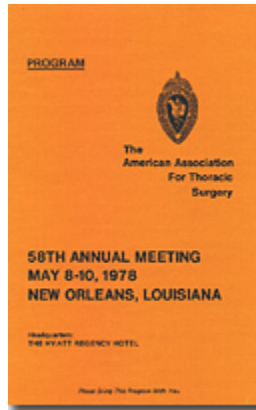


1978 ANNUAL MEETING PROGRAM



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American Association for Thoracic Surgery 58TH ANNUAL MEETING Scientific Program

MONDAY MORNING, MAY 8, 1978

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

Regency Ballroom

8:45 A.M. Scientific Session

Regency Ballroom

1. Resectable Tracheobronchoplasties for Carcinoid Tumor

NSIDINANYA OKIKE, W. SPENCER PAYNE, PHILIP E. BERNATZ
and PAUL F. LEONARD*, Rochester, Minnesota*

Fifteen patients—eight male and seven female, aged 10 to 70 years— with lower respiratory carcinoid tumors treated by a variety of resective tracheobronchoplastic procedures represent 8.3% of 180 carcinoids treated in a recent 20-year period.

All 15 had respiratory symptoms, and 2 also had the carcinoid syndrome. X-ray changes ranged from a mass or atelectasis (or both) through unilateral lung hyperinflation to clear lungs with subtle filling defects in major airways. All tumors were visualized endoscopically and 13 patients had biopsies. All tumors were "typical" carcinoids histo-pathologically. Before operation, the patients had minimal or no respiratory insufficiency, although flow-volume and ventilation-perfusion abnormalities were noted when major airways were affected.

Anesthetic management was generally by orotracheal tube alone, although this was occasionally supplemented by sterile tubing brought into the operative field. Use of the Carlens tube was reserved for more distal bronchial lesions.

Surgical management at thoracotomy was as follows: (1) simple wedge tracheobronchotomy without lung resection (four patients); (2) bronchial sleeve resection without lung resection (three patients); or (3) bronchial sleeve with upper lobe resection (eight patients). These 15 operations were performed with eight technical anatomic variations.

No early or late deaths occurred. There was one case of early transient atelectasis. Three patients required late endoscopic removal of suture granulation tissue. All patients are living without recurrence of tumor or carcinoid syndrome or other respiratory complications 1 to 19 years postoperatively.

*By invitation

2. Tracheobronchial Mucoepidermoid Carcinoma: Clinico-pathological Features and Results of Treatment

HOWARD K. LEONARDI, MERLE A. LEGG* and
WILFORD B. NEPTUNE, Boston, Massachusetts*

Mucoepidermoid carcinomas of the tracheobronchial tree are extremely uncommon lesions and, as a result, opinions regarding their natural history are conflicting. Some investigators have concluded that these tumors are uniformly aggressive in their clinical behavior, while others have tended to group them within the broad category of bronchial adenomas with few specific comments about their malignant potential.

In an effort to clarify existing uncertainties concerning the virulence of these tumors, seven well-documented, previously unreported cases have been collected from a clinical experience with over 4,200 primary pulmonary malignancies and 114 bronchial adenomas. Two tracheal and five endobronchial lesions are included. Clinical, roentgenographic, bronchoscopic and histologic features are presented with particular emphasis on the pathological criteria for establishing grades of malignancy. One high-grade and six low-grade variants were identified.

Curative resections, including segmental tracheal resection in two patients, lobectomy in three patients and pneumonectomy in two patients, were performed and follow-up is complete to the time of this report. Long term survivals ranging from five years to 22 years, averaging 11.6 years, have been achieved in the six cases of low-grade malignancy. The one high-grade variant proved fatal within 24 months of diagnosis despite two surgical attempts at control and adjuvant radiotherapy.

It is concluded that these tumors exhibit a spectrum of virulence with the low-grade lesions amenable to long-term surgical cure. The optimum treatment of high-grade lesions remains problematical.

*By invitation

3. Combined Therapy for Small Cell Undifferentiated Carcinoma of the Lung

*ISIDORE MANDELBAUM, NED B. HORNBACK**

BEN-TEK JOE and LAWRENCE EINHORN,*

Indianapolis, Indiana

Fifty-eight patients with small cell lung cancer were treated from September, 1974 to March, 1976 with combined chemotherapy and radiotherapy. Surgical resection of the lung lesion was performed in two patients and a number of surgical diagnostic methods carried out in the remaining patients with disseminated or unresectable lesions. Nineteen patients were from the V.A. Hospital and 39 from University Hospital. Of the latter, 24 were males and 15 females.

The median Karnofsky performance status was 60. Thirty-nine patients had extensive disease and 19 had disease limited to the chest and supraclavicular area.

All patients received chest radiotherapy and prophylactic whole brain radiotherapy. Adriamycin, Cytosan, and Vincristine were given on day one and continued every three weeks. There were 26 (45%) partial remissions of a median duration of 26 weeks. There were 23 patients (41%) with complete remission.

Nine of 58 patients (16%) are alive and disease free from 16 plus to 30 plus months. Seven of 19 patients with limited disease (37%) are presently alive and disease free. This includes the two patients in whom Surgical resection was performed.

Combined therapy influences favorably the prognosis of small cell cancer of the lungs especially in those patients with limited disease and favorable performance status.

*By invitation

4. Long Term Survivors After Resection of Lung Carcinoma

THOMAS W. SHIELDS, EDWARD W. HUMPHREY,

GEORGE A. HIGGINS, JR. and ROBERT J. KEEHN*, Chicago,*

Illinois, Minneapolis, Minnesota and Washington, D.C.

As of June 1976, 257 of 2238 patients with lung cancer who were entered into one of four surgical adjuvant chemotherapy lung trials prior to June 1966 have survived ten years. One hundred twenty-five of these 257 patients were eligible for 15 year survival; 67 patients did so. One hundred thirty-three lobectomies, 120 pneumonectomies and four lesser resections were the procedures performed. The cell type was squamous cell in 185 patients, adenocarcinoma in 24, other cell types in 47 and unknown in one. Lymph node metastases at the time of resection were absent in 185 of the patients, present in either the lobar or hilar nodes in 59, in the mediastinal nodes in 11 and the status was unknown in two.

Ninety-seven patients have died since the tenth year anniversary. The major causes of death were cardiovascular and pulmonary diseases and second primary carcinomas. The latter were the cause of death in 25 patients. In the entire group of 257 patients, 61 (23%) developed a second primary tumor; 25 were in the lung and 36 in another organ system. The more common sites were the head and neck region, the bladder, and the colon. One-half of the patients with a new primary other than in the lung underwent some form of definitive treatment, whereas only about a third with a second lung primary underwent definitive treatment. There were four lobectomies, 2 completion pneumonectomies, one wedge resection and two patients received irradiation. Only three of these patients survived to the fifteenth year. Frequent observation is indicated for earlier detection and possible treatment of this usually fatal occurrence.

INTERMISSION - VISIT EXHIBITS

*By invitation

5. Endobronchial Lymphoscintigraphy (EBLS): A New Diagnostic Modality

***DREW C. G. BETHUNE*, DAVID S. MULDER*, and
RAY C. J. CHIU, Montreal, Quebec, Canada***

A safe, simple method of visualizing the lymphatic drainage of the lungs has been developed using colloidal radionucleotides. The tracer is injected submucosally via a bronchoscope, and scanning of the thoracic lymph nodes is performed several hours later using a gamma camera.

Development and testing of the method was done in 7 canine experiments. Injection needles for both rigid and flexible bronchoscopes were designed. The procedure has been used in a preliminary group of 11 patients. In addition, direct injections of esophageal tumors were carried out in 2 patients.

The canine thoracic and cervical lymph nodes were well visualized following EBLS. In the human studies ^{99}Tc sulfur colloid, ^{99}Tc phytate and ^{198}Au colloid were used, the latter appearing to be the most promising. New cases are being added to the series rapidly at present. Two esophageal carcinoma patients subsequently found to be unresectable had no spread of isotope from the injections into the tumors, suggesting lymphatic obstruction by the tumor. In others peribronchial, subcarinal, paratracheal, cervical and even para-aortic nodes were visualized. Reversal of the normal RUL lymphatic drainage pattern was seen in a patient with SVC syndrome caused by an infiltrating bronchogenic carcinoma. From LLL injection sites, both contralateral and ipsilateral spreads were seen.

This technique allows delineation of the lymphatic drainage patterns of particular lung regions in the individual patient. This information should facilitate the selective choice of further diagnostic procedures and aid in management and follow up.

*By invitation

6. Tracheal Growth in Puppies

JOHN D. BURRINGTON, Chicago, Illinois

Subglottic stenosis both congenital and acquired remains an important cause of long term tracheostomy in infants and children. Operative procedures designed to relieve stenosis involve

division of tracheal rings and have not been widely applied in children for fear of interfering with normal tracheal growth.

To study normal tracheal growth, ten anesthetized beagle puppies 10 to 14 days old had their trachea and cricoid cartilage exposed under sterile conditions. After measuring the external diameter of the cricoid, third and fifth tracheal rings, dots were then placed circumferentially two millimeters apart in the perichondrium and cartilage using a 25 gauge needle dipped in India ink. The neck was re-explored after 2, 4 and 6 months for direct measurement of external diameter and distance between ink dots. Unoperated litter mates were sacrificed at 2,4 and 6 months for microscopic examination of tracheal cartilage.

RESULTS: The ten fold increase in body weight from 500 grams to 5 kilograms was accompanied by a ten fold increase in tracheal cross section from 19.53 mm² to 198 mm². The relationship of tracheal cross section appeared to be linearly related to body weight. The distance between ink dots increased evenly from 2 mm to 9 mm over the entire circumference of the tracheal cartilage. Microscopic examination indicates that tracheal cartilage grows continuously from the entire outer surface and ends without specific growth centers.

It is concluded from these studies that division of tracheal rings to relieve subglottic stenosis should not interfere with cross sectional growth of the trachea in infants and children.

11:15 A.M. Presidential Address

AS I REMEMBER THEM
J. Gordon Scannell

MONDAY AFTERNOON, MAY 8, 1978

2:00 P.M. Scientific Session - Ballroom

7. Thoracic Neuroblastoma in Infants and Children

PHILIP W. CATALANO, WILLIAM A. NEWTON*,
THOMAS E. WILLIAMS, JR. *, H. WILLIAM CLATWORTHY, JR*
and JAMES W. KILMAN, Columbus, Ohio*

Neuroblastoma is the third most common tumor in childhood. Over the past 32 years we have treated 186 patients with neuroblastoma. Sixty-five percent were primary abdominal tumors and 20 percent (38 patients) were primary chest tumors. These 38 tumors occurred in 16 males and 22 females. Three of the males were black, otherwise all patients were white. There were 22 patients (58%) under the age of 2 years with a 90% two-year survival. There were 16 patients (42%) who were two years old or older and of these only 37% (six patients) survived two years after the diagnosis was made. The vast majority of these patients were treated with surgery (debulking-type procedure), and postoperative radiation and chemotherapy. Of the 12 deaths, 11 occurred within two years of initial diagnosis. Patients with most differentiated tumors had a remarkably good survival with no deaths, however, the tumors with lesser differentiation did not stratify enough to draw conclusions as to survival. Staging correlated the least with survival when compared to age or grading. The percent of two-year survivors of Stages I, II, III, IV, IV's were 75%, 82%, 100%, 22% and 80% respectively. Postoperative deaths were reviewed and of the 12 deaths: 2 died of operative complications, 3 others had only node biopsy to confirm diagnosis without debulking procedure, and 1 died of massive gastrointestinal hemorrhage.

In conclusion, 38 documented primary thoracic neuroblastoma patients are reviewed with followup from 2 to 27 years with an average of 9.3 years. We have concluded from this experience that age is the main determining factor influencing survival. Heroic and/or radical surgery is not warranted and is contraindicated in this disease.

*By invitation

8. Conduit Repair for Complex Congenital Heart Disease: Late Follow-up

*HERMAN A. HECK, JR. * RICHARD M. SCHEIKEN*,*

*RONALD M. LAUER * and DONALD B. DOTY,*

Iowa City, Iowa

A five year experience with the Rastelli operation including systematic late recatheterization is presented. Twenty-two patients have undergone primary repair and an additional patient has had his obstructed conduit replaced. Mortality for primary repair was 27% (6/22). Eighty-eight percent of survivors are asymptomatic four months to seven years post repair. Of 14 patients who are alive and greater than one year post repair, 13 have undergone recatheterization a mean of 37.7 months later. Fourteen conduits are available for review and 11 (78%) reveal varying degrees of obstruction ranging from mild to severe, eight or 57% of these having significant gradients greater than 40 mm.Hg. All five homograft or composite homograft conduits reveal gradients at the homograft valve greater than 40 mm.Hg., two with severe gradients greater than 80 mm.Hg. Six of nine heterograft conduits recatheterized are obstructed proximally though only one has a severe degree of obstruction.

Three of eight patients (37.5%) with large systemic-pulmonary communications of greater than five years duration subsequently exhibited evidence of moderate to severe pulmonary vascular disease.

Experience with the Rastelli operation and late follow-up suggests that: 1) pre-existing shunts or very large collaterals should be considered for repair prior to five years duration, 2) acceptable early mortality and substantial long term palliation can be achieved in cases associated with severely increased pulmonary vascular resistance, 3) factors of growth and/or substernal positioning seem to be responsible for proximal conduit obstruction, 4) insofar as severe obstruction may exist in otherwise asymptomatic patients, routine late recatheterization should be performed on all conduit patients.

