patients is unknown. Annual cardiac catheterization data for 109 Cyclo-treated recipients are compared to that for 65 Azathioprine (Aza)-treated recipients. All patients underwent at least one annual study. Age, sex and HLA match were comparable for both groups. At the first annual study, the Cyclo group had a higher (t-test,  $P < 0.05$ ) mean arterial blood pressure (MAP, mmHg) ( $109 \pm 1$  vs  $95 \pm 2$ ); mean pulmonary artery pressure (PAP, mmHg) ( $17 \pm 5$  vs  $14 \pm 5$ ); left ventricular end-diastolic pressure (LVEDP, mmHg) ( $12 \pm 6$  vs  $9 \pm 4$ ); cardiac index (CI, L/min/sq m) ( $3.0 \pm 0.7$  vs  $2.6 \pm 0.6$ ); and stroke volume (SV, cc/beat) ( $66 \pm 17$  vs  $56 \pm 14$ ).

At annual study 2, MAP, PAP, LVEDP, and SV remained higher ( $P < 0.05$ ) for the Cyclo group but CI was similar for both groups. At study years 3, 4 and 5, PAP, LVEDP, SV and CI were similar, but MAP remained markedly higher for the Cyclo group (in spite of aggressive antihypertensive treatment). Ejection fraction was comparable for both groups at each annual visit.

Analysis of a subset of 34 Cyclo patients who survived at least 4 years after transplantation showed no significant time-related changes in hemodynamics over the 5 years of annual study.

In summary, the long-term hemodynamic function of the transplanted heart treated with Cyclo is satisfactory, demonstrates no deterioration over five-year follow-up, and manifests more systemic hypertension when compared to the Aza-treated group.

\*By Invitation

**38. Protection of the Ischemic Lung Using Verapamil and Hydralazine (Forum)**

*MITSUHIRO HACHIDA \* and DONALD L. MORTON  
Los Angeles, California*

Little is known about the optimum treatment of the lung during preservation in preparation for transplantation. In this study, we evaluated the effect of Verapamil, which has ability as a  $Ca^{2+}$  channel blocker and vasodilator, and Hydralazine, which has only vasodilator activity, compared with a non-treated control. Twenty-three dogs were used and after the left hilar structures were exposed, the pulmonary artery, vein and bronchus were clamped. The lungs of eight dogs in Group A were perfused with 200 ml of Collins & Sacks (C-S) solution alone by gravity at 40 cm pressure at the initial and terminal phases. By contrast, the lungs were identically perfused with C-S solution containing 20 mg of Hydralazine in seven dogs in Group B and with 5 mg of Verapamil in eight

dogs in Group C. The left lung in each dog was exposed to normothermic ischemia (28°C) for 30 minutes to 5 hours and pulmonary circulation was re-established. To detect the functional recovery of the left lung alone, the right main bronchus was ligated. The mean ischemic time was 2.3 hours in Group A, 2.9 hours in Group B, and 3.1 hours in Group C. The percentage of survivors was 12.5% in Group A, 25% in Group B, and 88% in Group C. Po<sub>2</sub> tension in room air after the bronchial ligation was 39.9 ± 10.2 in Group A, 59.2 ± 32.2 in Group B, 76.1 ± 32.9 in Group C. Statistical significance existed between Groups A and C (p<0.05). Lung perfusion scintigraphy after the experiment showed greater perfusion in Group C compared with Groups A and B. Pulmonary vascular resistance after bronchial ligation was 428.9 ± 158.8 in Group A, 219.9 ± 51.9 in Group B, and 208.3 ± 84.5 in Group C. The released enzymes, GOT, CPK, LDH, after reperfusion were measured by the level of enzymes in the pulmonary vein using PV-PA gradient. Each enzyme was significantly less in Group C than in Groups A and B (p<0.01). Thus, tissue damage due to ischemia was significantly less using Verapamil than the vasodilating drug, Hydralazine. Therefore, inhibition of Ca<sup>2+</sup> influx is the major factor which prevents injury of the pulmonary vascular tree due to ischemia following reperfusion rather than the vasodilating effect of this drug.

\*By Invitation

### 39. A Simple Technique for Multi-Organ Preservation (Forum)

*SUFAN CHIEN\*, EDWARD P. TODD and  
JOHN DIANA \**

*Lexington, Kentucky*

We report here a simple self-perfusing, self-cleaning preparation for multi-organ preservation with no ischemic time. In five mongrel dogs, after anesthesia, a mid-line incision was made. The abdominal aorta and IVC were divided below the renal arteries. The heart and lung were separated and removed with liver, pancreas, kidneys, and a portion of small intestine en bloc while they were self-perfused. The preparation was perfused by the heart, and a respirator was used. Arterial and venous pressures were measured through indwelling catheters. Fresh blood 10% glucose 500 ml, plus Insulin 50 units, KCl 2/□g/ml, CaCl<sub>2</sub> 2□g/ml, Mannitol 20 □g/ml, and Prednisolone 125 mg were dripping slowly through a catheter into the portal vein. One ml of 20% soyacal was administered every two hours. Organs were experimentally perfused for an average of 12 hours. Hemodynamic and lab tests are summarized in the figure below. AOSP ranged from 75-125 mm Hg, CVP 0-5 mm Hg, portal VP 0-3 mm Hg, bile output 5-20 ml/ hour, urine output 10-70 ml/hour, hematocrit 35-55%. The heart and lungs were normal and physiologically functional at 12 hours. The pancreas and small intestine appeared normal by observation. In 3 dogs, the liver showed some congestion which might be related to the special anatomy of the portal vein in dogs. The kidney appeared to have edematous swelling after 16 hours. The following features seem to characterize this procedure: 1) no ischemic time; 2) the preparation is physiologically self-sufficient and requires only ventilation and IV fluids; 3) the preparation appears suitable for distant procurement; and 4) additional tissues and organs can be attached to study their effect on preservation and overall physiological function. We believe this is the first report of multiple organ preservation employing auto-perfusion technique. Although the data are preliminary, the results are very promising and deserve further evaluation.

\*By Invitation

**40. Role of the Antibody to Vascular Endothelial Cells in Hyperacute Rejection in Patients Undergoing Cardiac Transplantation (Forum)**

*ALFREDO TRENTO\*, ROBERT L. HARDESTY,*

*BARTLEY P. GRIFFITH, TONY ZERBE\*,*

*ROBERT L. KORMOS\* and HENRY T. BAHNSON*

*Pittsburgh, Pennsylvania*

A positive lymphocytotoxic cross-match has been a contraindication to transplantation because of the possibility for hyperacute rejection. However, 12 of 275 heart transplant recipients had a positive lymphocytotoxic cross-match and only one of them died of hyperacute rejection. We also identified 6 patients in whom, despite a negative direct lymphocytotoxic cross-match, acute failure of the cardiac homograft was associated with histologic and immunologic findings consistent with hyperacute rejection. The patients' sera were found to have antibodies reacting against vascular endothelial cells and against concordant monocytes. The same sera did not show any reactivity against B or T lymphocytes. In these 6 patients the transplanted heart failed in either the operating room (4 patients), or within the first 6 postoperative hours (2 patients) with a pattern of severe biventricular failure: CVP >20 mm Hg, PCW >20 mm Hg and marked systemic hypotension despite massive in-otropic support. Two of the patients could be retransplanted within 6 and 8 hours respectively, but the second homograft failed acutely in both. In a third patient the failure of the first cardiac homograft was followed by insertion of a Jarvik-7 artificial heart. Successful retransplantation followed multiple plasmapheresis which were later found to eliminate anti-vascular endothelial cell (VEC) antibodies from the recipient's serum. Histologically the failing homografts showed many small vessels with endothelial damage, platelet-fibrin thrombi occluding arterioles, occasional small foci of myocardial necrosis and poly-morphonuclear granulocyte infiltrates. Direct immunofluorescence revealed the presence of IgM and C3 complement bound to the endothelium of numerous small and large vessels. This anti-VEC antibody was not found in a group of 17 patients who experienced an uneventful clinical course following cardiac transplantation. When the donor's tissue was available, donor's specific analysis revealed the presence in the recipient's serum of preformed anti-VEC antibody that bound to the epithelium of the donor aorta and vena cava. While the role of anti-VEC specific antibody in cardiac transplantation awaits further evaluation, these data strongly support the hypothesis of hyperacute rejection related to preexisting anti-VEC antibody.

**11:30 a.m. Basic Science Lecturer**

**"IMMUNO-REGULATION: THE KEY TO TRANSPLANTATION AND AUTOIMMUNITY"**

**Gustav J.V. Nossal, M.D., Melbourne, Victoria, Australia**

**Supported in part by an Educational Grant from the Coordinating Committee for Continuing Education in Thoracic Surgery. (CCCETS)**

**12:15 p.m. Adjourn for Lunch**

\*By Invitation

## WEDNESDAY AFTERNOON, APRIL 8, 1987

2:00 p.m. Scientific Session - Grand Ballroom

### 41. The Results of Management of Simple Transposition in the Current Era

*ALDO R. CASTANEDA, GEORGE A. TRUSLER,  
MILTON H. PAUL\*, EUGENE H. BLACKSTONE,  
JOHN W. KIRKLIN and THE CONGENITAL HEART  
SURGEONS SOCIETY  
Multi-Institutional*

Between January 1, 1985 and June 1, 1986, 245 neonates less than 2 weeks old with transposition (TGA) have been entered into an ongoing 20 institution prospective study. 187 had simple TGA, and 154 (82%) of these were less than 48 hours old on entry. Percent survival 1, 6, and 12 months after entry was 91%, 86%, and 81% respectively; there was an initially high but rapidly declining early phase of hazard function for death, giving way to a constant phase about 6 weeks after entry. 78 patients (16 deaths, 21%) were in a management program which included arterial switching, and 104 (9 deaths, 9%) in a program which included atrial switching.

Risk factors for death among the 182 patients were low birthweight (but not weight at operation), earlier date of entry into the study, and an arterial switch repair in an institution *without* a formal protocol of one type of operation or the other. Otherwise, neither arterial nor atrial switch protocol nor a protocol of Mustard vs. Senning type of atrial switching, nor a small patient volume institution, were risk factors for death in this experience to date.

