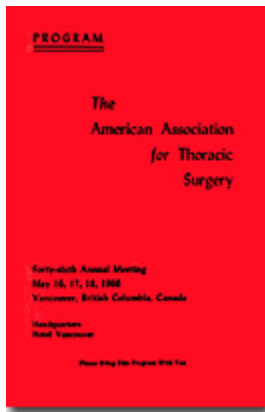


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MONDAY MORNING, MAY 16, 1966

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Monday Morning, May 16, 1966

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

Ballroom

8:45 A.M. Scientific Session: REGULAR PROGRAM

Ballroom

1. Tumors of the Thoracic Skeleton: Diagnosis and Management

A. OCHSNER, JR., GEORGE L. LUCAS*, and G. MCFARLAND*,
New Orleans, La.

In a 12 year period, 127 cases of bony and cartilaginous tumors involving the thoracic skeleton were studied in the Bone Pathology Laboratory. These cases have been reviewed. Sixty-nine were tumors of the ribs, 6 of the sternum, 15 of the thoracic vertebrae, 26 of the scapula and 14 of the clavicle (3 tumors involved more than one area). Forty-five were metastatic tumors, 36 were primary malignant tumors and 46 were primary benign tumors (includes 7 cases of fibrous dysplasia) The relative frequency of the different types of tumors is presented. The metastatic tumors were most commonly from the lung and breast. The primary malignant tumor most commonly encountered was the chondrosarcoma and the primary benign tumor seen most frequently was the osteochondroma. The presenting symptom varied with location and type but was usually pain, and in some instances a mass. The diagnostic problems are discussed, particularly the limits of X-ray and other laboratory studies and the questions relative to biopsy. Management, which is influenced by the type and location of the tumor, is discussed. Prognosis is evaluated.

2. Thymoma at the Massachusetts General Hospital

EARLE W. WILKINS, JR., L. HENRY EDMUNDS, JR.*, and
BENJAMIN CASTLEMAN*, Boston, Mass.

A quarter century of experience with thymoma is presented in this review of cases treated at the Massachusetts General Hospital between 1939 and 1964. The series of 63 patients includes only those in whom tissue confirmation was obtained during life. Follow-up is complete; 52 patients were initially diagnosed at least 5 years previously Thirty-seven patients had associated myasthenia gravis; 26 presented no evidence of myasthenia. Factors discussed in detail include pathological classification, prognostic significance of invasive tumor and presence of myasthenia, the role of radiation, and the accuracy of the 10-year survival rate as opposed to the conventional 5-year period in determination of potential cure. Modern methods of post-operative management are emphasized, particularly in the myasthenic. Discrepancies of conclusions with previous series are discussed The paper includes appropriate charts illustrating survival in relation to myasthenia gravis, encapsulated or invasive tumor, completeness of tumor excision, and use of irradiation.

3. Hyponatremia from Inappropriate Antidiuretic Hormone Elaboration in Carcinoma of the Lung

C. PORTER CLAXTON, JR. *, HARRY T. MCPHERSON*, WILL C. SEALY, and
W. GLENN YOUNG, JR., Durham, N.C.

A variety of endocrine disturbances are known to be associated with carcinoma of the lung, but only rarely has the secretion of an inappropriate antidiuretic hormone been linked with this malignancy. Over an 18 month period three patients with carcinoma of the lung were discovered to have this latter endocrinopathy. The serum sodium in the patients was reduced to 108, 119, and 126 mEq/L respectively. All exhibited normal extracellular fluid volume, relatively hypertonic urine, and absence of renal and adrenal dysfunction. In two patients, symptoms of water intoxication were present; and in one a suspicion of cerebral metastasis was entertained Management with fluid restriction to 800 to 1,000 cc. per day increased the serum sodium to 130 to 140 mEq/L In one patient improvement followed radiation to the lesion, while in another excision of all the known intrathoracic tumor failed to revert the electrolytes to normal levels in the immediate postoperative period. Though this occurs in a small percentage of patients with carcinoma of the lung, the striking symptoms as well as the ease with which symptoms can be controlled demands that this endocrinopathy be kept in mind in all patients with cancer of the lung.

4. Reoperation for Bronchogenic Carcinoma

WILFORD B. NEPTUNE, FRANCIS M. WOODS, and RICHARD H. OVERHOLT,
Boston, Mass.

Thirteen patients have had a second pulmonary resection for broncho-genic carcinoma (from 2400 verified cases, with 1176 primary resections). All originally had had a favorable operation and good cardiopulmonary reserve. The new or recurrent tumor was discovered early, and the second operation was done for what appeared to be localized disease. One

patient initially had bilateral primary tumors treated with a staged resection of the lower lobes. Four patients had their second operation on the contra-lateral side: one had a wedge resection one year following a pneumonectomy; one had a bilateral, bisegmental resection; two had bilateral lobectomies. Eight patients were reoperated on the ipsilateral side: one had resection of the middle lobe following an initial resection of the upper lobe; the other seven had completion of the pneumonectomy. There was one postoperative death. Five patients have subsequently died. There are seven patients still - alive and well - from 15 to 136 months after the initial operation, and these are now from 5 to 93 months following the second operation.