*By invitation

9. Mechanism of Sinus Node Damage During Mustard Operation

JOHN H. WITTIG, MARC DELAVAL *, and*

JARDASLAV STARK, Los Angeles, California
and London, England*

Sponsored by James V. Maloney, Jr., Los Angeles, California

We have previously described the damage to the atrial septum which produced postoperative arrhythmias during Mustard operation using epicardial and endocardial mapping in 39 patients. In 13 of 39 patients, detailed sinus node mapping before and after operation demonstrated significant damage to the sinus node with development of sick sinus node disease. This was further

investigated in 29 dogs undergoing baffle placement with 20 chronically implanted electrodes in the SA node area. Two immediate and one late iatrogenic mechanism for SA node arrhythmias were noted. Early arrhythmias after baffle placement in 5 of 15 dogs were due to ligation of the sinus node artery. In 2 of 15, placement of the sutures through the epicardially located SA node during suturing of the SVC portion of the intra-atrial baffle produced arrhythmias identical to those seen in our patients. The late sinus arrhythmias were seen when fibrotic scar from the SVC baffle suture line produced sclerotic changes in the sinus nodes in 13 of 15 animals. These arrhythmias developed between 6 weeks and 16 months post-operatively and appear to be similar to the late postoperative arrhythmias seen in the Mustard patients. Awareness of the variations in anatomy of the SA node, its arterial supply and nervous supply is mandatory. Movement of the SVC portion of the intra-atrial baffle into the RA appendage prevents ligation of the SA node artery and nerve. Placement of the baffle suture line away from the sinus node has reduced early arrhythmias to 0 of 14 and late arrhythmias due to sclerosis of the sinus node to 1 out of 14. The application of these operative changes to the Mustard technique can markedly reduce arrhythmias and sudden death in patients.

*By invitation

10. Clinical Implications of Postoperative Unilateral Phrenic Nerve Palsy

*JOHN J. MICKELL *, F. JAY FRICKER * ROBERT A. MATHEWS*,*

and RALPH D. SIEWERS, Pittsburgh, Pennsylvania*

Sponsored by Henry T. Bahnson, Pittsburgh, Pennsylvania

Unilateral phrenic nerve palsy (PNP) followed 28 (1.48%) of 1891 consecutive cardiac surgical procedures during an 8 year period. Patient age at time of operation ranged from 1 day to 14 years (mean 3.9 years), and 11 were infants under 8 months. Five (18%) had a Blalock-Taussig shunt, 4 (14%) PDA ligation, 4 (14%) a Mustard operation, 3 (11%) ASD closure, 2 (7%) a Waterston anastomosis, and 2 (7%) atrial septectomy. The remaining 8 (29%) were isolated occurrences with a variety of procedures. Though 7 (25%) occurred during 1975, including the 3 following ASD closure, there was no correlation with a specific surgeon or malfunction of electrocautery equipment. PNP complicated 6.7% of atrial septectomies, 5.0% of Blalock-Taussig shunts, 4.4% of Mustard operations, 3.6% of Waterston anastomoses, and 1.3% of ASD closures and PDA ligations. Sixteen (57%) had right PNP and 12 (43%) had left PNP. Five of the 8 (29%) who developed PNP following median sternotomy had a previous atrial septectomy or Blalock-Taussig shunt through a lateral thoracotomy. Radiographic diagnosis of PNP was often delayed during positive pressure ventilation. Diagnosis was confirmed in 18 (64%) by fluoroscopy of the diaphragm during spontaneous breathing. Twelve (43%), including 8 infants, required prolonged mechanical ventilation ranging from 36 hours to 93 days (mean 25 days). Weaning was complicated by atelectasis (8), postextubation stridor (7), CO₂ retention (4) and respiratory arrest (3). Four (14%) required tracheostomy and one underwent diaphragm plication 3 months postoperatively. One died of sepsis and 1 of a subsequent Fontane procedure. Radiographic resolution was documented in 18 (64%) from 1 week to 3½ years postoperatively. Radiographic abnormality persisted in 7 (25%) after a follow-up of 1 month to 5 years and all were asymptomatic. PNP significantly affects the morbidity of cardiac surgery especially in infancy. A satisfactory outcome is possible in most cases with prolonged hospitalization for ventilatory support.

INTERMISSION - VISIT EXHIBITS

*By invitation

11. The Senning Operation for Transposition of the Great Arteries

L. PARENZAN, G. LOCATELLI*, and*

M. VILLANI, Bergamo, Italy*

Sponsored by Albert D. Pacifico, Birmingham, Alabama

The reported incidence of the main complications related to the Mustard operation for correction of transposition of the great arteries seems to be quite high: more than half patients develop arrhythmias and about one third develop venous (pulmonary or systemic) obstructions.

For these reasons we have reconsidered the type I (1959) Senning operation. Thirteen children below two years of age (body weight ranging from 3.9 to 12 kg.) have been operated on with this technique at our Institution.

Twelve were D-TGA and one L-TGA. One patient had a complex TGA (large VSD and severe subpulmonary stenosis associated) where as the remaining cases were considered as having simple TGA (small VSD's and mild pulmonary outflow obstructions). All patients survived operation and none suffered from complications.

At the time of the discharge from the Hospital all were in sinus rhythm. Late evaluation (24 hours EKG, cardiac catheterization, ect.) is in course. We believe that the Senning operation is easier to perform than the Mustard operation because of its more standardized technique which respects the internal geometry of the heart. Additional advantages are: 1) the intraatrial conducting pathways are less likely to be damaged. 2) There is minimal or no need for artificial tissues.

*By invitation

12. Total Correction of Transposition of the Great Arteries: Conduction Disturbances in Infants Less Than Three Months of Age

KEVIN TURLEY and PAUL A. EBERT, San Francisco, California*

During the period 1975 through 1977, 49 patients underwent pericardial intra-atrial baffle procedure for correction of transposition of the great arteries (TGA). Thirty-three patients were less than 12 months of age; 22 were infants of three months or less. Twenty-four patients (12 infants) had simple TGA and underwent baffle procedure only. Twenty-one had associated ventricular septal defects (VSD); 16 defects were closed (6 infants) and five left open (3 infants). Five of these 21 patients underwent concomitant relief of left ventricular outflow tract obstruction (LVOTO). Four patients (one infant) had an intact ventricular septum with LVOTO that was resected at the time of their baffle procedure. Three patients (2 infants) died early postoperatively (6%). There were three late deaths (1 infant), none from sudden arrhythmia. No deaths occurred in patients with simple TGA, intact ventricular septum with LVOTO, or in those with VSD left open.

Surgery was performed utilizing either cardiopulmonary bypass (27) or bypass combined with profound hypothermia and circulatory arrest (22). The latter was employed with single atrial cannulation in 19/22 infants. Operative techniques included the use of a loose intraatrial pericardial baffle and patch enlargement of the systemic atrium. In no patient was the coronary sinus enlarged.

Complete heart block did not occur in any infant. Conducted atrial rhythm was present at discharge in 16 infants, junctional rhythm in two, junctional escape in two. Atrial flutter occurred in two infants prior to discharge, requiring cardioversion in one.

Total correction of TGA utilizing pericardial baffle technique in infants was associated with a low incidence of conduction disturbances. Contributing to this result was avoidance of injury in the region of the coronary sinus, ventricular septum, superior vena cava-atrial junction, and specifically in the area of the sinus node.

*By invitation

13. Factors Influencing the Results of Corrective Surgery for Tetralogy of Fallot with Pulmonary Atresia

OTTAVIO ALFIERI, JOHN W. KIRKLIN,*

EUGENE H. BLACKSTONE, ALBERT D. PACIFICO*

and NEVIN M. KATZ, Birmingham, Alabama*

The hospital mortality (1967-July 1977) in 69 patients with tetralogy of Fallot and congenital or acquired pulmonary atresia was 17%. It was higher in patients less than 48 months of age than in older patients ($p=0.06$). Five of 48 patients (10%, 70% confidence limit: 6%-17%) with normalized or moderately small right and left pulmonary arteries (RPA, LPA) died compared with 7 of 21 patients (33%, CL 22%-47%) in which they were very small or one absent ($p=0.02$). Right ventricular-pulmonary artery discontinuity was managed with a valved external conduit in 42 patients (hospital mortality 24%, CL 17%-32%), trans-annular patch in 20 patients (hospital mortality 10%, CL 3%-22%) and unfundibular resection with or without valvulotomy in 7 patients (no hospital mortality, CL 0%-24%). Thirteen of the 35 patients with congenital pulmonary atresia undergoing repair with a conduit required catecholamines postoperatively compared with none of the 8 with a transannular patch ($p=0.04$); postoperative mean PRV/LV was 0.60 in both groups. The survival of patients with a valved conduit was 84% (CL 71%-93%) at and beyond 4 years; 5 of the 32 hospital survivors have required reoperation for conduit obstruction. There have been no late deaths or reoperations among the patients with a transannular patch. Early postoperative pulmonary dysfunction occurred more frequently in patients with large "bronchial" collaterals than in patients with patent ductus arteriosus and/or previous surgical shunts ($p=0.003$). Ligation of large collaterals did not prevent pulmonary dysfunction and in 1 case resulted in fatal pulmonary infarction. Cold cardioplegia was associated with a higher early postoperative cardiac index than simple cold ischemia ($p=0.14$). In view of these results, at present the conduit operation is performed only if the main pulmonary artery is absent (which it was in 12.5% in this series) or if the anterior descending coronary artery arises anomalously, large "bronchial" collaterals are not ligated, and cold cardioplegia is used. A preliminary palliative operation is considered if RPA and LPA are very small.

*By invitation

14. Corrective Operation for Double Outlet Right Ventricle Associated with Ventricular Inversion

IMAD TABRY, DWIGHT C. McGOON, GORDON K. DANIELSON,*

*ROBERT B. WALLACE, ZEV DAVIS*and*

JAMES MALONEY, Rochester, Minnesota*

Twenty-two corrective operations for this unusual condition have been performed, beginning in 1965. All but two of the patients also had pulmonary stenosis (PS) and one of the exceptions had

been banded. In all but 1, the cardiac axis pointed inappropriately, and there was situs inversus in 3. Two types of correction were employed. The totally intracardiac repair involved placing the VSD patch between the semilunar valves, plus direct relief of PS. The extracardiac conduit repair involved closure of VSD so as to preserve double outlet RV, and placement of a conduit from pulmonic (morphologic left) ventricle to distal end of divided pulmonary trunk. The table gives results, the average duration of follow up being 45 months.

	No.	Hosp. Deaths	Heart Block	Late Deaths	Disability
Intracardiac repair	6	2 (33.3%)	2	1**	
Extracardiac conduit	16	1 (6.2%)	4	1***	1****
Total	22	3 (13.6%)	6* (27%)	2 (9%)	1 (4.5%)

*Includes 3 hosp. deaths (none were mapped).

**Due to left A-V valve regurgitation - 4 yrs. & 3 months post op.

***Due to digitalis toxicity - 4 months post op.

****Mild cardiac failure.

Three conduits were aortic homografts (the two survivors have required replacement with Hancock conduit (HC), one was a valveless conduit, and the 12 remaining received HC. Heart block occurred in 6, including two among 8 who had successful intra-operative mapping of His bundle. The bundle was not consistently positioned, being at the postero-caudal, rim of VSD in 4 and antero-cephalad in 4. There have been no hospital deaths in the last 16 operations. Thus correction provides good results, but leaves the ventricles in an inverted relationship functionally as well as anatomically.

*By invitation

TUESDAY MORNING, MAY 9, 1978

8:30 A.M. Scientific Session - Ballroom

15. A Randomized Study of Cold Cardioplegia for Coronary Artery Bypass Grafting

VINCENT R. CONTI, ENRIQUE BERTRANOU**,

*EUGENE H. BLACKSTONE*and STAN B. DIGERNESS**,

Birmingham, Alabama

Sponsored by John W. Kirklin, Birmingham, Alabama

Intraoperative myocardial care in 34 consecutive patients scheduled for 2 to 4 distal coronary anastomoses by 3 surgeons (participating surgeons were Drs. J. W. Kirklin, R. B. Karp, and N. T. Kouchoukos) was randomized between cold cardioplegia (Group A, 17 patients) and the technique usually employed by the surgeon (Group B, 17 patients, 14 of whom had a single cold ischemic cardiac arrest period, and 3 had intermittent aortic cross-clamping). Cold cardioplegia included a single period of aortic cross-clamping with 1) rapidly induced and strictly maintained cardioplegia and myocardial cooling (10° to 19°C septal temperature) by intra-aortic injection of 150 ml/min/m² body surface area for 2 min of an 8°C asanguineous hyperkalemic (30 mEqk⁺) solution, 2) supplemental measures to insure this state during the entire arrest period (topical cooling, systemic perfusion at 20°-24°C and low flow, and when necessary cardioplegic reinfusion), and 3) maintenance of moderately low perfusion pressure and moderate hypothermia (30°C) during the

first 2 min of reperfusion. Postoperative cardiac index was inversely related to cross-clamp time only in Group B ($r = -0.53$, $p=0.03$). Duration and quantity of release of CK-MB heart specific isoenzyme was twice as great in B, but there was considerable scatter ($p=0.5$). CK-MB was present for <12 hrs in 11 patients, Group A (65%), and 6 (35%) of B ($p=0.08$). Total LDH and SCOT were lower in Group A. 13 (76%) patients in Group A were free of any postoperative ECG ischemic changes vs 8 (47%) in B ($p=0.08$). We conclude that cold cardioplegia gave better protection against myocardial damage, and better operating conditions for the surgeon, than our previous methods. It did not eliminate myocardial damage, perhaps because of occasional imperfect use of the method, left ventricular overdistension during arrest and reperfusion, or too long a period of spontaneous ventricular fibrillation just before and after aorta cross-clamping.

