

1988 ANNUAL MEETING PROGRAM



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1988 Annual Meeting
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SIMULTANEOUS BREAKFAST SESSIONS

TUESDAY, April 19, 1988, 6:45 A.M.

(A) BLOOD CONSERVATION (Century Room)

Moderator: Delos M. Cosgrove, III, M.D.

AIDS Risk: Risk to the Patient, Risk to the Doctor

Donald Abrams, M.D., San Francisco, California

The Role of Desmopressin

Robert L. Thurer, M.D., Boston, Massachusetts

Techniques for Interoperative Blood Salvage

Hartzell V. Schaff, M.D., Rochester, Minnesota

Preoperative Predictors of Transfusion Requirements

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

(B) MUSCLE FLAPS: WHEN AND WHERE TO USE THEM (Westside Room)

Moderator: Peter C. Pairolero, M.D., Rochester, Minnesota

Infected Median Sternotomy Wounds

Joseph E. Miller, Jr., M.D., Atlanta, Georgia

Chest Wall Tumors

Geoffrey M. Graeber, M.D., Washington, D.C.

Pleural Space Infection

Peter C. Pairolero, M.D., Rochester, Minnesota

WEDNESDAY, April 20, 1988, 6:45 A.M.

(C) CARDIAC ASSIST DEVICES AND STRATEGIES (Century Room)

Moderator: Larry W. Stephenson, M.D., Philadelphia, Pennsylvania

A Mechanical Assist Device: A Review

William S. Pierce, M.D., Hershey, Pennsylvania

Centrifuge Pumps for Cardiac Assist

George J. Magovern, M.D., Pittsburgh, Pennsylvania

Piggyback Hearts: An Unusual Indication for Cardiac Assist

Bruno Reichart, M.D., Cape Town, Republic of South Africa

Skeletal Muscle Pumps for Potential Cardiac Assist

Larry W. Stephenson, M.D., Philadelphia, Pennsylvania

(D) TRANSPLANTATION: PRACTICAL ASPECTS (Westside Room)

Moderator: Joel D. Cooper, M.D., Toronto, Ontario, Canada

Richard M. Peters, M.D., San Diego, California

Thomas Petty, M.D., Denver, Colorado

**American Association for Thoracic Surgery
68TH ANNUAL MEETING
APRIL 18-20, 1988
Scientific Program**

MONDAY MORNING, April 18, 1988

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

8:45 a.m. Scientific Session - Ballroom

1. Myotomy for Reflux Induced Cricopharyngeal Dysphagia: Five Year Review

ROBERTO. HENDERSON, WED AD M. HANNA,*

GARY MARRYATT and ROBERT F. HENDERSON**

Toronto, Ontario, Canada

The cricopharynx is the proximal competent valve preventing reflux to the pharynx and possible aspiration. Despite this 25 patients, all of whom have severe reflux induced cricopharyngeal dysphagia were treated by myotomy and followed for five or more years. Patient selection was a) continued dysphagia following hernia repair (7); b) debility contraindicating hernia repair (12); c) dominant dysphagia without symptomatic reflux (6).

Preoperative evaluation confirmed reflux using a combination of history, manometry, common cavity pH, endoscopy, and radiology. Symptomatically the dysphagia was severe producing weight loss in 42% and respiratory infections in 52%. In the older patient it was severe enough to risk laryngeal obstruction and anoxic death. Past studies have shown that 1.5% of patients have persistence of cricopharyngeal dysphagia following effective hernia repair. All of these had severe preoperative dysphagia.

The investigative findings included radiologic aspiration (80%); reflux 72%; endoscopic incompetence 100%; cricopharyngeal incoordination 91%.

Surgery was under local anesthesia. There was no mortality or morbidity. In follow-up none have reflux induced aspiration pneumonia. Pathologic studies show muscle degeneration compatible with inflammation.

Symptomatically 19 (76%) are asymptomatic; 4 (16%) have minor residual dysphagia; 1 (4%) has moderate dysphagia and 1 is not improved.

In this group failure to respond to medical and surgical management may be due to permanent inflammatory cricopharyngeal pathology. Effective relief of major symptoms has been obtained in 92% of patients with no significant side effects from surgery.

*By Invitation

2. A Comparison of Endoesophageal Devices: Improved Results with the Atkinson Tube

JOHNM. KRATZ, CAROLYNE. REED*,*

FRED A. CRAWFORD, MARTHA R. STROUD and
EDWARD F. PARKER*

In the interval January 1, 1973 to December, 1986, we have palliated 40 patients with unresectable carcinoma of the esophagus by placement of Celestin (Group I, n = 12), Proctor-Livingston (Group II, n = 12) or Atkinson (Group III, n = 16) endoesophageal tubes. Age, race, sex, weight loss, location of tumor and duration of symptoms were similar for each group. Laparotomy was required in 100% of Group I patients, 42% of Group II and none of Group III. Postoperative complications (aspiration, sepsis, reflux, and pneumonia) occurred significantly less often in Group III (13%) than in Group I (58%) ($p < .05$) or II (67%) ($p < 0.05$). Hospital mortality was lower in Group III (6%) than Group I (42%) ($p < .05$) or II (42%) ($p < .05$). Hospital stay was shorter for Group III (4 ± 1 day) than for Group I (16 ± 4) ($p < .01$) or Group II (14 ± 2) ($p < .05$). Eighty-one percent of Group III patients reported good swallowing as opposed to 50% in Group I ($p = n.s.$) and Group II ($p < .05$). Survival was longer in Group III (108 ± 19 days) than in Group I (48 ± 9) ($p < .05$) or II (39 ± 8) ($p < .01$). Complications following discharge were fewer in Group III (33%) than I (71%) or II (43%) but the difference was not significant.

When patients were grouped into those requiring or not requiring a laparotomy for tube placement, then hospital complications ($p < .01$), operative mortality ($p = n.s.$), hospital days ($p < .01$) and home complications ($p = .06$) all occurred more frequently in the laparotomy group. In addition, patients whose tube did not cross the GE junction had less postoperative complications including aspiration ($p = n.s.$), sepsis ($p < .05$), reflux ($p < .05$) and pneumonia ($p = n.s.$). This data suggests that the Atkinson tube provides a superior method of palliation in patients with unresectable carcinoma of the esophagus and that its lower rate of complications may at least in part be due to the lack of need for a laparotomy for tube placement and the frequent lack of need for the tube to cross the GE junction.

*By Invitation

3. Does Open Lung Biopsy Affect Treatment in Patients with Diffuse Infiltrates?

WILLIAM A. WALKER*, F. HAMMOND COLE, JR. *,

ALIM KHANDEKAR*, SAADE S. MAHFOOD*

and DONALD C. WATSON

Memphis, Tennessee

The decision to perform open lung biopsy in the evaluation of a diffuse pulmonary infiltrate is based on the probability that this examination will yield specific information leading to a change in treatment. The role of this procedure remains controversial and many clinicians are reluctant to allow this invasive procedure without assurances that results will lead to a change in therapy for a significant number. To evaluate the impact of open lung biopsy on diagnosis and treatment of diffuse pulmonary infiltrates, a retrospective review of 50 patients undergoing this procedure at three university-affiliated hospitals during a recent six year period was performed. There were 31 males and 19 females, average age 55 years. Biopsy yielded a specific diagnosis in 18 (36%) patients, and a change in therapy in 28 (56%) patients. A complication developed in 9 (18%) patients; 5 (10%) were directly related to the biopsy procedure. Seven patients expired. Immune status in 19 (38%) patients was compromised. A specific diagnosis was obtained in 11 (58%) immunocompromised patients and a change in therapy occurred in 15 (79%) patients after biopsy. A specific diagnosis was obtained in only 7 (23%) of the 31 non-compromised patients and therapy was changed in 14 (45%) patients in this group ($p < 0.02$ compromised vs. non-compromised). Morbidity and mortality were not

significantly different between the two groups. A non-specific diagnosis led to a change in therapy as frequently as a specific diagnosis in both compromised and non-compromised groups. Open lung biopsy in the patient with a diffuse pulmonary infiltrate is an accurate diagnostic tool and frequently leads to a change in patient treatment. The procedure can be performed with acceptable morbidity and mortality in immunocompromised and non-compromised patients.

*By Invitation

4. Trans-Tracheal Aspirate and Fine Needle Aspiration Biopsy for the Diagnosis of Pulmonary Infection in Immuno-compromised Patients

*FABRIZIO de VIVO**, *GERALD D. POND**,

*BIRGER RHENMAN**, *TIMOTHY B. ICENOGLE**,

*M. ANDRE VASU** and *JACK G. COPELAND*

Tucson, Arizona

Between 1979 and 1987 a total of 65 patients with heart (61) or heart/lung transplants (4) underwent trans-tracheal aspiration (TTA) and/or fine needle aspiration (FNA) to isolate the causative pathogen of suspected pulmonary infection. Eighty-two TTA's and 47 FNA's were performed. Twenty-three patients underwent both TTA and FNA sequentially. Table I shows the results of TTA alone, FNA alone, and combined TTA/FNA. Table II shows the sensitivity, specificity, and accuracy of TTA, FNA, and combined TTA/FNA.

TABLE I

	True		False		Total Procedures
	+	-	+	-	
TTA	39	25	1	14	82
FNA	34	9	-	4	47
TTA&FNA	18	3	-	2	23

TABLE II

	Sens	Spec	Ace (%)
TTA	70%	96%	78%
FNA	89%	100%	91%
TTA&FNA	90%	100%	91%

TTA was the first examination performed in all patients regardless of the chest radiographic findings. This accounts for the lower sensitivity of TTA (70%) compared to FNA (89%). FNA requires a fluoroscopically identifiable lesion which can be used as a "target".

Moderate bleeding at the cricothyrotomy site was the only complication attributable to TTA (1%). A total of 11 complications resulted from FNA (23%), including 10 pneumothoraces, one of whom had associated air embolism.

The commonest pathogens isolated were *Nocardia* (34%), *Legionella* (18%), and *Coccidioidomycosis* (8%).

Because TTA is technically simple and associated with low morbidity, the authors conclude that for immunocompromised patients with suspected pulmonary infection it should be performed first in spite of the procedure's low sensitivity. If TTA fails to document a pathogen, then FNA can be done. FNA has a higher sensitivity but is associated with a greater morbidity.

10:05 a.m. Intermission - Visit Exhibits

*By Invitation

10:50 a.m. Scientific Session - Ballroom

5. A Clinical Study on Cerebral Circulation During Extracorporeal Circulation

*YASUHIRO SOMA**, *TAKASHI HIROTANI**,

*RYOHEI YOZU**, *TAKAHIKO MISUMI**,

*KOZO KAWADA** and *TADASHI INOUE**

Tokyo Japan

Sponsored by: HITOSHI MOHRI,

Tokyo, Japan

The goal of this study is to clarify the relationship of cerebral blood flow (CBF) to extracorporeal circulation (ECC) flow and mean arterial pressure (MAP) during nonpulsatile ECC under moderate hypothermia (27-28 C) to know the lower limit of ECC flow and MAP to meet the oxygen demand of the brain. The CBF was determined by Argon saturation and desaturation method after Pevsner et al using Mass-spectrometer in 21 adult patients undergoing cardiac operation. The CBF during ECC was such: 1) 33.8 ± 8.9 ml/100g brain/min on average and ECC flow passive, that is, proportional to ECC flow ($r = 0.73$, $p < 0.01$) while it was between 40 to 70 ml/Kg/min, 2) independent to MAP; showed no significant change while MAP ranged from 30 to 94 mmHg, that is, the lower limit of the cerebral autoregulation extended down to 30 mmHg. Cerebral oxygen consumption did not demonstrate significant decrease as far as CBF of 25 ml/100g brain/min or ECC flow of 40 ml/Kg/min was maintained. All of the patients survived the operation and have no postoperative cerebral damage. In conclusion, CBF was ECC flow passive and was maintained by the cerebral autoregulation down to MAP of 30 mmHg. We believe this is the first report that clearly demonstrated CBF to be ECC flow passive by measuring CBF itself.

*By Invitation

6. Extracorporeal Membrane Oxygenation for the Treatment of Neonatal Respiratory Failure: A Report of 50 Cases

*MICHAEL G. MORONT**, *NEVIN M. KATZ**,

*MAR TIN KESZLER**, *MARC S. VISNER **,

GREGORYR. HOY*, JOHN J. O'CONNELL*,

CYNTHIA COX* and ROBERT B. WALLACE

Washington, DC

Despite progress in neonatal intensive care, pulmonary failure remains an important cause of morbidity and mortality in high risk newborns. In the past few years Extracorporeal Membrane Oxygenation (ECMO) has become a therapeutic alternative for term neonates with life threatening respiratory failure. From February 1985 through June 1987, 50 newborn infants who failed maximal conventional ventilatory therapy (80% predicted mortality) were treated with ECMO according to the following entry criteria: gestational age < 36 wks., birth weight > 2 kg, $pO_2 < 50$ torr ($AaDO_2 > 630$ torr) for 2 hours or $pO_2 < 60$ torr ($AaDO_2 > 620$ torr) for 8 hours. Patient characteristics included: mean birth weight 3.28 ± 0.56 kg, mean gestational age 39.6 ± 1.7 weeks, mean 1 min. Apgar score 4.5 ± 7.2 , and mean 5 min Apgar score 6.2 ± 2.5 . Diagnoses for which ECMO was instituted were meconium aspiration (62%), primary pulmonary hypertension (8%), respiratory distress syndrome (8%), blood aspiration syndrome (8%), congenital diaphragmatic hernia (6%), congenital pneumonia (6%), and pulmonary hypoplasia (2%). To prevent pulmonary atelectasis, lung management during ECMO consisted of high Positive End Expiratory Pressure (PEEP), (8-14 cm H₂O) in 94% of patients. Arterial blood gases and ventilator settings before, during, and after ECMO are presented (mean with SD) (* = $p < 0.05$ for difference from pre ECMO parameter).

	$P0_2$ (torr)	PH	PCO_2 (torr)	PIP(cmH.O)	PEEP (cmH ₂ O)	FiO ₂	IMV
PreECMO	34.5±14.5	7.38±0.21	41.5±19.6	46.8±9.9	4.6 ±1.6	1.0±0.00	101.2±22.1
1 hr on ECMO	*180.4±107.4	*7.52±0.07	*26.5±5.5	*22.8±1.6	*10.3±2.5	*0.21±0.02	*11.8±2.9
1 hr after ECMO	*78.4±22.1	7.39±0.10	37.4±10.7	*25.2±3.9	5.6±1.2	*0.42±0.17	*41.3±12.6

PIP-Peak Inspiratory Pressure

FiO₂-Fraction Inspired Oxygen

IMV-Intermittent Mandatory Ventilation/min.