An inference is that, as yet, neither of the formal treatment protocols (arterial vs. atrial switching) can be considered more advantageous as regards survival, but *lack* of a defined protocol is disadvantageous. Earlier date of entry into the study was observed to be a risk factor in the case of patients in a program of arterial switching because of recently decreasing risks of the arterial switch repair (0 deaths among 28 neonates undergoing arterial switching in protocol institutions (1/1/1986-6/1/1986); in the case of programs of atrial switching, it was because of fewer deaths pre-repair. The improvement recently was particularly evident in small birthweight neonates. For those with a birthweight of 2.0 kg., predicted 12 month survival in either an arterial or atrial switch management program was 57% with entry January 1, 1985 and 86% with entry January 1, 1986; for those with a birthweight of 2.7 kg., it was 76% and 90% respectively.

\*By Invitation

### 42. Long-Term Outlook After Atrial Correction for Transposition of Great Arteries: Cautious Optimism

*MARKO I. TURINA \*, ROBERT SIEBENMANN\*,  
PETER NUSSBAUMER\* and AKE SENNING*

*Zurich, Switzerland*

Late results were reviewed in 220 survivors after atrial correction of TGA, operated between 1964 and 1985. Senning's procedure and its various modifications have been employed; all patients which survived 30 days after correction were included in this analysis. Average follow-up for the whole group was 9.2 years; 113 pts were observed for 10, 26 pts for 15 and 8 pts for 20 years. Actuarial survival for the whole group was 89% at 10, 87% at 15 and 82% at 20y; it was higher in simple than in complicated TGA (92% vs. 84% at 10y). Sudden deaths (8 pts) and late heart failure (6 pts) were principal death cause, predominantly in complicated TGA group (10/14 deaths). Late survival was higher in the later part of the study, with 96% of pts corrected after 1977 surviving 8y, as opposed to 86% of pts operated earlier. Late reoperation was necessary in 21 pts (9.5%), with 12 reoperations occurring within 2y after correction. Cumulative incidence of reoperations reached 10.9% after 10y. Reoperations were more common in complicated than in simple TGAs (7.8% vs. 3.1% at 10y). Late dysrhythmias can occur after atrial correction, and cumulative incidence of pacemaker implantations was 9.8% at 10y. Most of the survivors belong functionally to an asymptomatic or oligosymptomatic group (83% of simple and 78% of complicated TGAs). Tricuspid valve incompetence was encountered only in 3 pts, with 2 valve reconstructions being possible. In summary, long-term outlook for survivors of atrial correction for TGA remains encouraging, although complicated TGA does seem to encounter more late problems. Atrial correction is still warranted in simple TGA, but cardiological surveillance is necessary.

\*By Invitation

#### **43. Early and Late Results of Modified Fontan Operation**

*GORDON K. DANIELSON, FRANCISCO J. PUGA,*

*HARTZELL V. SCHAFF\*, RICHARD A. HUMES\**

*and DOUGLAS D. MAIR\**

*Rochester, Minnesota*

From October 1973 to January 1986, 421 patients have undergone the modified Fontan operation. Diagnoses include tricuspid atresia (n = 145), double inlet ventricle (n = 131), and other complex anomalies including mitral valve atresia, pulmonary atresia with intact ventricular septum, single AV valve with single ventricle (two-chambered heart), single ventricular anomalies with hypoplastic or straddling AV valves, and polysplenia/asplenia syndromes (n = 145). Ages ranged from 8 mos to 42 yrs (mean = 11 yrs). One or more (maximum of eight) of Fontan and Choussat's original criteria for operability were not satisfied in 75% of the tricuspid atresia patients and 65% of the double inlet ventricle patients. There were a total of 67 hospital deaths (17%). Mortality was correlated with elevation of mean pulmonary artery pressure, pulmonary arteriolar resistance, and ventricular end-diastolic pressure; presence of AV valve insufficiency; and decreased ventricular function. In the last five years, total hospital mortality has decreased to 13%. Improved mortality was seen in all anatomic subsets: tricuspid atresia 10% overall, 5.3% last five years; double inlet ventricle 15% overall, 11.4% last five years; other complex anomalies 24% overall, 19% last five years. Follow-up data were examined on 211 patients 3 mos to 11 yrs (mean = 3.1 yrs) after operation. Of numerous variables examined, late mortality (9.4%) correlated best with presence of ventricular dysfunction. Ninety-two percent of patients were in NYHA Class I or II, 95% were able to work or

attend school, and 90% claimed to be improved following operation. Forty-three percent of patients were on no medications. Eighteen percent had some degree of intermittent or persistent edema.

Conclusions: 1) the modified Fontan operation can be performed successfully for a variety of functional single ventricle anomalies, 2) hospital mortality has decreased progressively with experience, 3) functional improvement at intermediate follow-up is good to excellent in most patients.

\*By Invitation

#### **44. Repair of Ebstein's Anomaly by Longitudinal Ventricular Plication and Tricuspid Valve Repositioning**

*ALAIN F. CARPENTIER, SYLVAIN CHAUVAUD\**,

*JOHN Y. M. RELLAND\* and LOIC MACE\**

*Paris, France*

Ebstein's anomaly is a rare and complex malformation of the tricuspid valve and the right ventricle. The tricuspid valve malformation involves the posterior and lateral leaflets which are displaced downwards and also the anterior leaflet which may be partially or totally adherent to the muscular wall. The right ventricular anomaly consists of a transverse rather than a longitudinal dilatation of the posterior wall above the displaced leaflets. The anatomical considerations led to the development of a reconstructive operation which comprises:

- A longitudinal plication (instead of the classical transverse plication) of the dilated portion of the right ventricle.
- A separation of the anterior and posterior leaflets from their annular attachment so as to facilitate leaflet mobilization and subsequent repositioning at the normal level.
- An annuloplasty using a Carpentier ring to remodel the orifice.

This technique has enlarged the indications of valve repair in Ebstein's disease with an increased efficiency. In a series of 13 patients operated upon in the past 5 years. Twelve (92%) benefited from this operation and 1 patient with an associated atrioventricular canal required a valve replacement. The age of the patients ranged from 9 to 38 years (mean 25.1 years). All patients but 4 were in functional class III or IV prior to operation. Cardiothoracic ratio varied from 0.55 to 0.77 (mean 0.65). One patient has a previous Lillehei-Hardy operation and was repaired successfully. There were 2 hospital deaths (one in a patient with an associated complex malformation of the mitral valve) and no late deaths. Rhythm and conduction disturbances were improved postoperatively in half of the patients.

	<b>Pre-op</b>	<b>Post-op</b>
Sinus rhythm	7	7
First degree block	3	2
Dysrhythmias	4	1

All patients but 1 are in class functional I or II. Echocardiography and Doppler studies demonstrated good tricuspid valve function and a normal morphology of the right ventricle in all patients but 1.

\*By Invitation

#### **45. The Fate of the 12-MM Porcine Valve Right Ventricular-Pulmonic Artery Conduit: A 10-Year Experience**

*STEVEN W. BOYCE\**, *KEVIN TURLEY,*  
*EDWARDS. YEE\**, *EDWARD D. VERRIER\**  
*and PAUL A. EBERT*  
*San Francisco, California*

The 12-mm porcine valve conduit is the smallest conduit manufactured and is used in the youngest infants with the most diminutive pulmonary arterial systems. The natural history of these conduits is unknown.

Between 1975 and 1985, there were 49 hospital survivors following placement of a 12-mm valve right ventricular-pulmonic artery extra-cardiac conduit. Follow-up is available in 42 patients, aged 1 to 16 months (mean 3.5) and weighing 2.5 to 8.7 kg (mean 3.8). Twenty-eight patients (67%) have undergone subsequent conduit replacement, and 11 (26%) are alive and asymptomatic with a mean follow-up of 56 months. There were 3 late deaths. The interval between implantation and conduit change was 4.5 to 101 months (mean 44), allowing a weight gain of 5.8 to 32 kg (mean 14), prior to reoperation at age 15 to 117 months (mean 49). Despite elevated right ventricular pressures equalling systemic values, 37% of these patients were clinically asymptomatic. The gradient across the 12-mm valve conduit prior to explantation ranged from 30 to 173 torr (mean 83) with a near equal predilection for stenosis at the proximal anastomosis, valve, conduit, distal anastomosis, and main pulmonary artery. The intervening pulmonary artery growth determined the size of the replacement conduit, 14- to 25-mm (mean 16), and was the main factor influencing the results of reoperation.

This study demonstrates that the 12-mm porcine conduit affords palliation in this difficult subset of patients with the smallest pulmonary arterial systems. This palliation lasts longer than originally had been thought with stenosis occurring at multiple levels rather than the predominant problem of conduit intimal peel as previously suggested.

\*By Invitation

#### **46. Arterial Switch in Simple and Complex D-Transposition of the Great Arteries**

*FAROUK S. IDRIS, MICHEL N. ILBAWI,*  
*SERAFIN Y. DELEON\*, C. ELISE DUFFY\*,*  
*ALEXANDER J. MUSTER\*, TERESA E. BERRY\**  
*and MILTON H. PAUL \**  
*Chicago, Illinois*

Arterial switch (AS) was performed on 46 children with D-transposition of the great arteries (D-TGA), ages ranging from 2 days to 3 years. Twenty-two had intact ventricular septum (IVS) and primary repair in the first month of life (Group I) with death (mortality 9%). Group II included 12 infants with IVS who had AS after different preliminary procedures (11 pulmonary artery



banding (PAB), 10 shunt, 1 atrial septectomy, 2 coarctation (COA) repair) with 1 death (mortality 8%). Group III included 12 patients with complex D-TGA with ventricular septal defect (VSD) (3 with repaired COA, 6 PAB, 5 Taussig-Bing, and 1 double VSD). Two patients had both coronary arteries from the same sinus and 1 had associated supra- and subvalvar left ventricular (LV) outflow stenosis that was resected. Five patients in this group had the VSD closed through the pulmonary artery (PA). There was one death (mortality 8%). Echocardiography and cardiac catheterization were used in pre and postoperative evaluation. Postoperative catheterization was performed on 14 patients after AS. In 1, a second VSD missed on the original study was found and the patient was reoperated successfully. In another patient from Group III with a previously repaired COA, a narrowing developed in the aortic arch after AS, presumably due to LeCompte maneuver. Echocardiographic studies at  $0.93 \pm 0.61$  years of age available for 15 patients from Group I revealed normal LV function. The maximal LV outflow velocity was  $<1.6$  ml/sec (normal) in all, with normal LV end-diastolic dimension predicted for weight at  $101 \pm 12\%$ . Right ventricular (RV) velocity increase was trivial in 9 and mild in 1. There was no aortic valve insufficiency in 11, trivial in 2 and mild in 3. In the new PA valve, insufficiency was absent in 4, trivial in 7 and mild in 3. Six postoperative catheterizations in Group I at  $1.1 \pm 0.1$  years of age revealed a mean RV pressure of  $35 \pm 5$  torr. One patient has significant arrhythmias.

