

1974 ANNUAL MEETING PROGRAM



Local Arrangements

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Mrs. John E. Connolly
Mrs. Richard K. Hughes
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Mrs. Ivan A. May
Mrs. Bert W. Meyer
Mrs. Donald G. Mulder
Mrs. Beatty H. Ramsay
Mrs. Quentin R. Stiles
Mrs. Ellsworth E. Wareham

MONDAY MORNING, APRIL 22, 1974

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

8:45 A.M. Scientific Session
Ballroom

1. Comparative Study Between Ball and Disc Prostheses in Mitral Valve Replacement

ALEJANDRO ARIS,* ALFRED J. FAST,* ALFRED J. TECTOR,*
ROBERT J. FLEMMER and DERWARD LEPLEY,
Milwaukee, Wisconsin

A total of 196 patients underwent isolated mitral valve replacement between November 1967 and December, 1972. From 1967 to 1970, the cloth covered Starr-Edwards metal ball prosthesis was used in 87 patients. Two-thirds received the Model 6600 while the remaining one-third received a newer model, 6310, with composite configuration. One hundred, nine patients received the Bjork-Shiley tilting disc valve between 1970 and 1972. Computerization of all patients provided a 92% follow-up. In order to make fair comparison between the two types of valves, only the postoperative period up to 36 months was considered in each group (mean 21 months). Hospital mortality was 25% (21 patients) with the ball valve, 3.5% (4 patients) with the disc valve. This difference was derived mainly from the improvement in surgical technique and postoperative care initiated in 1970 when the ball valve series was concluded. Late mortality was 15% (10 patients) with the ball valve and 4.7% (5 patients) with the disc valve. Ball valve thromboembolic complications occurred in 9% (6 patients) and 4.7% (5 patients) in the disc valves; while prosthetic endocarditis developed in 12% (8 patients) and only 0.9% (1 patient) respectively ($p < 0.001$). Postoperative cardiac catheterization was performed in 17 patients. Both prostheses functioned well, with an equal decrease in pulmonary artery pressures and capillary wedge pressure. However, the mean decrease in gradient across the valve was 19.3 mm Hg with the disc prosthesis as opposed to 7.5 mm Hg with the ball prosthesis ($p < 0.05$). Quality of life among survivors was improved in over 90% of the patients in both groups. In view of the above results, the authors feel the Bjork-Shiley valve offers a significant improvement in the long-term outlook of patients requiring mitral valve replacement.

2. Tricuspid Annuloplasty - A Five-Year Experience With 78 Patients

ARTHUR D. BOYD, RICHARD M. ENGELMAN,* O. WAYNE ISOM,*
GEORGE E. REED and FRANK C. SPENCER, New York, N.Y.

Seventy-eight tricuspid annuloplasties (TA) were performed for Tricuspid Insufficiency (TI) at the New York University Medical Center between January 1968 and July 1973. During this same period ninety tricuspid valve replacements were performed. Sixty-three TA's were performed inpatients having mitral valve procedures and 15 in patients having mitral and aortic valve procedures. TI was not recognized preoperatively in 41% of the patients having TA's, emphasizing the importance of routine digital palpation of the tricuspid valve. The TI was severe in 25 patients (32%), moderate in 38(49%), and mild in 15 (19%). In 77% of the patients, the right atrial and ventricular pressures were elevated at pre-operative catheterization. The hospital mortality in the 78 patients was 14%.

Digital examination at operation following annuloplasty found a trace of residual TI in 14 patients (18%), while the other 64 (82%) had no palpable insufficiency. Subsequently 5 patients (6%) had a recurrence of significant TI. It seemed significant that in all of these a mitral valve operation was unsuccessful, resulting in elevated right sided pressures which contributed to the failure of TA.

Our operative technique for evaluating the tricuspid valve, guidelines for choosing between annuloplasty and replacement and our technique for annuloplasty will be discussed. The long-term results in these 78 patients will also be presented and compared with those in patients having tricuspid valve replacement.

3. Allograft Cardiac Valves: A View Through the Scanning Electron Microscope

JOHN W. HAMMON, JR., * MICHAEL J. O'SULLIVAN,*
JAMES OURY, * and RICHARD G. FOSBURG, San Diego, California

The clinical feasibility of implanting cardiac valvular allografts has been well established. Experimental studies have shown subtle degenerative changes in cardiac allograft valves and have linked them to rejection, trauma and poor preservation. It was the purpose of this study to examine canine aortic graft cardiac valves to more accurately assess the changes that occur after implantation.

Canine aortic valves were sterilely removed and mounted on dacron covered metal support frames. They were then sterilized by immersion in nutrient media containing antibiotics. Twenty-five valves were allowed to stay in tissue culture media two to seven days. Fifteen fresh allograft valves were then implanted into the mitral position in mongrel dogs. Valve function was assessed by regular cardiac catheterization and ventriculography. Animals were sacrificed at 3, 6, and 12 months. The valves were tissue cultured and studied with light and scanning electron microscopy. The remaining 10 valves served as controls. Transvalvular gradients averaged 8mm. Hg. and did not increase with implantation time. Ventriculography demonstrated 1+ insufficiency in 2/15 valves, which was present from the time of implantation. All fresh valves were viable, by tissue culture, during the period of observation. Leaflets became grossly thickened and stiff by one year. Light microscopy demonstrated areas of cell necrosis and fibrous dysplasia which increased with implantation time. Scanning electron microscopy showed that as implantation time lengthened the surface of the leaflet was increasingly irregular with areas of disrupted endothelium. These areas contained collagen fibers which were partially covered with a pseudoendothelium of platelets, fibrin, red and white blood cells. By one year greater than 60% of the leaflet surface was denuded of endothelium and replaced by the pseudoendothelial matrix.

The results of this study suggest that fresh preserved canine cardiac valvular allografts undergo changes in their architecture after *in vivo* function. These changes include disruption of the surface endothelium which is best appreciated with the use of the scanning electron microscope. These changes raise pertinent questions about the long-term function of cardiac allograft valves.

4. A Six-Year Study of Glutaraldehyde-Preserved Hetero-graft Valves

ALAIN CARPENTIER, * A. DELOCHE,* J. RELAND,* and
CH. DUBOST, * Paris, France

Sponsored by James R. Malm, New York, N.Y.

In March 1968, we introduced the use of Glutaraldehyde as a cross-linking factor in the preparation of heterograft valves. Glutaraldehyde markedly reduced the antigenicity of the graft while increasing the stability of the Collagen.

The first 100 patients operated upon between March 1968 and December 1972 have been reviewed. 17 patients had congenital valvular malformations (7 Ebstein's malformation, 4 Pulmonary Valve Atresia, 3 Truncus, 3 Mitral). The remainder had acquired valvular disease. The latter group comprised 30 aortic, 19 mitral and 34 double or triple valvular diseases.

The hospital mortality was 6% in the single valve replacement group and 14.5% in the multiple valve replacement group. Two cases of acute bacterial endocarditis occurred postoperatively. Only one late death was valve related. 4 valve dysfunctions were successfully reoperated at 4, 4.5 and 5 years following operation (3 mitrals and 1 aortic). Histological examination revealed the absence of immunological reaction and scarring. Cusp perforations were present in all four due to localized areas of collagen degeneration. 77 patients (85%) had excellent valve function. Hemodynamic data is available in 17 patients. No thrombo-embolic complications were observed.

These results confirm the view that the method of valve preparation and storage is critical to long term function, as indicated by the low failure rate in the present series compared to previous reports.

5. Long-Term Evaluation of Tissue Valves

MARION ION IONESCU, * BROJESH C. PAKRASHI, *
DAVID A. S. MARY, * IVAN T. BARTER, * and GEOFFREY H. WOOLER, *
Leeds, England

Sponsored by Dwight C. McGoon, Rochester, Minn.

Valve replacement with frame-mounted, three-cusp tissue valves was performed in 267 patients (150 aortic, 110 mitral and 7 tricuspid). Autologous or homologous fascia lata was used in 144 patients (follow-up 6-60 months) while 123 had heterologous pericardial valves (follow-up 6-36 months).

Myocardial failure was the main cause of hospital and late mortality. Infective endocarditis contributed to morbidity and mortality early in the series.

Graft failure occurred in 6.3% of mitral patients, all with fascial valves. None of the aortic or tricuspid grafts have failed.

Regurgitant murmurs appeared in 34.5% of mitral patients (the great majority with fascial valves) but only 9.5% have increased in intensity. In the aortic position 9.6% have diastolic murmurs (2.7% with pericardial grafts); 3% have haemodynamically significant regurgitation.

There were 7 thromboembolic episodes (5 transient). Anticoagulants were not used.

81.3% of mitral and 90.8% of aortic patients are in Grade I (N.Y.H.A.).

There have not been graft related complications in the tricuspid group.

Results of clinical, haemodynamic, angiographic and experimental studies are discussed.

Fascial valves have performed better in the aortic than in the mitral position. Pericardial valves, irrespective of the site of implantation, have shown much better results, in all respects, when compared with fascial valves.

6. Subannular Aneurysm Associated With Acute Massive Aortic Insufficiency

AGUSTIN ARBULU and NORMAN W. THOMS, *
Detroit, Michigan

Since January 1970, we have operated upon twelve patients with acute massive aortic insufficiency associated with subannular aneurysms. Eleven patients had recovered from a gram positive acute bacterial endocarditis. One patient was operated upon while the infection was still active. Only one had previous heart disease. Five were drug addicts. All patients were in functional class IV.