Overall long term patient survival was 90%. Mean PEEP maintained during ECMO was significantly greater than that reported by the National ECMO Registry (N.E.R.) (10.3 vs. 4.5 cmH₂O, $p < 0.01$). Mean pre ECMO pO_2 was significantly lower than that reported from the N.E.R. (34.5 vs. 42.6 torr, $p < 0.01$) despite slightly higher levels of ventilator support (PIP 46.8 vs. 44.2 cmH₂O, N.S.). Mean duration of ECMO support was significantly shorter compared to the N.E.R. (84.3 vs. 117.2 hrs., $p < 0.01$). In contrast to reports in the literature only 27% of our patients demonstrated an important increase in lung opacification while on ECMO. Mean time to extubation, length of hospital stay, and incidence of complications compared favorably to N.E.R. data.

We conclude that ECMO is a remarkably effective modality to reverse severe neonatal respiratory failure and that excellent survival can be achieved, despite the critical condition of these patients. The use of high PEEP during neonatal ECMO minimizes pulmonary atelectasis and may importantly decrease the necessary duration of ECMO support.

11:30 a.m. Presidential Address

Paul A. Ebert, M.D., Chicago, Illinois

12:15 p.m. Adjourn for Lunch - Visit Exhibits

MONDAY AFTERNOON, April 18, 1988

1:45 p.m. Scientific Session - Ballroom

7. Randomized Clinical Trial of Fibrin Sealant in Cardiac Surgery Patients Undergoing

Resternotomy or Reoperation - A Multicenter Study

JOHN A. ROUSOU, SIDNEY LEVITSKY, LORENZO GONZALES-LA VIN,

DELOSM. COSGROVE, HI, DONALD M. MAGILLIAN, JR.,

CLARENCE S. WELDON, CLEMENT A. HIEBERT,

PHILIP J. HESS, LYLE D. JOYCE*,*

JACOB BERGSLAND and ALAN B. GAZZANIGA*

Springfield, Massachusetts; Chicago, Illinois; Browns Mills,

New Jersey; Cleveland, Ohio; Detroit, Michigan; St. Louis,

Missouri; Portland, Maine; Charlotte, North Carolina;

Minneapolis, Minnesota; Buffalo, New York and

Orange, California

A multicenter prospective study was conducted in 11 institutions to test the efficacy and safety of Fibrin Sealant (FS) as a topical hemostatic agent in patients undergoing either reoperative cardiac surgery (redo) or emergency reoperation. Three hundred eleven patients were randomly assigned to receive either FS (Gp. A) or a conventional topical hemostatic agent (Gp. B). The time required for bleeding to stop was recorded. If the hemostatic agent was ineffective after five minutes, the alternate hemostatic therapy was used (78 of 97 Gp. B patients received FS after 5 min). FS group was additionally compared to historical matched and unmatched controls. End-points examined include for the *Concurrent Study*: 1) % of bleeds controlled within 5 min, 2) mortality; for *FS vs Matched Historical Controls*: 1) blood loss, 2) need for resternotomy, 3) hospital stay, 4) blood products received, and 5) mortality; for *FS vs Non-Matched Historical Controls* (redos only): 1) Resternotomy rate. Viral studies for hepatitis B (37 pts), non-A/non-B hepatitis (33 pts) and HIV (38 pts) were carried out up to 6 mos after operation.

Results			
<i>I. Concurrent Study</i>	Group A (FS)	Group B	p values
1. Hemostasis in:			
a. Redo patients	188/202(93.1%)	11/87 (12.6%)	<0.001
b. Resternotomy patients	10/12 (83.3%)	1/10 (10.0%)	<0.05
c. Total group	198/214 (92.6%)	12/97 (11.3%)	<0.001
2. Mortality	10/166 (6.1%)	18/169 (10.7%)	N.S
<i>II. FS vs. Hist. Matched Controls</i>	Group A (FS)	Group B	p values
1. Blood Loss (56prs) (>1499 cc/12 hr)	1/56(1.8%)	8/56 (14.3%)	<0.05
2. Resternotomy(In Redos) (88 prs)	4/88 (4.5%)	6/88 (6.8%)	N.S.
3. Hospital Stay Days (70 prs)	12	12.9	N.S.

4. Blood Product Tx (Odds Ratio) (86 prs)	0.9	1.0	N.S.
5. Mortality (88 prs)	9/88 (10.2%)	3/88 (3.4%)	N.S.
III. FS vs. Hist Non-Matched Controls (Redos)	FS Group	Non-Matched Cont	p values
Restemotomy rate	9/159 (5.6%)	30/300 (10%)	<0.05

No patient developed hepatitis and none of those tested developed HIV viremia.

Conclusions: 1) FS is highly effective in achieving local hemostasis in cardiac surgery. 2)

FS may reduce blood loss and the need for resternotomy in cardiac operations.

*By Invitation

8. A Prospective, Randomized Study of the Effect of Aprotinin on Blood Loss and Blood Usage After Coronary Bypass Operations

BENJAMIN P. BIDSTRUP, DAVID ROYSTON**,

KENNETH M. TAYLOR and RALPH N. SAPSFORD*
London, England

Sponsored by: Delos M. COSGROVE, III,
Cleveland, Ohio

Platelet dysfunction after cardiopulmonary bypass contributes to postoperative bleeding. Dipyridamole, desmopressin acetate and prostacyclin reduce blood loss post bypass but not to levels which obviate homologous blood transfusion.

The serine protease inhibitor aprotinin (Trasylol© Bayer A.G.) was evaluated in a randomized double blind trial on 80 patients undergoing primary aorto-coronary bypass grafting. 40 patients received aprotinin (group A) by intravenous infusion (to obtain initial blood levels of >150KIU/ml) and 40 received placebo (group C). Anaesthetic, perfusion (bubble oxygenator with crystalloid prime) and surgical techniques were standardized. Postoperatively, crystalloid was infused at 1ml/kgm/hr and colloid given to maintain the central venous pressure at 8-12 mm Hg. Blood was given only if the haematocrit was less than 30%. Hydroxy-ethylated starch (Hespan) was used if it was above 30%. Template bleeding times were measured preoperatively and 90 minutes postoperatively. The two groups were similar in demographic data and bypass times. Two patients in group C required reexploration for bleeding. Both had surgical causes for the haemorrhage. One other patient from group C was excluded from analysis as he required balloon pumping. Chest tube drainage was significantly reduced in group A (301ml ±18.7 vs. 571ml ±28.5 [mean±SEM] p<0.001). The total haemoglobin loss into the chest drainage differed significantly between the two groups: (12.0 g ± 2.02 vs 37.6 g ± 3.12, p < 0.001). Group A received less bank blood postoperatively with 32 of the 40 patients receiving no blood while 37 of the 39 in group C required transfusion (p<0.001). The 8 transfused patients in group A received a total of 11 units of blood compared with a total of 78 units for group C. Haemoglobin levels were similar in both groups preoperatively and on day 1 postoperatively. The haemoglobin on day 7 postoperatively was higher in group A, (13.1g/dl ± 0.23, range 10.2-15.8 vs 12.5g/dl ± 0.2, range 9.7-15.0). In group A, the bleeding time was within the normal range 90 min postoperatively while in group C it was significantly prolonged. (6.1 min vs 12.2 min [mean]). This study demonstrates that aprotinin reduces blood losses after primary coronary artery surgery to levels which allow the majority of patients not to require bank blood.

We have also studied this compound in complex open heart procedures. 22 patients having reoperations (through a previous median sternotomy) were admitted to a randomized trial. 8 of 11 who received aprotinin lost 286 (\pm 48) ml into the chest drains and received no homologous blood (total given 5 units). 11 patients who did not get aprotinin lost 1509 (\pm 388) ml and were given a total of 41 units. An additional 10 patients (all with acute infective endocarditis), 5 of whom had evidence of intravascular coagulation, were operated on with mean blood loss after aprotinin of 322 (\pm 76) ml. 6 had no bank blood. 11 units were given to the other 4 patients.

The ability to reduce post-bypass blood loss to levels which permit the majority of procedures to be performed without bank blood will have obvious benefits in reducing the need for a valuable, scarce and potentially hazardous resource.

*By Invitation

9. Replacement of the Transverse Aortic Arch During Emergency Surgery of Type A Acute Aortic Dissection

JEANE. BACHET, GIOVANNI TEODORI*,*

BERTRAND GOUDOT, FERNANDO DIAZ* and*

*DANIEL GUILMET**

Suresnes, France

Sponsored by: ALAIN CARPENTIER,

Paris, France

In type A aortic dissection, the intimal disruption is located on, or extends to the transverse arch in about 20% patients. Replacement of the arch may, then, be necessary to avoid leaving an unresected, acutely dissected aorta and to prevent bleeding, progression of aneurysm, rupture and, ultimately, reoperation or death.

From 1970 to September 1987, 119 patients were operated on for type A acute dissection. Starting in January 1977, the GRF biological glue was used in 91 patients to reinforce the dissected tissues at the suture sites. Among these, 26 patients (aged 32 to 76 years) underwent a replacement of the transverse aortic arch in addition to the replacement of the ascending aorta.

In 20 patients (Group 1), cerebral protection was achieved by Profound Hypothermia (16 to 20°C.) associated with circulatory arrest (15 to 40 minutes, mean time : 27 mn) during the distal anastomosis.

In 6 patients (Group 2), the carotid arteries were selectively perfused with cold blood (6°C.) under moderate core hypothermia (28°C.) while Car-diopulmonary bypass was discontinued (19 to 34 minutes, mean : 25 minutes), to allow suturing of the prosthesis without crossclamping the distal aorta. Moderate hypothermia avoided the long rewarming time necessitated by profound hypothermia.

Hospital mortality accounted for 34% (9 patients out of 26). In group 1, two patients died during operation and seven patients died from postoperative complications. In group 2, no death and no major complication were observed.

Follow-up of the 17 survivors range from 3 to 90 months (mean:39). One patient died six months after surgery from cerebral hemorrhage. One patient is disabled by neurologic sequelae. Fifteen patients are in good clinical condition (NYHA Class I or II).

Postoperative aortograms in 12 patients, and CT scans in all, have shown a good and stable repair of the transverse arch in all survivors, but a persisting dissection of the descending aorta in 11 (70%).

Growing experience and improving results in emergency surgery of type A aortic dissection have led us to extend the replacement of the aorta to the transverse arch, whenever necessary. The GRF glue has proved to be an efficient adjunct. The best cerebral protection was obtained in our experience with carotid perfusion using cold blood, during circulatory arrest at moderate core hypothermia.

*By Invitation

10. Total Cavopulmonary Connection: A Logical Alternative to Atriopulmonary Connection for Complex Fontan Operations - Experimental Studies and Early Clinical Experience

MARCR. DeLEVAL, CATHERINE BULL**

*and PHILIP KILNER**

London, England

Sponsored by: D WIGHT C. McGOON

Rochester, Minnesota

Atriopulmonary connections (APC) for complex anomalies other than tricuspid atresia (complex Fontans) have **disadvantages:** (i) Extensive atrial surgery sometimes in the atrioventricular (AV) node area with septation and/or AV valve closure, (ii) Patients (pts) are often left with a thin walled distended right atrium (RA) prone to early and late arrhythmias and atrial thrombosis, (iii) In vitro analogues of APC demonstrate that laminar flow becomes turbulent as it enters the RA with energy loss that is not compensated for by RA contraction. Consequently, we have replaced APC for complex Fontans with a **total cavopulmonary connection (TCPC)**. This consists of an end to side anastomosis of the superior vena cava (SVC) to the undivided right pulmonary artery (PA), the construction of a composite intra atrial tunnel using the posterior wall of the RA and a prosthetic patch to channel the inferior vena cava to the enlarged orifice of the transected SVC that is anastomosed to the main PA. The operation was performed on 13 consecutive patients aged 3-14 years, between February and October 1987. The diagnoses were double inlet ventricle (7), hypoplastic ventricle (4), transposition with straddling tricuspid valve (2). Four pts had a left SVC and underwent a bilateral SVC to PA anastomosis. There was 1 death in a pt with distorted PAs from previous banding. TCPC has the following **advantages:** (i) Technically simple and reproducible in any AV arrangement and away from AV node, (ii) Most of the RA chamber remains at low pressure thus reducing the risks of early and late arrhythmias, (iii) In vitro studies on casts of normal hearts on which TCPC had been performed suggest that turbulence could be alleviated thus preventing energy loss and minimizing the risks of atrial thrombosis, (iv) Postoperative cardiac catheterisation performed in 9 pts confirmed these favourable flow patterns with low caval pressures, no gradients and short transit times through the cavo pulmonary pathway. These encouraging early results support the continuing use of TCPC for complex Fontans.

*By Invitation

11. The Results of a Surgical Program for Interrupted Aortic Arch

JEFFREYE. SELL, RICHARD A. JONAS*,*

JOHN E. MA YER, EUGENE H. BLACKSTONE,*

JOHN W. KIRKLIN and ALDO R. CASTANEDA
Boston, Massachusetts and Birmingham, Alabama

Between Jan. 1, 1974 and 1987, seventy-one patients with interrupted aortic arch were admitted. Median age was 4 days, and 75% were 20 days of age or less. 63 underwent prompt initial or single stage repair; the 8 patients who died without operation within a few hours of admission or were unoperated because of extremely complex associated anomalies, are included in the data analysis. The interruption was type A in 20 (12 deaths), B in 49 (25 deaths) and C in 2 (2 deaths). An isolated ventricular septal defect (VSD) was present in 44 patients (19 deaths) and were multiple in 2 of these (2 deaths). Truncus arteriosus was present in 7 (6 deaths), and double outlet right ventricle in 5 (3 deaths). 14 patients (10 deaths) had other cardiac anomalies, and one patient had none expect bilateral patent ductuses.