Several technical details and modifications led to decrease of mortality and morbidity, including modifications minimizing rotation of the coronary arteries, myocardial protection with one cardioplegia infusion instead of intermittent infusion, primary rather than staged repair on infants with IVS as close to birth as possible, limiting staged repair to infants less than 2.5 kg or when other significant abnormalities are present, and performing a scalloped aortic anastomosis and reconstruction of the PA with pantaloons patch to create an extra large anastomosis and prevent serious narrowing.

#### **4:00 p.m. Adjourn**

\*By Invitation

#### **NECROLOGY**

Richard H. Blank, M.D., Tampa, FL

Albert C. Daniels, M.D., Carmel, CA

Paul Geary, M.D., Delray Beach, FL

Elliott Harrison, M.D., Vancouver, Canada

Thomas H. Hewlett, M.D., Hemet, CA

Thomas N. P. Johns, M.D., Richmond, VA

Ben F. Mitchell, Jr., M.D., Dallas, TX

Thomas J. E. O'Neill, M.D., Lumberville, PA

Roland D. Pinkham, M.D., Seattle, WA

Lawrence H. Strug, M.D., New Orleans, LA

Joseph A. Weinberg, M.D., Pacific Palisades, CA

# American Association for Thoracic Surgery, 1987-1988

*(Listed by Countries, States, Provinces and Cities)*

## Geographical - UNITED STATES

### ALABAMA

#### Birmingham

Blackstone, Eugene H

Blakemore, William S

Kahn, Donald R

Kessler, Charles R

Kirklin, James K

Kirklin, John W

McElvein, Richard B

Pacifico, Albert D

#### Montgomery

Simmons, Earl M

### ALASKA

#### Anchorage

Phillips, Francis J

### ARIZONA

#### Phoenix

Brown, Lee B

Cornell, William P

Fisk, R Leighton

Nelson, Arthur R

#### Tucson

Burbank, Benjamin

Copeland III, Jack G

Sanderson, Richard G

### ARKANSAS

#### Jasper

Hudson, W A

#### Little Rock

Campbell, Gilbert S

Read, Raymond C

Williams, G Doyne

### CALIFORNIA

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Benfield, John R

Newman, Melvin M

#### El Macero

Andrews, Neil C

#### Escondido

Mannix Jr, Edgar P

#### Fresno

Evans, Byron H

#### Irvine

Connolly, John E

Miller, Don R

Salyer, John M

#### La Canada

Aronstam, Elmore M

#### La Jolla

Fosburg, Richard G

Hutchin, Peter

#### La Mesa

Long Jr, David M

#### Loma Linda

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Stemmer, Edward A

#### Los Angeles

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Buckberg, Gerald D

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Holmes, E Carmack

Hughes, Richard K

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Carter, P Richard

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Matloff, Jack M

Meyer, Bert W

Morton, Donald L

Mulder, Donald G

Stiles, Quentin R

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**Martinez**

Guernsey, James M

**Montebello**

Lui, Alfred H F

**Monterey**

Read, C Thomas

**Oakland**

Ecker, Roger R

May, Ivan A

**Orange**

Gazzaniga, Alan B

Mason, G Robert

Wakabayashi, Akio

**Oxnard**

Dart Jr, Charles H

**Pacific Palisades**

Ramsay, Beatty H

**Palm Springs**

Goldman, Alfred

Kay, Jerome Harold

Khonsari, Siavosh

Laks, Hillel

Lee, Myles E

Lindesmith, George G

Longmire Jr, William

Maloney Jr, James V

Oury, James H

Peters, Richard M

Trummer, Max J

**San Francisco**

Culiner, Morris M

Ellis, Robert J

Gardner, Richard E

Grimes, Orville F

Heydorn, William H

Hill, J Donald

Kerth, William J

Leeds, Sanford E

McEnany, M Terry

Richards, Victor

Roe, Benson B

Rogers, W L

Thomas, Arthur N

Turley, Kevin

Ullyot, Daniel J

**San Jose**

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**San Rafael**

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Pratt, Lawrence A

**Santa Barbara**

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Cohn, Roy B  
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**Pasadena**

Ingram, Ivan N  
Penido, John R F

**Rancho Mirage**

Bjork, Viking O

**Sacramento**

Harlan, Bradley J  
Hurley, Edward J  
Miller Jr, George E  
Smeloff, Edward A  
Tyson, Kenneth R T

**San Bernadino**

Flynn, Pierce J

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Angell, William W  
Baronofsky, Ivan D  
Chambers Jr, John S  
Daily, Pat O  
Lamberti Jr, John J

Jahnke Jr, Edward J

Lewis, F John

Love, Jack W

**South Laguna**

Oatway Jr, William H

**South Pasadena**

Brewer III, Lyman A

**St Helena**

Dugan, David J

**Stanford**

Mark, James B D  
Miller, D Craig  
Shochat, Stephen J  
Shumway, Norman E  
Stinson, Edward B

**Thousand Oaks**

Tsuji, Harold K

**Torrance**

Carey, Joseph S  
Cukingnan, Ramon A  
Moore, Thomas C  
Nelson, Ronald J  
State, David

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Zaroff, Lawrence I

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Blair, Emil  
Brown, Robert K  
Burrington, John D  
Condon, William B  
Eiseman, Ben  
Grow, John B  
Harken, Alden H

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Midgley, Frank M  
Mills, Mitchell  
Randolph, Judson G  
Simmons, Robert L

Harper, Frederick R  
Hopeman, Alan R  
Kovarik, Joseph L  
Pappas, George  
Paton, Bruce C  
Pomerantz, Marvin  
Rainer, W Gerald  
Van Way III, Charles W  
Waddell, William R  
Wright, George W

**Lake wood**

Swan, Henry

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Hammond, Graeme L  
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Stansel Jr, Horace C  
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**Sharon**

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Wallace, Robert B

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**Atlantic Beach**

Stranahan, Allan

**Boca Raton**

Seley, Gabriel P

**Clearwater**

Lasley, Charles H

Wheat Jr, Myron W

**Coconut Grove**

Center, Sol

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Cooke, Francis N

**Gainesville**

Alexander, James A

Bartley, Thomas D

**Jacksonville**

Barnhorst, Donald A  
Koster Jr, J Kenneth  
Stephenson Jr, Sam

**Lakeland**

Brown Jr, Ivan W

**Marathon**

Mangiardi, Joseph L

**Miami**

Bolooki, Hooshang  
Chesney, John G  
Daughtry, Dewitt C  
Gentsch, Thomas O  
Jude, James R  
Kaiser, Gerard A  
MacGregor, David C  
Papper, Emanuel M  
Reis, Robert L  
Thurer, Richard J

**Miami Beach**

Greenberg, Jack J  
Grondin, Pierre  
Ripstein, Charles B

**N Miami Beach**

Spear, Harold C

**N Palm Beach**

Dorsey, John M

**Naples**

Linberg, Eugene J

**Orlando**

Scott, Meredith L  
Sherman, Paul H

**Ponte Vedra Beach**

Gilbert Jr, Joseph

**St Petersburg**

Clerf, Louis H  
Daicoff, George R  
Dematteis, Albert

**Tallahassee**

Kraeft, Nelson H

**Tampa**

Connar, Richard G  
Seiler, Hawley H

**Winter Haven**

Maurer, Elmer P R

**Winter Park**

Bloodwell, Robert D

**GEORGIA****Atlanta**

Graver, Joseph M  
Hatcher Jr, Charles  
Hopkins, William A  
Jones, Ellis L

**Savannah**

Langston, Hiram T  
Yeh, Thomas J

**Sea Island**

Collins, Harold A

**HAWAII****Honolulu**

Ching, Nathaniel P  
Gebauer, Paul W  
McNamara, Joseph J  
Moreno-Cabral, Ricardo

**IDAHO****Boise**

Ashbaugh, David G  
Herr, Rodney H

**ILLINOIS****Chicago**

Barker, Walter L  
Campbell, Charles D  
Ebert, Paul A  
Faber, L Penfield  
Goldin, Marshall D  
Hanlon, C Rollins  
Head, Louis R  
Hunter, James A  
Idriss, Farouk S  
Ilbawi, Michel N  
Javid, Hushang  
Jensik, Robert J  
Karp, Robert B  
Kittle, C Frederick  
Leininger, Bernard J  
Levitsky, Sidney  
Little, Alex G

King, Richard  
Lee Jr, Arthur B  
Logan Jr, William D  
Mansour, Kamal A  
Miller, Joseph I  
Rivkin, Laurence M  
Symbas, Panagiotis  
Williams, Willis H

**Augusta**

Ellison, Robert G  
Rubin, Joseph W

**Macon**

Sealy, Will C

**Evanston**

Anderson, Robert W  
Fry, Willard A  
Tatooles, Constantine

**Glencoe**

Rubenstein, L H

**Maywood**

Keeley, John L  
Pifarre, Roque

**Oak Brook**

Hudson, Theodore R  
Nigro, Salvatore L

**Peoria**

Debord, Robert A

**Skokie**

Baffes, Thomas G

**Springfield**

Wellons Jr, Harry A

**Winnetka**

Wackier, S Allen

**INDIANA**

Michaelis, Lawrence

Midell, Allen I

Najafi, Hassan

Raffensperger, John

Replogle, Robert L

Shields, Thomas W

Silverman, Norman A

Skinner, David B

Thomas Jr, Paul A

Vanecko, Robert M

Weinberg Jr, Milton

**KENTUCKY**

**Lexington**

Crutcher, Richard R  
Dillon Jr, Marcus L  
Todd, Edward P J

**Louisville**

Gray Jr, Laman A  
Mahaffey, Daniel E  
Mavroudis, Constantine  
Ransdell Jr, Herbert