At operation we found massive destruction of one to three aortic leaflets. The subannular aneurysm was located below the junction of the right and the non-coronary aortic cusps in nine patients. In one, the aneurysm was below the left aortic cusp and two showed two and three subannular aneurysms, respectively. The aneurysms contributed to the massive aortic insufficiency in all the patients. One aneurysm was calcified. In eight patients we closed the orifice of the aneurysm with pledgeted sutures and used this closure as the seat of the aortic prosthesis. In two of these patients, the sutures pulled through the margin of the aneurysm resulting in a perivalvular leak. One was reoperated upon and died. The other is alive and free of symptoms. In another patient the pledgeted sutures tore through the annulus which led to a fatal perivalvular leak. In four patients we patched the opening of the aneurysm prior to insertion of the prosthesis; none had complications. Nine patients survived the operations.

We recommend: (1) that the aneurysms be patched rather than simply closed with pledged sutures prior to the insertion of the aortic prosthesis; and (2) that the sutures holding the aortic valve be passed externally and pledged from outside the aorta.

7. The Treatment of Muscular Subaortic Stenosis

WILFRED G. BIGELOW, A. S. TRIMBLE, E. D. WIGLE,*
A. G. ADELMAN, * Toronto, Ontario, Canada,
and C. H. FELDERHOF, * Halifax, Nova Scotia, Canada

There have been two principle surgical techniques in common use for the correction of muscular subaortic stenosis. One is a transaortic myotomy with limited muscle resection. The other is a more radical resection through a ventricular incision.

Recently mitral valve replacement has been recommended as treatment based on the observation that the anterior leaflet of the mitral valve contributes to the ventricular outflow obstruction. Although successful the latter technique does not correct the essential pathology and exposes the patient to a more serious operation with a permanent threat to his wellbeing.

It was considered timely to review the results from the simpler ventriculomyotomy. Thirty-eight cases from a total of 95 studies were selected for surgery based on a natural life history study and their response to Propranolol. Trans-aorticventriculomyotomy was carried out with 3 hospital deaths all occurring before 1965. There were no deaths in the last 25 operations.

Of 35 surviving patients 80% have shown symptomatic improvement. Postoperative studies in 19 revealed that a successful ventriculomyotomy abolishes the abnormal anterior mitral leaflet movement, the outflow obstruction and related mitral regurgitation. Left ventricular end-diastolic pressure decreased in 15 of 19 patients.

Simpl eventriculomyotomy with limited resection of muscle is effective in muscular subaortic stenosis and is indicated in symptomatic patients not responding to Propranolol.

8. More Than Five Years' Experience With the Bjork-Shiley Tilting Disc Valve in Isolated Aortic Valvular Disease

VIKING O. BJORK, AXEL HENZE, * and
ALF HOLMGREN, * Stockholm, Sweden

Of 400 consecutive aortic valve replacements, 161 patients were followed 2 to 5 years. Early mortality, 5% late accumulated mortality, 10%, was neither due to mechanical failure nor thromboembolism. Postoperative results were judged from 100 aortographic examinations and 90 transeptal catheterizations at rest and exercise. All patients were re-examined, 80 of them twice. Pressure load was eliminated in aortic stenosis and volume load in aortic insufficiency, where congestive heart failure and pulmonary hypertension were eliminated. Clinical improvement was sustained during the entire follow-up as judged by remaining improvement in working capacity and heart volume. Five patients required re-operation for paravalvular leakage. No thromboembolic complications occurred in patients on anti-coagulation. Patients over 60 years of age encountered the same improvement as younger patients. Hemoglobin concentration and serum iron was within normal range despite absence of iron substitution. The rheology of the Bjork-Shiley prosthesis is favourable even in smaller sizes. Valve replacement is eliminating the volume load without adding a pressure load. Due to its non-overlapping disc it combines a minimum of turbulence and mechanical crushing resulting in low hemolysis.

11:15 A.M. Presidential Address

Lyman A. Brewer, III
A HERITAGE AND A CHALLENGE

*By invitation

MONDAY AFTERNOON, APRIL 22, 1974

2:00 P.M. Scientific Session

Ballroom

9. Pharyngoesophageal Dysphagia and Recurrent Laryngeal Nerve Palsy

ROBERT D. HENDERSON, * ANDREW BOSZKO,*

JOHN DESLAURIERS, * and A. W. PETER van NOSTRAND,*

Toronto, Ontario, Canada

Sponsored by F. G. Pearson, Toronto, Ontario, Canada

Recurrent laryngeal nerve palsy results in vocal cord paralysis. In a group of 18 patients with palsy, it was noted that 14 of these patients, in addition, developed the symptoms of pharyngoesophageal dysphagia. These patients had the sensation of sticking to liquids or solids at the pharyngoesophageal junctions and many developed a cough with swallowing, secondary to aspiration of food. Fifteen of 18 patients had bronchogenic carcinoma with the recurrent nerve palsy being secondary to carcinoma or following deliberate resection of the nerve at lung resection. In 1 patient the aetiology of recurrent nerve palsy was considered to be viral and in 2 it was secondary to thyroid surgery.

The obstruction produced aspiration and lung infection in 3 cases and pharyngoesophageal myotomy was necessary to correct the swallowing problem. In all 3 cases, the dysphagia was corrected. These patients have been studied by barium swallow, esophageal motility and esophagoscopy.

Five autopsy specimens have been examined and, in each, branches of their current nerve were traced to the cricopharyngeal muscle. The significance of this symptom, in producing respiratory infection in pneumonectomised patients, is demonstrated and cricopharyngeal myotomy has been shown to correct the problem.

10. A Simple Physiological Diaphragmatic Hernia Repair

VICTOR H. KAUNITZ, Kenmore, N.Y.,

LEONARD A. KATZ, * DAVID VASTOLA,* and

LOUIS MAAS, * Buffalo, New York

Because of the unacceptably high recurrence of current diaphragmatic hernia repairs, utilizing the fundal plication principle (10 to 15% in Belsey operations), a different technique of repair has been developed. An attempt is made to restore normal anatomy, and, thereby, normal physiology, by placing holding sutures in strong gastric wall, immediately below the cardio-esophageal junction, and securing these sutures to tendon of diaphragm. The lower esophageal sphincter (LES), is, thereby, repositioned within the peritoneal cavity, without creating any unnecessary flap valve mechanism. By using the strong gastric wall, rather than the weak esophagus, for the basic repair sutures, it is hoped that recurrence will be greatly minimized. To date, with the longest follow up 2 1/2 years, there has been no recurrence in 60 patients.

The effectiveness of this simple technique in preventing gastric reflux has been confirmed clinically, and by laboratory data. All patients have had complete subsidence of reflux symptoms. Pre-operative, and 3-month post-operative motility and reflux studies were done in a consecutive group of 23 patients. Lower esophageal sphincter (LES) activity, esophageal peristalsis, acid reflux and acid clearing were measured. Sixteen of 23 patients (70%) had low (10mm.Hg. or less) LES pressure. Following surgery, 92% of LES pressures rose. Mean pre-operative LES pressure was 6.6

mm. Hg.; mean post-operative pressure was 12.9 mm. Hg. ($p < .005$). Sixty-five per cent of 20 patients measured pre-operatively, had gastric reflux; post-operatively 90% showed no reflux.

11. The Use of Circular Myotomy to Facilitate Resection and End-to-End Anastomosis of the Esophagus: An Experimental Study

JESSADA MUANGSOMBUT, * JOHN R. HANKINS,*

and JOSEPH S. McLAUGHLIN, Baltimore, Maryland

Segmental resection of the thoracic esophagus with end to end anastomosis carries a lower mortality rate than esophagogastronomy or colon interposition. However, if more than a few centimeters are resected, the anastomosis fails because of tension. Presented is an experimental study in which circular myotomy was utilized to reduce tension and thereby increase the amount of esophagus which could be resected successfully.

Sixteen dogs were first subjected to end to end anastomosis without myotomy after resection of segments varying from 4 to 7 cm. in length and comprising 20 to 40% of the esophagus. Of 9 animals in whom less than a third of the esophagus was resected, 6 survived. However, of 7 animals in whom more than 33% of the esophagus was resected, only 3 survived.

Initial attempts at circular myotomy performed 3 cm. proximal to the anastomosis after resection of 40 to 50% of the esophagus failed because of ischemia leading to anastomotic breakdown. Latex injection studies demonstrated that the myotomy interrupted important vessels running longitudinally in the deeper layers of the muscularis. Subsequently, it was found that partial myotomy afforded just as great a reduction in tension without compromising the blood supply. Partial circular myotomy permitted successful anastomosis in 8 of 10 animals in whom 45 to 55% of the esophagus was resected.

It is concluded that partial circular esophageal myotomy affords a reduction in tension without interruption of blood supply and thus permits successful anastomosis after resection of much longer segments than would otherwise be possible.

12. The Value of Resection in Tumors Involving the Chest Wall

RALPH J. BURNARD, * NAEL MARTINI, *

and EDWARD J. BEATTIE, JR., New York, N.Y.

68 cases of chest wall resection for malignant tumors are reviewed. These cases cover the period 1962 through 1972. The patients ranged in age from 11 to 76 years and included 43 males and 25 females. 50% of the patients presented with local symptoms and 30% exhibited a visible or palpable mass. Radiographic examination revealed soft tissue density in 65% and bony erosion in 55%.

Histologic types consisted of 30 primary lung carcinomas, 6 metastatic carcinomas, and 32 primary sarcomas.

The resected specimen generally included 3 to 4 ribs and produced a chest wall defect of approximately 125 cm². Skeletal reconstruction was accomplished with marlex mesh in 46 cases, ox fascia in 7 and by other methods in 3. No skeletal reconstruction was used in 12 cases. The majority of the cases required little or no major cutaneous reconstruction.

The operative mortality was 10%. 50% of the patients developed some form of cardiopulmonary complications. Of these, 60% were pulmonary, 30% infectious, and 10% cardiovascular. The relationship between preoperative radiation therapy and surgery is discussed. 20 patients required tracheostomy for varying periods of time, only 4 of which were considered emergencies. 15 patients required respiratory support for 24 hours or more. The median hospital stay was 16 days with a range of 8 to 108 days.