Survivorship after entry (n = 71) at 1 week, 1 month, and 1, 5 and 10 years was 72%, 60%, 48%, 44% and 42% respectively (all patients but 2 were traced in Oct. 1987). The risk factors for death after repair (multivariate analysis) were (earlier) date of operation, cardiac anomalies other than single VSD, and use of a left ventricular (LV) to aortic conduit in repairing the arch interruption. The type of interruption, the type of arch repair (except for LV conduit) and single vs. multiple stage repair were not risk factors. The improvement throughout the 13 year experience is indicated by the predicted 1 week, 1 month, and 1, 5, and 10 year survival of 96%, 94%, 91%, 89% and 89% for patients with interrupted arch and single VSD operated upon in the current era. With double inlet LV as the cardiac anomaly, these predications are 74%, 63%, 50%, 44% and 42%.

LV outflow tract obstruction (LVOTO) became evident in 12 patients. Among the 10 with VSD, the freedom from evident LVOTO at 1 week, 1 month, 1 and 3 years after VSD repair (none became evident after 3 years) was 95%, 91%, 80% and 58%. Only 1 had undergone pulmonary artery banding. The hazard function had a single phase peaking at 12 months. 8 of the 12 patients received reoperation; 11 of the 12 are alive.

Aortic reobstruction became evident in 15 patients. Freedom from this at 1 week and at 1, 5 and 10 years was 99%, 80%, 46% and 27%. Direct anastomosis was a risk factor (compared with tube graft repair) but this risk declined in recent years. Only 3 deaths occurred.

Inferences: The repair of interrupted arch with VSD by one of several methods can give good early and intermediate-term results, but follow-up is important for detection of LVOTO. In view of recent good results with single stage repair, including direct anastomosis, this technique is currently preferred. Even complex associated cardiac anomalies are not contraindications to repair, although risks are increased.

*By Invitation

12. Durability of the Viable Aortic Allograft

WILLIAM W. ANGELL, JAMES H. OURY

and JOHN J. LAMBERTI

La Jolla, California

Aortic allografts have been implanted in 503 patients since 1968. Actuarial and Hazard Function curves describe the annual incidence and freedom from valve failure in 4 groups:

- 1) Frozen viable allografts for AVR - 34
- 2) Free-sewn fresh allografts for AVR - 134
- 3) Stent-mounted fresh grafts for AVR - 97
- 4) Stent-mounted fresh grafts for MVR - 238

This series is unique in that it includes patients from the early allograft experience. All grafts were cleanly procured, antibiotic sterilized and either stored at 4 degrees centigrade for up to 8 weeks or frozen to liquid nitrogen temperatures with cryoprotection in order to preserve the viable cusp fibroblasts. In all 4 groups, valves were potentially viable at the time of implantation. Sixty-six percent of the allografts were pre-mounted on a stent to facilitate implantation and permit their use in any intracardiac position.

The longevity of this experience permits an accurate evaluation of valve durability over 10 to 20 years.

Group	Mean Time To Valve Failure		% After 10 Yrs
Frozen AVR Free	12.1 yrs. p = .05	Free 12.4 yrs.	8/11-73%
Fresh AVR Fresh	12.5 yrs. p = .05	Free 12.4 yrs.	20/36-56%
Mounted AVR	6.6 yrs. p = .0001	Mounted 8.0 yrs.	10/16-63%
Fresh Mounted MVR	8.6 yrs. p = .0001	Mounted 8.0 yrs.	14/35-40%

In all groups, viable fibroblasts were present in specimens explanted up to 5 years following surgery. All specimens returned after more than 10 years were almost totally acellular. Evidence of increased collagen suggesting that the fibroblasts survive implantations and then gradually die was present in all specimens.

The long-term durability of fresh, allograft and frozen viable allografts will determine if the complex and expensive procurement methods are justifiable. This series suggests that durability of the viable allograft for AVR is greater than for other types of tissue valves, and has an anticipated mean survival of 12 years. Pre-mounted allografts for AVR or MVR have a mean survival of 8 years and are not more durable than the glutaraldehyde porcine xenografts.

3:45 p.m. Intermission - Visit Exhibits

*By Invitation

4:30 p.m. Scientific Session - Ballroom

13. Orthotopic Heart Transplantation Survival After Total Artificial Heart Implantation

CHRISTIANE. CABROL*, IRADJ GANDJBAKHCH*,
ALAIN PAVIE*, VALERIA BORS*, TAREK MESTIRI*
ANNIK C. CABROL, EDUARDO SOLIS*

CLAUDIO MUNERETTO and PHILIPPE LEGER**

Paris, France

Sponsored by: NORMAN E. SHUMWAY

Stanford, California

Between April 1986 to October 1987, 24 patients underwent orthotopic implantation of a TAH (JARVIK 7). They were 21 men and 3 women with a mean age of $37,6 \pm 11,3$ years. From them, 11 (46%) had an adequate support and were successfully transplanted. Mean follow-up time after transplantation is 257 ± 188 days for a total of 2833 days. The mean time in mechanical support for these patients was $12 \pm 5,7$ days (range 2-21). Mean age was $35,6 \pm 9,8$ years (range 22-25). From the 11 patients, 3 (27,3%) died during the follow-up period, one died at the 10 day post-transplant from an acute rejection with sepsis, another died of anoxic coma (20 days post-transplant), and the last one of a fulminant hepatitis and pulmonary embolism (18 days post-transplant). From the 11 patients, 4 (36,4%) developed an infection in the immediate post-transplant period. Three of these infections were successfully treated with antibiotics, the other is the patient that was previously mentioned. Three patients experienced rejection episodes, reversible in two. One patient had a Kaposi sarcoma secondary to Azathioprine treatment (476 days post-transplant) and was cured. In conclusion, 46% of the patients had an adequate mechanical support and were successfully transplanted; from these patients, 72,7% are alive and well. As compared to our series of 401 heart transplantations, the mid term outcome of these patients appears to be similar as for patients with elective orthotopic heart transplantation.

*By Invitation

14. Late Results of Cardiac Transplantation Using Cyclosporine: Concerns for the Future

ROBERTL. KORMOS, BARTLEYP. GRIFFITH,*

ROBERTL. HARDESTY, JOHNM. ARMITAGE,*

JAMES NARROD and HENRY T. BAHNSON*

Pittsburgh, Pennsylvania

Current immunosuppressive protocols using Cyclosporine have virtually eliminated acute rejection as a cause of late death, but it is associated with significant hypertension and renal toxicity and has not reduced the development of coronary artery disease (CAD) in the donor heart, as previously recognized with azathioprine. Between June 1980 and July 1986, 253 patients underwent cardiac transplantation, 188 (74%) of which have survived more than one year. Total later mortality has been 15% (28 pts). Annual mortality was 5% per year in the first 2 years and 2% per year thereafter. The risk of death after the first year due to infection was 5%, CAD 3%, and miscellaneous cases 7% (malignancy, 3 pts; accidental, 4 pts; liver failure, 2 pts; acute rejection, 2 pts; unknown causes, 2 pts). Evidence of acute rejection was seen in 6% of the endomyocardial biopsies performed after one year. Alterations in immunosuppressive therapy accounted for 77% of all rejection episodes. Morbidity included hypertension (92%), renal insufficiency (average serum creatinine = 1.9 ± 1 mg/dl) and progressive CAD. Seventeen patients (9%) had a serum creatinine greater than 2.5 mg/dl and 2 patients have required chronic dialysis. The incidence of CAD was 5.8% at one year and increased to 66% at year 6 with 33% of patients having developed multi-vessel disease. Based upon autopsy studies the degree of CAD was underestimated by yearly cardiac catheterization

studies. The near universal need for steroids has caused diabetes mellitus in 17 (9%), the need for cataract surgery in 7 patients (4%), and osteoporotic fractures in 12 patients (6%). The early survival following cardiac transplantation justifies its proliferation, but unless strategies are developed to deal with late problems, there exists the possibility for overwhelming the already limited supply of donor hearts due to an excessive need for late retransplantation of high risk candidates.

*By Invitation

15. Decision in the Management of Sudden Cardiac Death: Endocardial Resection or Automatic Internal Defibrillator

*W. CLARK HARGROVE, III**,

FRANK E. MARCHLINSKI, MARK E. JOSEPHSON**

*and JOHN M. MILLER**

Philadelphia, Pennsylvania

Sponsored by: L. HENRY EDMUNDS, JR.

Philadelphia, Pennsylvania

Subendocardial resection (SER) and implantation of the automatic internal defibrillator (AICD) are two recommended therapies for management of sudden cardiac death. Specific criteria for the choice of procedure are not developed. We reviewed 260 patients with SER and 64 with implanted AICD. Demographic, hemodynamic, arrhythmia (VT, VF or VT/VF) and survival data were analyzed in an attempt to develop selection criteria.

			Survival		At 5 Years: Freedom From:		
	Age	EF	30-Day	1 Year	5 Year All Arrhythmias	Sudden Death	
SER							
n = 260	59 ± 9	27 ± 10	85%	74%	62%	85%	92%
AICD							
n = 64	56 ± 2	34 ± 14	97%	78%	62%	55%	100%
p value	NS	NS	0.02	NS	NS	0.05	NS

Coronary bypass grafting was done in 69% of SER patients versus 30% of AICD patients (p<0.001). Postoperatively more AICD patients require antiarrhythmic drugs than SER patients (72% vs 25%, p<0.001). Pitfalls in AICD implantation include (1) occasional inability to convert VF at postoperative testing (8%), (2) failure to sense VT slower than cut-off rate (8%), (3) inability to drive an automobile (100%), (4) continued need for antiarrhythmics (72%) and (5) inappropriate shocks (45%). In the management of malignant ventricular arrhythmias operative survival is better with AICD. Neither long term survival nor freedom from sudden death differ between the two, but SER patients have a better life style since they require fewer drugs and have a fewer arrhythmias. Death in both groups is primarily from heart failure.

5:30 p.m. Adjourn

*By Invitation

TUESDAY MORNING, APRIL 19, 1988

6:45 a.m. SIMULTANEOUS BREAKFAST SESSIONS**

(See page 5 for further information)

A) BLOOD CONSERVATION

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

B) FLAPS - WHEN AND WHERE TO USE THEM

Peter C. Pairolero, M.D., Rochester, Minnesota

8:30 a.m. Scientific Session - Ballroom

16. Transhiatal Esophagectomy with Gastric Transposition for Pharyngolaryngeal Malignancies

MEL VYN GOLDBERG, JEREMY FREEMAN,
G. ALEXANDER PATTERSON*, THOMAS R.J. TODD,
PATRICK J. GULLANE* and DONALD McSHANE*
Toronto, Ontario, Canada*

Currently, in our center, laryngeal and early hypopharyngeal cancers are treated with radical radiotherapy (RT) with salvage surgery used for recurrent disease only. Late extensive disease is treated primarily with surgery and postoperative radiotherapy. We have found that gastric transposition with pharyngogastrostomy following pharyngolaryngectomy and transhiatal esophagectomy (PLE) provides an excellent functional result in these difficult management cases.

From 1981 to 1987, gastric transposition was used in 38 patients following PLE for hypopharyngeal (22), laryngeal (11), cervical esophageal (4), and tracheal (1) carcinoma.

Indications for PLE included: salvage surgery (19), previous RT for other lesions (3) and late extensive disease (16). Thirty day mortality was one in-traoperative disseminated intravascular coagulopathy.

Of 31 patients evaluable, deglutition was excellent in 24, good in 3 and poor in 4. Minimum follow-up has been 3 months. Median survival time is 11 months. Fifty percent of patients survive one year and the 5 year actuarial survival is 33%.

The most frequent complications were fistula and flap necrosis, seen almost exclusively in patients receiving RT preoperatively (salvage surgery). There were 9 anastomotic leaks, 5 requiring further surgical treatment. Seven patients failed to leave hospital mainly because of fistula related complications.

Our experience indicates that gastric transposition functions well following pharyngolaryngectomy. There is a high postoperative fistula rate in those patients who have received previous high dose RT.

*By Invitation

**Admission will be by ticket only and will be limited. Tickets must be obtained in the Registration Area of the Century Plaza Hotel prior to 2:00 p.m. on Monday, April 18. There are no provisions for pre-registration. Breakfast will be served until 7:00 a.m. only.

17. Surgical Management of 100 Consecutive Esophageal Strictures

ROBERT D. HENDERSON, GARY MARRY ATT*
and ROBERT F. HENDERSON*

Toronto, Ontario, Canada

There is controversy as to whether esophageal peptic strictures requiring surgery should be treated by conservative repair or resection. In a group of 100 consecutive strictures, the aim was to preserve the esophagus using a total fundoplication gastroplasty (TFG). In this group 98 were treated by TFG and only two required resection. All were fully evaluated by history, radiology, manometry with pH, endoscopy and dilatation. Using TFG there was no mortality and 3% significant morbidity. The results in 98 patients varied depending on the severity of preoperative pathology. The major preoperative pathologic factors were a) severe stricture pathology; b) previous esophageal or gastric surgery and c) scleroderma. Severe stricture with extensive ulceration was present in 35 patients, scleroderma in 13 patients and revision surgery in 26 patients. This cumulatively accounted for 54% of all patients. The results were tabulated as follows: A) asymptomatic; B) minor residual; C) major residual; D) failure.

	No.	A	B	C	D
Uncomplicated simple strictures	46	97.8	0	2.2	0
Complications 1 factor	35	91.4	5.7	2.9	0
2 factors	15	66.6	26.7	6.7	0
3 factors	2	0	0	50	50

Overall results in 98 patients showed 94.9% A and B, and 5.1% C and D. These results justify a conservative approach as there was no mortality, 3% morbidity and 94.9% acceptable results. Simultaneously by evaluating preoperative pathology there is also a method of preoperatively assessing and choosing to resect the most severe patients.

*By Invitation

18. Cervical Esophagogastric Anastomosis for Benign Disease - Functional Results

MARK B. ORRINGER and MACK C. STIRLING*

Ann Arbor, Michigan

Eighty-seven adult patients (average age 49 years) with various benign esophageal disorders treated by total thoracic esophagectomy and a cervical esophagogastric anastomosis have been followed with personal interviews and examinations from 1-104 months (average 34 months). Outpatient esophageal dilation has been used liberally for *any* degree of postoperative cervical dysphagia. At their latest follow-up, 34 patients (39%) eat without dysphagia; four patients (5%) have mild dysphagia requiring no treatment; 34 patients (39%) have undergone 1-3 dilations during the first 6-12 postoperative months for intermittent dysphagia; and 14 patients (16%) have more severe dysphagia requiring regular anastomotic dilations (two-thirds of these perform home self-dilations).