5. Thoracic Outlet Syndrome

DAVID B. ROOS*, Denver, Colo.

Sponsored by WILLIAM R. WADDELL

Neurovascular compression in the shoulder region has long been recognized as a common and distressing problem, but the exact mechanism and site of compression are often not clearly understood. The numerous labels that have added more to the confusion than the understanding of the shoulder compression problems have been replaced by the single entity called thoracic outlet syndrome which leads to clearer understanding, more accurate diagnosis and more effective treatment. Compression of the brachial plexus and subclavian vessels against the first thoracic rib is the common denominator of all the syndromes, whether vascular or neurological. The various symptoms with which the syndrome may present are listed. Onset may be spontaneous or follow trauma. The physical signs and tests that lead to a clear diagnosis are described. The author's adaptation of plethysmography as a helpful diagnostic aid is illustrated. A new surgical approach to first rib resection through the axilla is described, and results of this operation in 60 cases are tabulated. Of the 50 patients in the neurological group, all were relieved by the operation, but three of the ten in the vascular group failed to benefit.

6. Considerations in the Management of Acute Traumatic Hemothorax

ARTHUR C. BEALL, JR., H. WAYNE CRAWFORD*, and

MICHAEL E. DEBAKEY, Houston, Texas

At the 1965 Meeting of the Association moderate controversy arose in regard to management of acute traumatic hemothorax, both associated and unassociated with heart wounds. Some of these comments led to re-evaluation of methods employed for care of such patients in our own institutions. Review of experience with more than 650 patients with acute traumatic hemothorax admitted over the past 10 years now forces us to disagree with some of the statements made at last year's meeting. Heart wounds still are treated primarily by pericardiocentesis, reserving cardiorrhaphy for patients who do not respond to pericardial aspiration or who again develop tamponade following aspiration. Although thoracentesis may be used for minor degrees of hemothorax, most patients with acute traumatic hemothorax are managed primarily by intercostal thoracostomy tube drainage, depending upon rapid pulmonary re-expansion to prevent empyema rather than fearing contamination by the tube. Occasionally, when satisfactory evacuation of hemothorax cannot be accomplished in this way, early thoracotomy with removal of clotted blood has prevented formal decortication in almost all instances. Emergency thoracotomy, as in patients with heart wounds, is reserved for specific indications. Results supporting these concepts will be presented and indications for both emergency and delayed thoracotomy will be discussed.

7. Thoracic Repercussions of Amoebiasis

RODOLFO HERRERA, Guatemala City, Guatemala

Intestinal infestation with *Entamoeba histolytica* is frequently complicated by hepatic involvement. Hepatic amoebiasis, in its turn, is sometimes complicated by neighboring extension. This extension below and above either diaphragm creates what we have grouped as the thoracic repercussions of amoebiasis. Behavior of *Entamoeba histolytica* probably varies with the endemic zone in which it is present. In Guatemala, amoebiasis is not only very frequent (20% to 30% incidence in some hospitals), but it is also especially prone to be associated with thoracic complications. These can be divided in five groups: 1) non specific inflammatory changes of the pleura, 2) empyema (perforation of hepatic abscess into the pleural cavity), 3) pulmonary inflammatory changes ("amoebic pneumonitis"), 4) amoebic lung abscess (perforation of hepatic abscess into lung parenchyma), 5) pericardial, splenic, and other less frequent complications. Examples of these complications, the symptomatic evidence for the diagnosis, the therapeutic management, and the results obtained, will be presented.

*By Invitation

MONDAY AFTERNOON, MAY 16, 1966

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Monday Afternoon, May 16, 1966

2:00 P.M. Scientific Session: REGULAR

PROGRAM

Ballroom

**8. Surgical Management of Hernia of the
Foramen of Morgagni**

THOMAS P. COMER*, and O. THERON
CLAGETT, Rochester, Minn.

In a recent publication the commonly held concepts that foramen of Morgagni hernias occur through a defect in the anterior diaphragmatic attachments and that they have a peritoneal sac were challenged. Although the authors based their conclusions on a single cadaver dissection, their paper did stimulate a review of foramen of Morgagni hernias treated surgically at the Mayo Clinic. In a 32-year period from 1933 to 1965, 1750 patients with diaphragmatic hernias of various types underwent operation. In 50, or 2.9%, the hernia involved the foramen of Morgagni. Thirty-five patients were females and 15 were males. The ages of the patients at the time of operation ranged from 3 months to 78 years. Forty-five of the hernias were located to the right of the sternum anteriorly, and one was located on the left; in four patients the hernia was bilateral. In 46 of the 50 patients a definite hernial sac contained abdominal contents. In four cases the diaphragmatic defect was filled with a large fat pad, but there was no true hernial sac. Our experience with this series of patients will be reviewed.