24 patients survived for two or more years. The value of chest wall resection is discussed relative to morbidity, mortality, palliation and survival following the procedure. Observations on methods of skeletal and cutaneous reconstruction are presented.

13. Treatment of Thoracic Outlet Syndrome by Removal of First Rib and Related Entrapments Through A Posterolateral Approach: A 22-Year Experience

CLIVE R. JOHNSON, Fort Worth, Texas

Since February 4, 1952, 110 operations on 100 patients have been performed (bilateral in 10). Periosteum of first rib with insertions of scalene muscles were removed. In addition to the first rib, 58 related entrapments of brachial plexus and related vessels in 63 operations required correction: (1) cervical rib - 13; in 6 of these a fibromuscular band extended from tip of rib to area first rib anteriorly; (2) deformity one or both first and second ribs - 7; (3) fibromuscular band in absence of cervical rib - 9; (4) hypertrophy or abnormal anatomical relationship scalene muscles - 9; (5) cicatricial changes usually with periosteal proliferation and ossification in some involving insertions scalene muscles - 13; (6) miscellaneous - 7. Twenty patients were referred having had previous surgery without benefit. No operation was complicated. There was no injury to brachial plexus, subclavian artery or vein. Postoperative course was satisfactory in all patients, there being complications in four, all minimal and manageable. Current follow up was available in 85 patients. In 79 excellent results have been maintained with improvement in 5. One patient expressed no benefit. Subjective manifestations, although variable, are recognizable and there is adequate objectivity for accurate evaluation and assessment for surgical indication. Oscillotometric recording of radial pulse during outlet maneuvers, electromyographic testing and cinegraphic study of coronary arteries have been helpful. The chest pain component of the syndrome with the arm pain accounts for applicability of the latter. This program has been gratifying. It probably represents an endeavor, however, not generally as well accepted as deserved. Encouraged by several clinical associates involved in this experience, a report of it is submitted.

14. Primary Breast and Lung Carcinoma in the Same Patient

WILLIAM G. CAHAN, EL B. CASTRO, *

and ANDREW G. HUVOS, * New York, N.Y.

From 1949 to 1970 at Memorial Sloan-Kettering Cancer Center, there were 33 patients who had separate primary cancers of both breast and lung.

There were 30 females and 3 males with an average of 62 years. Eleven primary lung cancers (34%) were asymptomatic and discovered by follow-up chest x-ray; in 6 others, these were discovered at autopsy.

In 26, the lung cancers were found subsequent to the breast cancer; in 7, they were synchronous with it.

During the same period, there were 22 solitary breast cancer metastases. Therefore, in this clinical setting, there is about an equal chance that a solitary lung shadow may be either a new primary lung cancer (56.8%) or a breast metastasis. As the treatment of breast and lung cancer is different, it is mandatory to establish the correct diagnosis. Occasionally this can be done by cytology but usually an exploratory thoracotomy and biopsy are required for pathological confirmation. In addition, at that time, appropriate therapeutic measures may also be carried out.

Seven patients (21%) survived two or more years and one survived five years following resection of lung cancer. In contrast, 10 out of 13 patients who had irradiation only, died within one year; none survived beyond two years.

Although these figures do not appear encouraging, in part this could be attributable to the delay in detecting and treating the second cancer.

Implicit in this study is the need for diligent follow-up of breast cancer patients at regular intervals including periodic postero-anterior and lateral chest x-rays, for the earlier a cancer is detected, be it a new primary or a metastasis, the better the chance for its control.

15. Bronchoplastic and Conservative Resective Procedures for Bronchial Adenoma

ROBERT J. JENSIK, L. PENFIELD FABER,

CHARLES M. BROWN, * and C. FREDERICK KITTLE,

Chicago, Illinois

Recent reports in the literature have suggested an aggressive, more radical resection for bronchial adenoma.

We feel the surgical approach should be planned depending upon the anatomic position and the histologic type of adenoma encountered, believing the carcinoid variety lends itself to conservative or bronchoplastic procedures. Pulmonary parenchyma is salvaged and cure rates are comparable to reported series of carcinoid adenoma treated by conventional resection.

Conservative resection was accomplished in 22 individuals of a group of 32 patients with carcinoid adenoma seen over the past 17 years. Eight patients had sleeve resection of either the lobar (6) or stem bronchus (2), and two patients had local bronchotomy excision. All would have required pneumonectomy by conventional resection standards.

Sleeve segmentectomy was carried out in two others with anastomosis of the basilar bronchus to either the bronchus intermedius or left main bronchus preserving the major portion of the lower lobe.

Segmentectomy done in 10 others salvaged substantial portions of the involved lobe.

Survival rate by actuarial method approaches 90% over this 17-year period, and local recurrence has not been seen in any patients undergoing conservative procedures.

Special emphasis will be directed toward the various types of bronchoplastic procedures performed and the results.

16. Long-Term Results of Surgery for Bullous Emphysema

MUIRIS X. FITZGERALD, * Boston, Mass.,

PATRICK J. KEELAN, * Dublin, Ireland,

DAVID W. CUGELL, * Chicago, Illinois, and

EDWARD A. GAENSLER, Boston, Mass.

Reports of surgery for emphysema generally have involved small numbers of patients, variable selection criteria and short observation periods with improvement often pronounced on subjective grounds alone. Therefore, 21 years ago, we began a prospective study using clinical, radiologic and physiologic indices to classify bullae and to define the natural history, results of surgery and features which might predict a favorable outcome.

Since 1952, 368 cases of airspace disorders were referred. For this report we excluded bronchogenic cysts, lobar emphysema, unilateral hyperlucent lung and bullae secondary to fibrosis. This left 211 patients with clearly demarcated bullae in otherwise healthy lungs or associated with chronic bronchitis and/or emphysema. Of these, 85 had surgery, 11 bilateral. Patients were followed for a mean of 7.3 years and up to 20 years. Surgery was advised but not performed in others who were similarly followed as controls. Indications for operation included dyspnea (57), pneumothorax (18), "prophylaxis" (12), infection (6), and miscellaneous (3).

Operative mortality was 2.1% reflecting perhaps conservative or judicious selection in a group where 42% were over age 50. Physiologic results initially were excellent in 63%, moderate in 16% and insignificant in 21%. Striking improvement occurred most often in paraseptal (periacinar) emphysema and following multiple resections. Poorer results were seen after segmental or lobar

resections and in chronic bronchitis. Long term outcome will be compared to un-operated patients. Bullae rarely recurred on the operated side; occasionally, contralateral enlargement was noted.

Simple overall function tests were convenient and reliable in assessment. The extent of emphysema was best substantiated by angiography and diffusing capacity measurement. Comparison of plethysmographic and Helium FRC values was useful in estimating trapped gas. Regional function studies, including bronchspirometry and perfusion scans, as well as elastic recoil measurements yielded useful information but were associated with low patient acceptance or high cost.

WEDNESDAY MORNING, APRIL 24, 1974

8:30 A.M. Scientific Session

Ballroom

29. Mediastinal Masses in Infants and Children

WILLIAM J. POKORNY, * and JOSEPH O. SHERMAN,*

Chicago, Illinois

Sponsored by F. S. Idriss, Chicago, Illinois

During the last 18 years, 111 infants and children under 16 years of age were admitted to the Children's Memorial Hospital with a mediastinal mass. There were 36 neurogenic tumors, 3 enteric duplications, 11 bronchogenic cysts, 9 primary mediastinal Hodgkin's Disease, 15 lymphosarcomas, 6 undifferentiated sarcomas, 7 lymphangiomatous malformations, 4 teratomas, 3 thymic tumors, 3 thymic cysts, 7 thymic hyperplasias, 4 inflammatory masses and 3 miscellaneous tumors. 54% were malignant.

This retrospective study reviews the presenting signs and symptoms as well as laboratory and radiographic findings in an effort to outline useful points in the differential diagnosis. Treatment and follow-up are presented with particular emphasis on the 27 malignant neurogenic tumors and the 34 sarcomas and lymphomas presenting primarily as mediastinal masses.

Fifty of the 51 children with benign tumors were alive and well at the last follow-up. Thirty of the 61 children with malignant tumors died, including the 15 children with lymphosarcomas and the 5 children over 2 ½ years of age with neuroblastoma. There was only one death in the group of 13 children under 13 months of age with neuroblastoma. All 9 children with ganglioneuroblastoma, regardless of age, were living and well at the last follow-up.

30. Surgical Treatment in Myasthenia Gravis: A 27 Year Experience

HERBERT E. COHN, * ROBERT W. SOLIT,* NATHAN

SCHLEZINGER, * and NORMAN J. SCHATZ,*

Philadelphia, Pa.

Sponsored by Charles Fineberg, Philadelphia, Pa.

Surgical removal of the thymus gland now assumes an important role in the treatment of myasthenia gravis at our institution. Although the disease is characterized by spontaneous remissions and exacerbations, and symptoms may be controlled with anticholinesterase drugs, medical therapy generally does not effect a cure. Thymectomy can result in complete and permanent remission in properly selected cases. Increasing experience has been gained in the surgical approach to this disease, results have become more predictable, and postoperative morbidity and mortality has been significantly reduced.

Since 1946, 56 patients have undergone thymectomy for myasthenia gravis at the Thomas Jefferson University Hospital. Sixteen patients had thymomas. The patients have ranged in age from three years to 70 years, with the average age in the thymoma group being 50 years, and that in the non-thymoma group being 28 years.

Prior to 1962, there were five postoperative deaths in 18 patients. All of these deaths were related to ventilatory complications. Since 1962 there have been two postoperative deaths in 37 patients, both in patients with malignant thymomas and unrelated to ventilatory complications. There have been no deaths in the non-thymoma group. Of the 49 patients surviving operation, 43 have shown definite improvement with 18 showing complete remission to this time, anywhere from two to 11 years.