Mild regurgitation of gastric contents has been experienced by 26 patients (30%), particularly when recumbent after eating, but only three patients sleep with the head of the bed elevated to prevent nocturnal regurgitation. No patient has experienced pulmonary complications due to aspiration. Twenty patients (23%) have had varying degrees of "dumping syndrome", generally transient and well-controlled with medication. One patient has required a pyloroplasty for impaired gastric emptying 18 months after her initial esophagectomy and pyloromyotomy. At their latest evaluation, 37% of the patients weigh 3-83 (average 15) pounds *more* than they weighed preoperatively, 41% weigh 5-40 (average 12) pounds less, and 23% have had no change in their weight.

The stomach functions well as a visceral esophageal substitute, like the esophagus, is more thick-walled and resilient than colon. Significant gastroesophageal reflux is uncommon after a properly performed cervical esophagogastric anastomosis. Problems of late redundancy seen with colon interpositions do not occur with the stomach. These data support our belief that the stomach is the preferred organ for esophageal replacement, not only for carcinoma, but also for benign diseases as well.

9:30 a.m. Intermission - Visit Exhibits

*By Invitation

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

19. Survival Analysis of Medical Versus Prompt Surgical Therapy in Patients with Triple Vessel Coronary Artery Disease and Severe Angina Pectoris: A Cass Registry Story

WILLIAM O. MYERS, HARTZELL V. SCHAFF,*

LLOYD D. FISHER, BERNARD J. GERSH*,*

MICHAEL B. MOCK, DA VID R. HOLMES*,*

THOMAS J. R YAN and GEORGE C. KAISER*

Seattle, Washington; Marshfield, Wisconsin; Rochester,

Minnesota; Boston, Massachusetts and St. Louis, Missouri

We compared survival differences during a six year follow-up of patients in the registry of the Coronary Artery Surgery Study (CASS) who had three vessel coronary artery disease and Canadian Cardiovascular Society Class III-IV angina pectoris. All had a 70% or greater stenosis in either the mid or proximal segment of all three coronary arteries. There were 679 medically treated patients (M) and 1921 surgically treated patients (S) in this nonran-domized comparison. Patients were stratified by left ventricular wall motion score and number of proximal coronary artery stenoses; after adjustment for these variables, the estimated probability of being alive at six years was 82% for S and 59% for M ($p < .0001$). This advantage of surgical treatment was observed in subgroups of patients with normal as well as ischemically damaged left ventricles (LV) and subgroups with zero to three proximal coronary artery stenoses.

For patients with normal LV, 90% of S and 78% of M were living at six years ($p < .0001$). For them, survival was significantly increased for S compared with M only if two or three proximal stenoses were present. For patients with no proximal stenosis and all categories of LV function, 84% of S and 67% of M were alive at six years ($p < .0001$).

Patients with the most severe LV dysfunction (LV score of 16-30) had a six year survival of 63% for S and 30% for M (p < .0001). Those with three proximal stenoses and all gradations of LV score had an 81% survival for S and 40% for M at six years (p < .0001).

In a multivariate (Cox) analysis of preoperative clinical, hemodynamic and angiographic factors, early surgery was the strongest predictor of survival.

*By Invitation

20. Carcinoma of the Lung: Evaluation of Satellite Nodules as a Factor Influencing Prognosis After Resection

JEAN DESLAURIERS, RAYMOND CARTIER,
MARCIE Fournier*, MAURICE BEAULIEU*
and MICHEL PIRAUX*
Quebec, Quebec, Canada*

Like most solid tumors, lung cancer may be associated with satellite lesions. There is, however, no information available at the present time as to their definition, incidence, stage within the TNM terminology, management or prognosis following resection.

Over the past 18 years (1969-1987), we have identified 84 patients who had resection of a primary lung cancer associated with satellite nodules. There were 68 males and 16 females with a mean age of 58.3 years (37-76). All satellite nodules were clearly seen on the gross specimen, were separated from the main lesion by normal lung and were histologically identical to the primary carcinoma. In addition, they were all located within the same lung and usually within the same lobe (81%). Four subsets of nodules were identified: (a) Nodules peripheral to the main tumor (n:38), (b) Nodules around the main tumor (n:19), (c) Nodules in a different lobe (n:16) and (d) Nodules central to the main tumor (n:11). Pre-operative Chest films were reviewed and in only 17% of patients could the satellite nodule be identified.

All patients underwent pulmonary resection (complete in 77/84, 92%) with 4 operative fatalities (4.6%). Forty-six patients had a pneumonectomy while the remaining 38 patients had lobectomies (n:35) or limited resections (n:3). The survival figures are summarized in the table and are compared to those of patients resected during the same time interval but who did not have satellite lesions.

	Stage	No. Pts.	Survival at 5 years(%)	Survival 10 years	p.
Stage 1	No Satell. nodules	566	54.4%	38.8%	0.002
	With Satell. nod.	40	9.5%	0.0%	
Stage 2,3	No Satell. nodules	459	36.8%	30.6%	0.016
	With Satell. nod.	44	21.4%	12.3%	
Total	No Satell. nodules	1,025	43.8%	30.1%	

With Satell. nod. 84 18.7% 10.8%

0.001

These results indicate that the presence of satellite lesions has a negative impact on survival following surgery for lung cancer. These nodules should be carefully looked for by the pathologist and if they are found, the patient should probably be included in the M, subset of the TNM classification.

*By Invitation

21. Biochemical and Cytogenetic Studies of Human Lung Cancer

*JOHN R. BENFIELD, STEVEN S. SMITH**,

YASUSHI OHNUKI, JACK SHIVELEY**,

JOHN C. WAIN, MARVIN DERRICK**,

WILLIAM G. HAMMOND and HYUNK. PAK**

Los Angeles and Duarte, California

Work-up of lung cancers at the cellular level is a future approach toward assessment of prognosis and rational planning for new management strategies. In ongoing studies, we have tested resected lung cancers from 43 men and 35 women; 65 patients are free of disease, 13 died of cancer.

Methods or measurements employed were: total cellular DNA content by image analysis (n = 78); total genomic DNA methylation state, and banding patterns from probed Southern blots (n = 31); radio-immunoassay (RIA) for bombesin, gastrin, VIP, cholecystokinin (n = 13); cytogenetics (n = 26).

All lung cancers were hyperploid. Adenocarcinomas were generally hex-aploid, epidermoid carcinomas nearly septaploid; findings compatible with polyclonality of the cancers. There was general hypomethylation of DNA (p 0.001). DNA digests (restriction endonuclease *Hpa*II, probed with DNA homologous to KPN) showed banding patterns that correlated with cell types. These patterns separated histologically indistinguishable primary aden-ocarcinomas (n=13) and metastatic adenocarcinomas (n = 3) from one another. Cancers studied with RIA were all negative for polypeptide hormones. There were 6 cancers which grew adequately *in vitro* to permit study of 45 detailed karyotypes (3-15/tumor). The chromosome modal numbers range from 57-87. The number of clearly abnormal marker chromosomes ranges from 4-20; abnormality in chromosome #1 was prevalent.

Information obtained by molecular biologic and cytogenetic methods distinguishes between primary and metastatic adenocarcinomas, and promises to be a new basis for treatment planning.

11:15 a.m. Address by Honored Speaker - Ballroom

DO WE REALLY CORRECT CONGENITAL HEART DEFECTS?

Jaroslav F. Stark, M.D., London, England

12:00 noon Adjourn for Lunch - Visit Exhibits

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

†Admission will be 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 Century Plaza Hotel prior to 2:00 p.m. on Monday, April 18. Residents will be the guest of the Association.

*By Invitation

TUESDAY AFTERNOON, APRIL 19, 1988

1:45 p.m. Scientific Session - Ballroom

22. Survivorship After the Arterial Switch Repair for Transposition

*WILLIAM I. NORWOOD, ANTHONY R. DOBELL,
JAMES E. LOCK*, JOHN W. KIRKLIN,
EUGENE H. BLACKSTONE and THE CONGENITAL
HEART SURGEONS SOCIETY
From 20 cooperating institutions*

Four hundred sixty-six neonates, less than 15 days of age and with transposition of the great arteries (TGA) of all types, have been entered into an ongoing 20 institution study. Among these, 212 with simple TGA or TGA and ventricular septal defect (VSD) have undergone an arterial switch repair and are the basis of this report. 187 (67%) had the usual coronary anatomy, 34 (18%) had origin of the circumflex as well as the right coronary artery from sinus 2 (posterior sinus), and 16 patients (9%) had all coronary arteries arising from a single sinus. Survivorship did not correlate with the coronary anatomy.

Survivorship of the patients varied among the 16 institutions performing the arterial switch repair (4 others did none). Among the 6 "low risk" institutions, the one week, one month, one year, and 2½ year survivorships of patients with simple TGA (n = 114) were 96%, 94%, 91%, and 90% respectively. Among the total of 155 patients undergoing an arterial switch repair in the "low risk" institutions, only older age at repair in the case of simple TGA and TGA with ventricular septal defect were risk factors for death after repair. The survivorship for one month predicted from the multivariate equation for simple TGA was 94% when the repair was done at 6 days of age and 71% when done at 20 days of age.

Overall, among the 212 patients the one week, one month, one year, and 2½ year survivorships were 82%, 80%, 79%, and 78% respectively. Birth weight (smaller), associated cardiac or noncardiac anomalies, age at repair (older) in the case of simple TGA, and total elapsed repair time (longer) were risk factors for death after repair. The prevalence of the risk factors was no different in the "low risk" institutions compared with all others (all P-values >.5).

The inferences are that in simple TGA the arterial switch repair should be performed as soon after birth as is possible; that the arterial switch repair is as safe for TGA with VSD in the first month of life as later; and that, in "low risk" institutions, protocols leading to the arterial switch repair provide early and intermediate term survivorships which are better than those of protocols leading to an atrial switch repair.

*By Invitation

23. The Infant Mustard Procedure (100 Days): 10 Year Follow-Up

KEVIN TURLEY, FRANK L. HANLEY,
EDWARD D. VERRIER*, SCOTMERRICK*
and PAUL A. EBERT*

San Francisco, California

In 1978, at the American Association for Thoracic Surgery, a unique group of infants were presented with D-Transposition of the Great Arteries and Intact Ventricular Septum (dTGA - IVS) operated < 100 days of age, using the Mustard procedure. As true infant repairs, such patients represented the benchmark against which subsequent techniques applied to infants must be compared.

During the period 1975 -1981, 36 infants, < 100 days of age with dTGA -IVS underwent Mustard repair at the University of California, San Francisco. Ages ranged from 4-98 days (mean 50 days) and weights from 2.3 - 6.6 kg (mean 3.6 kg). There were no early deaths (operative 1 year). Follow-up 7 -13 years (mean 10 years) postoperatively was performed by direct contact of the cardiologists and echocardiographic evaluation in all 36.

Late survival is 94%, mean 10 years. There were two late deaths, one accidental drowning, and one procedure-related due to ventricular fibrillation. No neurologic complications have occurred. Rhythm is normal sinus in 22, with abnormalities in 12, minor atrial 7, major atrial 1, pacemaker 2, and premature ventricular contractions in 2. Reoperations were performed in 3 for superior vena caval obstruction, 2 of whom required pacemaker while no inferior vena caval or pulmonary venous obstructions have occurred. Finally, serial echocardiographic evaluation has failed to reveal deterioration of right ventricular function.

The Mustard procedure performed in the first 100 days of life results in a high-early - 100%, and 94% - late survival at mean 10 years (one procedure-related death), and a surprisingly low incidence of late complications, against which other techniques of infant repair bear comparison.

*By Invitation

24. Infant Orthotopic Heart Transplantation

CONSTANTINE MAVROUDIS, JON B. KLINE,
HAROLD L. HARRISON*, LAMANA. GRAY, JR.,
BRIAN L. GANZEL* and SAMUEL R. WELLHAUSEN**

Louisville, Kentucky

Infant OHT has been recently applied to various forms of congenital heart disease with encouraging short term results. From June 1986 to September 1987 we evaluated 16 infants for OHT. Fourteen had hypoplastic left heart syndrome (HLHS), one had endocardial fibroelastosis with aortic atresia and one had anomalous pulmonary artery origin of the left main coronary (ACA). Eight families accepted the treatment program and 8 families refused (2 because of infant associated anomalies and 6 on philosophical grounds). Of the 8 families who accepted, one died 6 hours after diagnosis, one was allowed to die after 60 days due to acquired neurologic complications and the other had congenital CMV. The remaining 5 patients (4 HLHS, 1 AGA) had OHT.

OHT was performed with PDS absorbable suture using deep hypothermia and circulatory arrest in 4 neonates for HLHS (average time 47 min.) and bicaval cannulation and continuous bypass in one eleven month infant for ACA. In-house retrieval was used in all. One neonate died from complications due to pre-transplant donor heart dysfunction and size discrepancy while the remaining 3 neonates and one infant survived and are home 15 months (HLHS), 10 months (ACA), 5 months (HLHS) and 1 month (HLHS) postoperatively. Triple drug immunosuppression included cyclosporine, azathioprine and prednisone.

Rejection was diagnosed by clinical evaluation of child activity and monocyte/cell cycle analysis from peripheral blood samples without myocardial biopsies. Routine echocardiography, EKG, and chest x-ray were not helpful. Six episodes of rejection were successfully treated in 3 patients. Twelve month post-op cath in one patient (HLHS) showed appropriate graft growth, no aortic or PA anastomotic strictures, normal RV and LV function, and no coronary artery disease. All four children are normally achieving their growth and personality milestones.

We conclude that while infant OHT is still an investigational procedure, our experience suggests that it can be applied to severe forms of congenital heart disease with excellent short term results.

2:45 p.m. Intermission - Visit Exhibits

*By Invitation

3:30 p.m. Scientific Sessions - Ballroom

25. Seven Years' Experience with the Pierce-Donachy Ventricular Assist Device

D. GLENNPENNINGTON, KIRKR. KANTER,
LA WRENCE R. McBRIDE*, GEORGE C. KAISER,
HENDRICK B. BARNER, LESLIE W. MILLER *
KEITH R. NAUNHEIM* and VALLEE L. WILLMAN*

St. Louis, Missouri

Of the current methods for circulatory support, the Pierce-Donachy external pneumatic ventricular assist device (PD-VAD) has proved to be one of the most versatile and effective. In order to define the current role of the PD-VAD, we reviewed the records of 41 patients (pts) aged 15-71 yrs (mean 53 yrs) with shock refractory to drugs and intraaortic balloon (IABP) who were supported with PD-VADs from 1981-1987. Of 26 pts who received a PD-VAD for postcardiotomy shock, 8 had biventricular (BVAD), 12 had left ventricular (LVAD) and 6 had right ventricular (RVAD) and IABP support. Flows of 2.3-4.8 liters/min (mean 3.6) were maintained for 3-312 hrs (mean 83). Eight pts died in the operating room, 14 were weaned and 10 (38.5%) are long-term survivors. Of 19 pts with biventricular failure, 0 of 5 with univen-tricular support survived while 6 of 14 with biventricular support survived. Perioperative myocardial infarction (MI) occurred in 12 of 16 nonsurvivors and in only one of 10 survivors ($p < .01$). Other causes for death were bleeding, renal failure and infection.