9. Penicillin Epilepsy. Studies on the Blood Brain Barrier During Cardiopulmonary Bypass

A. R. C. DOBELL, J. D. WYANT*, K. B. SEAMANS*, and
P. GLOOR*,

Montreal, Quebec

Blood stream infection is a tragic complication of valve replacement. Prophylactic antibiotics have a definite place in preventing this complication. It became our habit to give large doses of penicillin

intravenously during and following these operations. Two such patients operated upon on consecutive days were in status epilepticus at the conclusion of operation. Following the second operation, penicillin was suggested as a possible cause and it was stopped in both patients. The first patient succumbed shortly thereafter. The pathological changes in the brain were typical of status epilepticus and no other cerebral lesion was seen. The second patient recovered completely. A penicillin assay was done on the CSF of both patients. Animal experiments were designed to evaluate blood-brain barrier permeability to penicillin and its relationship to Cardiopulmonary bypass. Forty-six experiments have been performed to date and they indicate the following: 1) status epilepticus may occur in dogs given massive intravenous penicillin and placed on Cardiopulmonary bypass, 2) similar doses of penicillin are innocuous without bypass, 3) neither acidosis nor blood transfusion nor hemolysis will produce convulsions in penicillin-loaded dogs not placed on bypass. Current experiments are investigating fat embolism, hypotension and hypothermia as possible causes of the barrier permeability to penicillin.

10. Two Stage Surgical Treatment of Ventricular Septal Defect in Patients Requiring Operation During the First Year of Life: Results of Pulmonary Artery Banding and Subsequent Open-Heart Repair

GRADY L. HALLMAN,
DENTON A. COOLEY, and ROBERT D. BLOODWELL*,

Houston, Texas

If ventricular septal defect produces intractable cardiac failure in infancy in spite of vigorous medical therapy, surgical treatment must be utilized to prevent a fatal outcome. Results of closure of ventricular septal defect using cardiopulmonary bypass in the newborn period were discouraging (41 percent mortality in 31 patients) and led to the adoption of pulmonary artery banding as the procedure of choice when operation became necessary in small infants. Since 1959, sixty-eight patients have undergone banding during the first year of life with a 15 percent mortality. Most of the infants who died had multiple other major cardiovascular anomalies. Relief of heart failure in survivors was frequently striking. Twelve patients have subsequently undergone open-heart surgery for closure of the ventricular septal defect and reconstruction of the pulmonary artery. There was only one death and this occurred in an 11 month old infant in whom total repair was done only 4 months after the first operation because of a poor response to banding. Survivors who have been catheterized have exhibited normal cardiac dynamics. This paper is concerned with indications and surgical technics for

banding and total repair and will present results including pre and postoperative catheterization data.

11. Early and Late Results of Operation for Ventricular Septal Defect

TIMOTHY B. CARTMILL*,
DWIGHT C. MCGOON, JAMES W. DUSHANE*,

and JOHN W. KIRKLIN, Rochester, Minn.

Controversy exists concerning surgery for patients with 1) ventricular septal defects (v.s.d.) without pulmonary hypertension, 2) large defects with severe pulmonary hypertension. Relevant data are presented from 432 patients operated upon since January, 1960. Of 179 with large pulmonary blood flow but normal pulmonary pressure ($P_p/P_s < 0.45$) there were no hospital deaths. 2.5% had residual shunts. Cardiothoracic ratio (C/T) decreased in 66%. Height and weight increased in 51 and 45% of children. Results indicate propriety of operative treatment. 72 of 168 patients with severe pulmonary hypertension ($P_p/P_s > 0.75$) and with R_p/R_s of < 0.45 and the 77 with R_p/R_s of 0.45 - 0.75 had hospital mortality of 13% and 10% respectively. Residual shunt was detected in 12% and 15%. In the two groups together, C/T decreased in 79%; height and weight increased in 80% and 77%; late studies indicate that the R_p/R_s decreased in 62%. Operative results in infants over 6 months of age were similar to older patients. Hospital mortality was 54% in 19 patients with $R_p/R_s > 0.75$. However, a late fall in R_p/R_s to 0.50 was demonstrated in 2 of the 4 cases studied, suggesting that severely elevated pulmonary vascular resistance is not invariably a contraindication to operation.

12. Factors Modifying Hemodynamic Results in Total Correction of Tetralogy of Fallot

JAMES R. MALM, SIDNEY BLUMENTHAL*,
FREDERICK O. BOWMAN, JR.*,

KENT ELLIS*, A. GREGORY JAMESON*, MARY JANE
JESSE*,

and CHIN B. YEOH*, New York, N.Y.

