

1977 ANNUAL MEETING PROGRAM



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**American Association for Thoracic Surgery
 57th Annual Meeting
 Scientific Program
 MONDAY MORNING, APRIL 18, 1977**

**8:30 A.M. Business Session (Limited to Members)
 Grand Ballroom**

**8:45 A.M. Scientific Session
 Grand Ballroom**

1. Selective Surgical Management in Infants with Esophago-gastric Atresia Based Upon Clinical Status

JUDSON G. RANDOLPH, R. PETER ALTMAN* and

KATHRYN D. ANDERSON*, Washington, D.C.

Fifty-six patients with esophageal atresia and distal tracheo-esophageal fistula (Vogt-Gross Type C) have been treated at our institution since 1966. The methods of treatment have been individualized based upon the following criteria: (a) gestational age, (b) birth weight, (c) pulmonary status, and (d) coexistence of other major anomalies. Three distinct approaches have evolved:

- I. Immediate Primary Repair; reserved for infants weighing more than 2 Kg., with no major anomalies and satisfactory pulmonary status.
- II. Delayed Primary Repair; infants of adequate weight (greater than 2,000 gm.) showing significant but reversible pulmonary changes with anticipated recovery within 1 week, and infants requiring several days for evaluation of an associated congenital anomaly. Temporize by upper pouch suction, gastrostomy, and antibiotics.
- III. Staged Repair; premature and severely distressed infants as well as those with cardiac lesions of surgical priority; staging consists of upper pouch suction, gastrostomy, retropleural division of fistula, or gastric division, with subsequent transpleural repair in 4 to 8 weeks.

	No. Pts.	Operations	Survival	(86.2%)
I.	29	29	25	
II.	19	17	16	(94.1%)

III.	8	7	5	(71.4%)
Total	56	53	46	(87%) operated group (82%) all patients

The surgical approach to each of these infants has been selected after assessment of all aspects of their clinical condition. Flexibility in treatment which is predicated on previously established criteria, seems superior to any single surgical plan.

*By invitation

2. Resection of Left Ventricular Outflow Obstruction in D-Transposition of the Great Arteries

F. S. IDRIS, S. DE LEON*, H. NIKAI DOH*, M. A. PAUL*,
E. NEWFELD* and A. J. MUSTER*, Chicago, Illinois

Left ventricular (LV) outflow obstruction in d-transposition of the great arteries (TGA) may complicate surgical management. Two operative techniques can be used; direct resection of the obstruction or redirecting the flow with a Rastelli operation when a VSD is present. Of 110 patients who underwent correction of TGA by intra-atrial venous switch (Mustard), there were 22 patients who had significant LV outflow stenosis with or without VSD. Preoperatively, the LV to pulmonary artery peak systolic pressure gradient (LVPAG) in 20 patients ranged from 40 to 92 (average 67) mm Hg. Age at surgery ranged from 5 mo. to 18 yrs.; 18 had subpulmonic, 2 valvar and 2 supra-valvar stenosis. VSD was present in 14, PDA in 5 and mitral stenosis in 1; 3 patients had a previous Baffles procedure, 2 Waterston-Cooley anastomosis, 1 Blalock-Taussig shunt, 2 surgical atrial septectomy and 1 Glenn procedure.

The pulmonic and subpulmonic areas were usually approached through the pulmonary artery during a short period of hypothermia and circulatory arrest after placing the intra-atrial baffle and closing the VSD. In few patients resection was accomplished through the VSD. There were 3 hospital deaths; the remaining patients are doing well. Two patients sustained complete A-V block and have a permanent cardiac pacemaker. Cardiac catheterization 1 to 5 years after surgery in 13 patients showed a significant decrease in the LVPAG in 11 patients. The preoperative average gradient of 67 (40 to 92) mm Hg was reduced to an average of 23 (0 to 58) mm Hg. In one patient with intact ventricular septum there was no change and in one an increase in the pressure gradient; 75 mm Hg preoperative, 110 mm Hg postoperative.

Our experience with these 22 patients demonstrates that direct resection of LV outflow stenosis in TGA in conjunction with a Mustard procedure and closure of the VSD when present can be accomplished with satisfactory results and adequate relief of the LV outflow obstruction.

*By invitation

3. Discrete Subvalvular Aortic Stenosis - An Evaluation of Operative Therapy

ROBERT L. HARDESTY*, HARTLEY P. GRIFFITH*,

ROBERT A. MATTHEWS*, RALPH D. SIEWERS*,

JAMES R. ZUBERBUHLER* and HENRY T. BAHNSON,

Pittsburgh, Pennsylvania

Thirty-five children (median age of seven years) with discrete subvalvular aortic stenosis underwent operative treatment between 1962 and 1975. The three anatomic types of obstruction encountered were the thin membrane (21 cases), the fibromuscular collar (13 cases), and the fibromuscular tunnel (1 case). Valvular stenosis was associated with the thin membrane in six patients and with the fibromuscular collar in two. A second operation was performed for what was either an inadequate resection or regrowth of the subvalvular fibrous tissue in two instances and for an unrecognized membrane in a child who had previously undergone an aortic commissurotomy. The median gradient preoperatively was 80 Torr.

Three operative deaths occurred (9%). One death occurred three years post-operatively and was due to a malfunctioning pacemaker - the only complete heart block in the series. All the children have been re-evaluated periodically. Clinical electrocardiographic, and roentgenographic evaluations indicate that symptoms have been relieved (3 cases), left

ventricular hypertrophy has diminished (30 cases), and aortic insufficiency has remained the same as it was preoperatively (15 cases). One patient has mild mitral insufficiency caused by the resection. No iatrogenic ventricular septal defect has occurred.

*By invitation

4. Supravalvular Aortic Stenosis - Repair by Extended Aortoplasty

DONALD B. DOTY, DONALD B. POLANSKY* and

CONRAD B. JENSON*, Iowa City, Iowa and Salt Lake City, Utah

Enlargement of the aorta by diamond shaped patch of the noncoronary sinus of Valsalva may not be sufficient in severe cases of supravalvular aortic stenosis. This traditional reconstruction is asymmetric and if the fibrous supravalvular ring is thick and rigid, the aorta may not open widely with patch angioplasty so that aortic obstruction may remain as shown in cross section A. Also, aortic valve function may not be perfect after asymmetric reconstruction, so there may be aortic valve incompetence or obstruction of coronary ostia by the valve cusps.

A new reconstructive operation was designed and used in 8 patients. All survived and are asymptomatic. The aortoplasty was extended so that the supravalvular ring was incised at two points in the noncoronary and in the right coronary sinus of Valsalva. The area of stenosis was widely opened, and the cusps of the aortic valve lengthened, providing better approximation and function. A tubular dacron prosthesis, tailored to reconstruct the aorta, provided a wide aortic cross sectional area, as shown in B.

Better understanding of the details of surgical anatomy of supravalvular aortic stenosis and a technique - extended aortoplasty - for symmetric reconstruction of the aorta have provided more predictable relief of aortic obstruction and improved function of the aortic valve.

INTERMISSION - VISIT EXHIBITS

5. Repair of Tetralogy of Fallot in Infancy

ALDO R. CASTANEDA and WILLIAM I. NORWOOD*,

Boston, Massachusetts

Thirty-five infants, ranging in age from 12 days to 1 year (mean age 4 months) had repair of tetralogy of Fallot using deep hypothermic circulatory arrest. Two of these infants had a congenitally absent left pulmonary artery and one had an aorto-pulmonary window. Thirty-one required a right ventricular outflow (RVO) patch; in 29 the patch extended across the pulmonary valve annulus. All had patch closure of the ventricular septal defect (VSD); in one infant a perforated patch was used because of severe hypoplasia of both pulmonary arteries. Hospital mortality was 5% (2 patients). There were no late deaths. Transient complete heart block occurred in one, and right bundle branch block with left anterior hemi-block persisted one year after surgery in another patient. Cardiac output (Pick or thermodilution) and intracavitary pressures were obtained after surgery in all patients. So far, 18 patients had one year postoperative catheterization studies. Two infants, who had no RVO patch (done early in this series), had residual RVO gradients of 70 mm Hg, and also developed right ventricular aneurysms. Both of these patients, and another infant with a residual VSD (>2:1) have been successfully reoperated. We conclude that the hospital mortality and the late results justify our continued evaluation of primary repair of tetralogy of Fallot in symptomatic infants, regardless of weight or age. Our present contraindication to reparative surgery in infancy is an anterior descending coronary artery arising from the right coronary artery.

*By invitation

6. Primary Patch-Enlargement of the Pulmonary Valve Ring in the Repair of the Tetralogy of Fallot

ALBERT D. PACIFICO, JOHN W. KIRKLIN and

EUGENE H. BLACKSTONE*, Birmingham, Alabama

A precise way of identifying during the repair (rather than by pressure measurements immediately after repair) the patients with tetralogy of Fallot who require patch-enlargement of the pulmonary valve ring was sought by using a protocol for this in 54 consecutive patients during a 12 month period (May 1, 1975 to May 1, 1976). When the ring diameter (mm)

measured after pulmonary valvotomy was less than a "minimum acceptable" value from a table generated by us of this according to the patient's weight (kilograms), the ring was enlarged primarily by patch enlargement; otherwise, only the short vertical incision in the infundibulum was closed with a patch. Thirty-two patients did not receive primary graft enlargement of the valve ring (Group 1) and 22 patients did; in two patients of Group 1, patch enlargement was placed secondarily after measuring pressures. Primary enlargement was used in 4 (40%) of 10 patients ≤ 1 year of age, 13 (50.0%) of 26 > 1 year, and 7 (38.9%) of 18 > 4 . The ratio of systolic right over left ventricular pressure (systolic $P_{RV/LV}$) measured in the operating room was a mean of $0.46 \pm .135$ (1 SD) for patients receiving patch-enlargement of the ring.

Systolic $P_{RV/LV}$ immediately after repair in Group 1, without patch-enlargement of the ring was $0.37 \pm .140$ (in all 13 patients it was ≤ 0.65) when the valve ring was normal or larger, according to the normal values for weight of Rowlatt, Rimoldi, and Lev; it was $0.47 \pm .136$ (in 11 of 12 patients it was ≤ 0.65) when the diameter was less than normal but within its 50% confidence limits; it was 0.60 ± 0.86 (in 2 of 3 patients it was ≤ 0.65) when smaller but within the 72.5% confidence limits; and it was $0.74 \pm .215$ (in 2 of 4 patients it was ≤ 0.65) when smaller than the 95% confidence limits.

We conclude that relating the patient's valve ring diameter to the data of Rowlatt, Rimoldi, and Lev allows the surgeon during the repair to determine the probability that patch enlargement of the valve ring is necessary for achieving a satisfactory post-repair systolic $P_{RV/LV}$.

11:15 A.M. Presidential Address

OUR OBLIGATION TO DEVELOPING NATIONS

Henry T. Bahnson

MONDAY AFTERNOON, APRIL 18, 1977

2:00 P.M. Scientific Session Grand Ballroom

7. Radiation Carcinoma of the Lung - The St. Lawrence Tragedy

EARLE S. WRIGHT* and CECIL M. COUVES,

St. John's, Newfoundland, Canada

St. Lawrence is a small community in Southern Newfoundland with an economy based on fishing and mining of Flurospar. This mineral, calcium fluoride is widely employed in the manufacture of aluminum and to a lesser degree in the spray propellant industry.