Nine pts were supported with PD-VAD as "bridge to cardiac transplant (TX)," five pts with BVAD and four with LVAD. Six pts were supported 8-120 hrs (mean 65) and three pts for 22, 24 and 75 days. Five pts were TX, all of whom are long-term survivors; four pts were denied TX because of complications. Four other pts were supported for 12-144 hrs (mean 81) with PD-VADs

for cardiogenic shock after TX. In spite of biventricular support (two BVAD and two RVAD & IABP), none survived. Two pts with acute myocardial infarction (MI) shock were supported for 3.5-8.5 days with BVAD and LVAD. One pt was weaned, but neither survived.

Bleeding occurred in 23/41 pts but was decreased by improved surgical techniques and sternal closure. Thrombi found in three PD-VADs resulted in emboli in only one pt and were always due to interruption of PD-VAD flow. Anticoagulants were used only during weaning and prolonged support (>10 days). One pt had a stroke due to LV thrombus. Renal failure requiring dialysis (11 pts) was uniformly fatal. Factors predictive of death were myocardial infarction, renal failure, severe infection and the lack of biventricular support if needed. PD-VAD is a safe, effective device which has provided salvage of pts with postcardiotomy shock and pts requiring bridge to TX. Its effectiveness in pts with shock after MI or failed TX are not yet proven.

*By Invitation

26. Dynamic Cardiomyoplasty. Early Clinical Experience and Preliminary Conclusions

*ALAIN F. CARPENTIER, JUAN-CARLOS CHACHQUES**,

PIERRE GRANDJEAN, PATRICK PERIER**,

SYLVAIN CHAUVAUD and*

*SERBAN MIHAILEANU**

Paris, France

Since January 24, 1985, the date of the first clinical case of dynamic cardiomyoplasty (cardiac partial reinforcement or substitution with a stimulated striated muscle), 12 patients with acquired myocardial diseases have been operated on utilizing this technique. There were 11 males and 1 female, aged 18 to 67 years. The causes of the myocardial damage were: ischemia (8), tumor (2), cardiomyopathy (1), valvular (1).

All patients but 2 were in class functional IV and were thought to be contraindications to cardiac transplantation for the following reasons: multi-organ failure (4), age (3), diabetes (3), renal insufficiency (2), extensive cardiac tumor (2), pulmonary hypertension (1), social consideration (1). The two other patients had a giant left ventricular aneurysm for which a cardiomyoplasty was judged preferable to transplantation. Ejection fraction ranged from 9 to 24% (mean 14%). Mitral valve incompetence and tricuspid valve incompetence were present in 2 patients.

A dynamic Cardiomyoplasty was carried out using the pediculed left latissimus dorsi transposed into the thorax through a window made in the chest by removing the second left rib. The muscle was used either to reinforce the whole heart (9) or as a myocardial substitute to repair a large defect after removal of an extensive tumor (1) or aneurysm (2). Associated procedures were: subtotal resection and plastic repair of the diaphragme (1), prosthetic ring mitral valve repair (1), prosthetic ring tricuspid valve repair (1), coronary artery bypass (1). 6 patients required circulatory assistance, either post-operatively (4) or both pre and post-operatively (2), using intraaortic balloon counterpulsation (6) and a Pierce-Thoratec artificial left ventricle (1). The programmed sequential stimulation (AC) was begun 15 days after operation, to allow for complete fusion of the muscle to the heart, and was completed in an average of 8 weeks.

Five patients died in the post-operative period, the causes of death were: cardiac failure (3), ventricular tachycardia (1), renal failure (1). All patients but one had multiorgan failure prior to the operation. The average age was 61 years (42-67).

The 7 patients who survived the operation are in functional class I (1), or II (6). The first patient, operated upon 2 years and 8 months ago in desperate condition is living a normal family life as a mother of two children with no medication. Post-operative Echo-Doppler and 99 MTC heart Scan performed in all patients showed an average ejection fraction of 13.6% without stimulation and 20.6% with stimulation ($P < 0.01$).

This early experience calls for confirmation by a larger number of cases and a longer follow-up. It nevertheless demonstrates that dynamic car-diomyoplasty was effective in all surviving patients after the electrical stimulation has been instituted. This technique may prove to be helpful in the future whenever cardiac transplantation is contraindicated or as an alternative to cardiac transplantation in carefully selected cases.

*By Invitation

27. Current Status of Surgery for Bullous Emphysema

*JOHN E. CONNOLLY and ARCHIE F. WILSON**

Irvine, California

Bullous emphysema is the term used to describe patients with acquired emphysema and bullae of the upper lung fields. These bullae are usually bilateral, appear as cotton candy-like multiloculated cystic sacs, and commonly progressively compress relatively normal lower lobes, resulting in severe pulmonary impairment.

Careful selection of patients whose upper and middle lobe bullae severely compress uninvolved lower-lobe tissue permits excision of the bullous tissue with re-expansion of the compressed lower lobe tissue.

Over the past 20 years the authors have had experience with 19 such carefully selected patients. All were severely symptomatic. The majority of these patients required staged bilateral operations with intervals between operations ranging from one month to 11 years. Evidence of compression of relatively normal lower lobe tissue was sine qua non for operation. Selection was initially based on preoperative bronchograms and pulmonary angiography. However, currently tomography and radioisotope lung scanning have been found to be adequate to identify and quantitate compression.

Conservation of all uninvolved lung with excision of only destroyed tissue was carefully adhered to. In no case was lobectomy employed. The use of the stapler, multiple chest tubes, and careful ventilatory support postoperative resulted in no mortality. While prolonged postoperative ventilatory support was often required, all patients ultimately benefited from surgery, in some case dramatically so, with sustained improvement as long as over 11 years postoperatively. Objective pulmonary function data will be presented to document the effectiveness of operation in carefully selected patients. Although these cases represent only a minority of the emphysematous population, patients with bullous emphysema and compression can significantly be improved by appropriate surgical resection.

*By Invitation

28. Diffusing Capacity Predicts Morbidity and Mortality Following Pulmonary Resection

MARK K. FERGUSON*†, LOUISE R. LITTLE*,

DEBORAH MANJONEY*, ALAN LEFF*,

KEITH J. POPOVICH* and ALEX G. LITTLE

Chicago, Illinois

Spirometry and cardiovascular status are routinely used to exclude high risk patients from pulmonary resection. The majority of operative deaths in acceptable candidates are said to be random and unpredictable. We retrospectively reviewed 176 consecutive patients who underwent lobectomy or pneumonectomy to evaluate other pulmonary function parameters as predictors of operative morbidity or mortality. Data on 40 preoperative variables were collected and statistical analyses were performed to determine their relationship to 21 operative and postoperative events. There were 97 males and 78 females with a mean age of 60.2 years. 153 had lung cancer (58 Stage I, 23 Stage II and 72 Stage IIIA) while 22 had benign disease. 59 had pneumonectomy and 116 had lobectomy or bilobectomy. Overall hospital mortality was 8.5%. The incidence of pulmonary complications (PC; identified as ven-tilatory support > 24 hours, need for bronchodilators or reintubation, pneumonia, lobar collapse) was unrelated to spirometric values. PC were significantly influenced by diffusing capacity of the lung for carbon monoxide (DLCO, hemoglobin and volume corrected, expressed as ml/min/torr). Pulmonary complications occurred in 31.4% of patients with DLCO < 20 and 18.1% with DLCO \geq 20 ($p < 0.025$; 101 patients evaluable). Operative mortality was also importantly influenced by DLCO. Death occurred in 20% of patients with DLCO < 20 and 0% with DLCO \geq 20 ($p < 0.025$; $n = 101$). The incidence of pulmonary complications and death was inversely related to DLCO:

		DLCO (% Predicted)				
		0-48	49-64	65-80	81-96	97-112
Incidence	PC	56	41	42	23	0
(%)	Death	56	23	12	4	5

DLCO is a measure of pulmonary capillary hemoglobin concentration and is a sensitive indicator of the anatomic integrity of the pulmonary alveolus. As such, it can reveal subtle but important changes in lung structure undetected by spirometry. These data show that DLCO independently predicts the risk of pulmonary complications and death following major pulmonary resection and should be routinely used in the preoperative evaluation of such patients.

AN HISTORICAL VIGNETTE

Lyman A. Brewer, III, Pasadena, California

4:50 p.m. Executive Session (Members Only)

7:00 p.m. President's Reception (Tickets Required)

*By Invitation

†Edward D. Churchill Research Scholarship

WEDNESDAY MORNING, APRIL 20, 1988

6:45 a.m. SIMULTANEOUS BREAKFAST SESSIONS**

(See page 5 for further information)

C) CARDIAC ASSIST DEVICES AND STRATEGIES

Larry W. Stephenson, M.D., Philadelphia, Pennsylvania

D) PRE-OPERATIVE CARDIOPULMONARY EVALUATION

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

8:30 a.m. SCIENTIFIC SESSION - Ballroom

29. Experience with the Gore-Tex Surgical Membrane for Pericardia! Closure in

Congenital Heart Surgery

*JOSEPH J. AMATO, JOSEPH V. COTRONEO**,

RALPH J. GALDIERI, JOSE R. ANTILLON**,

R. LEE VOGEL and THOMAS M. CONNOR**

Newark, New Jersey

From 1984 through September 1987, pericardial closure in 88 patients (pts.) who underwent repair of congenital heart defects, was completed with placement of the Gore-Tex (polytetrafluoroethylene) surgical membrane. Review of these cases shows increased use of the membrane over the 3½ year (yrs) period, with 6 cases in 1984, 19 in 1985, 27 in 1986 and 34 cases in the first 9 months of 1987. The average age was 3.17 yrs. with a range of 3.0 to 44.6 kg. The pts. were divided into groups; Group I - 32 pts. with simple repairs (ventricular septal defects, atrial septal defects, partial canal defects, pulmonary stenosis, and uncomplicated tetralogy of Fallot); Group II - 16 pts., complex repairs with conduits; Group III - 40 pts. with complex repairs (Mustard, Jatene, Fontan procedures, total anomalous pulmonary venous drainage, aortic stenosis).

Early results show that there were no infections in any group and also no complications secondary to the Gore-Tex membrane. No increase in pericardial drainage was found in any group when compared to similar groups without the membrane. There were a total of 16 deaths (17.7%). Group I 1/32 (3%), Group II 6/16 (37.5%), and Group III 9/40 (22.5%). None of these deaths could be attributed to the placement of the Gore-Tex membrane.

There were two late reoperations which tested the usefulness of the membrane and in both, the findings were the same. There were no adhesions between the chest wall and the membrane which had basically become transparent. It was loosely attached to epicardium and easily removed except at the periphery where sutures had been placed. On the epicardium was a thin layer of collagenous fibrous tissue which did not interfere with the visualization of the heart anatomy including the coronary vessels.

In the postoperative follow-up, there was no difficulty in the M - mode or 2 - D echocardiographic examination of the heart. When the Gore-Tex membrane was placed externally on the chest wall and then the echo probe placed on top of the membrane, there was moderate blurring of the finer details of the cardiac architecture. Clinically this was evaluated by reviewing the 2 - D echocardiogram of all the post operative Mustard pts. with the Gore-Tex membrane and

comparing these with Mustard pts. with no membrane. There was no difference in the clarity of the studies between the groups.

Conclusions are:

1. The Gore-Tex surgical membrane can be safely used for pericardial closure.
2. Reoperation shows no adhesions to the chest wall or epicardium and visualization of the cardiac surface, especially the coronary vessels, is not obscured.
3. No difficulty was encountered in the echocardiographic examination of the pts. with the Gore-Tex membrane.

*By Invitation

**Admission will be by ticket only and will be limited. Tickets must be obtained in the Registration Area of the Century Plaza Hotel prior to 2:00 p.m. on Monday, April 18. There are no provisions for pre-registration. Breakfast will be served until 7:00 a.m. only.

30. Prevention of Reperfusion Injury in the Neonatal Heart Using Leukocyte-Depleted Blood

*MICHAEL A. BREDA *, DAVIS C. DRINKWATER*.*

HILLEL LAKS, ANTONIO F. CORNO,*

HAKOB G. DAVTYAN and PAUL CHANG**

Los Angeles, California

Activated leukocytes release oxygen free radicals and cause microvascular occlusion. This experiment tests the hypothesis that reperfusion with leukocyte-depleted blood reduces injury following extended ischemic preservation.

An *in vitro* model consisting of an isolated, working neonatal piglet heart and an adult support pig was used. Three groups were compared. Control hearts (n = 45), perfused with whole blood without a period of preservation, developed a left ventricular stroke work index (SWI) at a left atrial pressure of 9 mmHg of $1.29 \pm 0.39 \times 10^4$ erg/g (Mean \pm S.D.). In Groups 1 and 2, hearts were given crystalloid cardioplegia, excised, and stored in 4°C saline for 12 hours. Group 1 (n = 8), reperfused with whole blood, had a SWI of $0.031 \pm 0.088 \times 10^4$ erg/g (2.4% of control). Group 2 (n = 6), reperfused with blood rendered leukocyte-depleted by a polyester filter, had a SWI of $1.16 \pm 0.25 \times 10^4$ erg/g (89.9% of control). This difference was highly significant ($p < 0.0001$). Group 2 had normal ultrastructure on electron microscopy. Group 1 exhibited severe injury with myofibrillar necrosis, mitochondria! disruption, nuclear chromatin clumping, and moderate interstitial edema.

We conclude that reperfusion with leukocyte-depleted blood prevents reperfusion injury and results in excellent myocardial function after long-term heart preservation.