Although the etiology of the disease remains obscure, refinements in case selection and interoperative and postoperative management has led to a satisfactory outcome in the greater majority of these patients. Our experience compares favorably with that of other institutions caring for patients with similar problems. Indications for operation and pre- and postoperative management are reviewed. Correlation of clinical results with pathologic findings is presented, and the pertinent literature is reviewed. Our experience suggests that thymectomy is the preferred method of treatment in those cases of myasthenia gravis that do not show a favorable response to medical therapy.

31. Cardiorrhaphy in the Emergency Center

KENNETH L. MATTOX, * ARTHUR C. BEALL, JR.,

GEORGE L. JORDAN, JR., * and MICHAEL E. DeBAKEY, Houston, Texas

The acutely injured patient may require emergency thoracotomy as an integral part of his resuscitation. In critical circumstances thoracotomy in the emergency center for control of hemorrhage, cardiac massage, and direct repair of crucial injuries can be lifesaving. Such an approach may be required for urgent repair of cardiac injuries.

Between January of 1970 and December of 1972, over 5000 emergency operations were performed for blunt and penetrating trauma at Ben Taub General Hospital. Emergency thoracotomy was required in more than 300 cases. Of these, 106 patients required thoracotomy in the emergency center due to rapid deterioration in their clinical condition. Twenty-nine of these patients who required such a maneuver had injury to the heart.

This aggressive approach allowed salvage of 69 per cent of these critical patients with cardiac injuries. Autotransfusion, emergency cardiopulmonary bypass and fine screen filtration of transfused blood have been valuable adjuncts to this lifesaving measure. Thoracotomy in the emergency center should be considered as a primary modality in the management of moribund patients with penetrating wounds of the chest.

32. Effect of Neural and Humoral Factors on Pulmonary Hemodynamics and Microcirculation in Pulmonary Embolism

I. AYHAN OZDEMIR, * WATTS R. WEBB, and STENNIS D. WAX,*

Syracuse, N.Y.

Clotted blood releases humoral substances including serotonin which deleteriously alter cardiopulmonary hemodynamics much as occurs in pulmonary embolism. The etiology and role of the neural or humoral factors have not been established.

Thirty-one anesthetized dogs were divided into five groups. Effects of autologous clot 2 ml/kg, serotonin 75 micrograms/kg/min, heparin 10 mg/kg and reserpine 0.2 mg/kg x 3, on intact and denervated (reimplanted) left lungs were studied by measuring cardiac output (CO), right atrial (RA), pulmonary artery (PA), pulmonary artery wedge (PAW), pulmonary venous wedge (PVW), small pulmonary vein (SPV), left atrial (LA) and systemic pressures. Pulmonary and systemic vascular resistances were calculated. Pulmonary microcirculation was studied with cinemicroscopy up to 450 magnification.

In intact lung with serotonin infusion or autologous clot injection PA and PVW pressures increased 120% ($p < 0.02$). PAW and SPV pressures rose minimally as LA pressure fell. Thus pulmonary vascular resistance increased primarily in the arterioles. Cardiac output decreased 25-

35%, systemic pressure fell and systemic vascular resistance decreased 26% ($P < 0.05$). Pulmonary microcirculation was severely decreased and showed extensive red cell aggregation.

Lung denervation did not prevent serotonin or autologous clot induced pulmonary vascular hypertension and microcirculatory changes. Heparinized dogs tolerated 150% more clot than controls, pulmonary vascular hypertension was significantly less and cell aggregation did not occur in the microcirculation. In dogs pretreated with reserpine, autologous clot or serotonin induced pulmonary vascular changes were prevented and capillary microcirculation remained essentially normal.

These studies suggest that serotonin from autologous clot causes further cell aggregation and microemboli in the pulmonary bed which can be protected by heparin and by reserpine which depletes the blood serotonin level. Humoral factors play a more significant role than neural factors in the progressive patho-physiology of pulmonary embolism (increased pulmonary vascular resistance, interstitial and intra-alveolar edema, atelectasis). Motion pictures of the microcirculation will be shown.

33. Prognostic Factors in the Treatment of Acute Respiratory Insufficiency with Long-Term Extracorporeal Circulation

J. DONALD HILL,* JACK RATLIFF,* ROBERT FALLAT,*

HARVEY TUCKER,* MAURICE LAMY,* HARM DIETRICH,*

and FRANK GERBODE, San Francisco, Calif.

The lungs, inflicted with acute pathological changes producing severe hypoxemia, can recover if given time. Based on this premise, 21 patients were treated with prolonged extracorporeal oxygenation to provide the lungs time to heal. Eleven of the 21 patients were successfully taken off perfusion. Four were ultimate survivors. All pathological forms of acute respiratory insufficiency therefore are not reversible. The identification of various prognostic factors are important if this new therapy is going to be properly applied. To expand this identification process we performed open lung biopsies for pathological classification and graphed daily measurements of PaO₂, compliance, PVR, cardiac output, Qs/Qt and VD/VT at variable FI_{O2} and PEEP enabling us to develop pulmonary function profiles.

The following factors seem to be important in determining the reversibility of the pulmonary lesion:

1. The shorter the time lapse from onset of disease to initiation of perfusion, the more likely the lungs will improve during perfusion.
2. The presence of exudate and inflammatory cells in the pre-perfusion lung biopsy are more favorable for reversibility than fibroblastic infiltration.
3. Pulmonary insufficiency resulting from trauma is a favorable etiology.

4. Hypoxia related to severe ventilation-perfusion inequality (V/Q) is a favorable form of reversible pulmonary pathology.

5. Hypoxemia related to Qs/Qt (fixed shunt or severe diffusion abnormality) is an unfavorable form of pulmonary damage.

6. Maintaining high pulmonary artery blood saturation and adequate flow was associated with unusual improvements in pulmonary recovery.

34. Prolonged Extracorporeal Cardiopulmonary Support in Man

ROBERT H. BARTLETT,* ALAN B. GAZZANIGA,* SUSIE W. FONG,*

NORA E. BURNS,* TAMAR GERAGHTY,* NANCY WETMORE,*

DOUG WILL,* GILLIAN WILLIAMS,* and

CHRISTINE WOLDANSKY,* Irvine, Calif.

Sponsored by John E. Connolly, Irvine, Calif.

Techniques for management of prolonged extracorporeal circulation (ECC), and characterization of the normal response to that procedure, have been studied in sheep in our laboratory for 4 years. Based on this experience, prolonged ECC (>24 hours) has been carried out in 4 patients for periods of 2, 3, 3, and 16 days. Venoarterial bypass (60-90% of cardiac output) was used with: a membrane oxygenator circuit with no reservoirs, low dose heparin continuously titrated against clotting time, and servo-regulated bypass flow based on arterial and pulmonary arterial pulse contour. Hemodynamics, oxygen delivery and consumption, blood damage, organ function and damage, oxygenator function, and detailed studies of coagulation and platelet function were measured at regular intervals. One 2 year old boy was supported for 2 days for cardiac insufficiency; he survived without difficulty. Three young adults were supported for severe pulmonary insufficiency; all died with irreversible lung damage. ECC proceeded without incident in all patients. Coagulation factors remained normal while platelet function and concentration decreased slowly during bypass. Kidney, brain, liver and heart function remained normal up to 16 days. Mean pulmonary artery pressure could be maintained below 10mm Hg resulting in the resolution of interstitial infiltrates of adult respiratory insufficiency. Irreversible lung damage was manifested by very high pulmonary vascular resistance and very little gas exchange. Prolonged ECC can be carried out without complications for more than 2 weeks. Further clinical experience is needed to improve criteria for patient selection and timing of this procedure.

35. Impaired Oxygenation at Clinical Levels of Humidity: A Laboratory Study

NATHANIEL P. H. CHING,* JOSEPH M. KAZIGO,*

HAROLD Z. SCHEINMAN,* ROBERT G. HICKS,* and

THOMAS F. NEALON, JR., New York, N.Y.

In a laboratory study of oxygen toxicity, humidity levels used in current clinical practice proved undesirable based on lower blood oxygen determinations. The effect of different levels of oxygen on individual lungs as measured by blood PO_2 levels was studied in dogs ventilated with a trachea! divider. One lung was ventilated with room air while the other was ventilated with 100% oxygen. Humidity of the gases ranged from dry to 50 mg/L of water. Humidity was supplied by an Engstrom ultrasonic nebulizer (17-50 mg/L) or by heating Bennet humidifiers to 24°C (11-15 mg/L) or 40°C (20-41 mg/L). Blood was sampled from the pulmonary veins after 30 minutes, 5 and 7 hours and hourly from the femoral artery for analysis of pH, PCO_2 and PO_2 . After 7 hours the ventilating mixtures were reversed and pulmonary vein blood was again sampled for analysis of pH, PCO_2 and PO_2 .

After prolonged ventilation the lungs ventilated by the high oxygen mixtures produced gradually decreasing PO_2 €™s. When the mixtures between the two lungs were reversed the high oxygen mixture again produced high PO_2 €™s when introduced into the contralateral lung for the first time. The diminution in oxygenation which was measured after prolonged ventilation with high concentrations of oxygen was most severe for water contents of 28-50 mg/L. This water content is the same as that produced by the most commonly used clinical apparatus. Additional studies aimed at delineating this mechanism will be presented.

36. Positive-Pressure Breathing Treatments in Postoperative Respiratory Therapy: Myth vs. Fact

DOUGLAS H. McCONNELL,* GERALD D. BUCKBERG,*

and JAMES V. MALONEY, JR., Los Angeles, Calif.