In 1960 a program was instituted based upon the concept that complete surgical correction of tetralogy of Fallot was feasible and well tolerated by patients. One hundred cyanotic patients underwent total correction with seven post-operative deaths. Hemodynamic studies were performed pre-operatively in all patients with documentation of site and severity of outflow obstruction, right ventricular pressure of systemic level and arterial de-saturation. Complications due to left ventricular failure or impaired pulmonary vascular bed were not encountered. There was no correlation between operative results and intensity of cyanosis, hematocrit

level, severity of pre-operative symptoms and previous palliative procedures. All living patients are clinically improved. Post-operative catheterization demonstrated 52/60 had good to excellent hemodynamic results. A normal response to exercise was noted as measured by cardiac index, even in the presence of pulmonic valve insufficiency. Residual outflow tract gradients increased with exercise. The anatomy of right ventricle and pulmonary artery limited total correction in some cases - anomalous right coronary artery (4%), peripheral pulmonary artery stenosis (2%), fibrotic pulmonary annulus requiring an outflow patch (10%), end to end Blalock anastomosis (2 cases). The hemodynamic implications of these anatomic problems will be discussed. Survival and the late hemodynamic results were related to the ability to achieve total correction in the operating room.

13. The Ventriculomyotomy Operation for Muscular Subaortic Stenosis: A Reappraisal

W. G. BIGELOW, A. S. TRIMBLE*, and E. D. WIGLE*,

Toronto, Ontario

Despite its simplicity, the Ventriculomyotomy procedure for the relief of outflow obstruction and decreased compliance of the left ventricle in ventricular septal hypertrophy has not received wide general acceptance and more extensive resection procedures have been described. Recent experimental and haemodynamic studies suggest that these hypertrophic hearts may vary pathologically as well as in their functional derangement. These features may mean that one surgical procedure may not be effective in all forms of this condition. From a group of fifty-five patients with muscular subaortic stenosis, seventeen have been operated upon over the past four years at the Toronto General Hospital. There were two hospital deaths. Postoperative catheterization in eight patients confirms elimination of the systolic gradient at rest, and following digitalization or isoproterenol infusion. The complete follow-up study will be reported for all fifteen survivors. Preoperative catheter and angiographic studies will be correlated with: a) pathology at operation, b) postoperative catheter and angiographic results, and c) clinical assessment. The results from this simple muscle splitting operation may clarify the nature of the functional derangements in this currently controversial type of heart muscle disease and aid in the selection of patients for surgery.

14. Results of the Creation of an Atrial Septal Defect (Blalock-Hanlon Operation) in 90 Patients with Transposition of the Great Vessels

WILLIAM P. CORNELL*, Pittsburgh,
Pa., ROBERT E. MAXWELL*,

J. ALEX HALLER, JR., Baltimore, Md.,
and DAVID C. SABISTON, JR.,

Durham, N.C.

The Blalock-Hanlon procedure for creation of an atrial septal defect was performed in 90 patients with transposition of the great vessels between 1948 and 1964. Half of these patients were less than one year old at the time of the operation and one-third were in the first three months of life. Severe anoxemia and congestive heart failure were the primary factors which prompted surgical intervention. Forty per cent of the patients in the entire series survived the operative procedure, with the highest mortality occurring in infancy. The mechanisms involved in the death of these patients have been reviewed, and the *associated* cardiac defects and their relationship to the ultimate result have been evaluated and will be discussed. Clinical improvement of the survivors was definite as evidenced by the arterial oxygen saturation which increased an average of 24% in the survivors. Of particular interest are sixteen patients who have survived ten years or longer and who are now doing well. In the entire series there were only five *late* deaths. With open correction now available for this malformation, it becomes increasingly important to perform a palliative procedure in order that these patients may survive to an age when the definitive operation can be safely performed.

*By Invitation

TUESDAY MORNING, MAY 17, 1966

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Tuesday Morning, May 17, 1966

8:30 A.M. Scientific Session

THORACIC SURGERY FORUM

Ballroom

15. An Investigation of Induced Chronic Hyperthermia and In Vivo Heat Dissipation

W. F. BERNHARD, R. HARVEY*, J. C. NORMAN*, G. LAFARGE*,
T. ROBINSON*, and L. VAN SOMEREN*, Boston, Mass.

Since development of an implantable energy source (for powering a total cardiac prosthesis) is an essential part of artificial heart research, the mechanism to achieve excess heat dissipation assumes importance. Regardless of the energy converter used, it is unlikely that a conversion efficiency greater than 10% can be attained. Studies indicate that a blood pump (for man) requires 2 to 5 watts of pumping power; therefore, 20 to 50 watts of thermal power must be continually rejected from the body. In this study, the circulating blood was selected as the heat transfer medium. Stainless steel tubes, with thermally insulated electrical heaters on their outer surfaces and a coating of graphite-benzalkonium-heparin on their inner surfaces, were implanted in the aortas of dogs. The heaters were energized to power levels ranging from 8 to 40 watts (continuously) for intervals up to six months. Serial determinations were made of rectal, esophageal and blood temperature, plasma hemoglobin, blood viscosity, red cell fragilities, plasma protein profile, and thyroid, hepatic, renal, and cardiovascular function. Analysis of these data indicate that heat (40 watts) generated by a power source can be dissipated with only a small (1°C) increase in core temperature.