The mines commenced commercial operation in 1933 and have now become linked with the names Schneeberg and Joachemstal as historical landmarks in the tragic history of radiation induced lung carcinoma.

To the present date the death toll from this disease in the St. Lawrence miners has reached 78. This is approximately 29 times the provincial death rate from lung carcinoma in males of a comparable age group. Further examination of the statistics show that the incidence of the lesion in those miners at risk has been 36%.

An increasing awareness of the magnitude of the problem led to intensive investigations culminating in the discovery in 1959 of radon gas and its daughter nucleotides as the primary carcinogenic agent. Further research indicated that the most likely source of the radioactive contamination was in the water seeping into the mines through the flurospar granite. Heavy smoking in the mining population is probably a secondary co-carcinogen.

The histopathology of these tumours is surprising since squamous cell carcinoma predominates. This is in marked contrast to the findings among uranium miners in Colorado where oat-cell carcinoma is the major cell type. Radiotherapy has been the chief mode of treatment due to widespread reluctance on the part of the miners to undergo surgery.

The development of measures designed to protect the miners from further radiation risks were first instituted in 1960. These techniques have been singularly effective and control of "the St. Lawrence problem" has been achieved.

*By invitation

8. Results of Surgical Treatment in Stage I Lung Cancer

NAEL MARTINI and EDWARD J. BEATTIE, JR.,

New York City, New York

From 1973 to 1975, 70 patients underwent pulmonary resection for Stage I non-oat cell carcinoma of the lung. Each of these patients was carefully evaluated for disease extent and classified as having a Stage I cancer only after the resected specimen was histologically reviewed and all regional nodes in the mediastinum assessed.

There were no postoperative deaths. At one year of followup 66 of 70 patients (94%) were alive and free of disease. 34 patients were at risk for 2 years and 28 of these (82%) are alive and well. At present, 9 are dead of distant metastases and one of unrelated causes. No patient has had local recurrence and none was lost to followup.

Correctly staged early lung cancers have an excellent survival at 1 to 2 years with surgery alone. Merits of various adjuvant programs in this group of patients can only be correctly assessed if followups are prolonged and the number evaluated large.

*By invitation

9. Immunoprofile Studies in Patients with Bronchogenic Carcinoma, Significance and Prognosis

GEORGE A. LIEBLER*, JOSEPH P. CONCANNON*,

GEORGE J. MAGOVERN and MILTON H. DALBOW*,

Pittsburgh, Pennsylvania

Immunoprofile studies consisting of the measurement of lymphocyte mitogen stimulation (LMS) with phytohemagglutinin (PHA), concanavalin A (Con A), and pokeweed mitogen (PWM), T and B cell distributions, peripheral lymphocyte counts, skin tests with 5 microbial antigens and de novo sensitization with dini-trochlorobenzene (DNFB) was performed. These studies were performed prior to irradiation therapy and chemotherapy for 145 patients with a primary bronchogenic carcinoma, 55 patients with mammary cancer, and 35 patients with genitourinary malignancies. Many of the patients had a surgical procedure prior to their initial immune studies. Similar studies were made for 63 healthy volunteers.

The results of these studies indicate that the immune system of patients with cancer is frequently depressed when compared with healthy volunteers. It was anticipated that if immune competence was to show a correlation with survival, these measurements of general immunity should show a stage of disease related correlation. Since the prognosis for patients with lung cancer is generally poor, these patients should demonstrate a more uniformly abnormal immune system than patients with mammary cancer or GU malignancies. Although the degree to which the immune system is disturbed appears to be related to the stage of disease, patients in early disease stages may also demonstrate abnormal immune measurements. Further, there appears to be little difference between the immune status of patients with bronchogenic carcinoma and patients with mammary or GU cancers within comparable disease staging groups.

Analysis of the data for each of the immune parameters measured, by life table technique, indicates a good correlation between a disturbed immune system and a poor prognosis for patients with carcinoma of the bronchus. Disturbed immunity does not appear to be as critically related to survival in the other types of cancer.

*By invitation

10. Extensive Pulmonary Laceration Caused by Blunt Trauma

JOHN R. HANKINS, T. CRAWFORD McASLAN*,

BAEKYO SHIN*, ROBERT AYELLA*, R. ADAMS COWLEY

and JOSEPH S. McLAUGHLIN, Baltimore, Maryland

During the past 4 1/2 years, of 210 patients treated for lung injury resulting from blunt trauma (contusion or laceration with pneumothorax), 13 required emergency thoracotomy because of failure to respond to conservative measures. In each, an extensive pulmonary laceration was found.

The indications for thoracotomy were: Massive hemothorax, in 10 patients; profuse air leak not responding to chest tube suction, in 2 patients; and massive intratracheal bleeding, in 1 patient. Rib fractures were present in every patient. However, in only 10 patients was the pulmonary laceration directly produced by the sharp end of a fractured rib. In 3 patients the laceration was far removed from the rib fractures and evidently was caused by a shearing force.

The laceration was treated by pulmonary resection in 8 cases and by suture of the laceration in 4. One patient who developed irreversible cardiac arrest underwent exploratory thoracotomy only.

Four patients survived, 2 of whom had received lobectomy and 2, suture only. Among the 9 who expired, death was caused primarily by extrathoracic injuries in 6.

We conclude that extensive pulmonary laceration is an important cause of morbidity and mortality among patients with blunt chest injury. The importance of early diagnosis and prompt thoracotomy is emphasized. In many of these patients the initial chest tube drainage was not profuse. Later, while they were being treated for other injuries, blood loss increased precipitously. At least two of those who died might have been saved by earlier thoracotomy.

INTERMISSION - VISIT EXHIBITS

*By invitation

11. Prophylactic Antibiotics in the Treatment of Penetrating Chest Wounds - A Double Blind Study

FREDERICK L. GROVER, J. DAVID RICHARDSON*, JOHN G. FEWEL*,

KIT V. AROM*, GEORGE E. WEBB* and J. KENT TRINKLE,

San Antonio, Texas

Considerable controversy exists as to whether antibiotics should be administered "prophylactically" to patients with penetrating chest trauma. No prospective study of this problem has been reported. Seventy-five patients with isolated penetrating chest injury were therefore prospectively randomized in a double blind study to determine the efficacy of "prophylactic" antibiotic treatment. Group A (38 pts.) were given 300 mg. of clindamycin phosphate (CP) every 6 hours, beginning with admission until 1 day following chest tube removal, or for 5 days, whichever was shorter. Group B (37 pts.) were given a placebo on the same schedule. The patients' hospital course, fever, WBC, culture data, and x-rays were serially recorded.

RESULTS: Both groups were of comparable age, sex, and magnitude of injury.

	Pts. With WBC Elev.	Highest Ave. WBC	No. with Temp.>101	Pleural Cult. Pos.	Wound Cult. Pos.	Chest Tube Cult. Pos.
Group A (CP)	25 (66%)	11,850	11 (29%)	4/21 (19%)	5/11(45%)	2/9 (22%)
Group B	30 (81%)	13,260	17 (46%)	7/19(37%)	7/9 (78%)	3/7 (43%)
	Clinical Empyema	Pneumonia	Atelectasis	Hosp. Days	No. with 9 Hosp. Days	Operation Required
Group A (CP)	1 (3%)	4 (11%)	14 (37%)	6.7	3	1 (3%)
		(p<05)				
Group B (Control)	6 (16%)	13 (35%)	15 (41%)	7.7	9	6 (16%)

CONCLUSIONS: Group A patients (CP) consistently demonstrated less evidence of sepsis and required fewer operations for infectious complications than Group B. Antibiotics are advantageous as adjunctive therapy in the management of penetrating chest trauma.

*By invitation

12. Early Pleural Decortication for Empyema Thoracis in Immuno-suppressed Patients

NOEL H. FISHMAN and DAVID G. ELLERTSON*,

San Francisco, California

Treatment of pleural empyema by tube thoracostomy followed by rib resection and open drainage commits a patient to months of chronic drainage and packing. It is also predicated on the ability of the normal pleural space to localize and isolate purulent infections. Patients with impaired immune response often remain toxic during thoracostomy drainage of empyema because they fail to develop a satisfactory inflammatory tissue barrier to the spread of infection. Incompletely drained areas provide a focus for the infection to disintegrate adjacent pulmonary tissue. The mortality of pleural empyema is extremely high, therefore, in immuno-suppressed patients.

Since 1970 we have electively decorticated acute pleural empyema in 7 patients who were immuno-deficient for the following reasons: (1) immuno-suppressive drugs for cadaver renal transplant, (2) high dose steroids for sagittal sinus thrombosis, (3) high dose steroids for systemic lupus erythematosus, (4) multiple myeloma, (5) disseminated Hodgkin's disease, (6) hemolytic anemia and pulmonary infiltrates of unknown etiology, and (7) myelofibrosis.

The patient with multiple myeloma died postoperatively from uncontrolled bleeding from pleural tumor. Five patients (71%) left the hospital completely healed within 3 to 4 weeks after surgery, and all are alive 2 to 5 years later. The empyema in the patient with myelofibrosis was successfully treated, but the patient ultimately succumbed in the hospital to her underlying disease.

Acute pleural decortication for empyema consists of a formal thoracotomy incision through which the pleural space is completely mobilized, debrided, and irrigated. Necrotic lung tissue is also carefully debrided without lobectomy or incision into viable parenchyma. Multiple chest tubes are inserted. The muscles are closed anatomically with non-absorbable sutures, but the skin and subcutaneous tissues are closed loosely. This procedure in immuno-suppressed patients has the advantage of early, thorough drainage of infection, maximal preservation of lung tissue, and substantial reduction of morbidity.

*By invitation

TUESDAY MORNING, APRIL 19, 1977

8:30 A.M. Scientific Session Grand Ballroom

13. Management of the Pacemaker Recall

DAVID C. MACGREGOR*, EDWARD J. NOBLE*, JOHN D. MORROW*,

HUGH E. SCULLY*, H. DOMINIC COVVEY*

and BERNARD S. GOLDMAN, Toronto, Ontario, Canada

Rapid technological changes in the medical devices industry have led to an alarming deterioration in the reliability and safety of the cardiac pacemaker. During the past four years, we have been subjected to eight pacemaker recalls involving 469 pulse-generators (31.9% of our total of 1470 implants).

Upon notification of a pacemaker recall, it becomes the implanting physician's responsibility to verify the manufacturer's list of affected units and to make a frank disclosure in person to the patient and/or responsible relatives. Appropriate communications must also be established with government agencies, the news media, malpractice insurance carriers and local hospital boards. Although a pacemaker manufacturer may initiate a recall and make recommendations as to whether or not an individual pulse-generator should be replaced prophylactically or subjected to increased surveillance, these decisions rest primarily with the implanting physician.

To date, 138 (29.4%) of our recall pacemakers have been replaced because of unpredicted failure, premature rate drop or fear of catastrophic failure at a mean time of 10.6 months. Only 27 (5.8%) removed units have thus far demonstrated a

rate drop with battery depletion and 19 (4.1%) units have been replaced for other reasons. Patient deaths have accounted for 69 (14.7%) units and 16 (3.4%) units have been lost to followup. The remaining 200 (42.6%) recall pacemakers are under increased surveillance by our pacemaker clinic. Transtelephone monitoring assumes a major role in the management of the pacemaker recall, not only to predict, but also to identify the failure of any individual unit. Schedules should be adapted to the expected performance of suspect units and should be revised as circumstances dictate.