Intermittent positive pressure breathing treatments (IPPB) are an accepted adjunct for pulmonary toilet in the postoperative thoracic surgical patient. The rationale for IPPB is that it (1) expands unventilated alveoli, (2) dilates collapsed bronchi, (3) increases tidal volume, and (4) aids the elimination of secretions. It is fundamental to this rationale that pulmonary expansion by positive pressure applied to the upper airway is different and superior in physiologic effect to pulmonary expansion created by the negative pleural pressure of normal inspiratory effort. It is the purpose of this study to present data which proves false this widely accepted premise. Objective evidence demonstrates: 1) the physical force expanding the lung in normal respiration is atmospheric pressure (not negative pleural pressure) and is identical to the physical effects of IPPB,

2) bronchial dilation achieved with IPPB is the same as with normal inspiration (Otis-Proctor method), 3) significantly increased alveolar expansion can be achieved with continuous positive pressure breathing (CPPB or PEEP), by voluntary effort, or by breathing through a restricted orifice without positive pressure, but is not achieved by conventional IPPB treatments, 4) the direct pulmonary effects of a normal inspiration and positive pressure inspiration of the same depth and at the same thoracic volume are identical, 5) that the only physiologic difference between a normal and positive pressure inspiration of the same depth and at the same thoracic volume is related to the circulation. An appropriate understanding of the physiology of respiratory mechanics enables one to achieve the benefits that are erroneously attributed to IPPB without the cost and inconvenience associated with it.

* By Invitation

WEDNESDAY AFTERNOON, APRIL 24, 1974

2:00 P.M Scientific Session Ballroom

37. Four hundred Consecutive Patients with Permanent Transvenous Pacemakers

EDWARD F. CONKLIN,* STANLEY GIANNELLI,JR., and
THOMAS F. NEALON, JR., New York, N.Y.

400 consecutive patients were treated with permanent transvenous pacemakers between April 1, 1965 and May 1, 1973 at the St. Vincent's Hospital and Medical Center, New York, N.Y. The average age of the patients was 75 years. All procedures were performed in the cardiac catheterization laboratory under local anesthesia. Ventricular triggered demand pacemakers were used in 331 patients. There was one operative death. One primary implantation became infected. Three patients were converted to epicardial pacing following failure of transvenous spacing. This has not been necessary in any of the 350 patients treated since October, 1967. 156 patients have had a total of 235 pulse generator replacements without morbidity. Electrode fracture (10 patients), shift in catheter position (18 patients) and exit block (22 patients) have been easily corrected without morbidity under local anesthesia. 104 patients died within 22 months of implantation. 86 patients have been followed for 40 months or longer, and 10 patients for 80 or more months. Stable catheter position once achieved appears permanent. In the absence of exit block pacing thresholds have shown no tendency to rise. No recurrence of Adams-Stokes attacks have been noted in any paced patient.

The transvenous technique of permanent pacing remains the method of choice because it is easily tolerated by these aged patients, the pacing thus achieved is stable and effective, and the few complications are easily corrected.

38. The Advantages of Transthoracic (TT) Electrode Implantation For Permanent Cardiac Pacing

GEDDES (FRANK) O. TYERS,* H. C. HUGHES,JR.,*
H. A. TORMAN,* and J. A. WALDHAUSEN, Hershey, Pa.

It is generally accepted that transvenous (TV) electrodes have a lower stimulation threshold and risk than TT electrodes. The recent literature and our experience with >100 pacemaker insertions indicate a mortality rate of <2% with either technique. As complication rate (2-3x) and the late mortality rate are higher with TV pacing, and new techniques allow TT electrode insertion under local anesthesia, reinvestigation of pacing thresholds was indicated.

Identical high current density, ball-tip leads (Cordis) were placed intramyocardially on the left (LVA) and right (RVA) ventricular apices and TV in 20 dogs with complete heart block. At 7 stimulus durations 0.05-5 msec, threshold voltage and current were measured directly using an oscilloscope and current probe.

At all stimulus durations in the clinical range, LVA stimulation required less current (all $p < 0.05$), voltage (all $p < 0.025$) and energy (all $p < 0.01$) than either RV site. Threshold energy needs with a 1 m sec pulse were: LVA 0.07 ± 0.01 joules vs RVA 0.18 ± 0.05 Joules vs TV 0.15 ± 0.02 joules.

There is a 50% reduction in energy needs and battery drain with TT LVA pacing. Previous studies showing TV threshold slower than TT thresholds used electrodes of differing configuration, surface area, and materials which biased results in favor of the endocardial site. When all clinical and electrophysiological factors are considered, TT pacing electrodes deserve much wider clinical application.

39. Surgical Aspects of Regional Myocardial Blood Flow and Myocardial Pressure

RONALD J. BAIRD, MASAO OKUMORI,* FRIEDRICH DUTKA,*

ALBERTO de la ROCHA,* and MARTINGOLDBACH,*

Toronto, Ontario, Canada

The surgical manipulations of partial bypass, complete bypass, and ventricular fibrillation have profound effects on regional myocardial pressure and coronary flow distribution. In 80 experiments on mongrel dogs, regional myocardial pressure was monitored by both the "flow cessation" technique and by "micro-tip" pressure transducers. Regional flow distribution was mapped by radioactive micro-spheres of 15 micron size labelled with three different isotopes.

The gradient in systolic pressure, from a low subepicardial to a high subendocardial value, persists as the left ventricular volume decreases from normal to partial to complete bypass. This pressure gradient also persists in the fibrillating ventricle. Neither the regional myocardial pressure nor the regional myocardial flow are affected by the technique of inducing or maintaining fibrillation (spontaneous, alternating current, direct current).

If mean coronary perfusion pressure is held constant, there is an increase in total coronary flow with the change from normal (82 ± 13 S.D. ml./100 Gm of left ventricle/min), to complete bypass with the heart beating (117 ± 36 S.D.), and a further increase with fibrillation (171 ± 34 S.D.). $P < .005$. Flow to the inner half of the ventricle is not a hazard as long as perfusion pressure is adequate.

If perfusion pressure is allowed to fall below a critical level (55 - 60 mm. Hg) there is a marked decrease in the inner wall - outer wall flow ratio in the fibrillating heart, suggesting inadequate subendocardial perfusion. This level of critical perfusion pressure is elevated by coronary artery narrowing or ventricular hypertrophy.

40. A Clinical Method for Detecting Subendocardial Ischemia Following Cardiopulmonary Bypass

PETER A. PHILIPS,* ALAN T. MARTY,* and

ALFONSO M. MIYAMOTO,* Duarte, Calif.

Sponsored by Lyman A. Brewer, HI, Los Angeles, Calif.

Unrecognized subendocardial ischemia, a frequent cause of death following cardiac surgery, may be present despite satisfactory systemic and central venous pressures. A more accurate early indicator of subendocardial ischemia has been studied experimentally using the myocardial supply/demand ratio (MSDR), defined as the ratio of aortic diastolic pressure time index divided by aortic tension index. To make monitoring of MSDR clinically applicable, an inexpensive electronic circuit was designed utilizing mean left atrial (LA) and radial pressures to determine MSDR. Radial and aortic pressure calculations give similar MSDR values. The figure obtained is termed the endocardial viability ratio (EVR).

In 50 consecutive open cardiac procedures, EVR, LA, right atrial (RA), and radial artery pressures were recorded intra-operatively and for three days post-operatively. Results confirmed the applicability and reliability of EVR as an indicator of myocardial ischemia and patient survival. Forty patients with post-perfusion EVR's of .9 or greater had uneventful postoperative recoveries. Six patients with acceptable systemic pressures averaging 90/65 mm Hg, had average EVR's of .736 with average LA pressures of 30.3 mm Hg. Immediate application of intra-aortic balloon

counter pulsation (IABC) resulted in a rise of EVR to 1.26 ($p < .01$), a fall in LA pressures to 17.9 mm Hg ($p < .05$), and improvement in electrical and cardiac activity. All six survived. In four others, despite IABC, MVR's remained below .6 and all died (two from extensive myocardial necrosis, two from predominant right heart failure).

In conclusion, monitoring EVR is clinically useful in detecting early evidence of subendocardial ischemia. EVR may fall before systemic or central venous pressure deteriorates, indicating the need for early myocardial support, undetectable by conventional methods. Furthermore, EVR can easily be adapted to monitoring equipment currently used in coronary and postsurgical intensive care units.

41. Selection of the Candidate for Myocardial Revascularization: A Profile of High Risk Based on Multivariate Analysis

FLOYD D. LOOP,* JULIO N. BERRETTONI,* AUGUSTO D. PICHARD,* WAYNE SIEGEL,* MEHDI RAZAVI,* and DONALD B. EFFLER, Cleveland, Ohio

A survey of 50 patients who died from cardiac related causes after direct coronary artery surgery (1967-1973) was made with respect to 29 clinical, angiographic, and operative variables. These factors were compared with identical characteristics of 1,283 survivors operated on in 1972. Through discriminant analysis, the various characteristics, isolated or multiple in any combination, have been converted to risk related to operative death.

The distinctive features of the mortality group were vastly different from those in the surviving group. For example, 24% of the mortality group had probability (risk) indexes of 0.90 or higher, whereas these factors or variables of similar weight produced an equivalent risk in only 0.8% of the survivors; thus, operative death, under these specific circumstances, could be predicted with an estimated 96.7% assurance. Each of six patients with mortality risks in the 99th percentile had (1) cardiomegaly, (2) ECG evidence of previous infarction, (3) documented congestive heart failure (CHF), (4) triple vessel coronary artery disease, and (5) elevated left ventricular end diastolic pressure. Other prominent findings in high risk situations included left main or high anterior descending coronary artery obstruction associated with preoperative signs of cardiac decompensation. As a single factor, CHF exerted the most influence on the probability of dying.

A new and more descriptive statistical interpretation of the factors presumed to affect risk is presented. A numerical index indicates the relative importance of each variable and yields a coefficient used to predict high and low risk situations from given clinical and arteriographic combinations.

42. Myocardial Revascularization with Poor Ventricular Function

BEN F. MITCHEL, JR., Dallas, Texas, PETERALIVIZATOS,* Athens, Greece, MAURICE ADAM, GARY J. LAMBERT, and GERALD F. GEISLER,* Dallas, Texas

In order to evaluate current opinion concerning the inadvisability of bypass surgery for angina patients with poor ventricular function and/or congestive heart failure, we have reviewed our first 1000 patients undergoing revascularization. Eighty patients with poor ventricular function, as judged by ventriculography and ejection fraction determinations, were available for review.