16. An Evaluation of the Protective Effect of Hyperbaric Oxy-genation on the Central Nervous System During Circulatory Arrest

GORDON F. MOOR*, ROBERT FUSON*, GEORGE MARGOLIS*,
IVAN W. BROWN, JR., and WIRT W. SMITH*, Durham, N.C.

One of the hopes of hyperbaric oxygenation has been the theoretical possibility of increasing the blood and tissue stores of physically dissolved oxygen to permit a significantly longer period of circulatory arrest without damage to the

central nervous system. Using dogs and employing a critical neuropathologic study of the central nervous system as the determining end point, 179 separate experiments have been done. These have considered not only hyperbaric oxygenation, but the additional influence of hypothermia and added CO₂. Methods: Periods of total circulatory arrest of 5, 10 and 15 minutes at one (normal) and 3 atm. abs. were studied in normothermic and in modest hyperthermic (28-30° C.) animals using 100% oxygen or a mixture of oxygen and CO₂. EKG and arterial pressures were monitored and blood gas values and pH were determined at the ambient pressures of the experiments. The animals were allowed to recover and autopsy carried out 5-7 days later. Special emphasis was placed upon a detailed study of the CNS by neuropathologist. The clinical and neuropathologic findings will be discussed. Our results are not in agreement with previously published reports but are consistent with theoretical calculations based upon the increased levels of blood oxygen content.

17. An Anatomical Study of the Peripheral Pulmonary Lymphatics

TIMOTHY C. PENNELL*, Winston-Salem, N.C

Sponsored by H. H. BRADSHAW

An anatomical study of the peripheral pulmonary lymphatic system of human lungs is presented. Post-mortem expanded fixation of human lungs was accomplished with formalin vapor and the peripheral pulmonary lymphatic channels were injected with radiographic contrast media. The details of this technique are discussed. Gross, microscopic and radiographic studies, including cine fluoroscopy was carried out. As illustrated, these studies revealed the following: 1) Numerous lymphatic valves exist throughout the lungs. These valves display a fairly constant anatomical relationship, but allow an extremely variable direction of flow in the peripheral lymphatics. 2) The direction of flow in the interlobar septum, contrary to previous publications, is towards the hilum. 3) Numerous anastomotic sites exist between the perivascular and peribronchial channels in the system, apparently without a consistent anatomical relationship. 4) On the basis of present studies no definite segmental relationship of the peripheral pulmonary lymphatics can be established or delineated. These findings are contrary to previous published information concerning the subject, and these differences will be discussed.

18. Physiologic Studies of Lung Reimplantation and Homo-transplantation and the Effect of Dibenzylamine on the Incidence of Vascular Thrombosis

AKHILA N. SHARMA*, HARRY S. SOROFF*, ANDREW E. BELLAS*,

FABIO GIRON*, and RALPH A. DETERLING, JR., Boston, Mass.

The functional changes following homotransplantation of pulmonary tissue are a diminution of ventilation and CO₂ release in the presence of a normal oxygen uptake. The chief technical problem encountered in lung transplantation has been a high incidence of vascular thrombosis. The effects of Dibenzylamine upon these physiologic changes and upon the incidence of vascular thrombosis were evaluated. Reimplantation of the left lower lobe of the lung was performed in 44 dogs. Thirty-one animals served as controls. Of this group seventeen developed vascular thrombosis. Thirteen animals were pre-treated with Dibenzylamine. There was no instance of vascular thrombosis. The pulmonary blood flow, vascular resistance, gas exchange and diffusion capacity were unchanged in the five long-term survivors. Those animals which died had an increased pulmonary vascular resistance. Homotransplantation of the left lower lobe was performed in thirty-one animals. They received 4.0 mg/kg. Imuran daily. Twenty-one animals were controls. Sixteen of these animals, or 76%, died of vascular thrombosis. Three animals, 14%, were long-term survivors. Ten animals received Dibenzylamine. Two, or 20%, were long-term survivors. Of the remaining eight animals, venous thrombosis occurred in only one animal. The long-term survivors showed a normal CO₂ uptake, but a decreased CO₂ release and diffusion capacity.

19. pH and Respiratory Work

RICHARD M. PETERS, and E. McG. HEDGPETH, JR.*, Chapel Hill, N.C.