*By invitation

16. Constant Pressure Aortic Root Perfusion vs. Cardioplegia and Hypothermia-A Comparison of Myocardial Protection

*JOSEPH N. CUNNINGHAM, JR. *, JABER S. ABBAS*,*

PETER X. ADAMS, IRA NATHAN*, ILENE KLUGMAN**

and FRANK C. SPENCER, New York, New York

Coronary perfusion and hypothermic cardioplegia have both been widely used as effective methods of myocardial protection during aortic valve replacement. A theoretical objection to coronary perfusion is that it is not synchronized with cardiac contractions. Accordingly, a special pump was designed for these experiments to provide perfusion at a constant range of pressure.

Twenty dogs were studied during 4 hours of cardiopulmonary bypass (CPB). In Grp. I (6 dogs), no manipulations were carried out and hearts were allowed to beat in a perfused, vented, normothermic, non-working state. Grp. II (7 dogs), underwent 2 hours of cross-clamping and coronary perfusion with the system described providing constant aortic root pressure (80-100 mm Hg.). Coronary blood flow was regulated by intrinsic changes in coronary vascular resistance. In Grp. III (7 dogs) potassium arrest (30 mEq. of K^+ /L of Plasmalyte @ 4°C.) and profound hypothermia (<20°C.) were employed during 2 hours of uninterrupted aortic occlusion. Functional and metabolic measurements were made at the onset and end of CPB. Changes from baseline values in each group are listed below:

A significant degree of ventricular dysfunction occurred following 4 hours of CPB alone, perhaps from emboli, edema, or unknown causes. It was significant that constant pressure coronary perfusion resulted in a similar injury after 2 hours of aortic occlusion. Potassium cardioplegia, by contrast, during a 2 hour period of aortic occlusion provided a much greater degree of myocardial protection; perhaps both by limiting the degree of ischemic injury directly or as a result of exclusion of the heart from the circulating blood in the pump oxygenator system.

*By invitation

17. Effect of Crossclamp Time, Temperature and Cardioplegic Agents on Myocardial Function after Global Anoxia

HAROLD KAY, FREDERICK LEVINE*, JOHN FALLON*,*

GEIR GRÅ-TTE, ERIC BUTCHART*, SUBBA RAO*,*

TERRY McENANY, GERALD AUSTEN and

MORTIMER BUCKLEY, Boston, Massachusetts

In order to determine the importance of different protective techniques on the ability of the canine myocardium to maintain functional, metabolic and ultrastructural integrity following global anoxia, 228 dogs were studied varying temperature (37°, 28°, 11°C), anoxic time (0, 60, 90, 120 minutes), and cardioplegic agents (K⁺ [KCP], Mg⁺⁺, and procaine [PROC]). Change in left ventricular function was defined as the arithmetic difference in the center of mass between pre- and post-anoxic Sarnoff curves and expressed as percent recovery of function. Anoxic metabolism was monitored by lactate, pyruvate and oxygen washout curves. Electron microscopic changes were evaluated from ventricular biopsies.

After 90-120 minutes of crossclamp, only dogs with hypothermia (HYP) and KCP were able to significantly recover pre-ischemic function (28°C - 86%, 11°C - 93%, p<.01). HYP alone (28° or 11°C) preserved 87% of function after 60 minutes of crossclamp. PROC supplemented the protection of HYP + KCP (p<.01), but by itself was not effective (p>.05). Pretreatment with glucose-insulin-potassium, hydrocortisone, creatinine phosphate, citrate or propranolol did not alter the protective effect of HYP + KCP (p>.05). Pretreatment with isoproterenol, morphine or halothane decreased the protective effect of HYP + KCP (p<.01).

Inadequately protected groups (normothermia or hypothermia without KCP) showed more myocytic (intracellular edema, myofibrillar dissolution, loss of mitochondrial cristae and accumulation of dense granules, and partial dehiscence of intercalated discs) and capillary endothelial damage (capillary endothelial swelling, bleb formation and rupture) than the HYP + KCP groups.

No technique of myocardial protection studied completely preserved LVF, however, the combination of HYP, KCP and PROC resulted in maximal LVF recovery following crossclamp for up to 120 minutes.

*By invitation

18. Blood Cardioplegia - A Superior Method of Myocardial Protection

DAVID M. FOLLETTE, DONALD G. MULDER, JAMES V. MALONEY, JR.*

and GERALD D. BUCKBERG, Los Angeles, California

A new safe, effective method of producing a quiet, bloodless heart for two or more hours has been developed experimentally and used clinically. Aliquots of oxygenated blood from the heart/lung machine are altered (calcium chelation, Ca⁺⁺ 0.6m Eq/., “; alkalization, pH 7.8; hyperkalemia, 30m Eq/., “; and cooling, 22°C) and infused by the perfusionist from the pump console into the proximal aortic root or coronary ostia (during aortic valve replacement) every 20 min.

Experimental: Of 17 dogs placed on cardiopulmonary bypass, 7 received continuous coronary perfusion for 3 hours. In 10 dogs, the aorta was clamped for 2 hours (myocardial temperature 22°C) and 150 cc of pump blood injected into the aortic root every 20 minutes. In 5 dogs this blood was unaltered (simulating intermittent release of the aortic clamp) while in 5 others the blood was modified with the cardioplegic additives. The best myocardial protection occurred with blood cardioplegia with near-normal compliance (84% recovery*) and normal left ventricular (LV) contractility and maintenance of adenosine tri-phosphate (ATP). In contrast, with continuous coronary perfusion, ATP and contractility were preserved but compliance was reduced 50%*. With intermittent 22°C ischemia, severe depression of ATP (42%), compliance (75%*), and contractility (62%*) occurred.

Clinical: The hospital course of 148 consecutive, nonrandomized patients was analyzed. In the 77 patients with continuous coronary perfusion or intermittent ischemia, there were 59 coronary artery bypass grafts (CABG), 15 aortic valve replacements (AVR) and 3 AVR+ CABG. In 71 patients undergoing prolonged aortic clamping (longest 124 minutes) with blood cardioplegia, there were 55 CABG, 11 AVR and 5 AVR + CABG. Risk factors and bypass times were comparable in both groups. The average ischemic time was much longer on the blood cardioplegic group (43±33 vs 19±18 min*, 2 S.D.). Despite longer ischemia, results with blood cardioplegia were superior in regard to postoperative CPK (796 u/., " vs 1251 u/., "**), SCOT (59 u/., " vs 99 u/., "**), infarct rate (ECG, 1/71 vs 11/77*), cardiac output (5.2 vs 3.9 /min*), need for circulatory support (1/71 vs 6/77*), and mortality (1/71 vs 5/77*).

We conclude that blood cardioplegia, both experimentally and clinically, offers better myocardial protection and operating conditions than does intermittent ischemia or continuous coronary perfusion.

*p<0.05

INTERMISSION - VISIT EXHIBITS

*By invitation

19. Surgical Correction of Chronic Post-Embollic Obstructions of the Pulmonary Arteries

C. CABROL, A. CABROL*, G. TROUILLET*,*

I. GANDJBAKHCH, G. GUIRAUDON*, M. F. MATTEI*,*

*J. ACAR*and P. GODEAU*, Paris, France*

Sponsored by Pierre Grondin, Montreal, Quebec, Canada

Following episodes of pulmonary embolisms, the presence of blood clots in the pulmonary arteries leads to severe respiratory insufficiency and to chronic right heart failure. Medical therapy at that stage has little or no value and attempts at surgical correction have been followed by variable results.

We have operated upon 16 such patients, 9 men and 7 women with ages from 23 to 68. All had severe dyspnoea, 14 chronic cor pulmonale, 6 were suffering from mental disturbances with syncopes and 4 had severe cardiac failure. The presence of clots was demonstrated by pulmonary angiography and the permeability of the distal arterial bed was ascertained by selective injection of the bronchial arteries. The surgical procedure was performed in all cases but 2 through a lateral thoracotomy approaching distally the obstructed arterial branches. Ligation of the I.V.C. was always added to prevent recurrences. Operative mortality included 6 patients: 3 from R.H. failure, 1 from acute pulmonary oedema, 1 from hemothorax and 1 following a pyothorax. Ten patients are surviving after 9 months to 10 years. One is still limited because of significant pleuro-pulmonary sequelae. Six are enjoying good results with marked improvement in their functional limitations, a

significant drop in the P.A.P. and radiological permeability of previously obstructed arteries. Three are in excellent conditions i.e. they are completely asymptomatic, have a normal P.A.P. and an entirely normal pulmonary angiogram.

*By invitation

20. Conservative Management of Uremic Pericardial Effusions

E. M. KWASNIK, J. K. KOSTER, JR. *, J. M. LAZARUS*,*

L. J. SLOSS, R. B. B. MEE*, L. H. CORN and*

J. J. COLLINS, JR., Boston, Massachusetts

Although there has been a recent trend toward early operative treatment of uremic pericardial effusions unresponsive to intensified dialysis, this approach may be unnecessarily aggressive. Review of 787 chronic dialysis patients since 1968 has shown 54 patients (5.8%) to have developed 56 episodes of large pericardial effusion. All were managed by increasing the frequency of dialysis and, if the effusion failed to diminish, or if life-threatening signs of tamponade developed, pericardiocentesis was performed. In 62% (35/56) the effusion resolved with increased dialysis. In 38% (21/56), pericardiocentesis was performed with 57% (12/21) requiring only one aspiration. During a mean followup of 34 months (2-100 months) only 5.5% (3/54) have undergone operation: 1 partial pericardiectomy incidental to pulmonary decortication and 2 pericardiectomies for late (3 months and 5 months respectively) constriction. There were 5 complications of pericardiocentesis. One pneumothorax, 1 pneumoperitoneum, 1 costochondritis, and 2 myocardial punctures without sequelae. The 1 death related to pericardial effusion in this series occurred in a home dialysis patient who arrived in the Emergency Room moribund.

Our experience suggests that the great majority of uremic pericardial effusions can be effectively controlled with simple needle aspiration by experienced personnel, and that pericardial resection is usually not necessary.

11:15 A.M. ADDRESS OF HONORED SPEAKER

CARDIAC SURGERY - THE GOLDEN YEARS

Mr. Donald Ross

London, England

*By invitation

TUESDAY AFTERNOON, MAY 9, 1978

2:00 P.M. Scientific Session - Regency Ballroom

21. Role of Angiography in Cervico-Thoracic Trauma

*ARTHUR N. THOMAS and PHILLIP C. GOODMAN**

San Francisco, California

During 11 years, emergency angiographic evaluation was obtained in 253 patients. One hundred patients had penetrating cervical wounds, 43 stabs and 57 gunshots. One hundred fifty-three patients had thoracic injuries, 100 severe blunt trauma and 53 penetrating injury, -34 gunshot and 19 stabwounds. Angiography was used in 19% of all patients seen with penetrating neck injuries and 3% of patients with severe blunt or penetrating thoracic injury.

Patients with suspected vascular injuries who responded to resuscitation had angiographic assessment. The indications in penetrating injuries were the location of wounds or missile fragments; history of spurting blood; or presence of hematoma. In blunt trauma, evidence of severe injury such as: mediastinal widening; fractures of the first rib, sternum, transverse processes or vertebrae; abnormalities of the cardiac silhouette; or diaphragmatic rupture.

Vascular injuries were discovered by angiography and included disruptions of the thoracic aorta (5); major artery to vein fistula (3); or interruption of the subclavian (14), carotid (9), or vertebral arteries (8). Other vascular injuries were identified in 17 cases. Angiographic visualization of vascular injuries occurred in 10/43 of neck stabwounds, 15/57 of neck gunshot wounds, 22/100 of blunt chest trauma, and 7/34 of chest gunshot and 0/19 chest stabwounds. Overall, 54/253 (21%) were positive.

Angiographic results were useful whether positive or negative. In cases with a positive finding, operative treatment can be specific and improper incisions avoided. In cases with negative angiography, clarification of the vascular status avoids unnecessary thoracotomy and permits a definitive and concentrated therapeutic effort upon injuries to other systems. These results are compared to vascular injuries in other cervico-thoracic trauma patients who had unresponsive shock or profuse hemorrhage necessitating immediate operation.

*By invitation

22. Physicians' Assistants on a University Cardio-Thoracic Surgical Service-A Five Year Update

JOSEPH I. MILLER and CHARLES R. HATCHER, JR.,*

Atlanta, Georgia

In 1973, two physicians' assistants (PA's) were employed on the Cardio-Thoracic Surgical Service at Emory University Hospital, and in 1974 our initial experience with these paramedical personnel was presented to this Association. Since that time seven additional PA's have been added to our Service. They are now employed in four hospitals of the Emory University's Woodruff Medical Center. New guidelines and regulations have been imposed at both the State and Federal level regarding PA's, and their role in our Center has become rather well-defined. With over 1,500 cardiac cases and 400 thoracic cases per year to cover on our Service, the physician's assistant has assumed a position of increasing importance both in operating room assistance and pre-operative and postoperative care. Since the University has maintained a constant number of residents and fellows during this interval, PA's have filled needs of expanded clinical service in the various hospitals. In the pediatric and community hospitals associated with the University, the physician's assistant now functions as a junior house officer. In our University Center with a large resident staff, their role has become narrowed with definite guidelines. A credentials committee now governs the hiring of all physicians' assistants by the University.

When properly utilized and supervised, the physician's assistant can be a vital member of the cardio-thoracic team. This report details our experience with PA's for the past five years-culminating a staff of nine PA's working on our service in four types of hospitals within a University Medical Center.