Nine patients were categorized as having "very poor ventricular function" (poor contractility with ejection fraction of less than 0.2). All nine patients had three vessel disease and all three vessels were bypassed in each instance. Eight patients are alive and well. There were no early deaths and only one late death is noted. (Total mortality: 11.1%).

Thirty-one patients were categorized as having "poor ventricular function" (poor contractility with an ejection of 0.2 to 0.4). Twenty-five patients had three vessel disease but in only 14 patients were three vessels grafted. There were eight early deaths (25.8%) and five late deaths (16.1%). (Total mortality: 42%):

Forty patients were categorized as having "fair ventricular function" (poor contractility with an ejection fraction of 0.4 to 0.6). Thirty-six patients had three vessel disease but in only 23 patients were all three vessels bypassed. There were four early deaths (10%) and four late deaths (10%). (Total: 20%).

Mortality, in patients undergoing direct myocardial revascularization with poor ventricular function, therefore appears to be directly related to the severity of the disease and to whether or not diseased vessels can be bypassed. Until we can better distinguish the poorly functioning ischemic ventricle from the poorly functioning scarred ventricle, we feel that patients in this category should continue to be individually evaluated and not categorically denied surgery.

43. Direct Selective Myocardial Revascularization by Internal Mammary Artery to Coronary Vein Anastomosis

SANG B. PARK,* GEORGE J. MAGOVERN, GEORGE A. LIEBLER,*
CHARLES M. DIXON,* FRANK R. BEGG,* and
DON L. FISHER,* Pittsburgh, Pa.

In the past year, we have studied selective retrograde coronary perfusion in mongrel dogs by anastomosing the distal internal mammary artery to the anterior descending vein, ligating the vein proximally and simultaneously placing an aortic constrictor on the anterior descending coronary artery. Out of a group of ten dogs, there were two long-term survivors with a patent graft and a constricted anterior descending coronary artery in whom studies indicated retrograde myocardial perfusion. We have subsequently performed three clinical cases associated with right and circumflex artery bypass grafts. These three patients were studied before leaving the hospital and showed patent grafts and coronary sinus oxygen saturations and angiographic data which indicated retrograde myocardial perfusion. Subsequent studies at four months on two of the patients studied to date indicated one graft to be open and one to be closed. This paper will present the pre- and the post-operative angiograms and follow-up angiograms as well as the post-operative isotope myocardial scanning and coronary sinus saturation studies. The early clinical data would indicate that the procedure may have merit when diffuse disease or total obstruction of the anterior descending coronary artery precludes direct anastomosis. Experimental results suggest that the procedure does not prevent an infarction with acute ligation of the concomitant coronary artery as suggested by Kolff in his work in the calf.

44. The Rationale for Surgery in Preinfarction Angina

JACK M. MATLOFF, HECTOR SUSTAITA,* KANUCHATTERJEE,*
H. J. C. SWAN,* Los Angeles, Calif.

Of 100 patients with identical criteria for preinfarction angina, 33 have been treated medically and 67 surgically. Generally, these two patient populations were quite similar in regard to age, sex, number of prior infarctions and duration of acute and chronic anginal symptoms. With medical therapy, 13 patients died and 20 experienced non-fatal infarctions within two weeks. The surgical patients were studied and underwent saphenous vein bypasses on an emergent basis. Twenty-three of these patients, classified as complicated, experienced repetitive ventricular arrhythmias, congestive heart failure, myocardial infarction and/or shock prior to their referral for surgery. Two of these patients experienced post-operative infarction and died. The remaining 44 patients underwent surgery with a single mortality. Two to 37 months after surgery, 49 of the operated patients are asymptomatic and 3 who infarcted prior to surgery have mild congestive failure. Six patients have residual angina. This experience supports the concept that preinfarction angina is a malignant syndrome in which the course can be significantly altered by appropriate saphenous vein bypass.

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Frank, Howard A.
Grillo, Hermes C.
Gross, Robert E.
Harken, Dwight E.

Lindsey, Edward S.
Ochsner, Alton
Ochsner John, L
Rosenberg, Dennis M.
Schramel, Robert J.
Strug, Lawrence H.

MAINE

Liberty
Hurwitz, Alfred
Portland
Drake, Emerson H.
Hiebert, Clement A.

MARYLAND

Baltimore
Attar, Safuh M.A.
Brantigan, Otto C.
Cowley, R Adams
Gott, Vincent L.
Haller, J Alex, Jr.
Mason, G. Robert
McLaughlin, Joseph S.
Michelson, Elliott
Reinhoff, William F., Jr.
Wilder, Robert J.
Bethesda
Dennis, Clarence
Mills, Mitchell
Morrow, Andrew G.
Worton
Walkup, Harry E.

Swampscott
Miller, Carroll C.
Wayland
Lefemine, Armand A.

MICHIGAN

Ann Arbor
Gago, Otto
Kirsh, Marvin M.
Morris, Joe D.
Sloan, Herbert
Benton Harbor
Lui, Alfred H. F.
Detroit
Arbulu, Agustin
Benson, Clifford D.
Day, J. Claude
Davila, Julio C.
Dodrill, Forest Dewey
Lam, Conrad R.
McDonald, John R.
Wilson, Robert F.
Grand Rapids
Harrison, Robert W.
Meade, Richard H.
Rasmussen, Richard A.

Mundth, Eldred D.
Nardi, George L.
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.
Woods, Francis M.

Brookline
Madoff, Irving M.
Chestnut Hill
Benedict, Edward B.

Dedham
Soutter, Lamar

Maiden
Boyd, Thomas F.
Desforges, Gerard
Taylor, Warren J.

Newton Center
Gaensler, Edward A.
Newton Lower Falls
Laforet, Eugene G.
Lynch, Joseph P.
Strieder, John W.

Quincy
Thrower, Wendell B.

St. Paul
Leven, N. Logan
Perry, John F., Jr.

MISSISSIPPI

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

MISSOURI

Columbia
Almond, Carl H.
Kansas City
Adelman, Arthur
Benoit, Hector W.
Buckingham, William W.
Holder, Thomas M.
Killen, Duncan A.
Mayer, John H., Jr.

St. Louis
Earner, Hendrick Boyer
Baue, Arthur E.
Bergmann, Martin
Burford, Thomas H.
Clark, Richard E.
Ferguson, Thomas B.
Geha, Alexander S.
Kaiser, George C.

Grosse Pointe
Gerbasi, Francis S.
Grosse Pointe Woods
Taber, R. E.
Kalamazoo
Neerken, Adrian J.
Southfield
Barrett, Raymond J.
Royal Oak
Timmis, Hilary H.

MINNESOTA

Duluth
Fuller, Josiah
Minneapolis
Garamella, Joseph J.
Humphrey, Edward W.
Jensen, Nathan K.
Johnson, Frank E.
Lillehei, Richard C.
Myers, J. Arthur
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
Wallace, Robert B.

New Brunswick
Kunderman, Philip J.
Mackenzie, James W.

Pennsauken
Camishion, Rudolph C.
Pierucci, Louis, Jr.

Short Hills
Demos, Nicholas J.

Trenton
Sommer, George N., Jr.
NEW MEXICO

Albuquerque
Edwards, W. Sterling
Las Vegas
Thai, Alan P.
Santa Fe
Wilson, Julius L.

NEW YORK

Albany
Alley, Ralph D.
Kausel, Harvey W.
Stranahan, Allan
Bay Shore
Ryan, Bernard J.
Binghamton
Williams, Mark H.
Bronx
Bloomberg, Allan E.

Lewis, J. Eugene, Jr.
Lucido, Joseph L.
Roper, Charles L.
Weldon, Clarence S.
Willman, V. L.

NEBRASKA

Omaha
Bisgard, J. Dewey
Miller, Fletcher A.

NEW HAMPSHIRE

Hanover
Tyson, M. Dawson

NEW JERSEY

East Orange
Auerbach, Oscar
Gerard, Franklyn P.
Hillsdale
Amberson, J. B.
Jersey City
Timmes, Joseph J.
Moorestown
Morse, Dryden P.
Newark
Neville, William E.

Friedlander, Ralph
Hirose, Teruo
Robinson, George
Veith, Frank J.

Bronxville
Frater, Robert W. M.
Brooklyn

Burbank, Benjamin
Garzon, Antonio A.
Klopstock, Robert
Levowitz, Bernard S.
Potter, Robert T.
Sayer, Philip N.

Buffalo
Adler, Richard H.
Andersen, Murray N.
Leahy, Leon J.
MacManus, Joseph E.

Cooperstown
Blumenstock, David A.

Elmira
Tillou, Donald J.
Great Neck, L.I.
Crastnopol, Philip
Ripstein, Charles B.
Huntington
Heroy, William W.

Mineola
Mangiardi, Joseph L.
NewYork
Aufses, Arthur H.
Bailey, Charles P.
Beattie, Edward J., Jr.
Berry, Frank B.
Bloch, Robert G.
Bowman, Frederick O., Jr.
Boyd, Arthur D.
Cahan, William G.
Clauss, Roy H.
Cook, William A.
Cournand, Andre
Cracovaner, Arthur J.
Davidson, Louis R.
Ebert, Paul A.
Findlay, Charles W., Jr.
Fischer, Walter W.
Fitzpatrick, Hugh F.
Ford, Joseph M.
Gerst, Paul H.
Gianelli, Stanley, Jr.
Glenn, Frank
Green, George E.
Holman, Cranston W.
Holswade, George R.
Humphreys, George H., II
Jaretzki, Alfred III
Kirschner, Paul A.
Lambert, Adrian
Lillehei, C. Walton
Litwak, Robert S.