Metabolic acidosis and respiratory acidosis are common complications of major cardiac and pulmonary surgery. Fall in blood pH is a stimulus for increased ventilation. Respiratory acidosis while indicative of respiratory insufficiency may be associated with increased ventilation in a subject with mechanical derangements of the lung. It has been shown that inhalation of CO₂ mixtures which lower pH increase airway resistance. To clarify whether changes in pH independent of change in pCO₂ alter respiratory mechanics, a series of ten dogs were ventilated at a constant rate and volume while metabolic acidosis was induced by infusion of HCl and respiratory acidosis by CO₂ inhalation. Changes in measured compliance resistance, elastic and resistive work were compared by multivariate analysis with the induced changes in pH, pCO₂ and [HCO₃]. Elastic properties were not significantly altered. Fall in pH led to a progressive rise in resistance and resistive work. Significant increases in airway resistance shown by these experiments leads to alterations in time constants of various lung units. This further adds to respiratory work and pH depression by disturbing coordination of ventilation and perfusion. These experiments further emphasize the importance of restoring pH to normal.

20. Electrophrenic Respiration by Radiofrequency Induction

DANIEL W. VAN HEECKEREN*, and WILLIAM W. L. GLENN,

New Haven, Conn.

Electrical stimulation of the phrenic nerve (electrophrenic respiration - EPR) will effectively control ventilation. EPR by radiofrequency (RF) induction as developed in this laboratory would appear to have several advantages over other techniques. To simulate normal diaphragmatic respiratory movement the wave-form envelope generated in the externally located RF transmitter may be varied in contour, amplitude or frequency by modulation of the carrier wave. The internally placed receiver unit delivers mono-phasic or bi-phasic impulses to the phrenic nerve by electrodes applied directly to the nerve or indirectly through the cava or pulmonary artery. RF-EPR has been carried out in animals for up to two years. Stimulation thresholds remained stable unless electrolysis occurred. Temporary paralysis of the ipsilateral diaphragm following chronic RF-EPR was observed. The suppression of spontaneous respiration by RF-EPR has been investigated. Tetanic unilateral phrenic nerve stimulation caused a period of apnea. This period was decreased slightly by ipsilateral phrenic sensory nerve root section, markedly by bilateral vagotomy and abolished by distal ipsilateral phrenicectomy. Efficiency of RF-EPR was demonstrated by arterial gas studies in nembutal-induced apnea and by differential bronchspirometry. A limited clinical experience with RF-EPR will be reported.

21. Tracheobronchial Reconstruction with Autologous Periosteum

ERIC W. FONKALSRUD*, and WILLIAM G. PLESTED*, Los Angeles, Calif.

Sponsored by DONALD G. MULDER

Tracheal reconstruction with prosthetic materials or tissue grafts has generally been unsuccessful. The present study was undertaken to evaluate autologous costal periosteum as a pedicle flap or free graft for tracheal reconstruction. Both immediate and delayed rigid periosteal grafts were studied. Five groups of dogs were studied: 1) Costal periosteum was transplanted as a free graft to a defect in the cervical trachea. 2) Costal periosteum was placed over a large defect in the thoracic trachea as a pedicle flap. 3) A staged rib resection was performed with construction of a pedicle tube of periosteum over a solid plastic rod. Two and one-half weeks later a free circumferential graft of rigid periosteum was used to reconstruct a defect in the cervical trachea. 4) A staged rib resection was performed with molding of the periosteum into a sheet. At the second operation a free graft of rigid periosteum was placed over a large defect in the cervical trachea. 5) A staged periosteal flap was used to reconstruct a defect in the thoracic trachea. These studies indicated that autologous periosteum may serve as a suitable tissue for tracheobronchial reconstruction. Delayed rigid periosteal grafts function better than soft grafts transplanted immediately. Free periosteal grafts appear to take almost as well as pedicle flaps.

22. The Effect of Intraluminal Splinting in Preventing Caustic Stricture of the Esophagus

STANLEY C. FELL*, AUGUST DENIZE*, NORWIN BECKER*, and
ELLIOTT S. HURWITT, New York, N.Y.

Despite the administration of steroids and antibiotics, there is a significant incidence of esophageal stricture following the ingestion of caustics. The effect of intraluminal esophageal splinting was studied in cats, using the method of Haller and Bachman to produce lye stricture. Antibiotics but no steroids were administered. Surviving control animals all developed esophageal strictures, confirming the reliability of the method. In 20 cats the effect of an endoesophageal polyvinyl prosthesis implanted in the normal esophagus was studied. Thirteen animals survived between 15 and 40 days. Postmortem examination revealed aspiration pneumonia in all, with varying degrees of esophagitis. In the experimental group esophageal splinting was performed one hour after lye burning. In 10 cats the prosthesis was removed in less than 15 days; 7 developed esophageal stricture within 3 weeks, following removal of the splint. In 20 cats intraluminal esophageal splinting was maintained from 15 to 40 days. Esophageal stricture did not occur, nor has it developed in surviving animals followed thus far for 6 months. The means by which splinting protects the esophagus from caustic stricture, and the clinical applicability of the method will be discussed.