*By invitation

23. Bronchopleural Fistula: A Thirteen-Year Experience with Seventy-Two Cases

JOHN R. HANKINS, JOHN E. MILLER, SAFUH ATTAR,*

and JOSEPH S. McLAUGHLIN, Baltimore, Maryland

During the period 1963-1976, 72 patients were treated for broncho-pleural fistula. The underlying disease was tuberculosis in 58 patients, carcinoma in 8, lung abscess in 2, and other infections in the remaining 4. In 19 patients the fistula developed on the basis of the underlying disease and was present on admission. In 53 patients the fistula developed after a pulmonary resection. The highest incidence of fistulas occurred after lobectomy combined with segmental or wedge resection. The most prevalent etiologic factors appeared to be: the presence of a sputum culture positive for *M. tuberculosis* preoperatively, intercurrent illness, poor nutrition, and faulty surgical technique - particularly the leaving of a long bronchial stump.

The establishment of adequate dependent surgical drainage was the sine qua non of effective treatment. This procedure alone brought about closure of the fistula in 9 (21%) of the 43 patients in whom this was achieved. The majority of the other patients required multiple surgical procedures before healing was effected. Overall, the highest rate of fistula closure and the lowest mortality rate was obtained in the group of 20 patients who underwent muscle flap transfer (myoplasty) usually combined with a limited thoracoplasty. In this group, 16 patients (80%) had their fistulas obliterated and only 1 died.

For the entire series closure of the fistula was obtained in 68% of the patients. The mortality for the series was 22%. Though the incidence has declined in recent years, bronchopleural fistula still represents a challenge to the thoracic surgeon. Only by an energetic approach can the closure rate be raised and the mortality reduced.

*By invitation

24. Esophagectomy Without Thoracotomy

MARK B. ORRINGER and HERBERT E. SLOAN,

Ann Arbor, Michigan

Sixteen patients have undergone total thoracic esophagectomy utilizing blunt dissection of the esophagus from the mediastinum through upper abdominal and cervical incisions without a thoracotomy. Esophagectomy was performed for cervico-thoracic carcinoma (6 patients), middle third carcinoma (4 patients), distal third carcinoma (2 patients), post-irradiation stricture (2 patients), post-cricoid carcinoma (1 patient) and acute caustic injury (1 patient). Of 6 patients who required concomitant laryngopharyngectomy, 4 underwent anterior mediastinal tracheostomy.

Gastrointestinal continuity was re-established through the posterior mediastinal route at the time of esophagectomy (15 patients) or sub-sternally after 4 weeks (1 patient). The stomach was the visceral esophageal substitute in 13 patients and the colon in 3. The types of anastomoses included cervical esophagogastronomy (7), pharyngogastronomy (6), cervical esophagocolic (2) and pharyngocolic (1).

Operative and perioperative complications related to transmediastinal esophagectomy were pneumothorax (5 patients) and pleural effusion (3 patients). No excessive bleeding occurred intraoperatively during mobilization of the esophagus. The 3 postoperative deaths in this group were from a cerebrovascular accident (1), innominate artery rupture (1), and anastomotic disruption with sepsis (1) and were not directly related to the technique of esophagectomy.

Blunt transmediastinal esophagectomy carries less morbidity than standard esophagectomy via a thoracotomy. The procedure is applicable for both benign and malignant esophageal disease, affords optimal access to the abdomen for mobilization of the visceral esophageal substitute, and

requires re-establishment of gastrointestinal continuity in the neck, thus eliminating the hazards of an intrathoracic anastomotic disruption. This technique is not advocated for use in patients with evidence of tracheobronchial involvement by esophageal neoplasm.

INTERMISSION - VISIT EXHIBITS

*By invitation

25. Gastroesophageal Fundoplication for Management of Reflux in Infants and Children

*ERIC W. FONKALSRUD, MARVIN E. AMENT*and*

WILLIAM J. BYRNE, Los Angeles, California*

With the development of more sophisticated diagnostic techniques in Pediatric Gastroenterology, gastroesophageal reflux has been recognized with increasing frequency as a cause of a wide variety of symptoms in infants and children. During the past 8 years at the UCLA Hospital 60 patients under eighteen years of age have been identified as having sufficiently severe, symptomatic reflux to warrant gastroesophageal fundoplication. Although repeated emesis was the most common primary symptom, failure to thrive was the major symptom in 22 patients, unexplained repeated pneumonia in 14, asthma in 6, and dysphagia in 5. Five children with previously repaired esophageal atresia had severe reflux. Severe neurologic disorders were present in 14 children. Twelve children had esophageal stricture.

The diagnosis of reflux was established by a combination of positive cine esophagram (80%), Tuttle test (85%), esophageal manometry (65%), and esophagoscopy with biopsy (35%).

Nissen fundoplication with gastrotomy was performed on each of the 60 children (19 under 1-year of age). Each of the strictures was successfully managed by postoperative dilatations. There was no mortality and no major complications. Two patients have developed radiographic evidence of recurrent reflux, although they are asymptomatic. Four children experienced delayed gastric emptying. Each of the children has been relieved of clinical reflux and the pulmonary status in each, including the asthmatic children, has been markedly improved or is normal.

On the basis of this favorable experience it would appear that an aggressive surgical approach should be taken in the management of symptomatic reflux in infants and children.

*By invitation

26. Gastroplasty and Fundoplication in the Management of Complex Reflux Problems

F. GRIFFITH PEARSON, JOEL D. COOPER and

JOHN M. NELEMS, Toronto, Ontario, Canada*

Between 1963 and 1976, 214 patients with complex reflux problems were managed by adding a modified Collis gastroplasty to a Belsey hiatal repair. All patients had one or more of the following complicating conditions which were considered indications for the combined operation: peptic stricture (100), esophagitis and shortening without stricture (25), one or more prior hiatal repairs (59), massive sliding hernia and intra-thoracic stomach (32), motor disorders (26 - scleroderma 10, achalasia 10, diffuse spasm 6). The length of follow-up is one to two years (80 patients), two to five years (93 patients), five to 10 years (33 patients), and over 10 years (2 patients).

Of 196 patients (92%) with complete clinical follow-up, nine (5%) have significant symptomatic reflux (4 severe, 5 moderate), and 15 (8%) have significant dysphagia (6 severe, 9

moderate). Seven of the 15 patients with significant dysphagia have associated primary motor disorders. There were no post-operative deaths. Only one patient has undergone a subsequent anti-reflux operation. Complications occurred in 32 patients, and include one leak from the gastric suture line.

Recently, 20 patients in this series have been evaluated by pre-operative, intra-operative and sequential post-operative esophageal pressure studies. The mean pre-operative lower esophageal sphincter pressure (LESP) was 10 mmHg. One year after operation the mean LESP was 21 mmHg. These mean post-operative pressure values are at least double the post-operative levels recorded in two publications from other centres reporting on a similar group of patients managed by gastroplasty and partial fundoplication. In these latter publications, clinical results were much less satisfactory than those recorded in our series, and identify a high incidence of recurrent symptomatic reflux. We suggest that the significant differences in post-operative LESP observed in these reports are due to technical differences in the operative procedure itself, and account for the pronounced differences in the quality of results obtained.

4:00 P.M. Executive Session (Limited to Active and Senior Members)- Ballroom

*By invitation

TUESDAY EVENING, MAY 9, 1978

7:00 P.M. President's Reception

Ballroom

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

Ballroom

Attendance open to all physicians and their ladies. Tickets must be purchased at the registration desk by 5:00 P.M. on Monday, May 8th. Dinner dress preferred.

WEDNESDAY MORNING, MAY 10, 1978

8:30 A.M. Scientific Sessions - Ballroom

27. Long Term Clinical and Hemodynamic Evaluation of the Ionescu-Shiley Pericardial Xenograft, Braunwald-Cutter and Bjork-Shiley Prostheses in the Mitral Position

ANAND P. TANDON and MARIAN I. IONESCU*, Leeds, England*

Sponsored by Harris B. Shumacker, Indianapolis, Indiana

Since March 1971, single mitral valve replacement was performed in 220 patients. One hundred twenty-six received glutaraldehyde stabilized Pericardial Xenografts (PX), 52 Braunwald-Cutter (BC) and 42 Bjork-Shiley (BS) prostheses. No attempt was made at randomization. Only patients with BC and BS prostheses were permanently anticoagulated. Hemodynamic studies were performed in 29 patients with PX and in 6 each with BC and BS prostheses at mean periods of 40.2, 43.0 and 22.7 months postop respectively. The essential data are summarized below:

	PX	BC	BS
Follow-up (months) - total	3270	1947	1282
- range	6-83	25-62	7.82
Late mortality %	4.8	15.4	11.9

Actuarial survival rate %	89.0 ± 9.3	41.7 ± 22.9	81.9 ± 12.8
Actuarial thromboembolism free rate %	95.8 ± 2.1	93.2 ± 5.3	84.8 ± 8.4
Thromboemboli per 100patient years	1.46	1.8	4.7
Mean diastolic gradient (mm Hg)			
- rest	6.4	8.3	6.3
- exercise	15.3	18.1	17.6
Calculated valve area (cm ²)			
- rest	2.0	1.6	1.8
- exercise	2.3	1.7	2.2

Of the late deaths in the BC group 62% were valve related.

Detailed laboratory studies showed no hemolysis in patients with PX and mild red cell destruction in patients with BC and BS prostheses.

The Ionescu-Shiley Pericardial Xenograft in the mitral position has proved to be durable, least thrombogenic without anticoagulants and hemodynamically sound.

There was no significant difference, statistically, between the data recorded from the three groups of patients except for the survival rate of patients with pericardial xenografts and Braunwald-Cutter prostheses.

*By invitation

28. In Vitro Hydrodynamic Performance of Mitral Valve Prostheses at High Flow Rates

S. GABBAY, D. McQUEEN*, E. L. YELLIN*, R. M. BECKER**

and R. W. M. FRATER, New York, New York

The in vitro hydrodynamic characteristics of 7 currently available mitral prostheses were compared in a pulse duplicator at high-output steady and pulsatile flow with variable stroke volume and pulse rate. Three different mounting diameters (small, medium, large) of each of the following prostheses were studied: Starr-Edwards (SE), Beall (BE), Ionescu-Shiley (IS), Cooley-Cutter (CC), Hancock (H), Bjork-Shiley (BS), Lillehei-Kaster (LK). Effective orifice areas were computed using hydraulic formulas and a performance index (PI), defined as the ratio of effective area to mounting area, was calculated. The results for medium and large size valves in pulsatile flow are tabulated below:

Valve	MEDIUM					LARGE				
	Mount.	Mount.	Eff.	Press	Mount.	Mount.	Eff.	Press		
	Diam.	Area	Area	Drop†	Diam.	Area	Area	Drop†		
	mm	cm ²	cm ²	PI**	mmHg	mm	cm ²	cm ²	PI**	mmHg
SE	26	5.31	1.56	0.29	16.5	20	7.07	1.92	0.27	11.3
BE	--	--	--	--	--‡	29.2	6.70	2.00	0.30	9.8
IS	25	4.91	1.92	0.39	11.1	29	6.61	2.96	0.45	4.8
CC	24	4.52	2.08	0.46	9.5	30	7.07	2.66	0.38	5.8

H	25.6	5.15	1.64	0.32	15.3	29	6.61	1.98	0.30	10.3
BS	25	4.91	2.16	0.44	9.0	29	6.61	3.01	0.46	4.7
LK	25	4.91	1.54	0.31	17.6	29	6.61	2.67	0.40	5.8

** Based on all flow rates (of 1-11 L/min) and a range of rates from 60-125 /min.

†Mean gradient at a pulsatile flow rate of 9 L/min.

‡Not studied.

In all valves, effective orifice areas are less than 50% of mounting area and 75% of measured orifice area. At pulsatile flow rates of 9 L/min (comparable to mild to moderate exercise) all valves are mildly to severely stenotic. Among mechanical valves the BS has the least resistance to flow and the SE the most. Of the biological valves the IS is less resistant to flow than the H and only slightly more resistant than the BS.

Assuming a satisfactory durability and given the favorable characteristics of tissue valves, other than hemodynamic performance, the Ionescu-Shiley heterograft valve appears to be the best mitral prosthesis currently available.

*By invitation

29. Non-Cloth-Covered Caged-Ball Prostheses: The Second Decade

*ALBERT STARR, GARY L. GRUNKEMEIER**,

LOUIS E. LAMBERT, DAVID R. THOMAS*and*

EDWARD A. LEFRAK, Portland, Oregon*

This report is concerned with results achieved using current-model non-cloth-covered caged-ball valves since 1965. The data are analyzed in a comparative fashion with other series employing a variety of prostheses.

The actuarial late survival rates with the bare-strut ball valves were the same as those achieved with all mechanical and tissue valves, i.e., 80% at 5 years and 60% at 10 years after surgery. There were no significant differences in the hemodynamic effects with any contemporary prostheses. Mean systolic gradients after aortic valve replacement ranged between 8 and 20 mmHg with calculated orifice areas of 1.5 to 2.2 cm². Following mitral replacement, mean diastolic gradients varied between 3 and 8 mmHg at rest with orifice areas of 1.9 to 2.5 cm². An analysis of comparative thromboembolic rates failed to show a difference of significant magnitude (mitral 3 - 6%/year, aortic 1.5 - 5%/year). There was however a difference in the incidence of thrombotic catastrophic failure. After mitral replacement in patients receiving anti-coagulation, the rate of thrombosis with the caged-ball valve was 0.5 ± .3%/year versus 2.5 ± .7%/year with the Bjork-Shiley valve.

With the non-cloth-covered caged-ball aortic valves, in 182 patients followed for 855 patient-years (mean 4.7 years), there were no cases of thrombotic stenosis. Actuarial data are not available on the tilting disc valves but this complication has been frequently reported. Structural failures have not been seen with the Model 1200/1260 Starr-Edwards aortic prostheses, but have already appeared with glutaraldehyde-preserved porcine xenografts.