*By Invitation

31. End-To-Side and End-To-End Vascular Anastomoses Using CO₂ Laser

*SEISUKE NAKA TA **, *CHARLES D. CAMPBELL,*

RUTH PICK and ROBERT L. REPLOGLE*

Chicago, Illinois

There are several theoretical advantages to laser anastomoses. This study was designed to compare laser with conventional suture anastomoses. 120 end-to-end (E-to-E) and 40 end-to-side (E-to-S) laser anastomoses were performed on rabbit carotid arteries (2.0-3.0 mm). In each of 80 rabbits the divided left carotid artery was anastomosed using continuous suture technique, and the right carotid was anastomosed using a CO₂ laser. In each of other 40 rabbits both E-to-E laser and E-to-S laser anastomosis were performed on a carotid artery. The laser technique involved the placement of 3 stay sutures (E-to-E) or 4 stay sutures (E-to-S) of 7-0 polypropylene and everting laser seal (65 mW, Ricoh Co. TC 3-C 100). The stay sutures were placed slightly further from the vessel edges than the standard suture technique. Examination of patency by angiography, tissue bonding strength and scanning electron microscopy as well as standard histology of laser anastomoses was carried out sequentially from one hour to one year.

The overall patency rate was 98% (78/80) in E-to-E laser, 79% (63/80) in suture and 95% (38/40) in combined E-to-E and E-to-S laser. No aneurysmal formation was observed in any group. Microscopic findings in laser anastomoses demonstrated degeneration of collagen and protein in the adventitia and media, but much less intimal injury as compared with suture anastomoses. Reendothelialization began on day 3-7 and was completed by day 14 in the laser groups in contrast to day 14 and 30, respectively, in the suture group. The tissue bonding strength in laser was weaker at hour 1 as compared with suture, but withstood the challenge of intraluminal pressure loads of 350 mmHg.

Results indicate CO₂ laser vascular anastomosis results in substantially lesser intimal injury, allowing for rapid early reendothelialization and excellent patency rate. Slight alterations of laser technique produces consistent success of anastomosing this size of vessels without aneurysmal formation. We will demonstrate the laser technique for the anastomoses by videotape. This technique may improve healing and patency in clinical aorto-coronary artery bypass operation.

*By Invitation

32. Metabolic Support of Remote Myocardium After Acute Coronary Occlusion

*FRIEDHELM BEYERSDORF**, *GERALD D. BUCK BERG,*

*and CHRISTOPHER ACAR**

Los Angeles, California

HYPOTHESIS: Metabolic support of remote "non-ischemic" myocardium during acute infarction will reverse the trend towards cardiogenic shock.

METHODS: Of 34 dogs undergoing LAD ligation and 50% stenosis of the circumflex artery (Cx) (allowing 70 - 100% reactive hyperemia), 20 developed irreversible ventricular fibrillation. The 14 survivors were followed for 6 hours measuring global and regional left ventricular function (CI, SWI, ultrasonic crystals) and regional blood flow (radioactive microspheres). After 2 hours 8 dogs received an intravenous infusion of glutamate/aspartate, glucose, insulin, potassium and

Coenzyme Q₁₀ for 4 hours. Data are expressed as mean ± SEM; differences were considered significant at the $p < 0.05$ level.

RESULTS: The substrate infusion for 4 hours caused no change in regional or global cardiac function or coronary blood flow in 5 control dogs. The 6 untreated dogs developed cardiogenic shock (40% decrease in CI, 50% decrease in SWI)* due to persistent dyskinesia in the LAD region (- 40% systolic shortening [SS])* and hypocontractility in the Cx region (48% SS)* despite normal transmural blood flow in the posterior wall of the left ventricle (76 ml/100 g/min). In contrast, treated dogs recovered hypercontractility in the circumflex segment (138% SS)* and raised SWI to control levels (91%) without changing regional blood flow.

CONCLUSIONS: Cardiogenic shock after myocardial infarction is due to impaired ability of "non-ischemic" myocardium to maintain hypercontractility. This limitation can be prevented by metabolic support of viable muscle with intravenous substrate infusion before the definite treatment (e.g. CABG) is started. * $p < 0.05$

9:10 a.m. Basic Science Lecturer

PHYSIOLOGY AND PATHOPHYSIOLOGY OF ESOPHAGEAL PERISTALSIS

Raj K. Goyal, M.D., Boston, Massachusetts

9:55 a.m. Intermission - Visit Exhibits

*By Invitation

10:25 a.m. Scientific Session - Ballroom

33. Coronary Angioplasty vs Coronary Bypass: Three Year Follow-up of a Matched Series of 250 Patients

MARK S. HOCHBERG, ISAAC GIELCHINSKY,

VICTOR PARSONNET, SYED M. HUSSAIN,*

ERIC MIRSKY and DANIEL A. FISCH**

Newark, New Jersey

Two hundred fifty consecutive patients treated for one or two vessel coronary artery disease with either balloon angioplasty or surgical bypass were followed for three years to determine the comparative long term effectiveness of each treatment. The 125 angioplasty patients were matched with the 125 bypass patients so that both groups had a similar number of patients with single or double vessel disease. The two groups did not significantly differ in age, male:female ratio, NYHA Class, risk factors or ejection fraction. The LVEDP was 11 ± 7 mmHg in the angioplasty group and 14 ± 9 mmHg in the surgical patients ($p = 0.0046$).

Angioplasty was deemed initially successful in 88% (110/125), it failed in 10% (12/125) and in 2% (3/125) the lesion could not be crossed. Emergency bypass was performed in 10% (12/125). Four of these 125 angioplasty patients (3%) died within 30 days. Coronary artery bypass grafting was successfully performed on the matched set of surgical patients with 99% (124/125) discharged well. There was one (1%, 1/125) surgical death. The average hospital stay per patient was 4.8 ± 3.1 days for angioplasty and 12.1 ± 4.2 days for bypass.

Three year post procedure follow-up was obtained on 96% (236) of the 245 patients discharged alive. A second angioplasty was required in 18% and 11 angioplasty patients subsequently required surgical bypass. Overall, 19% (23/121) of the angioplasty patients ultimately required bypass. Four

late deaths occurred in the angioplasty group, bringing the early and late mortality to 7% (8/121). There were two late surgical deaths bringing the combined surgical mortality to 2.5% (3/120), $p = 0.1263$.

The evaluation of symptoms revealed that 62% (75/121) of the angioplasty patients are alive and in NYHA Class I or II three years following one or two angioplasty procedures. This compares to 92% (110/120) of surgical patients alive and in the same two NYHA Classes, ($p = 0.0000$).

*By Invitation

34. Late Results After Intracoronary Thrombolysis and Early Bypass Surgery for Acute Myocardial Infarction

*BRUNO J. MESSMER, RAINER UEBIS**,

CHRISTOPH RIEGER, CARMINE MINALE**,

FERDINAND HOFSTADTER and SVEN EFFERT**
Aachen, Federal Republic of Germany

Treatment of acute myocardial infarct has undergone major changes ever since thrombolytic therapy has proved to reduce significantly early mortality in comparison to conventional therapy. Thrombolysis results in reperfusion but does not alter the underlying arteriosclerotic stenosis. Additional and more definite treatment is necessary. Between April 1980 and the end of 1985 we performed early (1-10 days) bypass surgery in 70 patients. Hospital mortality was 1.4%. During a follow-up period from two to seven years (average 56 months) two cardiac and four non-cardiac deaths occurred. Actuarial survival was 90% at seven years. Reoperation was necessary in one patient. Postoperative angiocardiography was done in 50 patients (72%) to assess left ventricular wall motion in the formerly ischemic area. Normal or near normal wall motion was more often (68%) present when ischemia had been below three hours. In patients with reperfusion after three hours more persistent damage was recorded but complete recovery was still found in 45%. Correlation between ischemic time interval and late wall motion score was only 0.35.

In 24 patients transmural needle biopsies for electron microscopy studies had been taken from the formerly ischemic area at the time of surgery. Similar to late wall motion the extent of necrosis did not correlate with the ischemic time interval ($r = 0.17$) nor did the peak enzyme level or total enzyme activity. A clear correlation was, however, present between enzyme levels and the amount of necrosis within the biopsies ($r = 0.76$) as well as between the amount of necrosis and late wall motion ($r = 0.69$) in those patients who had intraoperative biopsy and late angiography.

It is concluded that early surgery after successful thrombolysis yields excellent long-term results but more reliable criteria for optimal patient selection are mandatory.

*By Invitation

35. Six Months Postoperative Clinical and Angiographic Assessment of 163 Consecutive Sequential Mammary Grafts

ROBERT DION, ROBERT VERHELST*,
MICHEL ROUSSEAU*, MARTIN GOENEN*,
ROBERT PONLOT* and CHARLES CHALANT**

Brussels, Belgium

Sponsored by: MARK BRAIMBRIDGE, London, England

Between October 1985 and March 1987, 163 consecutive sequential mammary grafts (SMG) were performed in 155 patients. Age averaged 61 years; 78% had a triple vessel disease; 69% had a history of myocardial infarction (MI); ejection fraction was below 0.4 in 25%; 33% had unstable angina. There were 16 (9.7%) reoperations. The length of the internal mammary artery (IMA) pedicle was the only limitation imposed on its use, and complex IMA grafting was confronted to the whole spectrum of grafting circumstances. No account was taken of the IMA free cut end flow. There were 8 free SMG, 16 triple SMG. Of the 340 sequential mammary anastomoses, 319 were built with the left IMA; 83 (24.4%) were diamond-shaped anastomoses. The right IMA was brought 27 times through the transverse sinus, 7 times for sequential grafting of circumflex branches. Taking in account the adjunctive venous anastomoses, and the single IMA anastomoses, there were 4.5 distal anastomoses per patient, 2.4 being mammary anastomoses, 2.2 being sequential mammary anastomoses. Extensive coronary endarterectomy could not be avoided in 22 cases (14%): in 17 cases, the left IMA was implanted into a venous patch primarily used to close the long arteriotomy. Additional procedures were valvular replacements or repairs (2 aortic, 3 mitral), right coronary ostium patch plastics (2), left main trunk plasty (1) and carotid endarterectomies (2). Hospital mortality rate was 1.3%. Perioperative significant MI rate was 3.3%. Follow-up averaged 15 months. 4 patients (2.5%) still experienced moderate angina pectoris and 4 other patients complained of residual dyspnea. 93 patients (60%) underwent a maximal stress test combined to a thallium scintigraphy at an average of 6 months post-operatively, with abnormal results in respectively 6/3% and 5.8% of the cases. 108 patients (70%) consented to a repeat catheterization at an average of 6 months after operation: 323 (95%) sequential mammary anastomoses were still patent. The patency rate of the diamond-shaped mammary anastomoses was 97%, that of the anastomoses corresponding to the right IMA's brought through the transverse sinus was 95%. As the attrition rate of the IMA grafts beyond 6 months postoperatively has proved to be minimal, gratifying long-term results with systematic use of SMG can be anticipated.

*By Invitation

36. Prospective Study of Adjuvant Surgery After Chemotherapy for Limited Small Cell Lung Cancer

ROBERT J. GINSBERG, FRANCES A. SHEPHERD,
G. ALEXANDER PATTERSON*, RONALD FELD* and
MARTIN E. BLACKSTEIN**

Toronto, Ontario, Canada

Seventy-two patients with central L-SCLC were identified as candidates for adjuvant surgical resection (ASR) after remission induction with chemotherapy (CT). There were 47 male and 25 female patients, median age 61 yrs (range 39-77). Pre-treatment clinical staging revealed 21 stage I, (T1-2 NO), 16 stage II (T1-2N1), and 35 stage III (MO). Pre-operative CT included cyclophosphamide, adriamycin, and vincristine (CAV) for 62, CAV and etoposide for 7, and cisplatin and etoposide for 3 patients. Twenty-six patients achieved complete remission, 29 partial remission, 15 less than partial remission, and there were 2 early deaths. Thirty-four patients did not undergo ASR for the following reasons: randomized to radiation in another study protocol (10), patient refusal (9), inadequate response to CT (4), medically unfit for thoracotomy (3), early death (2). The remaining 38 patients underwent thoracotomy (8 pneumonectomy, 25 lobectomy). Five patients were not resected at thoracotomy (4 unresectable, 1 no tumor identified). Post-operative pathological stage for the 38 ASR patients revealed 7 stage I, 10 stage II, and 21 stage III. N1 disease was not identified pre-operatively for 2 patients, N2 disease for 6, and M1 (pleural) for 1. Postoperative pathology showed no tumor for 3, SCLC only for 29, non-SCLC for 4, and mixed histology for 2. Post-operative treatment included mediastinal irradiation (27) and cranial irradiation (24), but no further CT. Twenty-eight of 72 patients were alive without disease (18 of 38 ASR and 10 of 34 non-ASR). Seven patients died without recurrent SCLC and 37 died in relapse. Median survival for the ASR group is 91 wks versus 47 wks for the non-ASR group ($p=0.001$). Within the ASR group, patients with stage I (NO) disease had significantly ($p = 0.037$) longer survival (median not reached) than stage II or III patients (median 69 and 52 wks, respectively). Their survival was also significantly longer than that of the 10 stage I non-ASR patients ($p = 0.001$). No survival advantage was seen for stage II and III ASR patients ($p = 0.086$). The median survival (51 wks) of the 19 patients who were eligible but did not undergo ASR (10 randomized, 9 refused) was significantly less than that of the ASR patients ($p = 0.049$), and only 1 of 6 stage I patients is alive in this group.

In summary, ASR for responding patients after chemotherapy results in long-term survival and perhaps cure for a significant number of stage I patients. Because a survival advantage cannot be demonstrated for patients with stages II and III, intensive pre-treatment and pre-operative investigation including mediastinoscopy is essential to exclude patients who would not benefit from such combined modality therapy. At this time, surgery cannot be recommended outside the clinical trial setting.