23. Experimental Esophageal Stenosis and Its Treatment

MASARU TSUKAMOTO*, FLOYD H. LIPPA*, and ALAN P. THAL,
Detroit, Mich.

The purpose of this experiment was to produce a model of esophageal stricture in dogs and to investigate the value of a gastric fundic patch in its correction. Thirty mongrel dogs were used. In one group of 15 dogs, 10% phenol was injected submucosally all around the esophagus above the esophagogastric junction, and then a skin graft was placed over the area of injection. In the other group of 15 dogs, a piece of fascia was put submucosally around the esophagus above the cardiac junction. Care was taken to prevent the stenosis of esophagus by fascia itself. Three weeks later, all the dogs in both groups had lost weight, and x-rays and esophagography showed severe stenosis of the distal esophagus and dilatation of the proximal esophagus. These dogs were operated upon again and the esophagus was incised longitudinally through the stenosed area and triangulated. A generous portion of gastric fundus was sutured over this area after biopsies were taken. The triangular defect in the esophagus protected by the overlying fundus was completely epithelialized four weeks after operation. The dogs gained weight, and x-rays and esophagography demonstrated no reflux or stenosis of the esophagus.

24. Hemodilution in Extracorporeal Circulation: Large or Small Non-Blood Prime?

ANATOLIO B. CRUZ, JR.*, and J. C. CALLAOHAN,
Edmonton, Alberta

Non-blood solutions, unmixed or in combination with homologous blood, and other ingredients have been used in small and large prime systems, with the respective proponents achieving good results. Thirty mongrel dogs of both sexes, weighing from 12 to 37 kg., divided into three groups, were placed on complete cardiopulmonary bypass for sixty minutes at normothermia, using disposable plastic bag oxygenators. The priming volumes were: Group I - 20cc/kg, Group II - 40cc/kg, and Group III - 80cc/kg, of Ringers Solution. No Alkali, THAM, or other diluents were added to the perfusate. Blood gases, pH, bicarbonate, buffer base, base excess, hemoglobin, hematocrit, lactic and pyruvic acids, electrolytes, blood sugar and plasma hemoglobin were determined before, during, and after perfusion, including the 8 hour post-bypass period. Acid base balance and metabolic derangements were minimal in Group I, and became worse in Groups II and III, although flow rates in the latter groups were the same as, or slightly better than, those in Group I. Animals in Groups II and III bled more in the post-bypass period, and remained unconscious longer. Survival rates were: Group I - 100%, Group II - 60%, and Group III - 40%.

25. Body Fluid Compartment Changes After Open Intracardiac Operations

JOHN CLELAND*, JAMES R. PLUTH*, W. NEWLON TAUXE*, and
JOHN W. KIRKLIN, Rochester, Minn.

Our previous work demonstrated that increased blood volume (BV) and total body water (TBW) of patients with mitral stenosis returned to pre-dieted normal values two weeks after closed commissurotomy and extraplas-matic extracardiac fluid failed to do so. 30 patients subjected to open intracardiac operations have now been studied pre-operatively, immediately postoperatively and two to thirty-five days later. Plasma volume was reduced immediately postoperatively (mean - 8%). There was greater reduction of red cell mass (ROM) following mitral valve replacement (mean - 31%) than aortic valve replacement (mean - 21%) or repair of congenital malformations (mean - 15%). Blood volumes late postoperatively were reduced compared to pre-operatively and similar to those immediately postoperatively. This is probably a result of improved cardiac performance after operation. Extracellular fluid (ECF - ⁸²Br) was increased immediately postoperatively (mean +13%) but especially in patients with recent congestive failure (mean +27%). Late postoperatively ECF in most patients returned to pre-operative values but were still above predicted normal. Abnormalities of renal function may be etiologic. TBW was unchanged immediately after surgery. Intracellular water appeared to be markedly decreased at that time.

26. The Importance of Micro-Embolism in the Pathogenesis of Organ Damage Caused by Prolonged Use of the Pump Oxygenator

P. G. ASHMORE, D. B. ALLARDYCE*, and S. H. YOSHTDA*,
Vancouver, British Columbia

There is considerable evidence that blood exposed to oxygen in an extra-corporeal circulation for prolonged periods accumulates large numbers of microscopic aggregates. These aggregates are removed during passage through the circulation, and are an important source of organ damage. We have attempted to define the nature and etiology of these aggregates, their effects during perfusion, and methods of eliminating them from extracorporeal circulation systems. Fresh, unmatched blood was circulated and oxygenated in a disc oxygenator, for ten hour periods. Partial cardiopulmonary bypass was then instituted in dogs, using veno-arterial, and veno-venous perfusion in different groups. The effect on renal, cerebral and cardiovascular function was evaluated by clinical and histological studies. Pulmonary function was studied with measurement of blood gases, and by post-mortem studies of surface tension of lung extracts, pressure-volume characteristics of excised lungs and routine and electron microscopic examination of lung sections. Screen filtration pressures were measured in the circulating blood, as an index of its content of embolic material. These studies indicate the importance of particulate obstruction of the micro-circulation during extracorporeal circulation, and relate to the clinical use of prolonged assisted circulation.