The authors wish to emphasize the need for improved pacemaker standards and for more extensive biological testing of new pacemaker models prior to release for human implantation.

*By invitation

14. The Changing Spectrum of Pericardiectomy for Chronic Pericarditis: Occult Constrictive Pericarditis

JAMES W. KILMAN, CHARLES A. BUSH*, CHARLES F. WOLLEY*,

JOHN M. STANG*, JOSEPH TEPLY* and NOBUHISA BABA*,

Columbus, Ohio

During the past twenty-four years seventy patients have had a total pericardiectomy at our institution. Fifty-nine patients had the classic findings of constrictive pericarditis as the reason for their surgery and operative mortality was five percent in this group. During the past few years a new indication for total pericardiectomy has been found in twelve patients. These patients have fatigue, dyspnea and chronic chest pain without any of the other classic findings of chronic constriction. Coronary angiograms have been normal. Cardiac catheterization following administration of a fluid load of 1000 cc of warm normal saline during six to eight minutes resulted in diastolic equilibration of pressures, constrictive pulse pressure contours and loss of the normal right atrial response to inspiration in all of these patients with occult constrictive pericarditis but in none of the six normal controls. Total pericardiectomy has been done with ease in this group with no morbidity or mortality. Relief of the symptoms has been dramatic. Repeat cardiac catheterization following total pericardiectomy revealed normal hemodynamics prior to and following fluid load. Tissue examination of the removed pericardium revealed gross and/or microscopic changes of inflammatory disease without calcification. Occult constrictive pericarditis appears to be a new indication for total pericardiectomy and can only be defined by the hemodynamic response to a rapid saline load.

*By invitation

15. Preliminary Clinical Experience with Isotonic Hypo-thermic Potassium Arrest (KA)

G. FRANK O. TYERS, NORMAN J. MANLEY*, DENNIS R. WILLIAMS*

and MARK KURUSZ*, Hershey, Pennsylvania

The modalities of KA and 15°C perfusion hypothermia were combined and used exclusively for myocardial protection (MP) in 70 consecutive patients (pt(s)). Following aortic cross-clamping (X) the arrest solution: 275 mOsm, pH 7.7, 2500 u heparin and in meq/L: Na 141, K 25, Cl 101, Ca 1.1, Mg 3, was perfused through a DeBakey cannula continuously (up to 3L) during direct coronary surgery (ACB), intermittently during multiple valves (2VR, 3VR) and once (½ to 1L) prior to single valve replacement (AVR or MVR). Left ventricular wall temps fell to 16-17°C. Mean X time was 65 min. Preop all pts were NYHA Class III or IV, over 60% had ejection fractions < 0.50, 7 had main left stenoses (2 with tight AS), 5 were redos, 20 had recent M infarction, 8 were emergent, 2 were Jehovah's Witnesses, age ranged from 6 to 76 yrs. 30 day mortality was 4/70, < 6%. No death was related to M depression. There were 14 AVRs, 5 MVRs, 6 2VRs, 1 3VR and 5 combined VR + ACB with 2 deaths, 6.6%, 1 due to right coronary injury in a triple redo AVR with collagen disease, 1 due to hemorrhage in a 2VR, double bypass pt with functional platelet abnormality. No primary, single or multiple valve pt died. There were 35 ACBs with a mean of 3 grafts, with 1 death, 2.9% in a post MI, CHB pt with ungraftable vessels. Although several pts required preop balloon assist, this was the only pt to require postop assist and to leave the OR alive who subsequently died. There were 4 congenital cases with 1 death due to poppet dysfunction in a tunnel AS with AVR and ascending aortic graft.

As evidence of excellent MP, postop pressors were used briefly in less than 11% of pts, a greater number required postop antihypertensives, over 50% defibrillated spontaneously immediately following X release, the rest required only a 5 watt sec shock. Both cardiac output, 5.6 ± 3 L/min and cardiac index, 2.7 ± 1 L/min/m² were immediately improved versus preop levels in the same pts while awake and anxious at cardiac cath (p < .05) and mean postop MB-CPKs were not significantly elevated at 12 (16 ± 3) and 24 hrs postop (15 ± 6 u/L). Respirator, ICU and hospital days, mean blood used/patient (3.6 + .3 u), and mean bypass time (94 min) were all equal or better than with coronary perfusion.

The significant advantages of 15°C KA are: 1) simplified high volume aortic root perfusion, effective even with 4 + AI, 2) the preclusion of the "calcium paradox", 3) minimization of defibrillator induced M injury, 4) operating conditions superior to normothermic ischemic arrest or topical hypothermia, 5) avoidance of coronary artery trauma and 6) extensive clinical and experimental evidence of superior MP.

*By invitation

16. Prolonged Safe Aortic Cross Clamping by Combining Membrane Stabilization, Multi-dose Cardioplegia and Physiologic Reperfusion

DAVID FOLLETTE*, KLAUS FEY*, DONALD G. MULDER,

JAMES V. MALONEY, JR. and GERALD BUCKBERG,

Los Angeles, California

We have shown that 1) continuous adequate perfusion of the beating heart, although cumbersome, prevents low output syndrome and 2) the superb operating conditions of arrest cannot be achieved safely with hypothermic (perfusion or topical) ischemic arrest; deleterious changes in LV flow, distribution, metabolism, compliance and function occur after only one hour of cross clamping. This study tests the hypothesis that prolonged (2 hours) of safe arrest is possible by combining membrane stabilization, cardioplegia, and physiologic reperfusion during cross clamping.

Methods: We studied 32 dogs using standard cardiopulmonary bypass. Ten dogs (control) underwent ischemic arrest with topical hypothermia (LV temperature 16°C) for 1 hour. To increase the safety of 1 hour of hypothermic arrest, we tested the effects of a) membrane stabilization (procaine HCl) (5 dogs), b) cardioplegia (500 cc of 4°C KCl, glucose, insulin, THAM, plasma, albumin) (6 dogs) and c) reperfusion (just before unclamping) with 500 cc blood buffered to pH 7.8 (5 dogs). In 6 dogs, we prolonged cross clamping to 2 hours by combining membrane stabilization, cardioplegia (replenishing 100ml each 20 min.) and pH 7.8 reperfusion. We measured regional coronary flow (microspheres), LV O₂ uptake, compliance (intraventricular balloon) and performance (isovolumetric curves) before and 30 minutes after arrest.

Results: The deleterious effects of 1 hour of ischemic arrest with topical hypothermia (LV compliance fell 53% ± 6*^Δ, LV performance fell 43% ± 3*) were improved substantially by membrane stabilization alone, cardioplegia alone, and pH 7.8 reperfusion alone; postischemic values did not, however, return to normal. In contrast, 2 hours of cross clamping with combined membrane stabilization, cardioplegia and physiologic reperfusion resulted in 1) highest LV flows (150 ± 21 cc/100 gm/tmin*), 2) most favorable flow distribution (endo/epi 2.0 ± 0.3*), 3) greatest LV O₂ uptake (0.06 ± 0.01cc/100 gm/beat*), 4) best LV compliance (87% ± 5 recovery*), and 5) normal (100% recovery*) post-ischemic function.

Conclusions: We conclude that combining membrane stabilization, multi-dose cardioplegia and physiologic reperfusion allows aortic cross clamping in the normal heart for up to 2 hours with as much safety as if the coronaries were perfused continually with oxygenated blood.

* = p<0.01 Δ = ±SEM

INTERMISSION - VISIT EXHIBITS

17. Haemodynamic Evaluation of Left Ventricular Bypass Using a Homologous Cardiac Graft

JACQUES G. LOSMAN*, ALAN G. ROSE* and CHRISTIAAN BARNARD*,

Cape Town, South Africa,

Sponsored By: THOMAS D. HARTLEY, Gainesville, Florida

A valid criticism of orthotopic cardiac transplantation for irreversible left ventricle disease is that a normal or slightly diseased right ventricle is removed, and that a number of patients in terminal cardiac failure will not tolerate orthotopic transplantation due to excessively elevated pulmonary resistance.

To overcome problems due to severe pulmonary hypertension, an operation was devised in which the donor heart is used to bypass the right and left ventricle of the recipient heart left 'in situ'. The functional efficacy of the donor heart was assessed in 50 baboons after inducing left ventricle failure by ligation of the left anterior descending coronary artery 1 ½ cm. from its origin and creating severe supra-aortic stenosis (peak systolic gradient of 80 to 100 mm Hg.). Haemodynamic studies were performed during selective fibrillation of the recipient heart and during synchronous and sequential pacing. It

was found that volume load, ventricular compliance and contractility were the major determinants of the recipient and donor heart function. After-load changes played a lesser role.

It was found that the recipient heart ejection fraction and maximal total cardiac output were significantly improved by sequential pacing with optimised delays. Low mortality, good donor heart function and prolonged survival were obtained despite lethal damage to the recipient heart (100% controls died).

Right and left ventricular bypass transplantation minimised recipient heart post-infarction arrhythmias, reduced myocardial necrosis area and allowed tolerance of severe supra-aortic stenosis. It is, therefore, a useful therapeutic variant of orthotopic cardiac transplantation and has been used successfully in seven human patients.

*By invitation

18. Prognostic Indices for Survival During Post-Cardiotomy IABP Pumping: A Simple Method of Scoring with Left Ventricular Assist Device Implications

JOHN C. NORMAN, DENTON A. COOLEY, STEPHEN R. IGO*,

C. WAYNE HIBBS*, J. GRAEME BENNETT* and

JOHN M. FUQUA*, Houston, Texas

Intraaortic balloon pumping has gained acceptance as a valuable adjunct in weaning patients from cardiopulmonary bypass. From Sept. 30, 1975 - Sept. 30, 1976, we have utilized IABP in 75 patients. Sixty-five (81%) were male. There were 33 (44%) survivors; 29 were male. The mean duration of IABP support was 55.4 ± 58 hrs.

To clarify prognoses during IABP support, we have analyzed: 1) hemodynamics [cardiac index & mean pulmonary capillary wedge pressure]; 2) degree of pharmacologic support (reflected by systemic vascular resistance); & 3) renal blood flow (reflected by urinary output) in 25 surviving and nonsurviving patients during IABP support over a total of 54.6 days. Each data point was obtained each hour for each variable, stored, retrieved, analyzed, assigned a relative score of 0-4 & summed with a modified Hewlett-Packard 5690B computerized catheterization system with a video monitor and terminal.

Results: Survivors had IABP support for 103 ± 28 hours; nonsurvivors had support for 25 ± 13 hours. During the initial 12 hours, survivor scores were 8.0 ± 1.9 and nonsurvivors were 5.4 ± 3.0 (N.S.). Survivors' scores increased from initial values of 8.0 ± 1.9 during the initial 12 hours to 11.6 ± 1.5 during the final 12 hours ($p < 0.01$). During the final 12 hours, survivors' scores were significantly higher (11.6 ± 1.5) than nonsurvivors (4.8 ± 2.9), $p < 0.001$.

Serial monitoring and scoring of post-cardiotomy IABP patients allows prediction of the outcome. Patients with initial scores of 6.0 or less for 12 or more hours, appear unsalvageable, short of implantation of a left ventricular assist device. The latter has proven to be an order of magnitude more effective than IABP during early clinical evaluations.