These features justify the continued use of the non-cloth-covered ball valve prosthesis as a device whose clinical performance has not been surpassed by any current mechanical valves.

*By invitation

30. Prosthetic Valve Endocarditis: A Comparison of Hetero-graft Tissue Valves and Mechanical Valves

*STEPHEN J. ROSSITER **, *EDWARD B. STINSON**, *PHILIP E. OYER**,
*D. CRAIG MILLER **, *JAY N. SCHAPIRA*, *RANDOLPH P. MARTIN**
and NORMAN E. SHUMWAY, Stanford, California

Despite decreasing incidence, prosthetic valve endocarditis (PVE) remains a highly lethal condition, with reported overall mortality rates of 50-60%. Some authors have suggested that gluteraldehyde preserved heterografts (HET) might be more resistant to infection or to certain of its complications than mechanical prosthetic valves.

This study reviewed 2,184 patients who underwent prosthetic valve replacement from 1963 to 1977, with a total follow-up of 7,123 patient-years. Eight-hundred and thirty-seven patients with Hancock HET valves - 384 aortic valves (HET AYR) and 453 mitral valves (HET AVR) were compared with 1,347 patients with mechanical Starr-Edwards valves (SE) - 779 aortic valves (SE AVR) and 568 mitral valves (SE MVR). PVE occurred in 51 patients, 9 early (<2 months postoperatively) and 42 late (>2 months postoperatively). Linearized rates of endocarditis (percent per patient-year) for the various groups were HET AVR 2.2%, HET MVR 0.1% ($p<0.01$); SE AVR 2.7%, SE MVR 0.4% ($p<0.01$). Differences between HET and SE groups are not significant but the higher incidence of PVE after AVR, as compared to MVR, is significant. Five of 16 (31%) HET patients and 13 of 35 (37%) of SE patients with PVE died (N.S.). In contrast to some studies, early PVE mortality (5/9 = 55%) was not significantly worse than late PVE mortality (13/42) = 31%). Additionally, comparison of HET and SE group mortality rates failed to reveal statistically significant differences upon analyzing results of medical versus surgical treatment or early versus late endocarditis. There was no significant difference between the two valves in distribution of types of infecting organisms (no Myco-bacterial infections were encountered). The higher incidence of HET valves sustaining early endocarditis (6/16) as compared to SE Valves (3/35) ($p<0.05$) remains unexplained.

Although heterograft valves have certain advantages compared to mechanical valves, resistance to endocarditis, pathological behavior once sustaining PVE, survival rates with PVE, and curability with medical treatment are similar. Diagnostic aids, including ultrasonic sector scanning, and therapeutic recommendations are discussed.

INTERMISSION - VISIT EXHIBITS

*By invitation

31. The Surgical Anatomy of Kent Bundles Based on Electrophysiologic Mapping and Surgical Exploration

*WILL C. SEALY, JOHN J. GALLAGHER*and*
EDWARD L. C. PRITCHETT, Durham, North Carolina*

The development of a reliable method for the interruption of Kent Bundles in all locations about the atrioventricular junction of the heart has been hampered by the paucity of anatomic

descriptions of the pathways and by their location in areas difficult to expose and unfamiliar to the surgeon. After a review of the 25 reported descriptions, it was evident that they were inadequate to explain many of the findings we had noted in the surface mapping and surgical exploration of 95 patients with Kent Bundles. In this report we will correlate the known anatomic facts with our deductions based on our observations at surgery. This has led to the development of satisfactory operative procedures for the interruption of Kent Bundles in the free wall of both ventricles and in the septal areas as shown by our success in 52 of our last 55 patients. The following conclusions concerning the location of Kent Bundles have been made:

1. Kent Bundles can occur anywhere that there is continuity of the atrium and ventricle.
2. More than one Kent Bundle may be present.
3. Kent Bundles may be found in the pericoronary fat from the sub-epicardial area to the annulus fibrosus.
4. Septal pathways may be adjacent to the AV node-His system, anterior to the atrial septum, or posterior at anyplace beginning at the insertion of the atrial septum into the right fibrous trigone and going to the epicardium over the crux.
5. Access to septal pathways has been facilitated-by entering from the right atrium the triangular space that is beneath the atrial septum and on top of the ventricular septum.
6. The key to the successful interruption of a Kent Bundle is the wide dissection of the fat away from the ventricle and the atrium.

*By invitation

32. Composite Replacement of the Aortic Valve and Ascending Aorta

*JOHN E. MAYER, JR. *, W. G. LINDSAY*, Y. WANG*,*

C. JORGENSON and D. M. NICOLOFF, Minneapolis, Minnesota*

Cystic medial necrosis primarily affects the ascending aorta resulting in aneurysm formation and secondary aortic insufficiency. Since the entire ascending aorta and sinuses of valsalva are involved, total correction should involve replacement of the aorta from the annulus to the innominate artery takeoff. A composite graft with an incorporated aortic prosthesis and re-implantation of the coronary artery ostia into the graft provides a method for correction. Fifteen (15) patients underwent this procedure between January, 1973 and December, 1976. Seven were Class II, six were Class III and one was operated upon emergently for acute dissection. The procedure consisted of sewing a Lillehei-Kaster aortic prosthesis into one end of a 30 or 35 mm. woven Dacron graft, and then suturing the composite graft to the annulus. The graft extended to just proximal to the innominate in 14 cases, and included the aortic arch in one case. One patient had concomitant mitral valve replacement. The coronary ostia were sewn into the sides of the graft except in one patient who had two saphenous vein coronary bypass grafts. None of the patients required reoperation for excessive postoperative bleeding. There was one early post-operative death (4 days) (6.6%) from redissection of the right coronary artery and one late death (5 months) from left ventricular failure. Ten patients had repeat catheterization 6-12 months after surgery. There were no coronary ostial stenoses, but one pseudoaneurysm developed secondary to suture line separation at left coronary ostia requiring re-operation. One small asymptomatic pseudoaneurysm occurred at the distal suture line and has not required re-operation. There were no aortic paravalvular leaks. The maximal gradient across the valve prosthesis was 10 mmHg in the five patients measured. All surviving patients are Class I or II with follow-up of 7 to 51 months. There has been one questionable episode of embolism which resolved. This technique of composite replacement of the aortic valve and ascending aorta can be accomplished with a low mortality, low

incidence of intra- and post-operative bleeding and with satisfactory long-term results in patients with cystic medial necrosis of the aortic root.

*By invitation

33. The Natural History of Saccular Aneurysms of the Left Ventricle

P. GRONDIN, L. CAMPEAU, O. BICAL*,*

P. DONZEAU-GOUGE, J. G. KRETZ*and R. PETITCLERC*,*

Montreal, Quebec, Canada and Paris, France

The natural history of left ventricular aneurysms is poorly known. Most studies are retrospective and based on autopsy cases. Forty consecutive patients having a true saccular aneurysm demonstrated by ventriculography, and who were not, for one reason or another, submitted to surgery, have been followed for a mean period of 6 years and 3 months. Only aneurysms showing an obvious diastolic bulge with a systolic paradoxical motion were retained. These patients were divided in two groups; group one representing patients who, at the time of diagnosis, had little or no symptoms and group two, those having symptoms.

The clinical course differs with the group: the functional status of patients in group one remaining satisfactory. Arrhythmias are encountered in 35% and thrombo-embolic episodes in 17.5% of all patients. Overall survival is satisfactory: 87% at one year and 80% at seven years. Mortality is however elevated (60%) in patients having ventricular extra-systoles at their first examination. Prognosis is influenced clinically, by the presence or absence of symptoms at the time of diagnosis, and anatomically, by the presence of an asynergic area adjacent to the aneurysm and by the extension, on the L.V. angiogram, of both the aneurysm and the asynergic area.

*By invitation

34. Techniques and Results of Ventricular Aneurysmectomy with Emphasis on Antero-Septal Repair

WILLIAM E. WALKER, WILLIAM S. STONEY,*

WILLIAM C. ALFORD, GEORGE R. BURRUS,*

ROBERT A. FRIST, DAVID M. GLASSFORD*and*

CLARENCE S. THOMAS, Nashville, Tennessee*

Over the past 9 years, 175 patients have undergone ventricular aneurysmectomy. Male/female ratio was 4:1, average age was 56 years (range 30 to 74). One hundred forty-six or 83% had concomitant coronary artery bypass (CAP), with an average of 1.8 grafts per patient. Forty-five patients (26%) underwent simple excisions of anterior, apical, or lateral wall aneurysms. One hundred fifteen patients (66%) underwent "antero-septal repair" where the lateral margin of the incised ventricular wall was sutured down to the posterior part of the inter-ventricular septum, to exclude the non-contracting septal myocardium from the circumference of the left ventricle. Fifteen patients (8%) had excision of an inferior wall aneurysm. Fifty patients undergoing antero-septal repair had postoperative ventriculography to assess changes in ejection fraction, akinetic volume, and end-diastolic volume.

There were 15 hospital deaths for an early mortality of 8.5%. Advanced age was not a factor in early mortality (3 of 32 patients between 65 and 74 years old died) nor did age affect long-term survival. Overall, adjuvant CAB did not affect early mortality nor long-term survival, but none of 20 patients undergoing aneurysmectomy without CAB in the past 6 years died. Three patients were

moribund when operated upon, 1 survived. Six patients required intra-aortic balloon support for an average of 4 days, with 4 survivors. Actuarial survivals (b stand, devn.) were $80\pm 4\%$ and $62\pm 5\%$ for the whole group at 2 and 5 years respectively. Despite being slightly older, the women fared better with $70\pm 6\%$ vs. $58\pm 5\%$ survival at 5 years (p less than 0.01). Heart failure following recent myocardial infarction did not preclude a good result, in fact these patients did very well. Three patients also had closure of a VSD, and all survived. Actuarial 5-year survival following antero-septal repair was $65\pm 5\%$. There was a distinct group of patients with very large aneurysms but with good contraction of the rest of the ventricle who had an excellent result. Postoperative ventriculography confirmed the return towards more normal hemodynamics following antero-septal repair.

Good results attend an aggressive approach to ventricular aneurysmectomy. Suitable vessels should be bypassed. Satisfactory results can be attained with the "bad" ventricle. Antero-septal repair is the optimal approach to the "typical" aneurysm.

*By invitation

WEDNESDAY AFTERNOON, MAY 10, 1978

2:00 P.M. Scientific Session - Regency Ballroom

35. Regional Myocardial Dimensions Following Coronary Artery Bypass Grafting in Patients: The Relationship of Functional Deterioration to Graft Occlusion

*LEONARD H. KLEINMAN**, *RONALD C. HILL**,

*W. RANDOLPH CHITWOOD**, *JOHN W. HAMMON, JR.**,

*KENT W. JONES** and *ANDREW S. WECHSLER**, *Durham, North Carolina*

Sponsored by David C. Sabiston, Jr., Durham, North Carolina

The direct relationship between graft flow and regional myocardial function has not been documented in patients. Therefore, the present study was designed to quantitate the effects of coronary artery bypass grafting on regional myocardial mechanics distal to a coronary artery obstruction. Thirteen patients with subtotal or total occlusion of the left anterior descending coronary artery underwent coronary artery bypass grafting. Following completion of the aortic and coronary anastomoses, two miniature ultrasonic dimension transducers (3 mm diameter) were positioned within the minor axis of the anterior left ventricular free wall and allowed complete freedom of movement. The transducers were placed at mid-wall depth, and areas of clinically apparent myocardial fibrosis were not utilized as sites of implantation. During control (C), 30 minutes following the termination of cardio-pulmonary bypass, regional myocardial dimensions, pulmonary artery diastolic pressures, arterial pressures and heart rate were recorded with all saphenous vein grafts open and following 30 seconds of single vein graft occlusion. These measurements were repeated during atrial pacing (AP) at a rate of 131 ± 3 beats/minute. Data are mean \pm SEM. During C, graft occlusion resulted in a regional decrease in systolic excursion from $1.99 \pm .37$ to $1.59 \pm .34$ mm ($p < .01$), as well as a decrease in the rate of shortening from 9.91 ± 1.67 to 7.24 ± 1.38 mm/sec ($p < .01$), while heart rate, arterial pressure and pulmonary artery diastolic pressure remained unchanged. Graft occlusion with AP resulted in an exaggerated decrease in both regional systolic excursion from $1.64 \pm .36$ to $0.85 \pm .33$ mm ($p < .05$), and rate of shortening from 10.76 ± 2.16 to 4.06 ± 1.50 mm/sec ($p < .05$). For the group of patients studied, end-diastolic lengths were unchanged with graft occlusion during C and AP. Moreover, with graft occlusion, isolated patients demonstrated regional dyskinesia as evidence by early systolic bulging. These studies in patients have documented for the first time that, despite a constant pre-load, after-load, and heart rate, regional myocardial function following coronary artery bypass grafting is dependent upon adequate graft flow, especially during stress.

*By invitation

36. Selective Arterialization of the Coronary Venous System: Encouraging Longterm Flow Evaluation Utilizing Radioactive Microspheres

MARK S. HOCHBERG, WILLIAM C. ROBERTS*,*

ANDREW G. MORROW and W. GERALD AUSTEN,

Bethesda, Maryland and Boston, Massachusetts

The longterm effectiveness of retrograde coronary venous bypass grafts (CVBG) to ischemic left ventricles was evaluated in 18 dogs. A saphenous vein was interposed between the aorta and left anterior descending (LAD) vein. The LAD vein was ligated proximal to the CVBG to prevent an arteriovenous fistula. The LAD artery was ligated at its origin to create anterior wall ischemia. Operative graft flow was 53 ml./min.