**LOUISIANA**

**Alexandria**

Knoepp, Louis F

**Baton Rouge**

Berry, B Eugene  
Beskin, Charles A

**Marrero**

O'Neill Jr, Martin J

**Metairie**

Ochsner Jr, Alton

**New Orleans**

**Indianapolis**

Battersby, James S  
Brown, John W  
King, Harold  
King, Robert D  
Mandelbaum, Isidore  
Siderys, Harry

**IOWA****Cedar Rapids**

Lawrence, Montague S

**Council Bluffs**

Sellers, Robert D

**Des Moines**

Dorner, Ralph A  
Phillips, Steven J  
Watkins, David H

**Iowa City**

Ehrenhaft, Johann L  
Rossi, Nicholas P  
Stanford, William

**KANSAS****Cunningham**

Allbritten Jr, F F

**Wichita**

Tocker, Alfred M

Hankins, John R  
McLaughlin, Joseph S  
Michelson, Elliott  
Moulton, Anthony L  
Reitz, Bruce A  
Turney, Stephen Z

**Bethesda**

Blalock, John B  
Decamp, Paul T  
Hewitt, Robert L  
Lindsey, Edward S  
Mills, Noel L  
Moulder, Peter V  
Ochsner, John L  
Pearce, Charles W  
Rosenberg, Dennis M  
Schramel, Robert J  
Webb, Watts R

**MAINE****Liberty**

Hurwitz, Alfred

**Portland**

Drake, Emerson H  
Hiebert, Clement

**Rockport**

Swenson, Orvar

**MARYLAND****Baltimore**

Attar, Safuh M A  
Baker, R Robinson  
Cowley, R Adams  
Gardner, Timothy J  
Gott, Vincent L  
Haller Jr, J Alex

Roberts, Arthur J  
Russell, Paul S  
Scannell, J Gordon  
Schuster, Samuel R  
Starkey, George W B  
Weintraub, Ronald  
Wilkins Jr, Earle W



Clark, Richard E  
Jones, Michael  
Shumacker Jr, Harris B  
**Chevy Chase**  
Iovine, Vincent M  
**Potomac**  
Zajtchuk, Rostik  
**Towson**  
Brawley, Robert K  
**Worton**  
Walkup, Harry E  
**MASSACHUSETTS**  
**Acton**  
Boyd, Thomas F  
**Boston**  
Akins, Gary W  
Austen, W Gerald  
Barsamian, Ernest M  
Berger, Robert L  
Bernhard, William F  
Bougas, James A  
Braunwald, Nina S  
Buckley, Mortimer J  
Burke, John F  
Castaneda, Aldo R  
Cleveland, Richard J  
Clowes Jr, George  
Cohn, Lawrence H  
Collins, John J  
Daggett, Willard M  
Daly, Benedict D T  
Deterling Jr, Ralph  
Frank, Howard A  
Gaensler, Edward A  
Grillo, Hermes C  
Hilgenberg, Alan D

**Brookline**  
Madoff, Irving M  
**Burlington**  
Boyd, David P  
Ellis Jr, F Henry  
Watkins Jr, Elton  
**Cambridge**  
Harken, Dwight E  
**Chestnut Hill**  
Laforet, Eugene G  
Strieder, John W  
**Concord**  
Soutter, Lamar  
**Dover**  
Black, Harrison  
**Lynnfield**  
Wesolowski, Sigmund A  
**Medford**  
Desforger, Gerard  
**Methuen**  
Wilson, Norman J  
**North Andover**  
Cook, William A  
**South Weymouth**  
Malcolm, John A  
**Springfield**  
Breyer, Robert H  
Engelman, Richard M  
Rousou, John A  
**West Roxbury**  
Khuri, Shukri F  
**Westport Harbor**  
Findlay Jr, Charles W  
**Winchester**  
Taylor, Warren J  
**Worcester**

Moncure, Ashby C  
Neptune, Wilford B  
Overholt, Richard H  
Rheinlander, Harold F

Vander Salm, Thomas J

**MICHIGAN**

**Ann Arbor**

Bartlett, Robert H  
Behrendt, Douglas M  
Bove, Edward L  
Gago, Otto  
Greenfield, Lazar J  
Kirsh, Marvin M  
Morris, Joe D  
Neerken, A John  
Orringer, Mark B  
Sloan, Herbert

**Birmingham**

Dodrill, Forest D  
Timmis, Hilary H

**Detroit**

Arbulu, Augustin  
Arciniegas, Eduardo  
Day, J Claude  
Levine, Frederick H  
Magilligan Jr, D J  
Steiger, Zwi  
Wilson, Robert F

**Farmington Hills**

Lam, Conrad R

**Grand Rapids**

Harrison, Robert W  
Meade, Richard H  
Rasmussen, Richard A  
Tomatis, Luis A

Molina, J Ernesto

Nicoloff, Demetre M

**Rochester**

Bernatz, Philip E  
Clagett, O Theron  
Danielson, G K  
McGoon, Dwight C  
Olsen, Arthur M  
Pairolero, Peter C  
Payne, W Spencer  
Pluth, James R  
Puga, Francisco J

**St Paul**

Lillehei, C Walton  
Miller, Fletcher A  
Perry Jr, John F

**MISSISSIPPI**

**Jackson**

Dalton Jr, Martin L  
Hardy, James D  
Johnston Jr, J H  
Netterville, Rush E

**MISSOURI**

**Bridgeton**

Codd, John E

**Columbia**

Silver, Donald

**Kansas City**

Adelman, Arthur  
Ashcraft, Keith W

**Grosse Pointe**

Benson, Clifford D

Taber, Rodman E

**Leonard**

Gerbasi, Francis S

**Ypsilanti**

Prager, Richard L

**MINNESOTA****Minneapolis**

Arom, Kit V

Foker, John E

Gannon, Paul G

Garamella, Joseph J

Helseth, Hovald K

Humphrey, Edward W

Jamieson, Stuart W

Johnson, Frank E

Kaye, Michael P

Kiser, Joseph C

Lewis Jr, J Eugene

Pennington, D Glenn

Roper, Charles L

Weldon, Clarence S

Willman, Vallee L

**NEBRASKA****Omaha**

Demeester, Tom R

Fleming, William H

Schultz, Richard D

**NEW HAMPSHIRE****Hanover**

Crandell, Walter B

Peterborough

Woods, Francis M

Benoit Jr, Hector W

Holder, Thomas M

Killen, Duncan A

Mayer Jr, John H

Padula, Richard T

Reed, William A

**Mt Vernon**

Campbell Jr, Daniel C

**St Louis**

Earner, Hendrick B

Baue, Arthur E

Bergmann, Martin

Bolman III, R Morton

Connors, John P

Cox, James L

Ferguson, Thomas B

Flye, M Wayne

Kaiser, George C

Kouchoukos, Nicholas T

**North Caldwell**

Wychulus, Adam R

**Paterson**

Bregman, David

**Short Hills**

Timmes, Joseph L

**Tenafly**

Gerst, Paul H

**NEW MEXICO****Albuquerque**

Akl, Bechara F

Edwards, W Sterling

**Las Vegas**

Thai, Alan P

**NEW YORK**

**NEW JERSEY****Alpine**

Holswade, George R

**Bellville**

Gerard, Franklyn P

**Belmar**

Bailey, Charles P

**Browns Mills**

Fernandez, Javier

Gonzalez-Lavin, Lorenzo

**Camden**

Camishion, Rudolph C

**Cherry Hill**

Pierucci Jr, Louis

**East Orange**

Auerbach, Oscar

**Hackensack**

Hutchinson III, John E

**Jersey City**

Demos, Nicholas J

**Millburn**

Parsonnet, Victor

**Moorestown**

Morse, Dryden P

**New Brunswick**

Kunderman, Philip J

Lewis, Ralph J

Mackenzie, James W

**Newark**

Abel, Ronald M

Amato, Joseph J

Gielchinsky, Isaac

Neville, William E

**New Hyde Park****Albany**

Alley, Ralph D

Foster, Eric D

Kausel, Harvey W

McKneally, Martin F

**Bay Shore**

Ryan, Bernard J

**Bronx**

Brodman, Richard F

Fell, Stanley C

Ford, Joseph M

Prater, Robert W M

Hirose, Teruo

Robinson, George

**Brooklyn**

Cunningham Jr, J N

Levowitz, Bernard S

Sawyer, Philip N

**Buffalo**

Adler, Richard H

Andersen, Murray N

Bhayana, Joginder N

Lajos, Thomas Z

MacManus, Joseph E

Subramanian, S

**Cooperstown**

Blumenstock, David A

**Fayetteville**

Bugden, Walter F

**Floral Park**

Crastrnopol, Philip

**Irvington**

Attai, Lari A

**Plattsburg**

Tyras, Denis H

**New Paltz**

Johnson, Elgie K

**New York**

Acinapura, Anthony J

Adams, Peter X

Bains, Manjit S

Beattie Jr, Edward

Bloomberg, Allan E

Bowman Jr, Frederick

Boyd, Arthur D

Cahan, William G

Clauss, Roy H

Conklin, Edward F

Cournand, Andre

Cracovaner, Arthur J

Culliford, Alfred T

Friedlander, Ralph

Green, George E

Griep, Randall B

Holman, Cranston W

Isom, O Wayne

Jaretski III, Alfred

Jurado, Roy A

King, Thomas C

Kirschner, Paul A

Lambert, Adrian

Litwak, Robert S

Maier, Herbert C

Malm, James R

Martini, Nael

Nealon Jr, Thomas F

Okinaka, Arthur J

Redo, S Frank

Reemtsma, Keith

Rubin, Morris

Potter, Robert T

**Rochester**

Craver, William L

DeWeese, James A

Hicks, George L

Mahoney, Earle B

Schwartz, Seymour I

Stewart, Scott

**Roslyn**

Thomson Jr, Norman B

Wisoff, B George

**Saranac Lake**

Decker Jr, Alfred M

**Scottsville**

Emerson, George L

**Southampton**

Heroy, William W

**Staten Island**

Garzon, Antonio A

**Stony Brook**

Anagnostopoulos, C

Dennis, Clarence

Soroff, Harry S

**Syracuse**

Brandt III, Berkeley

Bredenberg, Carl E

Effler, Donald B

Meyer, John A

Parker Jr, Frederick

**Valhalla**

Reed, George E

**Westhampton Beach**

Sarot, Irving A

**NORTH CAROLINA**

**Asheville**

Belts, Reeve H

Spencer, Frank C  
Spotnitz, Henry M  
Steichen, Felicien M  
Subramanian, V A  
Tice, David A  
Veith, Frank J  
Wallsh, Eugene  
Wichern Jr, Walter  
Wolff, William I