11:15 A.M. Address of Honored Speaker

PROFESSOR CHARLES DUBOST

Paris, France

TUESDAY AFTERNOON, APRIL 19, 1977

TUESDAY AFTERNOON, APRIL 19, 1977

2:00 P.M. Scientific Session Grand Ballroom

19. Cricopharyngeal Myotomy as a Method of Treating Pharyngoesophageal Dysphagia Secondary to Gastro-esophageal Reflux

R. D. HENDERSON and G. MARRY ATT*,
Toronto, Ontario, Canada

Food obstruction at the Cricopharyngeal level (Pharyngoesophageal dysphagia) is a common symptom of gastroesophageal reflux (51.3% of 1000 consecutive patients). In selected patients, Cricopharyngeal myotomy is effective in symptom relief. We have used myotomy in patients whose only symptom was dysphagia (2); and in patients too debilitated for major surgery (5); and in patients with persistent pharyngoesophageal dysphagia following hiatal hernia repair (12 out of 650).

All were investigated by barium esophagramme, endoscopy and manometry. 5 of 19 showed radiologic aspiration of barium. High speed manometric tracing showed intermittent Cricopharyngeal inco-ordination in the 6 consecutive patients most recently studied. This finding of inco-ordination has been shown to be present in 38 patients with reflux and in all with major Cricopharyngeal symptoms.

Myotomy was effective in relieving symptoms in both patients with this as their only reflux symptom and in the 5 patients too debilitated for major surgery. Good symptomatic improvement was obtained in 9 of 12 with persistent dysphagia following hernia repair, but in 3 relief was partial with persistent symptoms being secondary to distal esophageal obstruction.

Investigation is necessary to exclude other causes of dysphagia. However, with careful selection, myotomy has proved to be an effective method of treatment.

*By invitation

20. Complications and Failings of the Combined Collis-Belsey Operation

MARK B. ORRINGER* and HERBERT SLOAN,
Ann Arbor, Michigan

In the past 3 years, the Collis-Belsey operation has been performed in 82 patients. Thirty-three of these patients (40%) had undergone one or more previous operations at the esophagogastric junction; transthoracic (22) or transab-dominal (18) hiatal hernia repair; vagotomy (11); esophagomyotomy (5); or repair of an esophageal perforation (2).

In 4 of 15 patients, the combination of an esophagomyotomy and the Collis-Belsey reconstruction resulted in postoperative dysphagia which has required either chronic dilation (2) or esophagectomy and colonic interposition (2). In 2 patients who had had previous hiatal hernia repairs, mobilization of the extensively inflamed distal esophagus resulted in delayed perforation from a localized area of esophageal necrosis; both healed primarily following closure and reinforcement of the suture line with a pedicled intercostal muscle flap. One patient sustained an esophageal perforation during per-oral dilation of an esophageal stricture; attempted closure immediately at the time of the Collis-Belsey procedure failed and resulted in a chronic esophago-pleural-cutaneous fistula. A gastric fistula developed in 2 of 3 patients who required splenectomy because of intraopera-tive injury to the spleen; this closed spontaneously in 1 patient, but eventually resulted in the death of the other.

To date, 68 patients have had postoperative follow-up interviews and esophageal manometrics and acid reflux testing after 2-24 months (average 8.7 months). Clinically, 60 (88%) have had excellent or good control of gastroesophageal reflux, 3 have mild reflux but are greatly improved, and 5 have moderate to severe symptoms. With an intraesophageal pH electrode, however, moderate to severe gastroesophageal reflux has been detected in 17 patients (25%), 9 of whom emphatically deny symptoms of reflux, and 8 of whom have definite recurrent symptoms.

These data refute the concern expressed by others that ischemic necrosis of the gastroplasty tube in patients who have had prior operations at the esophagogastric junction is a frequent complication. They suggest, however, that the Collis-Belsey operation is not the best choice of an antireflux procedure when concomittant esophagomyotomy is required, and that the recent enthusiasm for the combined Collis-Belsey operation should be tempered by a cautious assessment of its long-term results.

*By invitation

21. Diffuse Spasm of the Esophagus: Clinical, Manometric and Surgical Consideration

HOWARD K. LEONARDI*, JOHN A. SHEA* and
F. HENRY ELLIS, JR., Boston, Massachusetts

Concern regarding the development of gastroesophageal reflux after extended esophagomyotomy for diffuse spasm of the esophagus (DSE) has influenced some to complicate the operation by adding a Collis-Belsey gastroplasty. Since we believe that a properly performed esophagomyotomy as proposed originally by one of us (FHE) relieves the symptoms in the majority of patients with DSE without the need for ancillary procedures, we have reviewed the clinical, manometric and surgical findings in 11 recent cases to shed further light on the controversy.

Substernal pain was the characteristic symptom in three of the 11. Dysphagia of variable degree was present in nine. Four patients had a small sliding esophageal hiatus hernia and two an epiphrenic diverticulum. Preoperative manometry determined the length of the myotomy and the lower esophageal sphincter (LES) was spared when normal. One patient whose lower sphincter was included in the myotomy developed medically manageable gastroesophageal reflux.

Esophageal manometry was performed in all patients. Hie disease involved the lower one-third of the esophagus in two, lower one-half in three and lower two-thirds in four. Themean maximum deglutitive pressure in the diseased area was 70 mm. Hg. The contractions were non-peristaltic, repetitive and spontaneous in most. Postoperative manometry in nine patients revealed a reduction in deglutitive pressures from a mean of 70 mm. Hg. to 20 mm. Hg. The mean LES pressure postoperatively was 13 mm. Hg. and was sufficient to prevent reflux in all but one patient.

*By invitation

22. Intra-Operative and Post-Operative Esophageal Mano-metric Findings with Collis Gastroplasty and Belsey Hiatus Hernia Repair for Gastro-Esophageal Reflux

J. D. COOPER*, S. GILL*, J. M. NELEMS* and F. G. PEARSON,
Toronto, Ontario, Canada

The combination of a Collis gastroplasty with a Belsey Mark IV fundoplication has proven clinically effective in the management of certain patients with complications of gastroesophageal reflux. The present study measured the effect of gastroplasty and Belsey repair on intraluminal pressure changes in the gastroplasty and lower esophagus. Manometric studies were performed on 8 patients who had gastroplasty and Belsey repair for reflux esophagitis. Measurements were

performed using the MP-3 catheter which consists of 3 miniature pressure transducers spaced 5 cms. apart. Manometric studies were performed pre-operatively, intra-operatively and post-operatively. Intra-operatively the precise location of the transducers could be determined by palpation through the wall of the stomach and esophagus. Post-operative studies were done with the aid of a fluoroscope so the transducer could be identified in relationship to the gastroplasty segment (which had been marked with radio-opaque clips at the time of surgery). At the time of operation the lower esophageal sphincter area was located manometrically and tagged with a marking suture. After creation of a 5 cm. gastroplasty tube, and again after completion of fundoplication, the transducers were advanced into the stomach and gradually withdrawn into the esophagus for pressure recordings. In each case the gastroplasty segment was immediately found to function as a high pressure zone. The pressure in this zone further increased following the fundoplication and this pressure could be diminished with intravenous Buscopan and augmented with intravenous Pentagastrin. The original, previously marked, lower esophageal sphincter was found in most instances to be included in the upper segment of the gastroplasty tube, but the entire length of the gastroplasty tube functioned as a high pressure zone and pressures in the tube were considerably higher than those originally present in the lower sphincter. The following Table gives the average pressures recorded in the eight patients:

Pressure (CM H ₂ O)	Pre-Operative	prior to gastroplasty	Intra-Operatively following gastroplasty	following fundoplication	Post-Operatively	
					1wk	3mos.
	16	13	25	55	39	34

The Post-operative pressures were significantly greater than the pre-operative pressures ($P < .05$). Animal experiments by others have demonstrated the ability of proximal gastric musculature to function as a high pressure zone when converted into a tube or when wrapped around the esophagus. These studies extend those findings to the human situation and provide a physiologic rationale for the effectiveness of gastroplasty and fundoplication.

3:30 P.M. Executive Session (Limited to Active and Senior Members) Grand Ballroom

TUESDAY EVENING, APRIL 19, 1977

7:00 P.M. President's Reception Dominion Ballroom

8:00 P.M. President's Dinner and Dance Dominion Ballroom

**Attendance open to all physicians and their ladies. Tickets must be purchased at the registration desk by 5:00 P.M. on Monday, April 18th.
Dinner dress preferred.**

WEDNESDAY MORNING, APRIL 20, 1977

8:30 A.M. Scientific Session Grand Ballroom

23. Extracorporeal Membrane Oxygenation (ECMO) in Newborn Respiratory Failure

ROBERT H. BARTLETT, ALAN B. GAZZANIGA, ROBERT F. HUXTABLE*,

HOUKJE C. SCHIPPERS*, MELODY O'CONNOR* and

MICHAEL R. JEFFERIES*, Orange, California and Minneapolis, Minnesota

Respiratory failure in the newborn is caused by: Respiratory Distress Syndrome (RDS), Meconium Aspiration Syndrome (MAS), Persistent Fetal Circulation (PFC), Congenital Diaphragmatic Hernia with PFC, or Streptococcal Pneumonitis. All of these disorders are potentially reversible, but high FiO_2 and ventilator pressure necessary for treatment may add to existing pulmonary damage causing death or chronic bronchopulmonary dysplasia. Temporary life support with ECMO offers the advantages of gaining time, lowering FiO_2 and pressure, and permitting unusual techniques of pulmonary management.

After extensive laboratory investigation, we have used ECMO in thirteen newborn infants who were moribund from respiratory failure. Indications and results include: RDS (3, 1 Survived), MAS (6, 3 S), PFC (1, 1 S), PPC with CDH (2, 1 S), Streptococcal Pneumonitis (1). Venoarterial bypass at flow rates approaching total cardiac output was used for 1-8 days. Bleeding was not a major problem despite heparinization and thrombocytopenia. Patient's ductus arteriosus was

ligated during ECMO in four cases. VA bypass permitted low FiO_2 and pressure; lung function improved rapidly in ten cases. Pulmonary and neurologic function, growth and development are normal in the six survivors.

This study, which includes the first six successful cases, demonstrates that ECMO is a useful method in the treatment of newborn respiratory failure, and suggests that high FiO_2 and barotrauma are major contributors to the pathogenesis of pulmonary damage.

24. Pneumothoraces in Children with Chronic Pulmonary Disease

SUSAN R. LUCK*, JOHN G. RAFFENSPERGER, HENRY J. SULLIVAN*

and LEWIS E. GIBSON*, Chicago, Illinois

Spontaneous pneumothorax is a frequent complication of chronic lung disease in children. In most instances closed thoracotomy tube drainage will rapidly re-expand the lung. However, prolonged drainage for continued air leak contributes to morbidity and increases mortality of the disease.

Pneumothoraces occurred in two percent of 140 children with cystic fibrosis over a five year period. An immediate ten to twenty percent mortality has been reported. These pneumothoraces are often under tension and further compromise limited respiratory reserve. Chest tube treatment interferes with postural drainage and further increases associated mortality because the child can't raise his copious secretions. Two patients were treated with bilateral thoracotomy, bleb resection, and mechanical pleurodesis. One boy recovered promptly despite severely compromised pulmonary function. Another child had continuous tube drainage for six weeks prior to thoracotomy. She died one week later with respiratory failure although her pneumothorax did not recur. We feel that a more prompt operation should be considered in this group of children. With a limited incision, intercostal nerve blocks, and vigorous tracheal toilet they tolerate an operation well.