The 14 surviving dogs were catheterized 3-5 months later. Ten of the 14 CVBGs were patent angiographically. The chests were opened and graft flow now averaged 50 ml./min. ¹⁴¹Ce microspheres were then injected into the left atrium to measure myocardial flow to the anterior wall. In the 10 dogs with patent grafts transmural flow was 39±3 (S.E.) ml./100 gm. tissue/min., with flow to the subendocardium alone 40±11 ml./100 gm./min. The endocardial/epicardial flow ratio was 1.4/1, indicating that retrograde venous perfusion effectively delivered blood to the subendocardium.

After ligation of the CVBG, microsphere measured flow dropped to 15 ± 4 ml./100 gm./min. In 15 control dogs, anterior wall flow was 100 ± 10 ml./100 gm./min., decreasing to 13 ± 6 with ligation of the LAD artery and vein.

Histologic examination of the anterior wall of the left ventricle, the area served by the CVBGs for 3-5 months, disclosed no evidence of venous sclerosis or thrombosis, and no evidence of interstitial edema or hemorrhage. Some intimal proliferation was noted in the intramural small arteries and arterioles.

Thus, a coronary venous bypass graft improves anterior wall flow almost three-fold compared to the ischemia of LAD artery ligation. Moreover, restoration of flow with CVBG is effective because it perfuses all layers of the myocardium, especially the subendocardium - the crucial layer of myocardial muscle.

*By invitation

37. Atherosclerotic Changes in Coronary Vein Grafts 6 Years after Operation: Angiographic Aspect in 100 Patients

CLAUDE M. GRONDIN, LUCIEN CAMPEAU,*

JACQUES LESPERANCE, B. CHARLES SOLYMOSS*,*

YVES R. CASTONGUAY, CLAUDE P. MEERE*,*

JACQUES HERMANN, FREDERICO CORBARA* and*

*MARTIAL G. BOURASSA *, Montreal, Quebec, Canada*

Angiographic studies were conducted six years (71.5±9.6 months) after operation in 100 patients with coronary vein grafts who previously had had similar studies at 2 weeks and one year. Of the 159 patent grafts at one year 17 (10.7%) were occluded 5 years later and 14 (8.8%) showed

localized narrowing of varying degree - more than half being $\leq 40\%$. Three grafts recovered at reoperation showed typical features of atherosclerosis.

Angiographically, these late narrowings differ from those described in studies conducted earlier after operation - occurring away from distal or proximal anastomoses - and are reminiscent of the more common narrowings seen in coronary arteries in that, usually, they are short and sharp.

Levels of serum lipids or blood sugar were comparable in patients with graft occlusion to those of patients showing graft narrowings. Progression of disease in the native (non-grafted) circulation differed, however, in the two groups being more prevalent in patients with graft stenosis and suggesting a common operative factor.

Late stenoses or occlusions in the graft could not be predicted upon review of the one year angiographic study. From the angiographic standpoint nearly all appeared amenable to surgical treatment although few patients complained of anginal symptoms, presumably because of patency of other grafts.

*By invitation

38. Intraoperative Relationships Between Regional Myocardial Distribution of Bypass Graft Flow and the Coronary Collateral Circulation

*H. NEWLAND OLDHAM, JR., ROBERT H. JONES**,

C. CRAIG HARRIS, W. ROBIN HOWE*, JACK K. GOODRICH**

and DAVID C. SABISTON, JR., Durham, North Carolina

Definition of the role of human coronary collateral vessels in supplying adequate perfusion to areas of ischemic myocardium is of considerable potential use in determining the proper number and optimal sites of insertion of bypass grafts for myocardial ischemia. To investigate this, the relationships between collateral flow and the volume and regional distribution of graft blood flow were studied in adjacent areas of myocardium. Measurements were obtained during a stable period prior to chest closure in 14 patients undergoing coronary artery bypass surgery. Using an electromagnetic flowmeter, graft flow was quantitated and the regional distribution of this flow was measured by radio-nuclide techniques. Two separate solutions containing macroaggregated human serum albumin particles labeled with ^{125}I and $^{99\text{m}}\text{Tc}$ were injected into the bypass grafts. Specially designed sterile scintillation probes were used to count both radionuclides simultaneously to map the distribution of the macroaggregates over 53 areas covering the surface of the heart. Flow in ml/min was calculated for each of the 53 regions by combining electromagnetic graft flow and the percentage distribution of the radioactivity. Injections were made into two separate grafts in three patients, into the same graft with an adjacent graft first open and then temporarily occluded in five patients, and into a graft with two sequential anastomoses in five patients. The entire study can be performed in 15 minutes.

In nine patients, there was no evidence of collateral communication between the anterior, lateral, or posterior regions of the myocardium, regardless of the presence or absence of angiographically visualized collateral vessels. In three patients, there was clear demonstration of an area of common perfusion over the apex of the heart supplied by both the anterior and posterior coronary arteries. Only two patients had collateral flow between closely adjacent regions of the anterolateral left ventricle and neither had angiographically demonstrated coronary vessels. In five patients with sequential anastomoses to adjacent areas of myocardium, both the total volume and the distribution of flow were improved by grafting both areas.

From these data, it is concluded that: (1) bypass graft flow is distributed to localized regions of myocardium, (2) collateral blood flow rarely occurs between adjacent areas of myocardium, (3) sequential or multiple grafts are beneficial in completely revascularizing adjacent areas of

underperfused myocardium, and (4) concepts of coronary collateral blood flow and function derived from experimental animals may not apply to patients and human data are necessary for application to the clinical situation.

*By invitation

39. Probability of Survival After Coronary Bypass Surgery in Veterans Administration and Community Hospitals

*J. S. CAREY, R. A. CUKINGNAN**

and G. F. GRONER, Los Angeles, California*

The VA Cooperative Study of coronary artery surgery has been criticized because (1) VA patients may differ from the population at large and (2) the surgical results were suboptimal in terms of hospital mortality and graft patency rates. To evaluate these problems, we compared the surgical results obtained at Wadsworth VA (VA-W) with those of the VA Cooperative Study (VA-C) and with the results obtained in a community hospital series (CH). There were 154 VA-W and 152 CH patients operated upon since January, 1972 who were followed at least one year. One to five saphenous vein grafts were performed using normothermic perfusion and intermittent aortic cross-clamping. The VA-W patients were similar to the VA-C patients in most categories: 3-vessel disease, 51% (VA-W) vs. 49% (VA-C); previous MI, 55% vs. 64%; LV function abnormalities, 55% vs. 64%. The results in the VA-W group were: hospital mortality 0.7%; perioperative infarction rate 5.8%; three year survival 94%; annual mortality rate 2.0%; graft patency rate 85% (168 of 197) and number of patients with at least one graft open 97% (66 of 68). These results contrast sharply with those of the VA-C series, but are very similar to results reported from the San Francisco VA. Compared to the CH series, the VA patients were younger, had more advanced symptoms, more previous MI's and a higher incidence of abnormal left ventricle ($p < .05$); bypass time, aortic cross-clamp time and duration of hospitalization were longer ($p < .001$). The annual cardiac mortality was 1.2% in the CH patients (not significant by Wilcoxon test). We conclude that (1) coronary bypass surgery differs significantly in VA and community hospitals, and (2) the data reported by the VA Cooperative Study is not representative of surgical results in non-participating VA hospitals or in community hospitals.

*By invitation

40. Is There a Penalty for Subtotal Myocardial Revascularization?

JAMES W. JONES, JOHN L. OCHSNER, NOEL L. MILLS*

and WILLIAM P. DUNLAP, New Orleans, Louisiana*

The influence of subtotal myocardial revascularization on clinical success following direct coronary artery procedures was studied by computer statistical methods. Of the initial 1004 patients requiring direct myocardial revascularization at Ochsner Clinic, 707 had all vessels with 70% or greater luminal lesions bypassed; 202 had a major coronary lesion unbypassed; 53 patients had a minor vessel untreated; and 42 patients had both a major and a minor lesion untreated. Follow-up, complete in 98% of instances, has ranged from 2 to 8 years and averages 48.6 months. Clinical success was determined by anginal relief, non-fatal myocardial infarction rates, congestive heart failure rates, and longevity. Of the four parameters, only longevity was adversely affected in the overall group with untreated stenoses, but more comprehensive analysis showed this to be secondary to advanced disease as determined by a higher percentage of patients having decreased ventricular function by angiography. Although the disease process seemed to determine the clinical outcome, patients with severely decreased ventricular function had higher rates of unrelieved

angina (5.3% vs. 26.1%) ($p=0.0172$) when subtotal revascularization was done. Patients with good ventricular function who had subtotal, revascularization experienced significantly higher non-fatal myocardial infarction rates ($p=0.032$). Certain factors were associated with a higher percentage of subtotal revascularization: (1) generalized decreased ventricular function; (2) ventricular aneurysmectomy; (3) age of 70 years or older and (4) larger number of vessels diseased. Those who had diabetes, hypertension, or hyperlipoproteinemia, women, and cigarette smokers did not have increased rates of subtotal revascularization. Analysis according to the specific vessels bypassed or left unbypassed was unremarkable.

*By invitation

41. Coronary Bypass Surgery - Five Year Follow-Up of a Consecutive Series of 140 Patients

*GEORGE E. GREEN, HARVEY G. KEMP**,

SAMIR ALAM and IVAN DAVID *, New York, New York*

The five year follow-up of a consecutive series of 140 patients who had coronary bypass surgery performed by one surgeon will be reported.

One hundred forty patients were operated between January and December of 1972. Twenty patients had single grafts, 49 double grafts, 58 triple grafts, 12 quadruple grafts, 1 quintuple grafts. Of the 345 grafts, 120 were mammary arteries and 225 were saphenous veins. Saphenous veins were removed from below the knee and measured 2.5 - 4.0 mm. diameter. Arteriotomies and anastomoses were performed with high magnification (Zeiss Operation Microscope 16x).

Five year survival was 93 per cent. There were 2 hospital deaths and 7 late deaths. Two of the late deaths were due to cancer and 5 were considered cardiac. Cardiac deaths occurred three months (1), three years (2), four years (1), and five years (1) after operation. Two patients were lost to follow-up two or more years after operation.

Of the 129 patients followed for five years 92 (70%) had no angina and 37 (30%) had at least one episode of angina. Thirty of these patients considered the angina to be less severe, 6 considered it to be the same and 1 considered it to be more severe than before the operation.

Late angiograms, predominantly in symptomatic patients, showed vein graft patency to be 80% and mammary artery patency to be 95%. Selective injection of radioactive xenon showed mammary artery flow to be equivalent to vein graft flow and to normal coronary flow.

*By invitation

42. Changing Concepts in the Surgical Management of Left Main Coronary Artery Disease

HENRY J. SULLIVAN, ROQUE PIFARRE, DONALD DIXON**,

JOHN M. MORAN, ALVARO MONTOYA*, SARAH A. JOHNSON**,

*ADEL EL-ETR*and ROLF M. GUNNAR*, Maywood, Illinois*

Since June 1970, 196 patients with significant main left coronary artery stenosis have undergone surgery. Our experience with this condition may be divided chronologically into three phases.

PHASE 1: 89 patients. Hemodynamic instability with frequent hypertension during induction of anesthesia characterized this group. Nine (10%) patients required urgent institution of

cardiopulmonary bypass (CPB) for acute left ventricle failure. Operative mortality was 11% (10 patients).

PHASE 2: 55 patients. Intra-aortic balloon counterpulsation (IABC) was instituted prior to surgery. Only one patient required urgent CPB. Operative mortality was 1.5%(1 patient).

PHASE 3: 52 patients. Anesthetic management was characterized by pharmacologic reduction of left ventricular afterload with intravenous nitroprusside or nitroglycerine, and monitoring of pulmonary (PA) pressure. No patients required urgent CPB and there was no operative mortality.

Anesthetic induction is a critical time in the surgical management of patients with significant left main coronary stenosis. Our experience suggests that hemodynamic stability during this period may be achieved by IABC or by pharmacologic unloading of the left ventricle aided by monitoring of PA pressure.

Adjournment

The American Association for Thoracic Surgery, 1977 - 1978

(Listed by Countries, States, Provinces and Cities)

Geographical - UNITED STATES

ALABAMA

Birmingham

Karp, Robert B.

Kessler, Charles R.

Kirklin, John W.

Kouchoukos, Micholas

Labrosse, C.

Pacifico, Albert D.

Montgomery

Simmons, Earl M.

ALASKA

Anchorage

Phillips, Francis J.

ARIZONA

Flagstaff

McPhail, Jasper L.

Phoenix

Brown, Lee B.

La Canada

Aronstam, Elmore M.

Laguna Hills

Cracovaner, Arthur J.

La Jolla

Fosburg, Richard G.

Hutchin, Peter

La Mesa

Long, David M.

Loma Linda

Wareham, Ellsworth E.

Long Beach

Bloomer, William E.

Carlson, Herbert A.

Stemmer, Edward A.

Los Angeles

Baisch, Bruce F.

Buchberg, Gerald D.

Cornell, Wm. P.
Nelson, Arthur R.
Sun City
Read, C. Thomas
Tucson
Burbank, Benjamin
Melick, Dermont W.
Sanderson, Richard G.
ARKANSAS
Fayetteville
Thrower, Wendell B.
Jasper
Hudson, W. A.
Little Rock
Campbell, Gilbert S.
Read, Raymond C.
CALIFORNIA
Anaheim
Main, F. Beachley
Artesia
Hewlett, Thomas H.
Carmel
Daniels, Albert C.
Davis
Andrews, Neil C.
Escondido
Mannix, Edgar P.
Fresno
Evans, Bryon H.
Irvine
Connolly, John E.
Miller, Don R.