**Patchogue**

Finnerty, James

**Durham**

Jones, Robert H  
Oldham Jr, H N  
Sabiston, David C  
Wechsler, Andrew S  
Wolfe, Walter G  
Young Jr, W Glenn

**Oriental**

Deaton Jr, W Ralph

**Pinehurst**

Fischer, Walter W

**Tryon**

Wilson, Julius L

**Winston-Salem**

Cordell, A Robert  
Hudspeth, Allen S  
Johnston, Frank R  
Meredith, Jesse H

**NORTH DAKOTA**

**Grand Forks**

James, Edwin C

**OHIO**

**Akron**

Scott, Stewart M  
Sethi, Gulshan K  
Takaro, Timothy

**Chapel Hill**

Starek, Peter J K  
Wilcox, Benson R

**Charlotte**

Robicsek, Francis  
Taylor, Frederick H

**Dayton**

Dewall, Richard A

**Pepper Pike**

Mendelsohn, Harvey J

**Toledo**

Davis, John T

**OKLAHOMA**

**Jenks**

Le Beck, Martin B

**Oklahoma City**

Elkins, Ronald C  
Felton II, Warren L  
Fisher, R Darryl  
Greer, Allen E  
Munnell, Edward R  
Williams, G Rainey  
Zuhdi, M Nazih

**Tulsa**

McPhail, Jasper L

**OREGON**

**Days Creek**

Miller, Arthur C

**Portland**

Falor, William H

**Cincinnati**

Albers, John E

Callard, George M

Flege Jr, John B

Gonzalez, Luis L

Helms worth, James A

Hiratzka, Loren F

Wright, Creighton B

**Cleveland**

Ankeney, Jay L

Cosgrove, Delos M

Cross, Frederick S

Geha, Alexander S

Grondin, Claude M

Groves, Laurence K

Kay, Earle B

Loop, Floyd D

Lytle, Bruce W

**Columbus**

Clatworthy Jr, H W

Kakos, Gerard S

Kilman, James W

Meckstroth, Charles

Vasko, John S

Williams Jr, Thomas E

**Lancaster**

Bonchek, Lawrence I

Witmer, Robert H

**Philadelphia**

Brockman, Stanley K

Donahoo, James

Dunn, Jeffrey M

Eddie, Richard N

Krause, Albert H

Okies, J Edward

Poppe, J Karl

Starr, Albert

**PENNSYLVANIA**

**Abington**

Frobese, Alfred S

**Bethlehem**

Snyder, John M

**Bryn Mawr**

Mundth, Eldred D

**Carlisle**

Demuth Jr, William

**Darby**

McKeown Jr, John J

**Fairfield**

McClenathan, James E

**Gladwyne**

Johnson, Julian

**Hamburg**

Judd, Archibald R

**Hershey**

Pennock, John L

Pierce, William S

Waldhausen, John A

**Columbia**

Almond, Carl H

**Landrum**

Stayman, Joseph W

**Mt Pleasant**

Crawford Jr, Fred A

**Spartanburg**

Utley, Joe R

Edmunds Jr, L Henry

Fineberg, Charles

Haupt, George J

Lemole, Gerald M

MacVaugh III, Horace

Mendelssohn, Edwin

Nemir Jr, Paul

Norwood, William I

Parr, Grant V S

Rosemond, George P

Stephenson, Larry W

Templeton III, John

Van De Water, Joseph M

Wallace, Herbert W

#### **Pittsburgh**

Bahnson, Henry T

Ford, William B

Griffith, Bartley P

Hardesty, Robert L

Magovern, George J

Pontius, Robert G

Rams, James J

Ravitch, Mark M

#### **Sayre**

Sewell, William H

#### **Villanova**

Lemmon, William M

#### **Yardley**

Sommer Jr, George N

#### **RHODE ISLAND**

##### **Providence**

Karlson, Karl E

Moran, John M

Simeone, Fiorindo A

Singh, Arun K

#### **SOUTH CAROLINA**

#### **TENNESSEE**

##### **Chattanooga**

Adams Jr, Jesse E

Hall, David P

##### **Johnson City**

Lefemine, Armand A

##### **Knoxville**

Blake, Hu Al

Brott, Walter H

Domm, Sheldon E

##### **Memphis**

Cole, Francis H

Eastridge, Charles E

Garrett, H Edward

Howard Jr, Hector S

Hughes Jr, Felix A

McBurney, Robert P

Pate, James W

Robbins Sr, S Gwin

Rosensweig, Jacob

Skinner, Edward F

Watson, Donald C

##### **Nashville**

Alford Jr, William

Bender Jr, Harvey W

Dale, W Andrew

Foster, John H

Gobbel Jr, Walter G

Hammon Jr, John W

Johnson, Hollis E

Sawyers, John L

Scott Jr, Henry W

Stoney, William S

Thomas Jr, Clarence

##### **Sewanee**

Thrower, Wendell B



**Charleston**

Bradham, R Randolph  
Hairston, Peter  
Parker, Edward F  
Sade, Robert M

**Austin**

Hood, R Maurice

**Burnet**

Ross, Raleigh R

**Dallas**

Adam, Maurice  
Crosby, Ivan K  
Holland, Robert H  
Lambert, Gary J  
Mills, Lawrence J  
Paulson, Donald L  
Platt, Melvin R  
Razzuk, Maruf A  
Seybold, William D  
Shaw, Robert R  
Sugg, Winfred L  
Urschel Jr, Harold

**El Paso**

Glass, Bertram A

**Ft Sam Houston**

Strevey Jr, Tracy E

**Galveston**

Conti, Vincent R  
Derrick, John R

**Houston**

Beall Jr, Arthur C  
Burdette, Walter J  
Cooley, Denton A  
Crawford, E Stanley

**Sparta**

Labrosse, Claude C

**TEXAS****Amarillo**

Sutherland, R Duncan

**San Antonio**

Dooley, Byron N  
French III, Sanford  
Grover, Frederick L  
Heaney, John P  
Treasure, Robert L  
Trinkle, J Kent

**Temple**

Brindley Jr, G V

**Woodville**

Harrison, Albert W

**UTAH****Salt Lake City**

Cutler, Preston R  
Doty, Donald B  
Gay Jr, William A  
Liddle, Harold V  
Mortensen, J D  
Nelson, Russell M  
Wolcott, Mark W

**VERMONT****Brattleboro**

Gross, Robert E

**Burlington**

Coffin, Laurence H  
Miller, Donald B

**Chester Depot**

Adams, Herbert D

**West Dover**

De Bakey, Michael E

Frazier, Oscar H

Hallman, Grady L

Henly, Walter S

Lawrie, Gerald M

Mattox, Kenneth L

Morris Jr, George C

Mountain, Clifton F

Ott, David A

Overstreet, John W

Reul Jr, George J

Walker, William E

Wukasch, Don C

**Kaufman**

Davis, Milton V

**Lubbock**

Bricker, Donald L

Feola, Mario

**Pearsall**

Hood Jr, Richard H

**Richmond**

Bosher Jr, Lewis H

Brooks, James W

Cole, Dean B

Gwathmey, Owen

Lower, Richard R

**WASHINGTON**

**Bainbridge Island**

Malette, William G

**Bellevue**

Li, Wei-I

**Bellingham**

Varco, Richard L

**Friday Harbor**

Humphreys II, G H

**White River Jet**

Tyson, M Dawson

**VIRGIN ISLANDS**

**St Thomas**

Wilder, Robert J

**VIRGINIA**

**Arlington**

Conrad, Peter W

Klepser, Roy G

**Charlottesville**

Dammann, John F

Minor, George R

Muller Jr, William

Nolan, Stanton P

**Lynchburg**

Moore, Richmond L

**Daniels**

Littlefield, James B

**Huntington**

Bryant, Lester R

Norman, John C

**Morgantown**

Murray, Gordon F

Warden, Herbert E

**Parkersburg**

Tarnay, Thomas J

**WISCONSIN**

**La Crosse**

Gundersen, Erik A

**Madison**

Fox, Robert T

**Lacey**

Fell, Egbert H

**Mercer Island**

Mills, Waldo O

**Seattle**

Anderson, Richard P

Dillard, David H

Hill III, Lucius D

Ivey, Tom D

Jarvis, Fred J

Jones, Thomas W

Manhas, Dev R

Mansfield, Peter B

Miller Jr, Donald W

Rittenhouse, Edward A

Sauvage, Lester

Thomas, George I

**Spokane**

Berg Jr, Ralph

**WEST VIRGINIA**

**Charleston**

Walker, James H

**CANADA**

**Alberta**

**Calgary**

Miller, George E

**Edmonton**

Callaghan, John C

Gelfand, Elliot T

Sterns, Laurence P

**British Columbia**

**Kelowna**

Couves, Cecil M

Berkoff, Herbert A

Chopra, Paramjeet S

Kroncke, George M

Young, William P

**Marshfield**

Myers, William O

Ray III, Jefferson F

Sautter, Richard D

**Milwaukee**

Flemma, Robert J

Hausmann, Paul F

Johnson, W Dudley

Litwin, S Bert

Mullen, Donald C

Narodick, Benjamin

Olinger, Gordon N

Tector, Alfred J

**Wausau**

Davila, Julio C

**West Bend**

Gardner, Robert J

**WYOMING**

**Teton Village**

Kaunitz, Victor H

**Vancouver**

Allen, Peter

Ashmore, Phillip G

Jamieson, W R Eric

Tyers, G Frank O

**Victoria**

Stenstrom, John D

**West Vancouver**

Robertson, Ross

**Manitoba**

Goldberg, Melvyn

**Winnipeg**

Goldman, Bernard S

Barwinsky, Jaroslaw

Henderson, Robert D

Cohen, Morley

Joynt, George H C

**Newfoundland**

McIntosh, Clarence A

**St John's**

Pearson, F Griffith

Brownrigg, Garrett M

Salerno, Tomas A

**Nova Scotia**

Scully, Hugh E

**Halifax**

Todd, Thomas R J

Murphy, David A

Trimble, Alan S

**Kentville**

Trusler, George A

Quinlan, John J

Weisel, Richard D

**Mabou**

Williams, William G

Thomas, Gordon W

**Westbrook****Ontario**

Lynn, R Beverley

**Dorset****Woodbridge**

Mustard, William T

Laird, Robert C

**Hamilton****Province Of Quebec**

Sullivan, Herbert J

**Montreal****Kingston**

Blundell, Peter E

Charrette, Edward J P

Chiu, Chu-Jeng (Ray)