One five year old child with histiocytosis X had bilateral pneumothoraces requiring tube drainage for eight weeks. He promptly recovered after bilateral thoracotomy, control of air leaks, and pleurodesis. A fourth child, a fourteen year old girl had tube drainage for three weeks. At operation she had typical apical blebs.

Open thoracotomy will yield good results even in patients with far advanced pulmonary disease. Postoperative complications and mortality are not increased over that seen without operation. Length of hospitalization and relative confinement is decreased.

*By invitation

25. Hypertension and the Renin-Angiotensin System Following Open-Heart Surgery

KENNETH M. TAYLOR*, IAN MORTON*, JOHOIDA J. BROWN*,

WILLIAM H. BAIN* and PHILIP K. CAVES*,

Glasgow, Scotland, U.K.

Sponsored by: NORMAN SHUMWAY, Stanford California

Systolic hypertension and peripheral vasoconstriction are frequently encountered for the first few hours after cardiopulmonary bypass (CPB). Their aetiology is poorly understood, although it has been suggested that the renin-angiotensin system may play an important role. Angiotensin II (AII) - the end product of stimulation of the renin-angiotensin system, is the most powerful naturally occurring vasopressor agent yet identified. We have, therefore, studied plasma AH levels in 10 patients during and after open-heart surgery.

Plasma AH was measured by radio-immunoassay (normal range 5-35 pg/ml). The patients studied (Group 1) were submitted to elective cardiac surgical procedures utilising CPB with non-pulsatile flow at a mean arterial blood pressure = 49 mmHg (± 8.3 S.E.M.). Patients submitted to closed mitral valvotomy were used as controls (Group 2). Serial samples were obtained before, during and for 2 hours post-operatively in both groups.

In both groups, pre-operative plasma AH levels were normal and showed a small rise after the chest had been opened (Mean plasma AH levels <60 pg/ml in both groups). In Group 1, plasma AII levels rose markedly during CPB to a mean level of 170 pg/ml ± 28 S.E.M. A very high level was maintained at 2 hours post-operatively (155 pg/ml ± 23 S.E.M.). Thereafter, AII levels fell rapidly and had returned to normal 4-24 hours post-operatively in all but one patient. This patient showed a progressive rise of AH post-operatively to a plasma AII level of 385 pg/ml at 24 hours, and died after 48 hours

from low cardiac output associated with subendocardial necrosis. By contrast, control patients (Group 2) showed no further rise in All levels during or post-operatively.

This study shows that marked elevation in the plasma AH level occurs during and for several hours after non-pulsatile CPB, the period when peripheral vasoconstriction is most marked. We have concluded that the renin-angiotensin system plays an important role in the occurrence of peripheral vasoconstriction and hypertension in the early post-operative period and may also be of critical importance in the production of the low-output syndrome.

*By invitation

26. Prospective Analysis and Treatment of Perioperative Hypertension Related to Coronary Artery Surgery.

ARTHUR J. ROBERTS*, STEPHEN D. HERMAN*, RONALD M. ABEL*, WILLIAM A. GAY, JR.* and

VALAVANUR A. SUBRAMANIAN*,

New York, New York

Sponsored by: ARTHUR J. OKINAKA, New York, New York

Forty consecutive patients undergoing saphenous vein bypass graft (SVBG) operations were studied to determine the incidence of systemic hypertension (HYPT) associated with coronary bypass surgery. In 15 of the 40 patients (37.5%) HYPT developed as defined by systolic blood pressure (SBP) >160 or diastolic blood pressure (DBF) >100. HYPT developed within two hours postoperatively (PO) in 11 patients during induction of anesthesia in one patient, and intra-operatively in three patients. A comparison of hemodynamic status two hours PO between patients with HYPT (N=15) and then without HYPT (N=12) showed only a significantly higher systemic vascular resistance in the HYPT group. Plasma catecholamines (nor-epi, dopamine) were also elevated significantly in the HYPT group. Nitroprusside (NP) infusion was given to control BP in 10 patients. The dose was adjusted to decrease SBP < 140 with a dose range of 40-100 μ g/min. Hemodynamic data was recorded prior to NP and 20 minutes after infusion.

	Control † □ 20 minutes†'	Nitroprusside	P-Value
HR	86.75 ± 4.31	94.88 ± 3.80	<.0025
Mean BP mm. Hg.	131.0 ± 3.89	89.75 ± 3.21	<.0005
SBP mm. Hg.	180.0 ± 5.40	129.17 ± 5.52	<.0005
DBP mm. Hg.	96.5 ± 4.60	66.74 ± 3.16	<.0005
MPAP mm. Hg.	16.83 ± 2.39	13.17 ± 1.95	<.0025
PWP mm. Hg.	10.25 ± 2.01	7.59 ± 1.75	<.0025
RAP mm. Hg.	9.6 ± .94	7.18 ± .89	<.0005
SVR dynes sec. cm. ⁵	3509.17 ± 215	2126. ± 165	<.0005
PVR dynes sec. cm. ⁵	229.07 ± 23	161.8 ± 17	<.01
LVSWI 9 m/m ²	59.63 ± 4.9	38 ± 3.4	<.0025
RVSWI 9 m/m ²	5.01 ± .84	3.55 ± .78	<.005
SVIml/m ²	32.75 ± 2.2	32.86 ± 1.8	<.2
CI l/min/m ²	2.83 ± .19	3.16 ± .18	<.025

The data suggest that the incidence of systemic hypertension related to SVBG surgery is high and that elevated catecholamines is associated with elevated systemic vascular resistance and may play a role in the development of post operative hypertension. Nitroprusside rapidly and effectively reduces blood pressure. Increases in cardiac index from nitroprusside administration appears to be due to an increase in stroke volume when LVFP >7, but reflex tachycardia when LVFP <7.

INTERMISSION - VISIT EXHIBITS

27. The Long-Term Outlook for Valve Replacement in Active Endocarditis

BENSON R. WILCOX, GORDON F. MURRAY and

PETER J. K. STAREK*, Chapel Hill, North Carolina

Treated with antibiotics alone, the prognosis is poor in infective endocarditis associated with congestive failure (>75% mortality). Viewing surgical intervention as the only alternative to this dismal outlook, we have replaced 23 valves in 22 patients over the past ten years during the active phase of infective valvular endocarditis. Short term results reported from our institution (90% thirty day survival) and by other groups have been gratifying. This report details the long-term outlook for such patients.

In our series there have been five deaths, four occurred within six months of initial operation. Three died at reoperation for paravalvular leak and severe heart failure; one died secondary to renal failure complicating prolonged preoperative heart failure. Two of the deaths were in patients with annular abscess. A fifth patient died three years postop with metastatic lung carcinoma. Significant postoperative complications occurred in eleven patients. These complications can be separated into four groups, I - paravalvular problems, 5; II - congestive failure, 4; III - heart block, 2; and, IV - systemic emboli, 5. Many of these complications were transient as evidenced by the fact that 17 of the 22 patients have been followed an average of four years (1 year toll years) and all are leading active lives.

Except in patients with annular abscess, the long-term outlook is as good in patients with active endocarditis as in other individuals under-going valve replacement. These results clearly establish surgery as an important mode of treatment in active infective endocarditis.

*By invitation

28. Re-Replacement of Prosthetic Heart Valves: A 15 Year Experience

JOSEPH G. SANDZA*, RICHARD E. CLARK, JOHN P. CONNORS*,

THOMAS B. FERGUSON and CLARENCE S. WELDON,

St. Louis, Missouri

Since the beginning of prosthetic valve replacement at the Barnes Hospital, 773 patients have received 884 prosthetic valves of various types between 1962 and October, 1976. Sixty-eight (8.8%) required re-replacement with 79 valves (79/884 8.9%). Ten patients (12.6%) had a prosthesis in the same position changed twice. The incidence of re-replacement by position was mitral 13.3%, aortic 5.8%, and tricuspid 4.6%. The re-replacement valves were classified by the predominant problem: (a) periprosthetic leak (L) 48% (38/79), (b) prosthetic valve infection (I) 27.8% (22/79), (c) prosthetic valve wear (W) 16.4% (13/79), and valve thrombosis (T) 7.6% (6/79). Subset incidences by position for mitral, aortic and tricuspid re-replacements were 63%, 34% and 2.5% respectively. Mortality was related to the disease category as follows L=23.7%, I=50%, W=23%, T=33%. Importantly, mortality was related to valve position, mitral 36%, aortic 26%, tricuspid 0%. The worst clinical combination was an infected mitral prosthesis with a mortality of 55% and the lowest mortality was found in the aortic valve leak group (15.3%) if tricuspid re-replacement is not considered. The operative mortality for the entire group was 36% and there was a late mortality of 18.6%. The primary cause for operative death for re-replacement valve surgery was profound left heart failure immediately after cessation of cardiopulmonary bypass when 80% of early deaths occurred. Mortality was also related to the number of re-replacements. Those having a prosthetic valve replaced more than once had an overall mortality of 50% (5/10), but patients having a second re-replacement for an infected prosthesis had a mortality of 83% (5/6). There were no deaths among the patients who had second re-replacement for clotted or leaking valves. No significant improvement in mortality has occurred with time. If it is considered that valve wear and thrombosis are related to valve manufacture and that valve leak and infection are surgical complications, it is seen that 80% of the deaths in the re-operated patients (20/25) are preventable, and that the incidence of re-replacement (76%) can be reduced by meticulous surgical technique and medical care.

*By invitation

29. Factors Influencing Long-Term Survival After Isolated Aortic Valve Replacement

JACK G. COPELAND*, RANDALL B. GRIEPP*,

EDWARD B. STINSON* and NORMAN E. SHUMWAY, Stanford, California

Followup information was obtained for 1,131 patients having had isolated aortic valve replacement between May, 1963 and April, 1976. The mean followup period was 4.4 yrs. and the total study included 4,125 patient years. Valves utilized included Starr-Edwards series 1,000 (83 pts.), 1,200 (204 pts.), 1,260 (435 pts.), 2,320 (49 pts.), fresh allografts (103 pts.), and porcine xenografts (251 pts.). The effects of preoperative variables upon long-term survival were evaluated using actuarial analysis. Five significant non-invasive preoperative determinants of long-term survival were identified (five-year survival rate and P value shown in parentheses): Age 31-64 vs. ≥ 64 years (70% vs. 57%, $p < .0001$), NYHA functional Class II or III vs. IV (80% or 67% vs. 50%, $p < .003$), radiographic cardiac enlargement vs. no enlargement (64% vs. 75%, $p = .007$), congestive heart failure vs. no CHF (63% vs. 76%, $p = .002$), and remote MI vs. no MI (56% vs. 69%, $p = .004$). Invasive preoperative determinants were also evaluated, pure AS or AS-AR vs. pure AR (72% or 70% vs. 50%, $p = .002$), left atrial mean pressure < 16 mmHg vs. ≥ 16 mmHg (76% vs. 62%, $p = .005$), pulmonary artery mean pressure < 30 mmHg vs. ≥ 30 mmHg (74% vs. 57%, $p = .006$), coronary arteriogram normal vs. CAD (at 3 $\frac{1}{2}$ years 80% vs. 54%, $p = .0002$), and left ventriculogram normal vs. LV dysfunction (at 3 $\frac{1}{2}$ years 74% vs. 56%, $p = .02$).