Jamplis, Robert W.
Wilson, John L.

Fonkalsrud, Eric W.
Goldman, Alfred
Kay, Jerome Harold
Lindesmith, George G.
Longmire, William P., Jr.
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.
Palm Desert
Julian, Ormand C.
Palo Alto
Cohn, Roy B.

Stanford
Mark, James B. D.

Pasadena

Cotton, Beit H.
Hughes, Richard K.
Ingram, Ivan N.
Penido, John R. F.
Silver, Arthur W.

Piedmont

Samson, Paul C.

Sacramento

Hurley, Edward J.
Miller, George E., Jr.
Smeloff, Edward A.

San Bernadino

Flynn, Pierce J.
Moersch, Richard

San Diego

Baronofsky, Ivan D.
Chambers, John S., Jr.
Daily, Pat O.
Peters, Richard M.
Trummer, Max J.
Utley, Joe R.

San Francisco

Culiner, Morris M.
Ebert, Paul A.
Faulkner, William B., Jr.
Fishman, Noel H.
Gardner, Richard E.
Gerbode, Frank
Grimes, Orville F.
Hill, J. Donald
Kerth, William J.
Leeds, Sanford E.
Richards, Victor
Roe, Benson B.
Rogers, W. L.

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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Brown, Robert K.
Condon, William B.
Eiseman, Ben
Grow, John B.
Harper, Frederick R.
Kovarik, Joseph L.
Newman, Melvin M.
Pappas, George
Paton, Bruce C.
Rainer, W. Gerald
Waddell, William R.
Zajtchuk, Rostik

Englewood

Pomerantz, Marvin

Lakewood

Swan, Henry

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Hartford

Kemler, R. Leonard

New Haven

Baue, Arthur E.

Thomas, Arthur N.

Ullyot, Daniel J.

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Santa Batbaia

Higginson, John F.

Jahnke, Edward J., Jr.

Lewis, F. John

Love, Jack W.

Santa Monica

Carey, Joseph H.

Sherman Oaks

Davis, Lowell L.

South Laguna

Oatway, William H.

South Pasadena

Brewer, Lyman A., III

Iovine, Vincent M.

Keshishian, John M.

Peabody, Joseph W., Jr.

Randolph, Judson G.

Smyth, Nicholas P. D.

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Coral Gables

Cooke, Francis N.

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Geary, Paul

Gainesville

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Moulder, Peter V.

Carter, Max G.

Geha, Alexander

Glenn, William W. L.

Hammond, Graeme L.

Stansel, Horace C., Jr.

Stern, Harold

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Sharon

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King, Richard

Logan, William D., Jr.

Mansour, Kamal A.

Rivkin, Laurence M.

Symbas, Panagiotis N.

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Gilbert, Joseph W., Jr.
Stephenson, Sam E., Jr.

Lakeland

Brown, Ivan W., Jr.

Largo

Daicoff, George R.

Miami

Bolooki, Hooshang
Center, Sol
Daughtry, DeWitt C.
Gentsch, Thomas O.
Jude, James R.
Kaiser, Gerard A.
Papper, Emanuel M.
Reis, Robert L.
Ripstein, Charles B.
Swenson, Orvar

Miami Beach

Greenberg, Jack J.

Naples

Linberg, Eugene J.

North Miami Beach

Spear, Harold C.

Orlando

Sherman, Paul H.

Pompano Beach

Maurer, Elmer P. R.

Ponte Vedra Beach

Stranahan, Allan

St. Petersburg

Clerf, Louis H.
DeMatteis, Albert
Wheat, Myron W., Jr.

South Miami

Chesney, John G.

Augusta

Ellison, Robert G.

Savannah

Yeh, Thomas J.

HAWAII

Honolulu

Gebauer, Paul W.

Kailua

McNamara, Joseph Judson

Kailua, Kona

Fell, Egbert H.

IDAHO

Boise

Ashbaugh, David G.
Herr, Rodney H.

ILLINOIS

Chicago

Anagnostopoulos, Constantine
Barker, Walter L.
Burrington, John D.
Hanlon, C. Rollins
Head, Louis R.
Holinger, Paul H.
Hudson, Theodore R.
Hunter, James A.
Idriss, Farouk S.
Javid, Hushang
Jensik, Robert J.
Langston, Hiram T.
Leininger, Bernard J.
Levitsky, Sidney
Michael's, Lawrence L.
Najafi, Hasson
Raffensperger, John G.
Replogle, Robert L.
Shields, Thomas W.

Tallahassee

Kraeft, Nelson H.

Thomas, Paul A., Jr.

Weinberg, Milton, Jr.

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Kittle, C. Frederick

Glencoe

Rubenstein, Laurence H.

Glenview

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Mines

Keeley, John L.

La Grange

Faber, L. Penfield

Lincolnwood

Lees, William M.

Maywood

Pifarre, Roque

Oak Brook

Nigro, Salvatore L.

Palos Heights

DeMeester, Tom R.

Paris

Pratt, Lawrence A.

Peoria

DeBord, Robert A.

Skokie

Baffes, Thomas G.

Winnetka

Mackler, S. Allen

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Dillon Marcus L.

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Harter, John S.

Mahaffey, Daniel E.

Ransdell, Herbert T., Jr.

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Beskin, Charles A.

Metairie

Ochsner, Alton, Jr.

New Orleans

Blalock, John B.

Bryant, Lester R.

DeCamp, Paul T.

Glass, Bertram A.

Hewitt, Robert Lee

Lindsey, Edward S.

Mills, Noel L.

Battersby, James S.

King, Harold

King, Robert D.

Mandelbaum, Isidore

Shumacker, Harris B., Jr.

Siderys, Harry

South Bend

Van Fleit, William E.

IOWA

Cedar Rapids

Lawrence, Montague S.

Des Moines

Dorner, Ralph A.

Watkins, David H.

Iowa City

Doty, Donald B.

Ehrenhaft, Johan L.

Rossi, Nicholas P.

KANSAS

Cunningham

Allbritten, Frank F.

Gott, Vincent L.

Haller, J. Alex, Jr.

Hankins, John R.

Mason, G. Robert

McLaughlin, Joseph S.

Michelson, Elliott

Rienhoff, William F., Jr.

Turney, Stephen Z.

Wilder, Robert J.

Bethesda

Morrow, Andrew G.

Kensington

Simmons, Robert L.

Ochsner, Alton

Ochsner, John L.

Pearce, Charles W.

Rosenberg, Dennis M.

Schramel, Robert J.

Strug, Lawrence H.

Webb, W. R.

MAINE

Liberty

Hurwitz, Alfred

Portland

Drake, Emerson H.

Hiebert, Clement A.

MARYLAND

Baltimore

Attar, Safuh M. A.

Baker, R. Robinson

Brantigan, Otto C.

Brawley, Robert K.

Cowley, R. Adams

Donahoo, James

Taylor, Warren J.

Methuen

Wilson, Norman J.

Nantucket

Mahoney, Earle B.

Newburyport

Cook, William A.

Newton Lower Falls

Laforet, Eugene G.

Lynch, Joseph P.

Strieder, John W.

Springfield

Engelman, R. M.

Worton

Walkup, Harry E.

*MASSACHUSETTS***Boston**

Austen, W. Gerald

Badger, Theodore L.

Barsamian Ernest M.

Berger, Robert L.

Bernhard, William F.

Bougas, James A.

Boyd, David P.

Braunwald, Nina S.

Buckley, Mortimer J.

Burke, John F.

Castaneda, Aldo R.

Cleveland, Richard J.

Clowes, George H. A., Jr.

Cohn, Lawrence H.

Collins, John J., Jr.

Daggett, Willard M.

Deterling, Ralph A., Jr.

Ellis, F. Henry, Jr.

Frank, Howard A.

Gaensler, Edward A.

Grillo, Hermes C.

Harken, Dwight E.

Neptune, Wilford B.

Overholt, Richard H.

Rheinlander, Harold F.

Russell, Paul S.

Scannell, J. Gordon

Schuster, Samuel R.

Starkey, George W. B.

Watkins, Elton, Jr.

Wilkins, Earle W., Jr.

Brookline**Stoughton**

Black, Harrison

Wayland

Lefemine, Armand A.

*MICHIGAN***Ann Arbor**

Behrendt, Douglas M.

Gago, Otto

Kirsh, Marvin M.

Morris, Joe D.

Orringer, Mark B.

Sloan, Herbert

Detroit

Arbulu, Agustin

Davila, Julio C.

Day, J. Calude

Dodrill, Forest Dewey

Lam, Conrad R.

McDonald, John R.

Wilson, Robert F.

East Lansing

Gonzalez- Lavin, Lorenzo

Grand Rapids

Harrison, Robert W.

Meade, Richard H.

Rasmussen, Richard A.

Grosse Pointe Farms

Benson, Clifford D.

Grosse Point Shores

Gerbasi, Francis S.

Grosse Point Woods

Taber, Rodman E.

Kalamazoo

Neerken, A. John

Royal Oak

Timmis, Hilary H.

Madoff, Irving M.

Malcolm, John A.

Concord

Soutter, Lamar

Medford

Boyd, Thomas F.

Desforges, Gerard

Minneapolis

Anderson, Robert W.

Garamella, Joseph J.

Humphrey, Edward W.

Jensen, Nathan K.

Johnson, Frank E.

Kiser, Joseph C.

Lillehei, Richard C.

Myers, J. Arthur

Nicoloff, D. M.

Varco, Richard L.

Wangensteen, Owen H.

Rochester

Bernatz, Philip E.

Clagett, O. Theron

Danielson, Gordon K., Jr.

McGoon, Dwight C.

Olsen, Arthur M.

Payne, W. Spencer

Pluth, James R.

Wallace, Robert B.

St. Paul

Leven, N. Logan

Lillehie, C. Walton

Miller, Fletcher A.

Perry, John F., Jr.

MISSISSIPPI

Southfield

Barrett, Raymond J.

MINNESOTA

Duluth

Fuller, Josiah

Roper, Charles L.

Weldon, Clarence S.

Willman, V. L.

NEBRASKA

Omaha

Fleming, William H.

Hopeman, Alan R.

Malette, William G.

Sellers, Robert D.

NEW HAMPSHIRE;

Hanover

Tyson, M. Dawson

Jaffrey Center

Woods, Francis M.

NEW JERSEY

Browns Mills

Fernandez, Javier

Camden

Camishion, R. C.

East Orange

Auerbach, Oscar

Gerard, Franklyn P.

Haworth

Edie, Richard M.

Hillsdale

Amberson, J. B.

Jersey City

Jackson

Hardy, James D.
Johnston, J. Harvey, Jr.
Neely, William A.
Netterville, Rush E.

*MISSOURI***Columbia**

Almond, Carl H.
Silver, Donald

Kansas City

Adelman, Arthur
Ashcraft, Keith W.
Benoit, Hector W., Jr.
Holder, Thomas M.
Killen, Duncan A.
Mayer, John H., Jr.
Padula, Richard T.

Mount Vernon

Campbell, Daniel C., Jr.

St. Louis

Earnar, Hendrick B.
Bergmann, Martin
Clark, Richard E.
Collins, Harold A.
Ferguson, Thomas B.
Kaiser, George C.
Lewis, J. Eugene, Jr.
Lucido, Joseph L.

McKneally, Martin F.

Bay Shore

Ryan, Bernard J.

Bronx

Altai, Lari A.
Bloomberg, Allan E.

Timmes, Joseph J.

Moorestown

Morse, Dryden P.

Newark

Neville, William E.

New Brunswick

Kunderman, Philip J.

North Caldwell

Wychulis, Adam R.

Pennsauken

Pierucci, Louis, Jr.

Piscataway

Mackenzie, James W.

Short Hills

Demos, Nicholas J.

Tenafly

Gerst, Paul H.

*NEW MEXICO***Albuquerque**

Edwards, W. Sterling

Las Vegas

Thai, Alan P.

Sante Fe

Wilson, Julius L.

*NEW YORK***Albany**

Alley, Ralph D.
Kausel, Harvey W.

Isom, O. Wayne

Jaretzki, Alfred, III

King, Thomas C.

Kirschner, Paul A.

Lambert, Adrian

Litwak, Robert S.

Friedlander, Ralph	Maier, Herbert C.
Hirose, Teruo	Malm, James R.
Robinson, George	Martini, Nael
Bronxville	Nealon, Thomas F., Jr.
Prater, Robert W. M.	Okinaka, Arthur J.
Brooklyn	Redo, S. Frank
Levowitz, Bernard S.	Reed, George E.
Sawyer, Philip N.	Reemtsma, Keith
Buffalo	Rubin, Morris
Adler, Richard H.	Sarot, Irving A.
Anderson, Murray N.	Seley, Gabriel P.
Lajos, Thomas Z.	Spencer, Frank C.
Leahy, Leon J.	Thompson, Samuel A.
MacManus, Joseph E.	Tice, David A.
Subramanian, Sambumurthy	Veith, Frank J.
Cooperstown	Watson, William L.
Blumenstock, David A.	Wichern, Walter A., Jr.
Elmira	Wolff, William I.
Tillou, Donald J.	Patchoque
Great Neck	Finnerty, James
Crastnopol, Philip	Plattsburgh
Kenmore	Potter, Robert T.
Kaunitz, Victor H.	Port Washington
Mineola	Johnson, Elgie K.
Mangiardi, Joseph L.	Poughkeepsie
New Hyde Park	Douglass, Richmond
B. Geo. Wisoff	Rochester
New York	DeWeese, James A.
Aberdeen, Eoin	Schwartz, Seymour I.
Bailey, Charles P.	Stewart, Scott
Beattie, Edward J., Jr.	Zaroff, Lawrence I.
Bloch, Robert G.	Rockville Centre
Bowman, Frederick O., Jr.	Wesolowski, Sigmund A.
Boyd, Arthur D.	Roslyn
Cahan, William G.	Thomson, Norman B., Jr.
Ching, Nathaniel P. H.	Saranac Lake

Clauss, Roy H.
Conklin, Edward F.
Courmand, Andre
Davidson, Louis R.
Findlay, Charles W., Jr.
Fischer, Walter W.
Fitzpatrick, Hugh F.
Ford, Joseph M.
Giannelli, Stanley, Jr.
Glenn, Frank
Green, George E.
Holman, Cranston W.
Holswade, George R.
Humphreys, George H., II
Hutchinson, John E., III

Decker, Alfred M., Jr.
Merkel, Carl G.