**London**

Dobell, Anthony R

Heimbecker, Raymond

Duranceau, Andre C H

**Nottawa**

Lepage, Gilles

Key, James A

MacLean, Lloyd D

**Ottawa**

Morin, Jean E

Keon, Wilbert J

Mulder, David S

**Sudbury**

Pelletier, Conrad L

Field, Paul

Scott, Henry J

Walker, George R

**Outremont****Toronto**

Bruneau, Jacques

Baird, Ronald J

**Quebec**

Bigelow, Wilfred G

Gravel, Joffre-Andre

Cooper, Joel D

**Sainte-Foy**

David, Tirone E  
Ginsberg, Robert J

Deslauriers, Jean  
**Westmount**  
Vineberg, Arthur M

## **OTHER COUNTRIES**

### **ARGENTINA**

#### **Buenos Aires**

Favaloro, Rene G

### **AUSTRALIA**

#### **South Australia**

#### **Piccadilly**

Sutherland, H D'Arcy

### **BRAZIL**

#### **Sao Paulo**

Jatene, Adib D

Zerbini, E J

### **London**

Braimbridge, Mark V

Kennedy, John H

Lennox, Stuart C

Ross, Donald N

### **FRANCE**

#### **Bordeaux-Pessac**

Fontan, Francis M

#### **Paris**

Binet, Jean-Paul

Carpentier, Alain F

Dubost, Prof Charles

### **GUATEMALA**

#### **Guatemala City**

Herrera, Rodolfo

### **INDIA**

#### **Raiputana**

Van Allen, Chester M

### **IRELAND**

### **ENGLAND**

#### **Bath, Avon**

Belsey, Ronald

#### **Buckinghamshire**

Sellors, Sir Thomas

#### **Hereford**

Thompson, Vernon C

#### **Herefordshire**

Smith, Mr Roger Abbey

### **P R China**

#### **Beijing**

Ying-Kai, Wu

### **PORTUGAL**

#### **Lisbon**

Macedo, Manuel E M

### **SAUDI ARABIA**

#### **Abha**

Lawrence, G Hugh

#### **Riyadh**

Deniord, Richard N

Merendino, K Alvin

### **SCOTLAND**

#### **Edinburgh**

Logan, Andrew

### **SPAIN**

#### **Santander**

Duran, Carlos Gomez

### **SWITZERLAND**

**Dublin**

O'Malley, Eoin

**ISRAEL**

**Haifa**

Fishman, Noel H

**ITALY**

**Bergamo**

Parenzan, Lucio

**JAPAN**

**Kitakyushn**

Miyamoto, Alfonso T

**Tokyo**

Wada, Juro J

**Ube**

Mohri, Hitoshi

**MOZAMBIQUE**

**Maputo**

McCord, Colin W

**NEW ZEALAND**

**Auckland**

Barratt-Boyes, Sir Brian

**Arzier**

Hahn, Charles J

**Zurich**

Senning, Prof Ake

**TANZANIA**

**Dar Es Salaam**

Silver, Arthur W

**UNITED ARAB EMIRATE**

**Abu Dhabi**

Brom, A Gerard

**URSS**

**Moscow**

Burakovsky, Vladimir I

**VENEZUELA**

**Caracas**

Tricerri, Fernando E

**WEST GERMANY**

**Aachen**

Messmer, Bruno J

**Hamburg**

Rodewald, Georg

**Hannover**

Borst, Hans G

**THE AMERICAN ASSOCIATION FOR  
THORACIC SURGERY  
Charter Members  
June 7, 1917**

E. Wyllis Andrews	Arthur A. Law
John Auer	William Lerche
Edward R. Baldwin	Howard Lilienthal
Walter M. Boothby	William H. Luckett
William Branower	Morris Manges
Harlow Brooks	Walton Martin
Lawrason Brown	Rudolph Matas
Kenneth Bulkley	E. S. McSweeney
Alexis Carrel	Samuel J. Meltzer
Norman B. Carson	Willy Meyer (Founder)
J. Frank Corbett	James Alexander Miller
Armistead C. Crump	Robert T. Miller
Charles N. Dowd	Fred J. Murphy
Kennon Dunham	Leo S. Peterson
Edmond Melchior Eberts	Eugene H. Pool
Max Einhorn	Walther I. Rathbun
Herman Fischer	Martin Rehling
Albert H. Garvin	B. Merrill Ricketts
Nathan W. Green	Samuel Robinson
John R. Hartwell	Charles I. Scudder
George J. Heuer	William H. Stewart
Chevalier Jackson	Franz Torek
H. H. Janeway	Martin W. Ware
James H. Kenyon	Abraham O. Wilensky
Adrian V. S. Lambert	Sidney Yankauer

**BY-LAWS OF  
THE AMERICAN ASSOCIATION  
FOR THORACIC SURGERY**

**ARTICLE I. Name**

The name of this Corporation is The American Association for Thoracic Surgery (hereinafter the "Association").

**ARTICLE II. Purposes**

The purposes of the Association shall be:

To associate persons interested in, and carry on activities related to, the science and practice of thoracic surgery, the cure of thoracic disease and the related sciences.

To encourage and stimulate investigation and study that will increase the knowledge of intrathoracic physiology, pathology and therapy, and to correlate and disseminate such knowledge.

To hold scientific meetings featuring free discussion of problems and developments relating to thoracic surgery, and to sponsor a journal for the publication of scientific papers presented at such meetings and other suitable articles.

To succeed to, and continue to carry on the activities formerly conducted by, The American Association for Thoracic Surgery, an unincorporated association.

**ARTICLE III. Membership**

Section 1. There shall be four classes of members: Honorary, Senior, Active and, for a time, Associate. Admission to membership in the Association shall be by election. Membership shall be limited, the limits on the respective classes to be determined by these By-Laws. Only Active and Senior Members shall have the privilege of voting or holding office, except as provided by these By-Laws.

Section 2. Honorary Membership shall be reserved for such distinguished persons as may be deemed worthy of this honor by the Council with the concurrence of the Association.

Section 3. The number of Senior Members shall be unlimited. Active Members automatically advance to Senior Membership at the age of sixty years. In addition, a younger Active Member may be eligible for Senior Membership if incapacitated by disability, but for no other reason.

Section 4. Active Membership shall be limited to six hundred. A candidate to be eligible must be a citizen of the United States of America or Canada, unless in unusual cases this citizenship requirement shall have been waived by the Council. The candidate shall have achieved distinction in the thoracic field or shall have made a meritorious contribution to knowledge pertaining to thoracic disease or its surgical treatment.

Sections 5. Election to Honorary, Senior or Active Membership shall be for life, subject to the provisions of Section 9 following. There shall be no further additions to the Associate Membership. All new members shall be elected directly to Honorary or Active status.

Section 6. Associate Membership for those members elected after 1960 shall be limited to a five year period. During this limited period, an Associate Member, if properly qualified, may be elected to Active Membership. After the expiration of this limited period an Associate Member, if not yet qualified for Active Membership, must either be re-elected to an additional period of Associate Membership or dropped from the rolls of the Association.

Section 7. Candidates for membership in this Association must be formally nominated and seconded, in an approved manner, by not less than three Active or Senior Members. Such nomination must have been in the hands of the Membership Committee for not less than four months, and the name of the candidate must have been distributed to all members of the Association before final action may be taken on any new candidate for election to Active Membership. Provided the foregoing requirements have been met and the candidates have been approved by the Membership Committee and by the Council, their names shall be presented to the Association at a regularly convened annual meeting for final action. A three-fourths vote of those present and voting shall be required to elect. Any candidate for membership in this Association who has failed of election for three successive years shall automatically cease to be a candidate and may not be renominated until after a lapse of three years.

Section 8. The report of the Membership Committee shall be rendered at the second executive session of each annual meeting of the Association. Candidates shall be presented in groups in the following order: Candidates for Honorary Membership; retirement of Active Members to Senior Membership; Candidates for Active Membership, Associate Members for re-election; members dropped from the rolls of the Association.

Section 9. Membership may be voluntarily terminated at any time by members in good standing. The Council, acting as a Board of Censors, may recommend the expulsion of a member on the grounds of moral or professional delinquency,



and submit his name, together with the grounds of complaint, to the Association as a whole at any of the regularly convened meetings, after giving such member ample opportunity to appear in his own behalf.

Section 10. The Council shall recommend that any Active or Associate Member whose dues are in arrears for two years, or who has been absent, without sufficient excuse, from three consecutive annual meetings, shall have his membership terminated.

Section 11. Notwithstanding Section 10, any member of the Association over 60 years of age is excused from the attendance requirement and upon his specific request may likewise be excused from the payment of dues.

#### **ARTICLE IV. Board of Directors ("Council")**

Section 1. The Board of Directors of the Association shall be called the Council and shall be composed of the President, Vice-President, Secretary, Treasurer and Editor of the Association, and five Councilors. All members of the Council must be Active or Senior Members of the Association, except that the Editor may be an Honorary Member.

Section 2. The Council shall be the governing body of the Association, and shall have full power to manage and act on all affairs of the Association, except as follows:

- a. It may not alter the initiation fees or annual dues, or levy any general assessments against the membership, except that it may, in individual cases, waive annual dues or assessments.
- b. It may not change the Articles of Incorporation or By-Laws.
- c. It may neither elect new members nor alter the status of existing members, other than to apply the provisions of Article III, Section 9.
- d. It may not deplete the principal of the Endowment Fund. Section 3. At the conclusion of the annual meeting, the retiring President shall automatically become a Councilor for a one-year term of office. One of the other four Councilors shall be elected at each annual meeting of the Association to serve for a four-year term of office in the place of the elected Councilor whose term expires at such meeting, but no Councilor may be reelected to succeed himself. Any Councilor so elected shall take office upon the conclusion of the annual meeting at which he is elected.

Section 4. Vacancies in the office of Councilor shall be temporarily filled by the Council subject to approval of the Association at the next annual meeting of the Association.

#### **ARTICLE V. Officers**

Section 1. The officers of the Association shall be a President, a Vice-President, a Secretary, and a Treasurer. All officers must be Active or Senior Members of the Association. Said officers shall be ex officio members of the Council of the Association.