Overall survival was 68% for all patients and 77% for discharged patients at 5 years after operation. Analysis of combined cumulative risk for thromboembolism, valve failure and prosthesis-related death for each valve type showed the percentage of patients free of prosthesis-related complications at 2 $\frac{1}{2}$ postoperative to be as follows: porcine xenograft 78%, SE 1200 and 1260 68%, SE 1000 59%, SE 2320 57%, and allograft 50%. Differences for xenograft vs. SE 1000, 1200, 1260, 2320, and for allograft vs. SE 1200 and 1260 were significant ($p < .03$).

*By invitation

30. Evaluation of Computer Aided Monitoring of Postoperative Cardiac Patients

L. H. EDMUNDS, JR., H. MAC VAUGH, III,

J. M. STEVENS* and A. E. WECHSLER* Philadelphia, Pennsylvania

The unique economic, medical and educational benefits of a "turn key" computer aided patient monitoring system (Roche Medical Electronics) were evaluated in a prospective, randomized, controlled study of 300 postoperative cardiac patients. Using predetermined ranges of 6 to 11 measurements ("limits"), systematized care was common to both control patients (C) and computer system patients (S). "Limits" were written on single bedside sheets for C and were entered into the computer for S. Criteria related to "smoothness" of convalescence and work sampling studies were recorded.

Time to reach milestones (e.g. extubation), time outside of each of the 6 to 11 "limits", crises, complications, deaths, duration of intensive care and hospital stay did not differ between groups. During the first year S required more staff care (15.8 hours) than did C (12.6 hours). Subsequently 2.04 hours were saved in S in making measurements, charting and communication, and direct patient care increased 0.56 hours (S 11.2 hrs.; C 12.6 hrs.; P, ns). Downtime of the computer system averaged 16.4 hours per week during the first year and most recently 14.2 hours per week. Frequent failures necessitate on-site technical help and backup front-end units. The fluid infusion system is less versatile and reliable than the manual system.

Current computer aided monitoring systems do not provide discernible medical benefits after cardiac surgery and only small time savings in making, recording and displaying measurements. Downtime and need for backup units and technical help are serious medical and economic disadvantages. The benefit/cost ratio is low.

*By invitation

WEDNESDAY AFTERNOON, APRIL 20, 1977

2:00 P.M. Scientific Session Grand Ballroom

31. Preliminary Survival Data Following a Randomized Trial of Aorto-Coronary Saphenous Vein Bypass

RAYMOND C. READ, HERBERT HULTGREN*, KATHERINE DETRE*
and TIMOTHY TAKARO, Little Rock, Arkansas; Palo Alto, California;
West Haven, Connecticut and Asheville, North Carolina

1,015 men with chronic angina pectoris for 6 months, an abnormal resting or exercise electrocardiogram, and angiographic evidence > 75% occlusion of one or more major graftable coronary arteries and acceptable ventricular function, (>50% had had MI) were entered by 13 hospitals into a prospective study comparing medical versus surgical treatment. 474/507 designated for operation received surgery with a 30 day mortality of 9.3%. During the initial "learning" period (1970-71), 16% of 162 patients died. This mortality fell during the later 3 years (312 patients) to 5.7%. Because of the influence of early surgical mortality on outcome, randomization was re-instituted in 1972, therefore, surgical and medical results have been compared for the later 3 years of the study. As reported earlier (Circ. 52:143, 1975) patients with left main coronary artery disease did have significantly better cumulative survival with surgery, p. value <0.05. However, the survival rate for other sub-groups of patients (1,2,3 vessel disease with or without abnormal left ventricular function) while differing with respect to each other has not yet (2 to 5 years later) demonstrated statistically significant improvement with surgery.

Vein graft patency obtained in 81% of cases one year after operation was 71%. 89% of patients had at least one graft patent.

*By invitation

32. Pressure-Flow Characteristics of the Coronary Collateral Circulation During Cardiopulmonary Bypass: Effects of Hemodilution

LEONARD H. KLEINMAN*, JOHN W. YARBROUGH* and
ANDREW S. WECHSLER*, Durham, North Carolina,

Sponsored by: DAVID C. SABISTON, JR., Durham, North Carolina

Hemodilution is employed frequently during cardiopulmonary bypass (CPU). Previous investigators have shown that perfusion and oxygenation of major vascular beds supplied by normal arteries will be maintained during hemodilution by increasing organ flow. However, the effects of hemodilution on myocardial regions supplied by collateral vessels have not been determined. Thus, twelve dogs were subjected to hemodilution during normothermic CPB; Group I normal hearts supplied by normal coronary arteries and Group II collateralized hearts (ameroid model) consisting of a region of myocardium supplied by collateral vessels (CR) and a region of myocardium supplied by normal coronary arteries (NR). Regional myocardial blood flow was determined by tracer microspheres. Retrograde coronary pressure was measured in the collateralized hearts by can-nulation of the circumflex artery distal to the ameroid induced occlusion. Data were collected in the empty beating state at hematocrits (hcts) of 39 ± 1.6 and $20 \pm .7$ vols % with perfusion pressure maintained at 80 mm Hg and PO_2 and heart rate held constant. Most significant changes are presented below (mean \pm SEM).

	Subendocardial Flow			cc/min/gm	Subepicardial Flow		
	40	hct	20		40	hct	20
NH	.73 \pm .06		3.63 \pm .50	<.01	.64 \pm .03	2.91 \pm .40	<.01
NR	.81 \pm .16		2.03 \pm .24	<.01	.79 \pm .17	1.61 \pm .30	<.01
CR	.48 \pm .10		.88 \pm .37	NS	.59 \pm .08	1.24 \pm .26	<.01

In the collateralized hearts, the subendocardial flow difference between NR and CR which existed at 40 vols % was markedly exaggerated at 20 vols % (p <.01), even though hemodilution did not result in a subepicardial flow difference. With hemodilution, retrograde coronary pressure decreased from 45 ± 5 to 29 ± 4 (p <.05), as perfusion pressure was held constant. These data suggest that during CPB, hemodilution is associated with an increasing perfusion defect in regions of myocardium supplied by collateral vessels and therefore, the subendocardium does not receive the flow increase necessary to maintain oxygen delivery at pre-hemodilution levels. This may result in prolonged periods of impaired regional oxygen delivery in patients with known coronary artery disease subjected to hemodilution during corrective surgery.

*By invitation

33. Does Coronary Bypass Increase Longevity?

O. WAYNE ISOM, FRANK C. SPENCER, EPHRAIM CLASSMAN*,
JOSEPH N. CUNNINGHAM*, PHYLLIS TEIKO*,
GEORGE E. REED and ARTHUR D. BOYD, New York, New York

The principle question with coronary bypass is its influence on longevity. To investigate this, 1,174 consecutive patients undergoing elective coronary bypass surgery at New York University between 1968 and 1975 have been recently studied (98% follow-up). Most patients were operated on for disabling angina refractory to medical therapy. Patients undergoing concomitant valve replacement, ventricular aneurysmectomy, and emergency bypass surgery were excluded from this analysis.

The overall operative mortality was 5.2%, decreasing from 28% in 1968 to two to three percent in the last three years (1972-1975). Multiple grafts (two to six) were used in 88% of the group. Angina was cured or greatly improved in 92% of the surviving patients.

The five-year survival (computed by life-table analysis including operative deaths but excluding late non-cardiac deaths) was quite high, 88%. Only 49 deaths from cardiac causes occurred after leaving the hospital in the entire group of 1,174 patients. Non-fatal myocardial infarctions were similarly uncommon, 2.6% per year (actuarial analysis).

These data show a better survival than previous surgical reports (average late mortality of three percent per year) and a much greater survival than medically treated patients with double or triple disease (five-year mortality of 35% and 55% respectively). The significance of these findings will be discussed in detail.

*By invitation

34. Results of Combined Coronary Endarterectomy and Coronary Bypass for Diffuse Coronary Artery Disease

MARK S. HOCHBERG*, WALTER H. MERRILL*, LAWRENCE L. MICHAELIS and CHARLES L. McINTOSH*, Bethesda, Maryland

The treatment of diffuse distal coronary artery disease is presently unsatisfying. Coronary artery bypass grafting (CABG) is usually not successful in these circumstances.

Mechanical endarterectomy of a distal coronary artery combined with CABG has been performed 21 times at this institution. Follow-up catheterization six months after operation revealed that 11 of the 15 grafts studied were patent (73%). Eleven endarterectomies were performed to the distal right coronary artery, two to the distal left anterior descending coronary artery, and one each to the circumflex and diagonal coronary arteries. The average flow in these patent grafts at the time of operation was 92 ml/min (range 30-200 ml/min). Intraoperatively, the four non-patent grafts had flows of 5-30 ml/min. All of these 15 patients had concomitant CABG's without endarterectomy to other coronary arteries. There were two perioperative myocardial infarctions. There were no early or late deaths.

A literature survey shows that 447 CABG's constructed to endarterectomized coronary arteries have undergone postoperative catheterization. Three hundred fifty (78%) of these grafts were patent from three months to two years following surgery. Histologic studies demonstrate that a neo-intima is formed over the endarterectomized surface. Neither thrombosis nor the recurrence of atherosclerosis seems to be the problem that many have feared.

Every surgeon who performs coronary bypass grafts is often unfortunately surprised to find an angiographically attractive artery unsuitable for bypass upon exploration in the operating room. Endarterectomy of coronary arteries alone has not proved to be of lasting value for this problem. However, the present series, as well as the combined series from the literature, lends encouraging support to the value of endarterectomy plus coronary artery bypass grafting for the treatment of a diffusely diseased distal coronary artery.

*By invitation

35. Atherosclerosis in Vein Bypass Grafts After Three Years - Implication on Indications and Prognosis in Coronary Surgery

ROBERT J. FLEMMA, JOSEPH BARBORIAK*, GEORGE E. BATAYIAS*, MICHAEL KORNS*, DONALD C. MULLEN and DERWARD LEPLEY, JR., Milwaukee, Wisconsin

Approximately 100 patients who underwent coronary vein bypass grafting have had removal of their vein grafts beyond three years from insertion either at autopsy or reoperation. A high percentage had atherosclerotic involvement of the vein bypass grafts as a major pathologic finding. The implication of this atherosclerotic involvement, which is identical to that seen in arteries, on the long term fate of coronary vein bypass grafting is obvious. We found there was a positive correlation in these patients between elevated serum cholesterol and triglycerides and atherosclerosis in vein bypass grafts.

These cases are not a random sample as they were selected by death or closure of vein grafts and atherosclerosis may occur in only a small percentage of all patients. However, the ominous portent on the long term fate of vein grafts demands that a vigorous effort be made to determine the exact incidence of atherosclerosis occurring in vein bypass grafts and the identification and categorization of risk factors that might help elucidate the mechanism for this atherosclerosis. A model identification and follow-up program to achieve this will be presented that will allow for accumulation of considerable data in a short time.

*By Invitation

The American Association for Thoracic Surgery, 1976-1977

(Listed by Countries, States, Provinces and Cities)

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Kessler, Charles R.

Kirklin, John W.

Irvine

Connolly, John E.

Miller, Don R.

La Canada

Aronstam, Elmore M.

Kouchoukos, Micholas
Pacifico, Albert D.
Montgomery
Simmons, Earl M.

ALASKA

Anchorage
Phillips, Francis J.

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Nelson, Arthur R.
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Tucson
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Melick, Dermont W.
Sanderson, Richard G.

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Fayetteville
Thrower, Wendell B.
Jasper
Hudson, W. A.
Little Rock
Campbell, Gilbert S.
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Daniels, Albert C.
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Escondido
Mannix, Edgar P.
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Evans, Bryon H.