Scottsville

Emerson, George L.

Setauket

Dennis, Clarence

Southampton

Heroy, William W.

Staten Island

Garzon, Antonio A.

Stony Brook

Soroff, Harry S.

Syracuse

Bugden, Walter F.

Effler, Donald B.

NORTH CAROLINA

Asheville

Scott, Stewart N.
Sethi, Gulshan K.
Takaio, Timothy

Chapel Hill

Murray, Gordon F.
Starek, Peter J. K.
Wilcox, Benson R.

Charlotte

Robicsek, Francis
Taylor, Frederick H.

Durham

Hart, Deryl
Oldham, H. Newland, Jr.
Sabiston, David C.
Sealy, Will C.
Smith, David T.
Wolfe, Walter G.

Dayton

Dewall, Richard A.

Gates Mills

Kennedy, John Hines

Toledo

Blakemore, William S.

Selman, Morris W.

OKLAHOMA

Oklahoma City

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

Tulsa

Guernsey, James M.
Leibovitz, Martin

OREGON

Young, W. Glenn, Jr.

Greensboro

Deaton, W. Ralph W., Jr.

Oteen

Belts, Reeve H.

Winston-Salem

Cordell, A. Robert

Hudspeth, Allen S.

Johnston, Frank R.

Meredith, Jesse H.

OHIO

Akron

Falor, William H.

Chardon

Mautz, F. R.

Cincinnati

Carter, B. Noland

Gonzalez, Luis L.

Helmsworth, James A.

Rosenkrantz, Jens G.

Cleveland

Ankeney, Jay L.

Cross, Frederick S.

Groves, Laurence K.

Kay, Earle B.

Loop, Floyd

Mendelsohn, Harvey J.

Wright, George W.

Columbus

Clatworthy, H. William, Jr.

Kilman, James W.

Klassen, Karl P.

Meckstroth, Charles V.

Sirak, Howard D.

Vasko, John S.

Portland

Lawrence, G. Hugh

Poppe, J. Karl

Starr, Albert

Roseburg

Miller, Arthur C.

PENNSYLVANIA

Bethlehem

Snyder, John M.

Fairfield

McClenathan, James E.

Gladwyne

Johnson, Julian

Hamburg

Judd, Archibald R.

Haverford

Flick, John B.

Havertown

Chodoff, Richard J.

Hershey

DeMuth, William E., Jr.

Pierce, William S.

Waldhausen, John A.

Lancaster

Witmer, Robert H.

Lumberville

O'Neill, Thomas J. E.

Narberth

Burnett, W. Emory

Philadelphia

Brockman, Stanley K.

Edmunds, L. Henry, Jr.

Fineberg, Charles

Haupt, George J.

Lemmon, William M.

Lemole, Gerald M.

MacVaugh, Horace, III

Mendelssohn, Edwin

Mundth, Eldred D.

Nemir, Paul, Jr.

Rosemond, George P.

Stayman, Joseph W.

Templeton, John Y., III

Wallace, Herbert W.

Pittsburgh

Bahnson, Henry T.

Ford, William B.

Magovern, George J.

Pontius, Robert G.

Rams, James J.

Ravitch, Mark M.

Steichen, Felicien M.

Rydal

Frobese, Alfred S.

Sayre

Sewell, William H.

Wynnewood

McKeown, John J., Jr.

Yardley

Sommer, G. N. Jr.

RHODE ISLAND

Providence

Karlson, Karl E.

McEnaney, M. Terry

Simeone, Fiorindo A.

SOUTH CAROLINA

Charleston

Bradham, Randolph R.

Hairston, Peter

Parker, Edward F.

Robbins, S. Gwin

Rosensweig, Jacob

Skinner, Edward F.

Nashville

Alford, William C., Jr.

Bender, Harvey W., Jr.

Dale, W. Andrew

Daniel, Rollin A., Jr.

Diveley, Walter L.

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.

Dallas

Adam, Maurice

Davis, Milton V.

Holland, Robert H.

Kee, John L., Jr.

Lambert, Gary J.

Mitchel, Ben F., Jr.

Paulson, Donald L.

Platt, Melvin R.

Razzuk, Maruf A.

Shaw, Robert R.

Sugg, Winfred L.

Sade, Robert M.

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.

Lubbock

Bricker, Donald L.

Dalton, Martin L., Jr.

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.

Urschel, Harold C., Jr.

Wilson, Hugh E., III

Galveston

Derrick, John R.

Tyers, G. Frank O.

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.

Greenfield, Lazar J.

Gwathmey, Owen

Johns, Thomas N. P.

Lower, Richard R.

WASHINGTON

Mercer Island

Mills, Waldo O.

Seattle

Anderson, Richard P.

Cantrell, James R.

Dillard, David H.

Trinkle, J. Kent	Hill, Lucius D.
Temple	Jarvis, Fred J.
Brindley, G. Valter, Jr.	Jones, Thomas W.
<i>UTAH</i>	Merendino, K. Alvin
Salt Lake City	Pinkham, Roland D.
Cutler, Preston R.	Sauvage, Lester R.
Johnson, Clive R.	Thomas, George I.
Liddle, Harold V.	Spokane
Mortensen, J. D.	Berg, Ralph, Jr.
Nelson, Russell M.	<i>WEST VIRGINIA</i>
Rumel, William R.	Charleston
Wolcott, Mark W.	Walker, James H.
<i>VERMONT</i>	Morgantown
Brattleboro	Tarnay, Thomas J.
Gross, Robert E.	Warden, Herbert E.
Burlington	Huntington
Coffin, Laurence H.	Littlefield, James B.
Miller, Donald B.	<i>WISCONSIN</i>
Chester Depot	La Crosse
Adams, Herbert D.	Gundersen, A. Erik
White River Junction	Madison
Crandell, Walter B.	Chopra, Paramjeet S.
<i>VIRGINIA</i>	Curreri, Anthony R.
Arlington	Kahn, Donald R.
Conrad, Peter W.	Young, William P.
Klepser, Roy G.	Marshfield
Charlottesville	Myers, William O.
Dammann, John F.	Ray, Jefferson F., III
Drash, Everett C.	Sautter, Richard D.
Minor, George R.	Milwaukee
Muller, William H., Jr.	Boncheck, Lawrence I.
Nolan, Stanton P.	Flemma, Robert J.
Great Falls	Hausmann, Paul F.
Mills, Mitchell	Johnson, W. Dudley
Lynchburg	Lepley, Derward, Jr.
DeNiro, Richard N.	Litwin, S. Bertrand

Moore, Richmond L.

Richmond

Bosher, Lewis H.

Brooks, James W.

Cole, Dean B.

Mullen, Donald C.

Narodick, Benjamin G.

Pemberton, Albert H.

Tector, A. J.

Weisel, Wilson

West Bend

Gardner, R. J.

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.

Delarue, Norman C.

Goldman, Bernard S.

Henderson, Robert D.

Joynt, George H. C.

Key, James A.

Lockwood, A. L.

MacGregor, David C.

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.

MacLean, Lloyd D.

McIntosh, Clarence A.

St. John's

Brownrigg, Garrett M.

Couves, Cecil M.

NOVA SCOTIA

Halifax

Murphy, David A.

Kentville

Quinlan, John J.

ONTARIO

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.

Cooper, Joel D.

ENGLAND

Bristol

Belsey, Ronald

Hampden Row

Sellers, Sir Thomas Holmes

Hereford

Thompson, Vemon

London

Brock, Lord

Surrey

Barrett, Norman R.

SCOTLAND

Scott, Henry J.

Vineberg, Arthur M.

Outremont

Lepage, Gilles

Quebec City

Gravel, Joffre-Andre

OTHER COUNTRIES

ARGENTINA

Buenos Aires

Favaloro, Rene G.

BRAZIL

Sao Paulo

Zerbini, E. J.

GUATEMALA

Guatemala City

Herrera, Rudolfo

VENEZUELA

Caracas

Tricerri, Fernando E.

GERMANY

Aachen

Messmer, Bruno J.

SWEDEN

Stockholm

Bjork, Viking O.

Crafoord, Clarence

SWITZERLAND

Zurich

Senning, Ake

INDIA

Bikaner, Raiputana

Edinburgh

Logan, Andrew

HOLLAND

Amsterdam

Boerema, I.

Leiden

Brom, Gerard A.

IRELAND

Dublin

O'Malley, Eoin

FRANCE

Paris

Dubost, Charles

Van Allen, Chester M.

Noakhali, Bangladesh

McCord, Colin W.

JAPAN

Sendai, Miyagi-ken

Mohri, Hitoshi

Toyko

Sakakibara, Shigeru

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

ARTICLE I. Name

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

ARTICLE II. Purposes

The purposes of the Association shall be:

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

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

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

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

ARTICLE III. Membership

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

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

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

Section 4. Active Membership shall be limited to six hundred. A candidate to be eligible must be a citizen of the United States of America or Canada, unless in unusual cases this citizenship requirement shall have been waived by the

Council. The candidate shall have achieved distinction in the thoracic field or shall have made a meritorious contribution to knowledge pertaining to thoracic disease or its surgical treatment.

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

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

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

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

Section 9. Membership may be voluntarily terminated at any time by members in good standing. The Council, acting as a Board of Censors, may recommend the expulsion of a member on the grounds of moral or professional delinquency, and submit his name, together with the grounds of complaint, to the Association as a whole at any of the regularly convened meetings, after giving such member ample opportunity to appear in his own behalf.

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

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

ARTICLE IV. Board of Directors ("Council")

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

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

- a. It may not alter the initiation fees or annual dues, or levy any general assessments against the membership, except that it may, in individual cases, waive annual dues or assessments.
- b. It may not change the Articles of Incorporation or By-Laws.
- c. It may neither elect new members nor alter the status of existing members, other than to apply the provisions of Article III, Section 9.
- d. It may not deplete the principal of the Endowment Fund.

Section 3. At the conclusion of the annual meeting, the retiring President shall automatically become a Councilor for a one-year term of office. One of the other four Councilors shall be elected at each annual meeting of the Association to serve for a four-year term of office in the place of the elected Councilor whose term expires at such meeting, but no Councilor may be reelected to succeed himself. Any Councilor so elected shall take office upon the conclusion of the annual meeting at which he is elected.

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

ARTICLE V. Officers

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

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

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

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

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

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

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

Section 8. The Editor of the Association shall be appointed by the Council at its annual meeting. He shall be appointed for a one-year term and may be re-appointed indefinitely. He shall serve as the Editor of the official Journal and shall ex officio be the Chairman of the Editorial Board.

Section 9. Vacancies occurring among the officers named in Section 1 shall be temporarily filled by the Council, subject to approval of the Association at the next meeting of the Association, except that appointment of the Editor need not be approved.

ARTICLE VI. Committees

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

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

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

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

Section 5. The Nominating Committee shall consist of three Active or Senior Members who are, by preference, also past Presidents of the Association and in attendance at the annual meeting. They shall be elected at the first executive session of the annual meeting of the Association after nomination from the floor. This Committee shall prepare a slate of nominees

for officers and Councilors upon instruction from the Council as to the vacancies which are to be filled by election and shall present its report at the second executive session of the annual meeting.

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

Section 7. The 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 Graham Education and Research Foundation and to carry out other business pertaining to the Fellowship and the Fellows, past, present, and future.

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

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

ARTICLE VII. Finances

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

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

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

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

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

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

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

ARTICLE VIII. Meetings

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

Section 2. Notice of any meeting of the Association shall be given to each member of the Association not less than five nor more than forty days prior to any annual meeting and not less than thirty nor more than forty days prior to any special meeting by written or printed notice delivered personally or by mail, by or at the direction of the Council, the

President or the Secretary. Such notice shall state the place, day and hour of the meeting and in the case of a special meeting shall also state the purpose or purposes for which the meeting is called.

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

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

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

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

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

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

1. Reading or waiver of reading of the minutes of the preceding meetings of the Association and the Council.
2. Report of the Treasurer for the last fiscal year.
3. Audit Report.
4. Report of the Necrology Committee.
5. Report of the Program Committee.
6. Action on amendments to the Articles of Incorporation and By-Laws, if any.
7. Action on recommendations emanating from the Council.
8. Unfinished Business.
9. New Business.
10. Report of the Membership Committee.
11. Election of new members.
12. Report of the Nominating Committee.
13. Election of officers.

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

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

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

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

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

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

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

ARTICLE IX. Indemnification of Directors and Officers

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

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

ARTICLE X. Papers

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

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

ARTICLE XI. Initiation Fees, Dues and Assessments

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

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

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

Section 4. Senior Members are exempt from dues.

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

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

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

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

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

ARTICLE XII. Parliamentary Procedure

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

ARTICLE XIII. Amendments

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

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

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
 1977-Toronto..... President, Henry T. Bahnson

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	Seven 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 B4000, 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
29th	1978-79	Eduardo Otero Coto, M.D. Valencia, SPAIN