Patchogue
Finnerty, James
Port Washington
Johnson, Elgie K.
Poughkeepsie
Douglass, Richmond
Rego Park
Davis, Lowell L.
Rochester
DeWeese, James A.
Mahoney, Earle B.
Schwartz, Seymour I
Zaroff, Lawrence I.
Rockville Centre
Wesolowski, Sigmund A.
Roslyn
Thomson, Norman B., Jr.
Saranac Lake
Decker, Alfred M.
Merkel, Carl G.
Scottsville
Emerson, George L.
Snyder
Lajos, Thomas Z.
Syracuse
Bugden, Walter F.
Webb, Watts R.
Tonawanda
Kaunitz, Victor H.

NORTH CAROLINA

Asheville
Scott, Stewart M.

Maier, Herbert C.
Malm, James R.
McCord, Colin W.
Miscall, Laurence
Nealon, Thomas F., Jr.
Okinaka, Arthur J.
Pickhardt, Otto C.
Redo, S. Frank
Reed, George E.
Reemtsma, Keith
Riggins, H. McLeod
Rubin, Morris
Sarot, Irving A.
Seley, Gabriel P.
Spencer, Frank C.
Thompson, Samuel A.
Tice, David A.
Touroff, Arthur S. W.
Watson, William L.
Wichern Walter A., Jr.
Wolff, William I.
Wylie, Robert H.
Northport
Soroff, Harry S.

Chardon
Mautz, F. R.
Cincinnati
Carter, B. Noland
Gonzalez, Luis L.
Helmsworth, James A.
Maurer, Elmer P. R.
Cleveland
Ankeney, Jay L.
Cross, Frederick S.
Effler, Donald B.
Groves, Laurence K.
Kay, Earle B.
Mendelsohn, Harvey J.
Wright, George W.
Columbus
Clatworthy, H. William
Kilman, James William
Klassen, Karl P.
Meckstroth, Charles V.
Sirak, Howard D.
Vasko, John Stephen
Dayton
DeWall, Richard A.
Toledo
Blakemore, William S.
Selman, Morris W.

OKLAHOMA

Oklahoma City
Felton, Warren L. II
Greenfield, Lazar J.
Greer, Allen E.
Munnell, Edward R.

Chapel Hill
Wilcox, Benson R.
Charlotte
Robicsek, Francis
Taylor, Frederick H.
Durham
Hart, Deryl
Sabiston, David C.
Sealy, Will C.
Silver, Donald
Smith, David T.
Young, W. Glenn
Greensboro
Deaton, W. Ralph, Jr.
Oteen
Betts, Reeve H.
Takaro, Timothy
Winston-Salem
Cordell, A. Robert
Hudspeth, Allen S.
Johnston, Frank R.
Meredith, James H.

OHIO

Akron
Falor, William H.

Lancaster
Witmer, Robert H.
Harberth
Burnett, W. Emory
Havertown
Chodoff, Richard J.
Philadelphia
Aberdeen, Eoin
Edmunds, L. Henry, Jr.
Fineberg, Charles
Haupt, George J.
Lemmon, William M.
MacVaugh, Horace L. S.
Mendelsohn, Edwin
Nemir, Paul, Jr.
O'Neill, Thomas J. E.
Rosemond, George P.
Stayman, Joseph W.
Templeton, John W.
Thomas, Paul A.
Wallace, Herbert W.
Willauer, George
Pittsburgh
Bahnson, Henry T.
Ford, William B.
Magovern George J.
Pontius Robert C.
Rams, James J.
Ravitch, Mark M.
Sanes, Gilmore M.
Steichen, Felicien M.
Rydal
Frobese, Alfred S.
O'Neill, James F.

Williams, G. Rainey
Zuhdi, M. Nazih
Tulsa
Leibovitz, Martin
OREGON
Portland
Conklin, William S.
Poppe, J. Karl
Stari, Albert
Roseburg
Miller, Arthur C.

PENNSYLVANIA
Bethlehem
Snyder, John M.
Gladwyne
Flick, John B.
Johnson, Julian
Judd, Archibald R.
Hershey
DeMuth, William E., Jr.
Waldhausen, John A.

Jackson
Chandler, John H.
Knoxville
Blake, Hu Al
Domm, Sheldon E.
Newman, Robert W.
Waterman, David H.
Memphis
Carr, Duane
Cole, Francis H.
Eastridge, Charles E.
Garrett, H. Edward
Howard, Hector S., Jr.
Hughes, Felix A.
McBurney, Robert P.
Pate, James W.
Robbing, S. Gwin
Skinner, Edward F.
Nashville
Bender, Harvey W., Jr.
Dale, W. Andrew
Daniel, Rollin A.
Diveley, Walter L.
Foster, John H.
Gobbell, Walter G., Jr.
Johnson, Hollis E.
Sawyers, John L.
Scott, Henry W., Jr.

TEXAS
Austin
Hood, R. Maurice
Ross, Raleigh R.
Beaumont
Harrison, Albert W.
Cotulla
Hood, Richard E.
Dallas
Adam, Maurice

Sayre
Sewell, William H.
Wynnewood
McKeown, John J.
RHODE ISLAND
Providence
Karlson, Karl E
Simeone, Fiormdo A.

SOUTH CAROLINA
Charleston
Bradham, R. Randolph
Hairston, Peter
Lee, William H., Jr.
Parker, Edward F.
Columbia
Ryan, Thomas C.

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

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.
Kennedy, John Mines
Morris, George C., Jr.
Norman, John C.
Overstreet, John Wm.
Seybold, William D.
La Porte
Barkley, Howard T.
Lubbock
Dalton, Martin L., Jr.
San Antonio
Dooley, Byron M.
Heaney, John P.
Nixon, James W.
Proctor, Oscar S.
Stanford, William
Trinkle, J. Kent
Temple
Brindley, G. Walter
Weslaco
Dailey, James E.

UTAH
Salt Lake City
Cutler, Preston R.
Hughes, Richard K.
Liddle, Harold Venable
Mortensen, J. D.
Nelson, Russell M.
Rumel, William R.
Wolcott, Mark W.

Davis, Milton V.
Holland, Robert H.
Kee, John L., Jr.
Lambert, Cary J.
Mitchel, Ben F., Jr.
Paulson, Donald L.
Razzuk, Maruf A.
Shaw, Robert R.
Sugg, Winfred L.
Urschel, Harold C., Jr.
Wilson; Hugh E., III
Fort Worth
Johnson, Clive R.
Galveston
Derrick, John R.
Padula, Richard T.
Tyson, Kenneth R. T.

Richmond
Bosher, Lewis H.
Brooks, James W.
Cole, Dean B.
Gwachney, Owen
Johns, Thomas N. P.
Lower, Richard R.

WASHINGTON
Seattle
Bell, John W.
Cantrell, James R.
Dillard, David H.
Hill, Lucius D.
Jarvis, Fred J.
Jones, Thomas W.
Lawrence, G. Hugh
Merendino, K. Alvin
Mills, Waldo O.
Pinkham, Roland D.
Sauvage, Lester R.
Thomas, George I.
Spokane
Berg, Ralph, Jr.

CANADA

ALBERTA
Calgary
Miller, George E.
Edmonton
Callaghan, John C.
Couves, Cecil Melville
Meltzer, Herbert
Sterns, Laurence P.

BRITISH COLUMBIA
Vancouver
Allen, Peter
Ashmore, Phillip G.
Harrison, Elliott
West Vancouver
Robertson, Ross

VERMONT
Burlington
Miller, Donald B.
White River Junction
Crandell, Walter B.

VIRGINIA
Charlottesville
Damann, John F.
Drash, Everett C.
Muller, William H., Jr.
Nolan, Stanton Peele
Falls Church
Conrad, Peter W.
Lynchburg
DeNiord, Richard N.
Moore, Richmond L.

WEST VIRGINIA
Charleston
Walker, James H.
Morgantown
Tarnay, Thomas J.
Warden, Herbert E.

WISCONSIN
Green Bay
Vorwald, Arthur J.
La Crosse
Gunderson, Alf E.
Madison
Curreri, Anthony R.
Kahn, Donald R.
Young, William P.
Marshfield
Sautter, Richard D.
Milwaukee
Flemma, Robert J.
Hausmann, Paul F.
Johnson, W. Dudley
Lapley, Derward, Jr.
Narodick, Benjamin G.
Pemberton, Albert H.
Weisel, Wilson

NEWFOUNDLAND
St. Anthony
Thomas, Gordon W.
St. Johns
Brownrigg, Garrett M.
Littlefield, James B.

NOVA SCOTIA
Kentville.
Quinlan, John J.

ONTARIO
Hamilton
Sullivan, Herbert J.
Sudbury
Walker, George R.

Victoria
Stenstrom, John D.

MANITOBA

Winnipeg
Barwinsky, Jaroslaw
Cohen, Morely

NEW BRUNSWICK
St. John
Skinner, George F.

Toronto
Baird, Ronald J.
Bigelow, Wilfred G.
Delarue, Norman C.
Goldman, Bernard S.
Heimbecker, Raymond O.
Joynt, George H. C.
Kergin, Frederick G.
Key, James A.
Lockwood, A. L.
Mustard, William T.

Toronto (Continued)
Pearson, Frederick G.
Trimble, Alan S.
Trusler, George A.
Westbrook
Lynn, R. Beverley
Woodbridge
Laird, Robert

QUEBEC

Montreal
Blundell, Peter E.

ARGENTINA

Buenos Aires
Favaloro, Rene G.

BRAZIL

Sao Paulo
Zerbini, E. J.

ENGLAND

Bristol
Belsey, Ronald
Hamden Row
Sellors, Sir Thomas Holmes
Llowes, Hereford
Thompson, Vernon
London
Brock, Russell C.