*By Invitation

37. The Effect of Vertebral Column Invasion on the Surgical Treatment of Lung Cancer

CLAUDIO BOTTI TOM R. DeMEESTER*

*and PETER J. DAWSON**

Omaha, Nebraska

The New International TNM Staging System, as proposed by Mountain, characterizes all tumors invading the vertebral column as having a sufficiently poor prognosis to discourage resection. This is contrary to our experience with 12 patients treated between 1976 and 1987 whose tumors clinically extended into the vertebral column. All received 3000 rads of preoperative radiation followed by en bloc resection of the lung and costovertebral angle including a portion of the vertebral body. A complete mediastinal lymphadenectomy was also performed. In two patients the lowest trunk of the brachial plexus was resected, including the subclavian vessels in one. Preoperatively, three patients had a true Pancoast syndrome and in

eight the tumor was located in the apex of the lung. All patients were free of mediastinal node involvement as assessed by pre-radiation mediastinoscopy. Resectability was based on the absence of tumor invasion as assessed by tomograms or CT scans into the triangle formed by the rib and the transverse process and pedicle of the vertebra (costo-transverse foramen) (Figure 1). The first two structures were transected posteriorly and pushed inward, allowing the vertebral body to be resected with a tangentially oriented osteotome (Figure 2). There were eight adenocarcinoma, three squamous carcinoma and one large cell carcinoma. All were T3NO. Follow-up ranged from five months to 11 years with an average of 36 months. Five patients died within 12 months from recurrent disease (one local, two distant and two local and distant). One patient died at five months disease free. Six patients are alive at five months to 11 years (three beyond five years) without evidence of tumor recurrence and arthritic pain. The overall five and ten year survival rate (Kaplan-Meier method) was 42 percent, which is similar to other resected T3NO tumors. Vertebral involvement does not always preclude resection. In proper patient selection, the removal of the involved portion of the vertebral body as described is associated with long term survival without sequelae.

*By Invitation

38. Primary Isolated Aortic Valve Replacement: Early and Late Results

BRUCE W. LYTLE, DELOS M. COSGROVE,

PAUL C. TAYLOR, FLOYD D. LOOP,*

LEONARD A.R. GOLDING, ROBERT W. STEWART*,*

CARL C. GILL and MARLENE GOORMASTIC**

Cleveland, Ohio

One thousand three hundred eighty-two consecutive patients underwent primary isolated aortic valve replacement (AYR) from 1972 through 1983. There were 52 (3.8%) in-hospital deaths. Multivariate analysis identified advanced age ($p < 0.0001$), preoperative shock or cardiac arrest ($p = 0.0002$) and preoperative BUN > 25 mg/100 ml ($p = 0.006$) as independent variables increasing in-hospital mortality, and the use of cardioplegia for myocardial protection ($p = 0.006$) as a factor decreasing mortality.

Follow-up (mean postoperative interval 103 months, range 39-187 months for late survivors, total of 10,125 patient years of follow-up) documented survival of 85% and 66% and event-free survival of 71% and 43% at 5 and 10 postoperative years, respectively. Multivariate models were used to examine the impact of variables over a 10-year follow-up and advanced age, moderate or severe impairment of left ventricular function, coronary artery disease and preoperative BUN > 25 mg/100 ml were identified as factors decreasing late survival and event-free survival (all $p < 0.05$). Patients with bioprostheses had better survival ($p = 0.0001$) and event-free survival ($p = 0.0007$) than patients with mechanical valves. Patients with bioprostheses had superior results only if not taking warfarin, and experienced more reoperations and endocarditis; those with mechanical prostheses suffered more strokes, myocardial infarctions, bleeding complications and thromboembolic events. Survival and event-free survival curves for patients grouped according to prosthesis type converged late in the follow-up. At 5 postoperative years univariate comparisons showed a significant advantage for bioprostheses while at 10 postoperative years they did not.

Analysis of patients grouped according to age at operation showed that bioprostheses were associated with improved survival and event-free survival for patients >60 years, improved survival but not improved event-free survival for patients in the 40-59 year range and did not influence either survival or event-free survival for patients <40 years.

We conclude the 10-year results after isolated AYR are influenced by both patient-related and management-related factors and the impact of those factors is different for patients of different ages.

12:30 p.m. ADJOURN

*By Invitation

NECROLOGY

Jesse E. Adams, Jr., M.D. Chattanooga, TN
Harold A. Collins, M.D. Sea Island, GA
Wendell B. Thrower, M.D. Sewanee, TN

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
Pacífico, Albert D

Montgomery

Simmons, Earl M

ALASKA

Anchorage

Phillips, Francis J

ARIZONA

Phoenix

Brown, Lee B
Cornell, William P
Kerth, William J
Nelson, Arthur R

Scottsdale

Fisk, R Leighton
Pluth, James R

Sun City

Read, C Thomas

Tucson

Burbank, Benjamin
Copeland III, Jack G
Sanderson, Richard G

ARKANSAS

Jasper

Hudson, W A

Little Rock

Campbell, Gilbert S

Chico

Becker, Ronald M

Covina

Carter, P Richard

Duarte

Benfield, John R

El Macero

Andrews, Neil C

Escondido

Mannix Jr, Edgar P

Fresno

Evans, Byron H

Indian Wells

Salyer, John M

Irvine

Connolly, John E
Miller, Don R

La Canada

Aronstam, Elmore M

La Jolla

Fosburg, Richard G
Hutchin, Peter

La Mesa

Long Jr, David M

Loma Linda

Bailey, Leonard L
Wareham, Ellsworth E

Long Beach

Bloomer, William E
Carlson, Herbert A
Stemmer, Edward A

Los Angeles

Baisch, Bruce F
Buckberg, Gerald D
Fonkalsrud, Eric W

Read, Raymond C
Williams, G Doyne
CALIFORNIA
Anaheim
Main, F Beachley

Holmes, E Carmack
Hughes, Richard K
Kay, Jerome Harold
Khonsari, Siavosh
Laks, Hillel
Lee, Myles E

Moreno-Cabral, Ricardo

Lindesmith, George G
Longmire Jr, William
Maloney Jr, James V
Mandal, Ashis K
Matloff, Jack M
Meyer, Bert W
Morton, Donald L
Mulder, Donald G
Stiles, Quentin R

Martinez
Guernsey, James M

Montebello
Lui, Alfred H F

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

Palo Alto
Conn, Roy B
Jamplis, Robert W
Wilson, John L

Pasadena
Ingram, Ivan N
Newman, Melvin M
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

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

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

COLORADO

Oury, James H
Peters, Richard M
Trummer, Max J
San Francisco
Culiner, Morris M
Gardner, Richard E
Grimes, Orville F
Heydorn, William H
Hill, J Donald
Leeds, Sanford E
McEnany, M Terry
Richards, Victor
Roe, Benson B
Rogers, W L
Thomas, Arthur N
Turley, Kevin
Ullyot, Daniel J

San Jose
Oakes, David D

San Marino
Tsuji, Harold K

San Rafael
Julian, Ormand C

Santa Ana
Pratt, Lawrence A

Santa Barbara
Higginson, John F
Jahnke Jr, Edward J
Lewis, F John
Love, Jack W

Seal Beach
Silver, Arthur W

South Laguna
Oatway Jr, William H

South Pasadena
Brewer III, Lyman A

St Helena
Dugan, David J

Stanford
Baldwin, John C
Mark, James B D
Miller, D Craig
Oyer, Philip E
Shochat, Stephen J
Shumway, Norman E
Stinson, Edward B

DELAWARE

Newark
Lemole, Gerald M

Wilmington
Pecora, David V

DISTRICT OF COLUMBIA

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Zaroff, Lawrence I

Denver

Blair, Emil

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Burrington, John D

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Eiseman, Ben

Grow, John B

Harken, Alden H

Harper, Frederick R

Hopeman, Alan R

Pappas, George,

Paton Bruce C

Pomerantz, Marvin

Rainer, W Gerald

Van Way III, Charles W

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Wright, George W

Englewood,

Kovarik Joseph L

Lakewood

Swan, Henry Vail

Fuller, Josiah

CONNECTICUT**Hartford**

Kemler, R Leonard

New Haven

Carter, Max G

Glenn, William W L

Hammond, Graeme L

Lindskog, Gustaf E

Stansel Jr, Horace C

Stern, Harold

Norwich

Kelley, Winfield O

Sharon

Wylie, Robert H

Wilton

Pool, John L

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

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Sherman, Paul H

Ponte Vedra Beach

Gilbert Jr, Joseph

St Petersburg

Clerf, Louis H

Daicoff, George R

Dematteis, Albert

Tallahassee

Kraeft, Nelson H

Aaron, Benjamin L

Bowles, L Thompson

Graeber, Geoffrey M

Hufnagel, Charles A

Keshishian, John M

Midgley, Frank M

Mills, Mitchell

Randolph, Judson G

Simmons, Robert L

Smyth, Nicholas P D

Wallace, Robert B

FLORIDA**Atlantic Beach**

Stranahan, Allan

Boca Raton

Seley, Gabriel P

Clearwater

Lasley, Charles H

Wheat Jr, Myron W

Coconut Grove

Center, Sol

Coral Gables

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

Macon

Sealy, Will C

Savannah

Langston, Hiram T

Yeh, Thomas J

HAWAII**Honolulu**

Ching, Nathaniel P

Gebauer, Paul W

McNamara, Joseph J

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

Tampa

Connor, Richard G
Seller, 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
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

Maywood

Keeley, John L
Pifarre, Roque

Oak Brook

Hudson, Theodore R
Nigro, Salvatore L

Park Ridge

Weinberg Jr, Milton

Princeville

Debord, Robert A

Skokie

Baffes, Thomas G

Springfield

Wellons Jr, Harry A

Winnetka

Mackler, S Allen

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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

Behrendt, Douglas M
Ehrenhaft, Johann L
Rossi, Nicholas P
Stanford, William

KANSAS**Cunningham**

Allbritten Jr, F F

Wichita

Ilbawi, Michel N

Javid, Hushang

Jensik, Robert J

Karp, Robert B

Kittle, C Frederick

Leininger, Bernard J

Levitsky, Sidney

Little, Alex G

Michaelis, Lawrence

Midell, Allen I

Najafi, Hassan

Raffensperger, John

Replogle, Robert L

Shields, Thomas W

Silverman, Norman A

Thomas Jr, Paul A

Vanecko, Robert M

Evanston

Anderson, Robert W

Fry, Willard A

Tatooles, Constantine

Glencoe

Rubenstein, L H

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

Mills, Noel L

O'Neill Jr, Martin J

Metairie

Ochsner Jr, Alton

New Orleans

Blalock, John B

Decamp, Paul T

Hewitt, Robert L

Lindsey, Edward S

Moulder, Peter V

Ochsner, John L

Pearce, Charles W

Rosenberg, Dennis M

Schramel, Robert J

Webb, Watts R

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Hurwitz, Alfred

Portland

Drake, Emerson H

Hiebert, Clement

Rockport

Swenson, Orvar

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Attar, Safuh M A

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Baumgartner, William A

Cowley, R Adams

Gardner, Timothy J

Tocker, Alfred M
KENTUCKY
Lexington
Crutcher, Richard R
Dillon Jr, Marcus L
Todd, Edward P J

Bethesda
Clark, Richard E
Jones, Michael
Shumacker Jr, Harris B

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Iovine, Vincent M

Potomac
Zajtchuk, Rostik

Towson
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Worton
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MASSACHUSETTS
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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
Moncure, Ashby C
Neptune, Wilford B
Overholt, Richard H
Rheinlander, Harold F
Roberts, Arthur J
Russell, Paul S
Scannell, J Gordon
Schuster, Samuel R
Starkey, George W B
Thurer, Robert L
Weintraub, Ronald
Wilkins Jr, Earle W

Birmingham
Dodrill, Forest D
Timmis, Hilary H

Detroit
Arbulu, Augustin
Arciniegas, Eduardo
Day, J Claude
Levine, Frederick H
Magilligan Jr, D J

Gott, Vincent L
Haller Jr, J Alex
Hankins, John R
McLaughlin, Joseph S
Michelson, Elliott
Reitz, Bruce A
Tuurney, Stephen Z

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
Desforges, Gerard

Methuen
Wilson, Norman J

No Andover
Cook, William A

So 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
Vander Salm, Thomas J

MICHIGAN
Ann Arbor
Bartlett, Robert H
Bove, Edward L
Gago, Otto
Greenfield, Lazar J
Kirsh, Marvin M
Morris, Joe D
Neerken, A John
Orringer, Mark B
Prager, Richard L
Sloan, Herbert

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

MISSOURI
Bridgeton
Codd, John E

Steiger, Zwi
Wilson, Robert F
Farmington Hills
Lam, Conrad R
Grand Rapids
Harrison, Robert W
Meade, Richard H
Rasmussen, Richard A
Tomatis, Luis A
Grosse Pointe
Benson, Clifford D
Taber, Rodman E
Leonard
Gerbasi, Francis S
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
Riser, Joseph C
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
Puga, Francisco J
St Paul
Lillehei, C Walton
Miller, Fletcher A
Perry Jr, John F

Peterborough
Woods, Francis M
NEW JERSEY
Alpine
Holswade, George R
Belleville
Jurado, Roy A
Bellville
Gerard, Franklyn P
Belmar
Bailey, Charles P
Browns Mills
Fernandez, Javier
Gonzalez- Lavin, Lorenzo
Camishion, Rudolph C
Cherry Hill
Pierucci Jr, Louis
East Orange
Auerbach, Oscar
Hackensack
Hutchinson III, John E
Jersey City
Demos, Nicholas J
Millburn

Columbia
Silver, Donald
Kansas City
Adelman, Arthur
Ashcraft, Keith W
Benoit Jr, Hector W
Holder, Thomas M
Killen, Duncan A
Mayer Jr, John H
Padula, Richard T
Piehler, Jeffrey M
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
Lewis Jr, J Eugene
Pennington, D Glenn
Roper, Charles L
Weldon, Clarence S
Willman, Vallee L
NEBRASKA
Omaha
Demeester, Tom R
Fleming, William H
Moulton, Anthony L
Schultz, Richard D
NEW HAMPSHIRE
Hanover
Crandell, Walter B

Las Vegas
Thai, Alan P
NEW YORK
Albany
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
Rubin, Morris
Brooklyn
Cunningham Jr, J N
Levowitz, Bernard S
Rose, Daniel M
Sawyer, Philip N
Buffalo
Adler, Richard H
Andersen, Murray N

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
Hochberg, Mark S
Neville, William E
No 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

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
Jaretzki III, Alfred
King, Thomas C
Kirschner, Paul A
Lambert, Adrian
Litwak, Robert S
Maier, Herbert C
Malm, James R
Martini, Nael
McCord, Colin W
Nealon Jr, Thomas F
Okinaka, Arthur J
Redo, S Frank
Reemtsma, Keith
Skinner, David B
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
Plattsburg
Potter, Robert T
Rochester
Graver, William L
Deweese, James A

Bhayana, Joginder N
Lajos, Thomas Z
MacManus, Joseph E
Subramanian, S
Cooperstown
Blumenstock, David A
Fayetteville
Bugden, Walter F
Effler, Donald B
Floral Park
Crastnopol, Philip
Irvington
Altai, Lari A
Loudonville
Alley, Ralph D
New Hyde Park
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