Section 2. The Council may, for the purposes of Article IX, give status as officers of the Association to the individual members of any ad hoc Committee appointed by the Council.

Section 3. The President, Vice-President, Secretary and Treasurer shall be elected at the annual meeting of the Association and shall take office upon conclusion of the meeting. The President and the Vice-President shall be elected for a one-year term of office and neither may be reelected to succeed himself in the same office, unless such officer is filling the unexpired term of an officer previously elected to such office. The Secretary and the Treasurer shall be elected for a one-year term of office and may be reelected indefinitely.

Section 4. The President of the Association shall perform all duties customarily pertaining to the office of President. He shall preside at all meetings of the Association and at all meetings of the Council.

Section 5. The Vice-President of the Association shall perform all duties customarily pertaining to the office of the Vice-President, both as to the Association and the Council. In the event of a vacancy occurring in the office of President, the Council shall advance the Vice-President to the Presidency and appoint a new Vice-President.

Section 6. The Secretary of the Association shall perform all duties customarily pertaining to the office of Secretary. He shall serve as Secretary of the Association and as Secretary of the Council. When deemed appropriate, an Active or Senior Member may be elected to serve as an understudy to the Secretary in anticipation of the latter's retirement from office.

Section 7. The Treasurer of the Association shall perform all duties customarily pertaining to the office of Treasurer. He shall serve as Treasurer of the Association and shall also serve as custodian of the Endowment Fund.

Section 8. The Editor of the Association is not an officer of the Association. He shall be appointed by the Council at its annual meeting; provided, however, that such appointment shall not become effective until approved by the Association

at the annual meeting of the Association. The Editor shall be appointed for a five-year term and may not be appointed to more than two successive terms; provided, however, that an Editor completing two years or less of the unexpired term of a previous Editor may be appointed for two successive five-year terms. The Editor shall serve as the Editor of the official Journal and shall be ex officio the Chairman of the Editorial Board and a member of the Council of the Association.

Section 9. Vacancies occurring among the officers named in Section 1 or a vacancy in the position of Editor shall be temporarily filled by the Council, subject to approval of the Association at the next meeting of the Association.

## **ARTICLE VI. Committees**

Section 1. The Council is empowered to appoint a Membership Committee, a Program Committee, a Necrology Committee and such other committees as may in its opinion be necessary or desirable. All such committees shall render their reports at an executive session of the Association, except that no ad hoc committee need report unless so directed by the Council.

Section 2. The Membership Committee shall consist of seven Active or Senior Members. The Council may appoint not more than one of its own members to serve on this Committee. The duties of the Membership Committee are to investigate all candidates for membership in the Association and to report its findings as expeditiously as possible to the Council through the Secretary of the Association. This Committee is also charged with searching the literature of this and other countries to the end that proper candidates may be presented to the Association for consideration. Appointment to this Committee shall be for a period of one year, and not more than five of the members may be reappointed to succeed themselves. This Committee is also charged with maintaining a record of membership attendance and participation in the scientific programs and reporting to the affected members and to the Council any deviations from the requirement of Article VIII, Section 4, of these By-Laws.

Section 3. The Program Committee shall consist of at least six members: the President, the Vice President, the Secretary and the Editor of the Association, and at least two members-at-large appointed by the President. The duties of this Committee shall be to arrange, in conformity with instructions from the Council, the scientific program for the annual meeting.

Section 4. The Necrology Committee shall consist of one or more Active or Senior Members. Appointments to this Committee shall be for a one-year term of office. Any or all members of this Committee may be reappointed to succeed themselves. The Council may, if it so desires, appoint one of its own members to serve as Chairman of this Committee. The duties of the Necrology Committee shall be to prepare suitable resolutions and memorials upon all deaths of members of the Association and to report such deaths at every annual meeting.

Section 5. The Nominating Committee shall consist of the five (5) immediate Past Presidents of the Association. The most senior Past President shall serve as Chairman. This Committee shall prepare a slate of nominees for Officers and Councilors upon instruction from the Council as to the vacancies which are to be filled by election and shall present its report at the Second Executive Session of the Annual Meeting.

Section 6. The Association as a whole may authorize the Council to appoint Scientific or Research Committees for the purpose of investigating thoracic problems and may further authorize the Council to support financially such committees to a limited degree. When Scientific or Research Committees are authorized by the Association, the Council shall appoint the Chairmen of these Committees, with power to organize their committees in any way best calculated to accomplish the desired object, subject only to the approval of the Council. Financial aid rendered to such Committees shall not exceed such annual or special appropriations as may be specifically voted for such purposes by the Association as a whole. Members are urged to cooperate with all Scientific or Research Committees of the Association.

Section 7. The Evarts A. Graham Memorial Traveling Fellowship Committee shall consist of six members: the President, Secretary, and Treasurer of the Association and three members-at-large, one member being appointed by the President each year to serve a term of three years. The Chairman shall be the member-at-large serving his third year. The duties of the committee shall be to recommend Fellowship candidates to the Graham Education and Research Foundation and to carry out other business pertaining to the Fellowship and the Fellows, past, present, and future.

Section 8. The Editorial Board shall be appointed by the Editor, subject only to the approval of the Council. The Editor shall be, ex officio, the chairman of this board and shall be privileged to appoint and indefinitely reappoint such members of the Association, regardless of class of membership, and such non-members of the Association as in his opinion may be best calculated to meet the editorial requirements of the Association.

Section 9. The Ethics Committee shall consist of five members appointed by the Council. No member shall serve more than four years. The Ethics Committee shall advise the Council concerning alleged breaches of ethics. Complaints regarding alleged breaches of ethics shall be received in writing by the Ethics Committee and shall be investigated by it. In addition, the Ethics Committee may investigate on its own initiative.

Section 10. The Committee on Manpower shall be a Joint Committee of this Association and The Society of Thoracic Surgeons. The Committee shall consist of two members of this Association, two members of The Society of Thoracic Surgeons, and a Chairman who shall be a member of this Association and The Society of Thoracic Surgeons. The duties of

this Committee, and the manner of appointment and term of its members and chairman, shall be determined jointly by the Council of this Association and the Council of The Society of Thoracic Surgeons.

## **ARTICLE VII Finances**

Section 1. The fiscal year of the Association shall begin on the first day of March and end on the last day of February each year.

Section 2. Members shall contribute to the financial maintenance of the Association through initiation fees, annual dues, and special assessments. The amount of the annual dues and the initiation fees shall be determined by these By-Laws. If, at the end of any fiscal year, there is a deficit in the current funds of the Association, the Council may send out notices to that effect and invite Active members to contribute the necessary amount so that no deficit is carried over from one fiscal year to another. The Association may, in any regularly convened meeting, vote a special assessment for any purpose consistent with the purposes of the Association, and such special assessment shall become an obligatory charge against the classes of members affected thereby.

Section 3. To meet the current expenses of the Association, there shall be available all revenue derived by the Association subject to the provisions of Section 4, following.

Section 4. Funds derived from the payment of initiation fees shall not be available for current expenses and shall be placed in a special fund, to be invested and reinvested in legal securities, to be held intact, and to be known as the Endowment Fund. The Council is responsible for the proper management of the Endowment Fund, and may divert any surplus in the current funds of the Association into this fund, but may not withdraw any of the principal of the Endowment Fund except in accordance with the provisions of Section 6, following.

Section 5. The income from the Endowment Fund shall be expended as the Council directs.

Section 6. The principal of the Endowment Fund may be withdrawn, in whole or in part, under the following conditions only: The amount of principal to be withdrawn shall have been approved by the Council; it shall have been approved by a majority of the members present and voting at a regularly convened annual meeting; it shall have been tabled for one year; it shall have been finally passed by a three-fourths vote of the members present and voting at the next regularly convened annual meeting.

Section 7. In the event of the dissolution of the Association, the Endowment Fund shall be distributed among national institutions of the United States and Canada in a proportion equal to the then existing ratio between the numbers of citizens of the two nations who are members of the Association.

## **ARTICLE VIII. Meetings**

Section 1. The time, place, duration, and procedure of the annual meeting of the Association shall be determined by the Council and the provisions of these By-Laws.

Section 2. Notice of any meeting of the Association shall be given to each member of the Association not less than five nor more than forty days prior to any annual meeting and not less than thirty nor more than forty days prior to any special meeting by written or printed notice delivered personally or by mail, by or at the direction of the Council, the President or the Secretary. Such notice shall state the place, day and hour of the meeting and in the case of a special meeting shall also state the purpose or purposes for which the meeting is called.

Section 3. A special meeting of the Association may be called by the Council or on the written request of fifteen members delivered to the Council, the President or the Secretary. The specific purposes of the meeting must be stated in the request.

Section 4. Attendance at annual meetings and participation in the scientific programs shall be optional for all Honorary and Senior Members, but it shall be expected from all Active and Associate Members.

Section 5. Each annual meeting shall have at least two executive sessions.

Section 6. When the Association convenes for its annual meeting, it shall immediately go into the first executive session, but the business at this session shall be limited to:

1. Appointment of necessary committees.

2. Miscellaneous business of an urgent nature.

Section 7. The second executive session of the Association shall be held during the afternoon of the second day of the meeting. The business at this session shall include, but is not limited to:

1. Reading or waiver of reading of the minutes of the preceding meetings of the Association and the Council.

2. Report of the Treasurer for the last fiscal year.

3. Audit Report.
4. Report of the Necrology Committee.
5. Report of the Program Committee.
6. Action on amendments to the Articles of Incorporation and By-Laws, if any.
7. Action on recommendations emanating from the Council.
8. Unfinished Business.
9. New Business.
10. Report of the Membership Committee.
11. Election of new members.
12. Report of the Nominating Committee.
13. Election of officers.

Section 8. Except where otherwise required by law or these By-Laws, all questions at a meeting of the members shall be decided by a majority vote of the members present in person and voting. Voting by proxy is not permitted.

Section 9. Fifty voting members present in person shall constitute a quorum at a meeting of members.

Section 10. While the scientific session of the annual meeting is held primarily for the benefit of the members of the Association, it may be open to non-members who are able to submit satisfactory credentials, who register in a specified manner, and who pay such registration fee as may be determined and published by the Council from year to year.

Section 11. There shall be an annual meeting of the Council held during the annual meeting of the Association. Additional meetings of the Council may be called on not less than seven days' prior written or telephonic notice by the President, the Secretary or any three members of the Council.