HOLLAND

Amsterdam
Boerema, I.
Leiden
Brom, A. Gerard

Bruneau, Jacques
Dobell, Anthony
Gagnon, Edouard D.
Grondin, Pierre
Kunstler, Walter E.
Lepage, Gilles
MacLean, Lloyd D.
McIntosh, Clarence A.
Scott, Henry J.
Vineberg, Arthur M.
Quebec City
Gravel, Joffre-Andre

FOREIGN COUNTRIES

GUATEMALA

Guatemala City
Herrera, Rodolfo

MEXICO

Michoacan
Eloesser, Leo

GREAT BRITAIN

Oxford
Allison, P. R.
Surrey
Barrett, Norman R.
Warwickshire
D'Abreau, A. L.

SCOTLAND

Edinburgh
Logan, Andrew

EUROPE

SWEDEN

Stockholm
Björk, Viking Olov
Crafoord, Clarence

SWITZERLAND

Geneva
Tricerri, Fernando E.
Zurich
Senning, Ake

INDIA

Bikaner, Rajputana
Van Allen, Chester M.

AFRICA

Tunisia
Minor, George R.

CONSTITUTION AND BYLAWS

ARTICLE I. Name

Section1. This Association shall be known as The American Association for Thoracic Surgery.

ARTICLE II. Object

Section1. The object of the Association shall be to encourage and stimulate investigation and study that will increase the knowledge of intrathoracic physiology, pathology, and therapy, to correlate such knowledge and disseminate it.

Section2. To attain this object, the Association shall hold at least one scientific meeting every year in which free discussion shall be featured; shall conduct a Journal for the publication of the papers presented at this meeting, and other acceptable articles; and shall undertake such other activities as the Council or the Association as a whole may decide.

ARTICLE III. Membership

Section1. There shall be four classes of members: Active, Associate, Senior and Honorary. Admission to membership in the Association shall be by election. Membership shall be limited, the limits on the respective classes to be determined by the By-Laws. Only Active and Senior Members shall have the privilege of voting or holding elective office.

Section 2. Election to Active, Senior, and Honorary Membership shall be for life, subject to the provisions of Section 3, following. After the 1960 Annual Meeting of the Association, election to Associate Membership shall be for a limited period of time, as determined by the By-Laws. During this limited period, an Associate Member, if properly qualified, may be elected to Active Membership. At 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 be dropped from the rolls of the Association.

Section3. Membership may be voluntarily terminated at any time by members in good standing. The Council, acting as a Board of Censors, may recommend the expulsion of a member on the grounds of moral or professional delinquency, and submit his name, together with the grounds of complaint, to the Association as a whole at any of the regularly convened meetings, after giving the member so accused ample opportunity to appear in his own behalf.

ARTICLE IV. Officers and Government

Section1. The officers of the Association shall be a President, a Vice-President, a Secretary, a Treasurer, and Editor, and five Councilors. These ten officers and councilors shall be the governing body of the Association, and shall have full power to act on all matters, except as follows:

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

Section2. Officers and Councilors shall be elected at the annual meeting of the Association, and shall take office upon conclusion of the meeting. The President and the Vice-President shall be elected for a one-year term of office and neither may be re-elected to succeed himself in the same office. The Secretary, the Treasurer, and the Editor shall be elected for a one-year term of office,

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

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

ARTICLE V. Committees

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

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

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

Section 4. The Association as a whole may authorize the Council to appoint Scientific or Research Committees for the purpose of investigating thoracic problems and may further authorize the Council to support financially such committees to a limited degree. In appointing such committees, the Council shall be governed by the provisions of the By-Laws.

ARTICLE VI. Finances

Section 1. The fiscal year of the Association shall coincide with a calendar year. The books of the Association shall be kept and audited on this basis.

Section 2. Members shall contribute to the financial maintenance of the Association through the medium of initiation fees, annual dues, and special assessments. The amount of the annual dues and the initiation fees shall be determined by the By-Laws.

If, at the end of any fiscal year, there be a deficit in the current funds of the Association, the Council may send out notices to that effect and invite Active members to contribute the necessary amount so that no deficit be carried over from one fiscal year to another. The Association may, in any regularly convened meeting, vote a special assessment for any purpose consistent with the objects of the Association (Article II), and such special assessment shall become an obligatory charge against the classes of members affected thereby.

Section 3. To meet the current expenses of the Association, there shall be available all revenue derived from annual dues, special assessments, and income from the Endowment Fund, subject to the provisions of Section 4, following. Funds derived from the payment of initiation fees shall not be available for current expenses.

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

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

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

passed by a three-fourths vote of the members present and voting at the next regularly convened annual meeting.

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

ARTICLE VII. Meetings

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

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

Section 3. The annual meeting of the Council shall be held at or near the close of the fiscal year.

ARTICLE VIII. Amendments

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

BY-LAWS

ARTICLE I.

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

ARTICLE II.

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

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

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

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

Section 5. While the scientific session of the annual meeting is held primarily for the benefit of the members of the Association, it may be thrown open to nonmembers who are able to submit satisfactory credentials, who register in a specified manner, and who pay such registration fee as may be determined and published by the Council from year to year.

ARTICLE III.

Section 1. Candidates for membership in this Association must be formally nominated and seconded, in an approved manner, by not less than three Active or Senior Members. Such

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

Section 2. Active Membership shall be limited to six hundred. The candidate to be eligible must be a citizen of the United States of America or Canada, unless in unusual cases this citizenship requirement shall have been waived by Council. The candidate shall have achieved distinction in the thoracic field or shall have made a meritorious contribution to knowledge pertaining to thoracic disease or its surgical treatment.

Section 3. The Associate Members shall be appropriately phased out. The limited period of time for Associate Membership as required by Article III, Section 2 of the Constitution, shall be five years. During this limited period, an Associate Member, if properly qualified, may be elected to Active Membership. After the expiration of this limited period an Associate Member, if not yet qualified for Active Membership, must either be re-elected to an additional period of Associate Membership or dropped from the rolls of the Association.

Section 4. The number of Senior Members shall be unlimited. Active Members automatically advance to Senior Membership at the age of sixty, years. In addition, starting with the 1971 Annual Meeting, a younger Active Member may be eligible for Senior Membership if incapacitated by disability, but for no other reason.

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

Section 6. The report of the Membership Committee shall be rendered at the annual Executive Session of the Association. Candidates shall be presented in groups in the following order: Candidates for Honorary Membership, retirement of Active Members to Senior Membership; Candidates for Active Membership, Associate Members for re-election; members dropped from the rolls of the Association.

Section 7. The Council shall recommend that any Active or Associate Member whose dues are in arrears for two years, or who has been absent, without sufficient excuse, from three consecutive annual meetings, shall have his membership terminated.

Section 8. Notwithstanding Section 7, any member of the Association over 60 years of age is excused from the attendance requirement and upon his specific request may likewise be excused from the payment of dues.

ARTICLE IV.

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

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

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

Association. When deemed appropriate, an Active or Senior Member may be elected to serve as an understudy to the Secretary in anticipation of the latter's retirement from office.

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

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

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

Section 7. In the event of a vacancy occurring in the office of President, the Council shall advance the Vice-President to the Presidency and appoint a new Vice-President under the Provisions of Article IV, Section 3, of the Constitution.

ARTICLE V.

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

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

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

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

Section 5. The Necrology Committee shall consist of one or more Active or Senior Members, and shall be appointed in accordance with the provisions of Article V, Section 2, of the Constitution. Appointments to this Committee shall be for a one-year term of office. Any or all members of this Committee may be reappointed to succeed themselves. The Council may, if it so desires, appoint one of its own members to serve as Chairman of this Committee. The duties of the Necrology

Committee shall be to prepare suitable resolutions and memorials upon the deaths of all members of the Association and to report such deaths at every annual meeting.

Section 6. The Editorial Board shall be appointed by the Editor, subject only to the approval of the Council. The Editor shall be, ex officio, the chairman of this board and shall be privileged to appoint and indefinitely reappoint such members of the Association, regardless of class of membership, and such non-, members of the Association as in his opinion may be best calculated to meet the editorial requirements of the Association.

Section 7. When Scientific or Research Committees are authorized by the Association, the Council shall appoint the Chairmen of these Committees, with power to organize their committees in any way best calculated to accomplish the desired object, subject only to the approval of the Council. Financial aid rendered to such Committees shall not exceed such annual or special appropriations as may be specifically voted for such purposes by the Association as a whole.

Section 8. The Everts A. Graham Memorial Traveling Fellowship Committee shall consist of six members: The President, Secretary, and Treasurer of the Association and three members-at-large, one member being appointed by the President each year to serve a term of three years. The Chairman shall be the member-at-large serving his third year. The duties of the committee shall be to recommend Fellowship candidates to the Council, and to carry out all business pertaining to the Fellowship and the Fellows, past, present, and future.

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

ARTICLE VI.

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

Section 2. Annual dues for Active Members shall be \$50.00.

Section 3. Annual dues for Associate Members shall be \$50.00.

Section 4. Senior Members are exempt from dues.

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

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

Section 7. Income from the Endowment Fund shall be expended as the Council directs.

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

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

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

ARTICLE VII.

Section1. When the Association convenes for its annual meeting, it shall immediately go into executive session, but the business at this session shall be limited to:

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

Section2. The annual executive session of the Association shall be held at the opening of the afternoon session of the second day of the meeting. The order of business shall be:

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

Section3. There shall be an annual meeting of the Council.

ARTICLE VIII.

Section1. These By-Laws shall in no wise be changed except by a two-thirds vote of the members present at the annual meeting or a properly convened meeting of the Association, and further provided that the proposed action or amendment shall have been moved and seconded by not less than three of the members in a properly convened annual or special meeting of the Association.

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

CHARTER MEMBERS

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)
I. 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

PAST MEETINGS AND PRESIDENTS

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 - DenverPresident, 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 – Montrea lPresident, 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
1972 - Los Angeles... President, John W. Strieder
1973 - Dallas. President, Frank Gerbode