Saranac Lake
Decker Jr, Alfred M
Scarsdale
Robinson, George
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
Bredenber, Carl E
Meyer, John A
Parker Jr, Frederick
Valhalla
Reed, George E
Westhampton Beach
Sarot, Irving A
NORTH CAROLINA
Asheville
Belts, Reeve H
Scott, Stewart M
Sethi, Gulshan K
Takaro, Timothy
Chapel Hill
Keagy, Blair A
Starek, Peter J K
Wilcox, Benson R
Charlotte
Robicsek, Francis
Taylor, Frederick H
Durham
Jones, Robert H
Lowe, James E
Oldham Jr, H N
Sabiston, David C
Wechsler, Andrew S

Hicks, George L
Mahoney, Earle B
Schwartz, Seymour I
Stewart, Scott

Roslyn

Thomson Jr, Norman B
Wisoff, B George

Tryon

Wilson, Julius L

Winston-Salem

Cordell, A Robert
Crosby, Ivan K
Hudspeth, Allen S
Johnston, Frank R
Meredith, Jesse H
Mills, Stephen A

NORTH DAKOTA

Grand Forks

James, Edwin C

OHIO

Akron

Falor, William H

Cincinnati

Albers, John E
Callard, George M
Flege Jr, John B
Gonzalez, Luis L
Helmsworth, James A
Hiratzka, Loren F
Wilson, James M
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
Van Heeckeren, Daniel W

Columbus

Clatworthy Jr, H W
Kakos, Gerard S
Kilman, James W
Meckstroth, Charles
Vasko, John S
Williams Jr, Thomas E

Dayton

Dewall, Richard A

Pepper Pike

Mendelsohn, Harvey J

Toledo

Davis, John T

Philadelphia

Brockman, Stanley K
Donahoo, James
Dunn, Jeffrey M
Edie, Richard N
Edmunds Jr, L Henry
Ellis, Robert J
Fineberg, Charles
Haupt, George J
MacVaugh III, Horace

Wolfe, Walter G
Young Jr, W Glenn

Oriental

Deaton Jr, W Ralph

Pinehurst

Fischer, Walter W

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

Cobanoglu, Adnan
Krause, Albert H
Okies, J Edward
Starr, Albert

Tigard

Poppe, J Karl

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

Harrisburg

Pennock, John L

Hershey

Pierce, William S
Waldhausen, John A

Lancaster

Bonchek, Lawrence I
Witmer, Robert H

Mt Pleasant

Crawford Jr, Fred A

Spartanburg

Utley, Joe R

TENNESSEE

Chattanooga

Hall, David P

Johnson City

Lefemine, Armand A

Knoxville

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

Wayne

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

Charleston

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

Columbia

Almond, Carl H

Landrum

Stayman, Joseph W

Lambert, Gary J
Mills, Lawrence J
Paulson, Donald L
Platt, Melvin R
Razzuk, Maruf A
Ring, W Steves
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
De Bakey, Michael E
Frazier, Oscar H
Mailman, Grady L
Henly, Walter S
Lawrie, Gerald M

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

Sparta

Labrosse, Claude C

TEXAS

Amarillo

Sutherland, R Duncan

Austin

Hood, R Maurice

Burnet

Ross, Raleigh R

Dallas

Adam, Maurice
Holland, Robert H

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

VERMONT

Brattleboro

Gross, Robert E

Burlington

Coffin, Laurence H
Miller, Donald B

Chester Depot

Adams, Herbert D

West Dover

Humphreys II, G H

White River Jct

Tyson, M Dawson

VIRGIN ISLANDS

St Thomas

Wilder, Robert J

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

San Antonio

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

WASHINGTON

Bainbridge Islands

Malette, William G

Bellevue

Li, Wei-I
Manhas, Dev R

Bellingham

Varco, Richard L

Friday Harbor

Fox, Robert T
Lawrence, G Hugh

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
Mansfield, Peter B
Miller Jr, Donald W
Rittenhouse, Edward A
Sauvage, Lester
Thomas, George I

Spokane

Berg Jr, Ralph

WEST VIRGINIA

Charlestown

Walker, James H

Daniels

Littlefield, James B

Huntington

Bryant, Lester R
Norman, John C

CANADA

Alberta

Calgary

Miller, George E

Edmonton

Callaghan, John C
Gelfand, Elliot T

VIRGINIA

Arlington

Conrad, Peter W
Klepsner, Roy G

Charlottesville

Dammann, John F
Kron, Irving L
Minor, George R
Muller Jr, William
Nolan, Stanton P

Falls Church

Wolcott, Mark W

Lynchburg

Moore, Richmond L

Richmond

Bosher Jr, Lewis H
Brooks, James W
Cole, Dean B
Gwathmey, Owen
Lower, Richard R

Morgantown

Murray, Gordon F
Warden, Herbert E

Parkersburg

Tarnay, Thomas J

WISCONSIN

La Crosse

Gundersen, Erik A

Madison

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

British Columbia

Kelowna

Couves, Cecil M

Vancouver

Allen, Peter
Ashmore, Phillip G

Sterns, Laurence P

Jamieson, W R Eric
Tyers, G Frank O

Victoria

Stenstrom, John D

W Vancouver

Robertson, Ross

Manitoba

Winnipeg

Barwinsky, Jaroslaw

Cohen, Morley

Newfoundland

St John's

Brownrigg, Garrett M

Nova Scotia

Halifax

Murphy, David A

Kentville

Quinlan, John J

Mabou

Thomas, Gordon W

Ontario

Dorset

Mustard, William T

Hamilton

Sullivan, Herbert J

Kingston

Charrette, Edward J P

London

Heimbecker, Raymond

Nottawa

Key, James A

Ottawa

Keon, Wilbert J

Sudbury

Field, Paul

Walker, George R

Toronto

Baird, Ronald J

Bigelow, Wilfred G

Cooper, Joel D

David, Tirone E

Ginsberg, Robert J

Goldberg, Melvyn

Goldman, Bernard S

Henderson, Robert D

Joynt, George H C

McIntosh, Clarence A

Pearson, F Griffith

Salerno, Tomas A

Scully, Hugh E

Todd, Thomas R J

Trimble, Alan S

Trusler, George A

Weisel, Richard D

Williams, William G

Westbrook

Lynn, R Beverley

Woodbridge

Laird, Robert C

Province Of Quebec

Montreal

Blundell, Peter E

Chiu, Chu-Jeng (Ray)

Dobell, Anthony R

Duranceau, Andre C H

Lepage, Gilles

MacLean, Lloyd D

Morin, Jean E

Mulder, David S

Pelletier, Conrad L

Scott, Henry J

Outremont

Bruneau, Jacques

Quebec

Gravel, Joffre-Andre

Sainte-Foy

Deslauriers, Jean

Westmount

Vineberg, Arthur M

OTHER COUNTRIES

Argentina

Buenos Aires

Favaloro, Rene G

Australia

New South Wales

Melbourne

Nossal, Gustav J V

South Australia

Piccadilly

Sutherland, H D'Arcy

Brazil

Sao Paulo

Jatene, Adib D

Zerbini, E J

England

Bath, Avon

Belsey, Ronald

Buckinghamshire

Sellers, Thomas

Hereford

Thompson, Vernon C

Herefordshire

Smith, Roger A

London

Braimbridge, Mark V

Kennedy, John H

New Zealand

Auckland

Barratt-Boyes, Brian

P R China

Beijing

Ying-Kai, Wu

Portugal

Lisbon

Macedo, Manuel E M

Saudi Arabia

Riyadh

Deniord, Richard N

Lennox, Stuart C
Ross, Donald N
France
Bordeaux-Pessac
Fontan, Francis M
Paris
Binet, Jean-Paul
Carpentier, Alain F
Dubost, Charles
Guatemala
Guatemala City
Herrera, Rodolfo
India
Raiputana
Van Allen, Chester M
Ireland
Dublin
O'Malley, Eoin
Israel
Haifa
Fishman, Noel H
Jerusalem
Davis, Lowell L
Italy
Bergamo
Parenzan, Lucio
Japan
Kitakyushu
Miyamoto, Alfonso T
Miyagi
Mohri, Hitoshi
Tokyo
Wada, Juro J

Merendino, K Alvin
Scotland
Edinburgh
Logan, Andrew
Spain
Santander
Duran, Carlos Gomez
Switzerland
Arzier
Hahn, Charles J
Zurich
Senning, Ake
United Arab Emirate
Abu Dhabi
Brom, A Gerard
URSS
Moscow
Burakovsky, Vladimir I
Venezuela
Caracas
Tricerri, Fernando E
W 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. Lockett
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 Renting
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. Purpose

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.

Section 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 re-elected 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 re-elected 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 re-elected 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 and 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
1987-Chicago..... President, Norman E. Shumway

**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 William S. Pierce, M.D., Hershey, Pennsylvania

**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, 38 young surgeons from 19 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, M.B., 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

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.
Tammisalonitie 20, Helsinki, 00830, Finland |
| 11th | 1963-64 | Masahiro Saigusa, M.D.
National Nakano Chest Hospital, 3-14-20 Egata, Nakano-
Ku, Tokyo 165, JAPAN |
| 12th | 1963-64 | Adar J. Hallen, M.D.

Department of Thoracic Surgery, University Hospital

Uppsala, SWEDEN |
| 13th | 1964-65 | Stuart C. Lennox, M.D.
18 Alexander Sq., 5W3 2AX, London, ENGLAND |
| 14th | 1964-65 | Elias Carapistolis, M.D., F.A.C.S.
Thessaloniki, GREECE |
| 15th | 1965-66 | Gerhard Friehs, M.D. |

Chirurgische University Klinik, Graz A-8036, AUSTRIA

- 16th 1965-66 Ary Blesovsky, M.D.
London, ENGLAND
- 17th 1966-67 C. Peter Clarke, F.R.A.C.S.
Ste. #4, 6th Floor, 55 Victoria Parade, Fitzroy 3065
AUSTRALIA
- 18th 1966-67 G. B. Parulkar, M.D.
K.E.M. Hospital & Seth G.S., Medical College, Bombay
400 012, INDIA
- 19th 1967-68 Claus Jessen, M.D.
Surg. Dept. D, Rigshospitalet, Blegdamsvej 9,
Copenhagen, DENMARK
- 20th 1969-70 Peter Bruecke, M.D.
AM Steinbruch, 29 Linz-Puchenau, A-4040, AUSTRIA
- 21st 1970-71 Michel S. Slim, M.D.
New York Medical College, Division of Pediatric Surgery

New York, New York 10595 USA
- 22nd 1971-72 Severi Pellervo Manila, M.D.
Department of Thoracic Surgery, Helsinki University
Central Hospital, Helsinki 29, FINLAND
- 23rd 1972-73 Yasuyuki Fujiwara, M.D.
Department of Cardiovascular Surgery, Tokyo Medical
College Hospital, Shinjuku, Tokyo, JAPAN
- 24th 1973-74 Marc Roger deLeval, M.D.
8 Thornton Way, Hampstead Garden Suburb, London NW
11, ENGLAND
- 25th 1974-75 J. J. DeWet Lubbe, M.D.
1406 City Park Medical Center, 181 Longmarket St., Cape
Town 8001, REPUBLIC OF SOUTH AFRICA
- 26th 1975-76 Mieczyslaw Trenkner, M.D.
Institute of Surgery, 80-211 Ul, Deinsky 7, Gdansk,
POLAND
- 27th 1976-77 Bum Koo Cho, M.D.
Yonsei University, P.O. Box 71

Severance Hospital, Seoul, KOREA
- 28th 1977-78 Alan William Gale, M.D., FRACP, FRACS

171 Sutherland, Paddington 2021

Sydney, AUSTRALIA
- 29th 1978-79 Eduardo Otero Goto, M.D.

- Servicio de Cirugia Cardiovascular, Ciudad Sanitaria "Le Fe"
Valencia, SPAIN
- 30th 1980-81 Richard K. Firmin, M.D.
"Moss Grove", 5 Knighton Grange Road, Stoneygate,
Leicester LE2 2LF, ENGLAND
- 31st 1981-82 Claudio A. Salles, M.D.
Av Celso Porfirio Machado, 370, Bairro Belvedere
Belo Horizonte MG, BRAZIL
- 32nd 1982-83 Yasuhisa Shimazaki, M.D.
First Dept. of Surgery, Osaka Univ. Medical School
Fukushima-ku, Osaka 553, JAPAN
- 33rd 1983-84 Georg S. Kobinia, M.D.
LKH Klagenfurt, Dept. of Cardiac Surgery, Klagenfurt,
9020, AUSTRIA
- 34th 1984-85 Aram Smolinsky, M.D.
Department of Cardiac Surgery, The Sheba Medical
Center
Tel Hashomer, 52621, ISRAEL
- 35th 1985-86 Florentine J. Vargas, M.D.
San Martin 1353, Buenos Aires, ARGENTINA
- 36th 1986-87 Ari L. J. Harjula, M.D.
745 So. Bernardo Ave., Apt. 312, Sunnyvale, CA 94087
USA
- 37th 1987-88 Byung-Chul Chang, M.D.
Stanford University, 1160 Welch Road, #623, Palo Alto,
CA 94304 USA
- 38th 1988-89 Wan Cheng, M.D.
Union Hospital, Tongji Medical University, Jiefang St.
575, Wuhan, Hubei, The People's Republic of CHINA

THE AMERICAN ASSOCIATION FOR THORACIC SURGERY RESEARCH SCHOLARSHIP

The American Association for Thoracic Surgery Research Scholarship was established by the Association in 1985. Funded by the Association and individual contributions, the Research Scholarship provides an opportunity for research, training and experience for North American surgeons committed to pursuing an academic career in cardiothoracic surgery. Administered by the Graham Education and Research Foundation, the program is undertaken within the first three years after completion of an approved cardiothoracic residency and is about two years in duration.

EDWARD D. CHURCHILL RESEARCH SCHOLARSHIP

"Pharmacology of the Pulmonary Lymphatics"

1986-1988 Mark K. Ferguson, M.D.

University of Chicago, Department of Surgery, Box 255
5841 South Maryland Avenue, Chicago, Illinois 60637

ALFRED BLALOCK RESEARCH SCHOLARSHIP

"Efficacy and Toxicity of a New Blood Substitute: Polymerized, Ultra-Pure, Stroma-Free Bovine Hemoglobin"

1988-1990 Gus J. Vlahakes, M.D.

Massachusetts General Hospital and Harvard Medical School Department of Surgery, Boston,
Massachusetts 02114