Section 12. Five members of the Council shall constitute a quorum for the conduct of business at any meeting of the Council, but a smaller number may adjourn any such meeting.

Section 13. Whenever any notice is required to be given to any member of the Council, a waiver thereof in writing, signed by the member of the Council entitled to such notice, whether before or after the time stated therein, shall be deemed equivalent thereto.

Section 14. Any action which may be or is required to be taken at a meeting of the Council may be taken without a meeting if a consent in writing, setting forth the action so taken, shall be signed by all of the members of the Council. Any such consent shall have the same force and effect as a unanimous vote at a duly called and constituted meeting.

## **ARTICLE IX. Indemnification of Directors and Officers**

Section 1. The Association shall indemnify any and all of its Councilors (hereinafter in this Article referred to as "directors") or officers or former directors or officers, or any person who has served or shall serve at the Association's request or by its election as a director or officer of another corporation or association, against expenses actually and necessarily incurred by them in connection with the defense or settlement of any action, suit or proceeding in which they, or any of them, are made parties, or a party, by reason of being or having been directors or officers or a director or officer of the Association, or of such other corporation or association, provided, however, that the foregoing shall not apply to matters as to which any such director or officer or former director or officer or person shall be adjudged in such action, suit or proceeding to be liable for willful misconduct in the performance of duty or to such matters as shall be settled by agreement predicated on the existence of such liability.

Section 2. Upon specific authorization by the Council, the Association may purchase and maintain insurance on behalf of any and all of its directors or officers or former directors or officers, or any person who has served or shall serve at the Association's request or by its election as a director or officer of another corporation or association, against any liability, or settlement based on asserted liability, incurred by them by reason of being or having been directors or officers or a director or officer of the Association or of such other corporation or association, whether or not the Association would have the power to indemnify them against such liability or settlement under the provisions of Section 1.

**ARTICLE X. Papers**

Section 1. All papers read before the Association shall become the property of the Association. Authors shall leave original copies of their manuscripts with the Editor or reporter, at the time of presentation, for publication in the official Journal.

Section 2. When the number of papers makes it desirable, the Council may require authors to present their papers in abstract, and may set a time limit on discussions.

**ARTICLE XI. Initiation Fees, Dues and Assessments**

Section 1. Honorary Members of the Association are exempt from all initiation fees, dues, and assessments.

Section 2. Annual dues for Active Members shall be \$75.00 and shall include a year's subscription to THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY.

Section 3. Annual dues for Associate Members shall be \$75.00 and shall include a year's subscription to THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY.

Section 4. Senior Members are exempt from dues.

Section 5. The initiation fee for those elected directly to Active Membership shall be \$15.00.

Section 6. If and when an Associate Member is elected to Active Membership, he shall pay an additional \$5.00 initiation fee.

Section 7. Associate and Active Members must subscribe to THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY to retain their membership status.

Section 8. Subscription to THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY is optional for Senior Members.

Section 9. Bills for membership dues and for subscriptions to THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY will be mailed to members by the Treasurer after the annual meeting.

**ARTICLE XII. Parliamentary Procedure**

Except where otherwise provided in these By-Laws or by law, all parliamentary proceedings at the meetings of this Association and its Council and committees shall be governed by the then current Sturgis Standard Code of Parliamentary Procedure.

**ARTICLE XIII. Amendments**

Section 1. These By-Laws may be amended by a two-thirds vote of the members present and voting at an executive session of a properly convened annual or special meeting of the Association provided that the proposed amendment has been moved and seconded by not less than three members at a prior executive session of that meeting or a prior meeting of the Association.

Section 2. These By-Laws may be suspended in whole or in part for a period of not more than twelve hours by a unanimous vote of those present and voting at any regularly convened meeting of the Association.

**Meetings of the American Association  
for Thoracic Surgery**

- 1918-Chicago..... President, Samuel J. Meltzer
- 1919-Atlantic City..... President, Willy Meyer
- 1920-New Orleans..... President, Willy Meyer
- 1921-Boston..... President, Rudolph Matas
- 1922-Washington..... President, Samuel Robinson
- 1923-Chicago..... President, Howard Lilienthal

1924-Rochester, Minn..... President, Carl A. Hedblom  
1925-Washington..... President, Nathan W. Green  
1926-Montreal..... President, Edward W. Archibald  
1927-New York..... President, Franz Torek  
1928-Washington..... President, Evarts A. Graham  
1929-St. Louis..... President, John L. Yates  
1930-Philadelphia..... President, Wyman Whittemore  
1931-San Francisco..... President, Ethan Flagg Butler  
1932-Ann Arbor..... President, Frederick T. Lord  
1933-Washington..... President, George P. Muller  
1934-Boston..... President, George J. Heuer  
1935-New York..... President, John Alexander  
1936-Rochester, Minn..... President, Carl Eggers  
1937-Saranac Lake..... President, Leo Eloesser  
1938-Atlanta..... President, Stuart W. Harrington  
1939-Los Angeles..... President, Harold Brunn  
1940-Cleveland..... President, Adrian V. S. Lambert  
1941-Toronto..... President, Fraser B. Gurd  
1944-Chicago..... President, Frank S. Dolley  
1946-Detroit..... President, Claude S. Beck  
1947-St. Louis..... President, I. A. Bigger  
1948-Quebec..... President, Alton Ochsner  
1949-New Orleans..... President, Edward D. Churchill  
1950-Denver..... President, Edward J. O'Brien  
1951-Atlantic City..... President, Alfred Blalock  
1952-Dallas..... President, Frank B. Berry  
1953-San Francisco..... President, Robert M. Janes  
1954-Montreal..... President, Emile Holman  
1955-Atlantic City..... President, Edward S. Welles  
1956-Miami Beach..... President, Richard H. Meade  
1957-Chicago..... President, Cameron Haight

1958-Boston..... President, Brian Blades  
1959-Los Angeles..... President, Michael E. De Bakey  
1960-Miami Beach..... President, William E. Adams  
1961-Philadelphia..... President, John H. Gibbon, Jr.  
1962-St. Louis..... President, Richard H. Sweet (Deceased 1-11-62)  
..... President, O. Theron Clagett  
1963-Houston..... President, Julian Johnson  
1964-Montreal..... President, Robert E. Gross  
1965-New Orleans..... President, John C. Jones  
1966-Vancouver, B. C..... President, Herbert C. Maier  
1967-New York..... President, Frederick G. Kergin  
1968-Pittsburgh..... President, Paul C. Samson  
1969-San Francisco..... President, Edward M. Kent  
1970-Washington, D. C..... President, Hiram T. Langston  
1971-Atlanta..... President, Thomas H. Burford  
1974-Las Vegas..... President, Lyman A. Brewer, III  
1975-New York..... President, Wilfred G. Bigelow  
1976-Los Angeles..... President, David J. Dugan  
1977-Toronto..... President, Henry T. Bahnson  
1978-New Orleans..... President, J. Gordon Scannell  
1979-Boston..... President, John W. Kirklin  
1980-San Francisco..... President, Herbert Sloan  
1981-Washington, D.C..... President, Donald L. Paulson  
1982-Phoenix, Arizona..... President, Thomas B. Ferguson  
1983-Atlanta..... President, Frank C. Spencer  
1984-New York..... President, Dwight C. McGoon  
1985-New Orleans..... President, David C. Sabiston  
1986-New York..... President, James, R. Malm

## GRAHAM EDUCATION AND RESEARCH FOUNDATION

13 Elm Street, Manchester, Massachusetts 01944, (617) 927-8330

President Quentin R. Stiles, M.D., Los Angeles, California

Vice President Floyd D. Loop, M.D., Cleveland, Ohio

Secretary-Treasurer William T. Maloney, Manchester, Massachusetts

Director D. Craig Miller, M.D., Stanford, California

### EVARTS A. GRAHAM MEMORIAL TRAVELING FELLOWSHIP

The Evarts A. Graham Memorial Traveling Fellowship was established in 1958 by The American Association for Thoracic Surgery. Administered through the Graham Education and Research Foundation, it provides grants to young surgeons from outside North America who have completed their formal training in general, thoracic, and cardiovascular surgery. The award allows the recipient to study a year in North America to intensify his training in a program of special interest and to travel to several sites to broaden his overall training and increase his contacts with North American thoracic surgeons. Awards are made to surgeons of unique promise who have been regarded as having the potential for later international thoracic surgical leadership. Since the inception of the Graham Fellowship, 37 young surgeons from 18 foreign countries have trained at thoracic surgical centers throughout North America.

- |      |         |                                     |  |
|------|---------|-------------------------------------|--|
| 1st  | 1951-52 | L L Whytehead M D F R C S           | 790 Sherbrooke St., Winnipeg, Manitoba, R3A 1M3 CANADA                         |
| 2nd  | 1953-54 | W B Ferguson MB F R C S             | Royal Victoria Infirmary, Newcastle-upon-tyne, ENGLAND                         |
| 3rd  | 1954-55 | Lance L. Bromley, M.Chir., F.R.C.S. | St. Mary's Hospital, London, W.2, ENGLAND                                      |
| 4th  | 1955-56 | Raymond L. Hurt, F.R.C.S.           | The White House, 8 Loom Lane, Radlett Herts, ENGLAND                           |
| 5th  | 1956-57 | Mathias Paneth, F.R.C.S.            | Brompton Hospital, London, S.W. 3, ENGLAND                                     |
| 6th  | 1957-58 | Peter L. Brunnen, F.R.C.S.          | Department of Thoracic Surgery, Woodend General Hospital<br>Aberdeen, SCOTLAND |
| 7th  | 1958-59 | N. G. Meyne, M.D.                   | University of Amsterdam, Wilhelmina-Gasthuis, Amsterdam, HOLLAND               |
| 8th  | 1960-61 | Godrej S. Karai, M.D.               | Calcutta, INDIA  |
| 9th  | 1961-62 | Fritz Helmer, M.D.                  | Second Surgical Clinic, University of Vienna, Vienna, AUSTRIA                  |
| 10th | 1962-63 | Theodor M. Scheinin, M.D.           | Oulun Laaninsairaala, Oulu, FINLAND  |
| 11th | 1963-64 | Masahiro Saigusa, M.D.              | National Nakano Chest Hospital, 3-14-20 Egata, Nakano-Ku, Tokyo 165,<br>JAPAN  |
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