Palm Desert
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San Bernadino
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Long Beach
Bloomer, William E.
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Brewer, Lyman A. III
Buchberg, Gerald D.
Fonkalsrud, Eric W.
Goldman, Alfred
Kay, Jerome Harold
Lindesmith, George G.
Longmire, William P., Jr.
Ludington, Louis G.
Maloney, James V., Jr.
Matloff, Jack M.
Meyer, Bert W.
Morton, Donald L.
Mulder, Donald G.
Ramsay, Beatty H.
Ringler, Leo G.
Stiles, Quentin R.

Montebello
Lui, Alfred H. F.

Oakland
Dugan, David J.
Ecker, Roger R.
May, Ivan A.

Orange
Bartlett, Robert H.
Salyer, John M.

Orinda
Stephens, H. Brodie
Oxnard

Dart, Charles H., Jr.
Pacific Palisades
Weinberg, Joseph A.

Stanford
Guernsey, James M.
Mark, James B. D.
Shumway, Norman E.

Thousand Oaks
Tsuji, Harold K.

Torrance
Benfield, John R.
Moore, Thomas C.
Nelson, Ronald J.
State, David

West Covina
Carter, Paul R.

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Condon, William B.
Eiseman, Ben
Grow, John B.

Baronofsky, Ivan D.
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Peters, Richard M.
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Grimes, Orville F.
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Santa Barbara
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Santa Monica
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Oatway, William H.

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Gilbert, Joseph W., Jr.
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Lakeland
Brown, Ivan W., Jr.
Largo
Wheat, Myron W., Jr.
Miami
Bolooki, Hooshang
Center, Sol

Harper, Frederick R.
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Newman, Melvin M.
Pappas, George
Paton, Bruce C.
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Waddell, William R.
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New Brunswick
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North Caldwell
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Piscataway
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Bronxville

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Levowitz, Bernard S.

Potter, Robert T.

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Subramanian, Sambumurthy

Cooperstown

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Elmira

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Great Neck, L. I.

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Martini, Nael

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Patchoque

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Stony Brook

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Syracuse

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Kaunitz, Victor H.

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Chapel Hill

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Helmsworth, James A.
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Cleveland
Ankeney, Jay L.
Frederick S. Cross
Groves, Laurence K.
Kay, Earle B.
Kennedy, John Hines
Loop, Floyd
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Mendelssohn, Edwin
Mundth, Eldred D.
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Rosemond, George P.

Nashville
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Foster, John H.
Gobbel, Walter G., Jr.
Johnson, Hollis E.
Sawyers, John L.
Scott, Henry W., Jr.
Stoney, William S.

TEXAS

Austin
Hood, R. Maurice
Ross, Raleigh R.
Beaumont
Harrison, Albert W.

RHODE ISLAND

Providence

Karlson, Karl E.
Simeone, Fiorindo A.

SOUTH CAROLINA

Charleston

Bradham, Randolph R.
Hairston, Peter
Lee, William H., Jr.
Parker, Edward F.

Columbia

Ryan, Thomas C.

TENNESSEE

Chattanooga

Adams, Jesse E., Jr.
Hall, David P.

Jackson

Chandler, John H.

Knoxville

Blake, Hu Al
Domm, Sheldon E.
Waterman, David H.

Memphis

Carr, Duane
Cole, Francis H.
Eastridge, Charles E.
Garrett, H. Edward
Howard, Hector S., Jr.
Hughes, Felix A., Jr.
McBurney, Robert P.
Pate, James W.
Robbing, S. Gwin
Rosensweig, Jacob
Skinner, Edward F.

San Antonio

Dooley, Byron N.
French, Sanford W., III
Grover, Frederick L.
Heaney, John P.
Hood, Richard H., Jr.
Nixon, James W.
Proctor, Oscar S.
Trinkle, J. Kent

Temple

Brindley, G. Valter, Jr.

UTAH

Salt Lake City

Cutler, Preston R.
Liddle, Harold V.
Mortensen, J. D.
Nelson, Russell M.
Rumel, William R.
Wolcott, Mark W.

VERMONT

Brattleboro

Gross, Robert E.

Burlington

Coffin, Laurence H.
Miller, Donald B.

Chester Depot

Adams, Herbert D.

White River Junction

Dallas

Adam, Maurice
Davis, Milton V.
Holland, Robert H.
Kee, John L., Jr.
Lambert, Gary J.
Mitchel, Ben F., Jr.
Paulson, Donald L.
Razzuk, Maruf A.
Shaw, Robert R.
Sugg, Winfred L.
Urschel, Harold C., Jr.
Wilson, Hugh E., III

Forth Worth

Johnson, Clive R.

Galveston

Derrick, John R.
Tyson, Kenneth R. T.

Houston

Beall, Arthur C., Jr.
Burdette, Walter J.
Cooley, Denton A.
Crawford, E. Stanley
De Bakey, Michael E.
Hallman, Grady L., Jr.
Henly, Walter S.
Morris, George C., Jr.
Norman, John C.
Overstreet, John Wm.
Reul, George J., Jr.
Seybold, William D.

Lackland Air Force Base

Stanford, William

La Porte

Barkley, Howard T.

Lubbock

Bricker, Donald L.
Dalton, Martin L., Jr.

WASHINGTON

Seattle

Anderson, Richard P.
Cantrell, James R.
Dillard, David H.
Hill, Lucius D.
Jarvis, Fred J.
Jones, Thomas W.
Merendino, K. Alvin
Mills, Waldo O.
Pinkham, Roland D.
Sauvage, Lester R.
Thomas, George I.

Spokane

Berg, Ralph, Jr.

WEST VIRGINIA

Charleston

Walker, James H.

Morgantown

Gardner, Robert J.
Tarnay, Thomas J.
Warden Herbert E.

WISCONSIN

Green Bay

Vorwald, Arthur J.

La Crosse

Gundersen, A. Erik

Madison

Crandell, Walter B.
VIRGINIA
Arlington
Conrad, Peter W.
Klepser, Roy G.
Charlottesville
Dammann, John F.
Drash, Everett C.
Minor, George R.
Muller, William H., Jr.
Nolan, Stanton P.
Great Falls
Mills, Mitchell
Lynchburg
DeNiord, Richard N.
Moore, Richmond L.
Richmond
Bosher, Lewis H.
Brooks, James W.
Cole, Dean B.
Greenfield, Lazar J.
Gwathmey, Owen
Johns, Thomas N. P.
Lower, Richard R.

CANADA
ALBERTA
Calgary
Miller, George E.
Edmonton
Callaghan, John C.
Meltzer, Herbert
Sterns, Laurence P.
BRITISH COLUMBIA
Vancouver
Allen, Peter
Ashmore, Phillip G.
Harrison, Elliott
West Vancouver
Robertson, Ross
Victoria
Stenstrom, John D.

MANITOBA
Winnipeg
Barwinsky, Jaroslaw
Cohen, Morley
NEW BRUNSWICK
St. John
Skinner, George F.
NEWFOUNDLAND
St. Anthony
Thomas, Gordon W.
St. John's
Brownrigg, Garrett M.
Couves, Cecil M.
Littlefield, James B.

NOVA SCOTIA
Halifax
Murphy, David A.
Kentville
Quinlan, John J.

ONTARIO

Curreri, Anthony R.
Kahn, Donald R.
Young, William P.
Marshfield
Myers, William O.
Sautter, Richard D.
Milwaukee
Boncheck, Lawrence I.
Flemma, Robert J.
Hausmann, Paul F.
Johnson, W. Dudley
Lepley, Derward, Jr.
Litwin, S. Bertrand
Mullen, Donald C.
Narodick, Benjamin G.
Pemberton, Albert H.
Weisel, Wilson

Delarue, Norman C.
Goldman, Bernard S.
Henderson, Robert D.
Joynt, George H. C.
Key, James A.
Lockwood, A. L.
Mustard, Wm. T.
Pearson, F. Griffith
Trimble, Alan S.
Trusler, George A.
Westbrook
Lynn, R. Beverley
Woodbridge
Laird, Robert

QUEBEC
Montreal
Blundell, Peter E.
Bruneau, Jacques
Chiu, Chu-Jeng (Ray)
Dobell, Anthony R. C.
Grondin, Claude M.
Grondin, Pierre
Kunstler, Walter E.
Lepage, Gilles
MacLean, Lloyd D.
McIntosh, Clarence A.
Scott, Henry J.
Vineberg, Arthur M.
Quebec City
Gravel, Joffre-Andre
Sherbrooke
Labrosse, Claude C. L.

OTHER COUNTRIES
ARGENTINA

Buenos Aires
Favaloro, Rene G.

BRAZIL
Sao Paulo
Zerbini, E. J.

Hamilton
Sullivan, Herbert J.
London
Heimbecker, Raymond O.
Ottawa
Keon, Wilbert J.
Sudbury
Field, Paul
Walker, George R.
Toronto
Baird, Ronald J.
Bigelow, Wilfred G.

ENGLAND

Bristol
Belsey, Ronald
Hampden Row
Sellers, Sir Thomas Holmes
Hereford
Thompson, Vernon
London
Brock, Lord
Surrey
Barrett, Norman R.

SCOTLAND

Edinburgh
Logan, Andrew

HOLLAND

Amsterdam
Boerema, I.
Leiden
Brom, Gerard A.

IRELAND

Dublin
O'Malley, Eoin

GUATEMALA

Guatemala City
Herrera, Rudolfo

VENEZUELA

Caracas
Tricerri, Fernando E.

SWEDEN

Stockholm
Bjork, Viking O.
Crafoord, Clarence

SWITZERLAND

Zurich
Senning, Ake

INDIA

Bikaner, Raiputana
Van Allen, Chester M.
Noakhali, Bangladesh
McCord, Colin W.

SAUDI ARABIA

Riyadh
McPhail, Jasper L.

JAPAN

Sendai, Miyagi-ken
Mohri, Hitoshi
Tokyo
Sakakibara, Shigeru

CONSTITUTION OF THE AMERICAN ASSOCIATION FOR THORACIC SURGERY

As amended to April 24, 1976

ARTICLE I. Name

Section 1. This Association shall be known as The American Association for Thoracic Surgery.

ARTICLE II. Object

Section 1. The object of the Association shall be to encourage and stimulate investigation and study that will increase the knowledge of intrathoracic physiology, pathology, and therapy, to correlate such knowledge and disseminate it.

Section 2. To attain this object, the Association shall hold at least one scientific meeting every year in which free discussion shall be featured; shall conduct a Journal for the publication of the papers presented at this meeting, and other acceptable articles; and shall undertake such other activities as the Council or the Association as a whole may decide.

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 the By-laws. Only Active and Senior Members shall have the privilege of voting or holding office, except as provided by the By-laws.

Section 2. Election to Honorary, Senior or Active Membership shall be for life, subject to the provisions of Section 3 following. Starting with the 1970 annual meeting, there shall be no further additions to the Associate Membership. All

new members shall be elected directly to Honorary or Active status. Associate Membership shall be continued for a limited period of time as determined by the By-laws.

Section 3. 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 the member so accused ample opportunity to appear in his own behalf.

ARTICLE IV. Officers and Government

Section 1. The officers of the Association shall be a President, a Vice-President, a Secretary, a Treasurer, and Editor, and five Councilors. These ten officers and councilors shall be the governing body of the Association, and shall have full power to act on all matters, except as follows:

1. They may not alter the initiation fees or annual dues, nor levy any general assessments against the membership, except that they may, in individual cases, remit annual dues or assessments.
2. They may in no wise change the Constitution or By-Laws.
3. They may neither elect new members nor alter the status of existing members, other than to apply the provisions of Article III, Section 3.
4. They may not deplete the principal of the Endowment Fund.

Section 2. Officers and Councilors 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. The Secretary, and Treasurer, and the Editor shall be elected for a one-year term of office, and any or all may be re-elected indefinitely. The outgoing President shall automatically become a Councilor for a one-year term of office. The other four Councilors shall be elected, one each year, for a four-year term of office, but no Councilor may be re-elected to succeed himself.

Section 3. Vacancies occurring among the officers and councilors during the year shall be temporarily filled by action of the Council, subject to approval of the Association at the next regularly convened meeting.

ARTICLE V. Committees

Section 1. At the opening session of the annual meeting there shall be elected, after nomination from the floor of the Association, a Nominating Committee of three. This Committee shall prepare a slate of nominees for officers and councilors and shall present their report at the Executive Session of the Association.

Section 2. The Council is empowered to appoint a Membership Committee, an Auditing Committee, a Program Committee, a Necrology Committee, and such other committees as may in its opinion be necessary. All such committees shall render their report at the Executive Session of the Association.

Section 3. The Editor is empowered to appoint an Editorial Board, subject only to the approval of the Council.

Section 4. 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. In appointing such committees, the Council shall be governed by the provisions of the By-Laws.

ARTICLE VI. 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 the medium of initiation fees, annual dues, and special assessments. The amount of the annual dues and the initiation fees shall be determined by the By-Laws.

If, at the end of any fiscal year, there be 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 be 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 objects of the Association (Article II), 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 from annual dues, special assessments, and income from the Endowment Fund, subject to the provisions of Section 4, following. Funds derived from the payment of initiation fees shall not be available for current expenses.

Section 4. All funds derived from the payment of initiation fees 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 VII. 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 the By-Laws.

Section 2. A special meeting of the Association may be called on one month's notice on the written request of fifteen members. The specific purposes of the meeting must be stated in the request and in the official call for the meeting.

Section 3. There shall be an annual meeting of the Council.

ARTICLE VIII. Amendments

Section 1. This Constitution shall in no wise be changed except by a three-fourths vote of the members present at an annual meeting, and further provided that the proposed alteration or amendment shall have been moved and seconded at a previous annual meeting, and that printed copies of the suggested alteration or amendment shall have been circulated among the members, and that the members shall have been specifically advised that such alteration or amendment will be voted upon.

BY-LAWS

ARTICLE I.

Section 1. These By-Laws shall merely interpret the Constitution and specifically apply its principles. They shall set forth no principles not included in the Constitution.

ARTICLE II.

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.

Section 3. Members are urged to cooperate with all Scientific Committees of the Association.

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. While the scientific session of the annual meeting is held primarily for the benefit of the members of the Association, it may be thrown open to nonmembers 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.

ARTICLE III.

Section 1. 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 the Association as a whole 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 2. Active Membership shall be limited to six hundred. The 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 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 3. The Associate Members shall be appropriately phased out. The limited period of time for Associate Membership as required by Article III, Section 2 of the Constitution, shall be five years. 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 4. The number of Senior Members shall be unlimited. Active Members automatically advance to Senior Membership at the age of sixty years. In addition, starting with the 1971 Annual Meeting, a younger Active Member may be eligible for Senior Membership if incapacitated by disability, but for no other reason.

Section 5. Honorary Membership shall be reserved for such distinguished persons as may be deemed worthy of this honor by the Council with concurrence of the Association.

Section 6. The report of the Membership Committee shall be rendered at the annual Executive Session 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 7. 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 8. Notwithstanding Section 7, 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.

Section 1. The President of the Association shall perform all duties customarily pertaining to the office of President. He shall not only preside at all meetings of the Association, but also at all meetings of the Council. The President shall be elected from the Active or Senior Members of the Association.

Section 2. The Vice-President of the Association shall perform all duties customarily pertaining to the office of the Vice-President, not only as to the Association, but also as to the Council. The Vice-President shall be elected from the Active or Senior Members of the Association.

Section 3. The Secretary of the Association shall perform all duties customarily pertaining to the office of Secretary. He shall serve not only as Secretary of the Association but also as Secretary of the Council. The Secretary shall be elected from the Active or Senior Members of the Association. 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 4. The Treasurer of the Association shall perform all duties pertaining to the office of Treasurer. He shall not only serve as Treasurer of the Association but shall also serve as custodian of the Endowment Fund. The Treasurer shall be elected from the Active or Senior Members of the Association.

Section 5. The Editor of the Association shall be the Editor of the official Journal and shall, ex officio, be the Chairman of the Editorial Board. The Editor may be elected from the Honorary, Active, or Senior Members of the Association.

Section 6. The Councilors of the Association shall hold office as specified in the Constitution. They shall be elected from the Active or Senior Members of the Association.

Section 7. 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 under the Provisions of Article IV, Section 3, of the Constitution.

ARTICLE V.

Section 1. The Nominating Committee shall consist of three Active or Senior Members who are, by preference, also past Presidents of the Association and in attendance at the meeting. They shall be elected in accordance with the provisions of Article V, Section 1, of the Constitution. The Council shall instruct the Committee as to the vacancies which are to be filled by election.

Section 2. The Membership Committee shall consist of seven Active or Senior Members appointed in accordance with the provisions of Article V, Section 2, of the Constitution. 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 their 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 II, Section 4, of these By-Laws.

Section 3. The Auditing Committee shall consist of three Active or Senior Members appointed in accordance with the provisions of Article V, Section 2, of the Constitution. None of these may be selected from the officers or councilors of the Association. Their duty shall be to audit the accounts of the Association each year and render their report to the Executive Session of the Association. Appointment to this Committee shall be made for a one-year term. Not more than two members may be reappointed to succeed themselves.

Section 4. The Program Committee shall consist of five members: The President of the Association, the Secretary of the Association, the Editor of the Association, and two members at large, one of whom shall be resident at or near the place of annual meeting. The duties of this Committee shall be to arrange, in conformity with instructions from the Council, the scientific program for the annual meeting.

Section 5. The Necrology Committee shall consist of one or more Active or Senior Members, and shall be appointed in accordance with the provisions of Article V, Section 2, of the Constitution. 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 the deaths of all members of the Association and to report such deaths at every annual meeting.

Section 6. 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 7. 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.

Section 8. The Everts 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 Council, and to carry out all business pertaining to the Fellowship and the Fellows, past, present, and future.

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.

ARTICLE VI.

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.

Section 3. Annual dues for Associate Members shall be \$75.00.

Section 4. Senior Members are exempt from dues.

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

Section 8. Associate and Active Members must subscribe to THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY to retain their membership status.

Section 9. Senior Members may retain their membership status without the payment of annual dues, and subscription to THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY is optional.

(NOTE. 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 VII.

Section 1. When the Association convenes for its annual meeting, it shall immediately go into executive session, but the business at this session shall be limited to:

1. Election of Nominating Committee.
2. Appointment of necessary committees.
3. Miscellaneous business of an urgent nature.

Section 2. The annual executive session of the Association shall be held at the opening of the afternoon session of the second day of the meeting. The order of business shall be:

1. Reading of the minutes of the preceding meetings of the Association and Council.
2. Report of the Treasurer for the last fiscal year.
3. Report of the Auditing Committee.
4. Report of the Treasurer for the current year to date.
5. Report of the Necrology Committee.
6. Report of the Program Committee.
7. Action on amendments to the Constitution and By-Laws.
8. Action of recommendations emanating from the Council.
9. Unfinished Business.
10. New Business.
11. Report of the Membership Committee.
12. Election of new members.
13. Report of the Nominating Committee.
14. Election of officers.

Section 3. There shall be an annual meeting of the Council.

ARTICLE VIII.

Section 1. These By-Laws shall in no wise be changed except by a two-thirds vote of the members present at the annual meeting or a properly convened meeting of the Association, and further provided that the proposed action or amendment shall have been moved and seconded by not less than three of the members in a properly convened annual or special 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 at any regularly convened meeting of the Association.

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. Melter
Norman B. Carson	Willy Meyer (Founder)
J. Frank Corbett	James Alexander Miller
Armistead C. Crump	Robert T. Miller
Charles N. Dowd	Fred J. Murphy
Kennon Dunham	Leo S. Peterson
Edmond Melchior Eberts	Eugene H. Pool
Max Einhorn	Walther I. Rathbun
Herman Fischer	Martin Rehling
Albert H. Garvin	B. Merrill Ricketts
Nathan W. Green	Samuel Robinson
John R. Hartwell	Charles I. Scudder
George J. Heuer	William H. Stewart
Chevalier Jackson	Franz Torek
H. H. Janeway	Martin W. Ware
James H. Kenyon	Abraham O. Wilensky
Adrian V. S. Lambert	Sidney Yankauer

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

EVARTS A. GRAHAM MEMORIAL TRAVELING FELLOWS

1st	1951-52	L L Whytehead, M.D. F.R.C.S. 790 Sherbrooke St., Winnipeg 2, Manitoba, 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. Oulun Laaninsairaala, Oulu, FINLAND
11th	1963-64	Masahiro Saigusa, M.D. Department of Surgery, Tokyo University School of Medicine 1 Motofuji-cho, Bunkyo-Ku, Tokyo, 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. Brompton Hospital, London, S.W. 3, ENGLAND
14th	1964-65	Elias Carapistolis, M.D., F.A.C.S. University Hospital A.H.E.P.A., Surgical Clinic Department Aristotelian University of Thessaloniki, Thessaloniki, GREECE
15th	1965-66	Gerhard Friehs, M.D. Chirurgische University Klinik, Graz, AUSTRIA
16th	1965-66	Ary Blesovsky, M.D. London, ENGLAND
17th	1966-67	C. Peter Clarke, F.R.A.C.S. Cardiac Surgeon, The Royal Childrens Hospital, Flemington Road, Parkville, Vic. 3052 AUSTRALIA
18th	1966-67	G. B. Parulkar, M.D. Thoracic and Cardiovascular Center, K.E.M. Hospital, Parel, Bombay 12, INDIA
19th	1967-68	Claus Jessen, M.D. Surg. Dept. D, Rigshospitalet, Blegdamsvej 9, Copenhagen, DENMARK
20th	1969-70	Peter E. Bruecke, M.D. A-1090 Vienna, Alserstrasse 4, 1st Surgical Clinic, Vienna, AUSTRIA
21st	1970-71	Michel S. Slim, M.D. Department of Surgery, American University Hospital, Beirut, LEBANON
22nd	1971-72	Severi Pellervo Mattila, 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. 41 rue Louvrex, Liege B-4000, BELGIUM
25th	1974-75	J. J. DeWet Lubbe, M.D. Dept. of Cardio-Thoracic Surgery, University of Stellenbosch P. O. Box 53 Bellville, REPUBLIC OF SOUTH AFRICA
26th	1975-76	Mieczyslaw Trenkner, M.D. Institute of Surgery Debinski, POLAND

27th	1976-77	Bum Koo Cho, M.D. St. Luke's Episcopal Hospital Houston, Texas, KOREA
28th	1977-78	Alan William Gale, M.D., FRACP, FRACS, Paddington, NSW, AUSTRALIA