27. Must Heparin Be Neutralized Following Open Heart Operations?

ALDO R. CASTANEDA*, Minneapolis, Minn.

Sponsored by RICHARD L. VARCO

Systemically administered heparin during extracorporeal perfusion has commonly been neutralized at the conclusion of the operative procedure. However, either polybrene or protamine for heparin back titration are polybasic, and can produce major hemodynamic changes. Red blood cell suspensions so exposed customarily reveal progressive decreases in RBC electrical charge and severe degrees of RBC aggregation can be observed in vitro and in vivo. Furthermore, thrombotic episodes from all causes, have become serious hazards after prosthetic valvar procedures. Hence, prolongation of systemic heparinization, in the immediate postoperative period, was sought in 72 consecutive open heart operations, including 56 valve replacements. Neutralization drugs were avoided except in four instances of medial cystic necrosis with valvar replacement and aortic grafts. Postoperative, clotting times gradually returned to normal within eight hours in the non-neutralized group. Chest tube drainage became serosanguineous within 24 to 48 hours, and was regularly discontinued by 72 hours. No early postoperative thrombotic problems developed. Moreover, no patient of the entire group of 72 required reoperation for postoperative bleeding. These results suggest that withholding protamine neutralization of heparin, particularly after prosthetic valve implantation does no harm and may be beneficial when close attention has been paid to precise hemostasis.

*By Invitation

WEDNESDAY AFTERNOON, MAY 18, 1966

[Back to Annual Meeting Program](#)

Wednesday Afternoon, May 18, 1966

2:00 P.M. Scientific Session: REGULAR PROGRAM Ballroom

44. Gastroesophageal Reflux and Hiatus Hernia: Complications and Therapy

HAROLD G. URSCHERL, and DONALD L. PAULSON, Dallas, Texas

Although gastroesophageal reflux has been associated with esophageal hiatal diaphragmatic hernia, its true significance has not been fully appreciated until recently. Of 1148 patients with esophageal hiatal hernia or gastroesophageal reflux without hernia, 15 percent were recognized as having respiratory symptoms prior to 1961 in contrast to 50 percent since that date. Symptoms include cough, hoarseness, bronchitis, asthma, and pneumonitis. Gastroesophageal reflux was documented with esophagoscopy and esophageal cine fluorography. Patients with gastroesophageal and pulmonary complications secondary to reflux with, or without, elevated gastric acids were managed by reconstruction of the gastroesophageal angle and hernia repair. In those with associated duodenal or gastric ulcers and elevated acids vagotomy and pyloroplasty were added. Longitudinal stenoses were treated by dilatation, reconstruction of the gastroesophageal angle and hernia repair except where esophageal shortening necessitated colon interposition. Annular strictures were treated through a transthoracic gastrotomy by circumferential mucosal resection and anastomosis, gastroesophageal angle reconstruction and hernia repair. Comparison of 436 patients operated upon by modified Allison procedures with 227 patients undergoing "Belsey" operations indicates a 10 percent hernia recurrence, and a 25 percent persistence of gastroesophageal reflux in the former group, and 2 percent hernia recurrence and less than 10 percent reflux in the latter.

45. Surgical Management of Esophageal Reflux and Hiatus Hernia: Long Term Results with 1030 Patients

DAVID B. SKINNER*, Boston, Mass., and RONALD BELSEY*,

Bristol, England

Sponsored by PAUL S. RUSSELL

One thousand and thirty patients, including 119 children, required surgical treatment for esophageal reflux and hiatus hernia at the Thoracic Surgery Unit, Bristol, England, between 1949 and 1962. Symptoms, esophagoscopy and radiographic findings, indications for surgery, operative management, and results have been reviewed. Long term follow-up has been obtained in 97%. Post-operative barium swallows were obtained in all patients, and have been repeated during follow-up in 57%. In this series, the standard hiatus hernia repair has been a technique developed at Frenchay Hospital, which creates a segment of intra-abdominal esophagus held in place by an exaggerated esophago-gastric angle. This technique will be

described. Studies of the motor function and pH gradient of the cardia before and after hiatus hernia repair support the physiological effectiveness of this method. Low mortality, complication and long term recurrence rates have been encouraging. Factors contributing to recurrences have been identified. When hiatus hernia repair has not been possible, other techniques such as left colon interposition or esophagogastrctomy have been employed. A review of this experience suggests an overall approach to the management of esophageal reflux and hiatus hernia.

46. Functional Evaluation of Childhood Esophageal Replacement

H. BIEMANN OTHERSEN, JR.*, Charleston, S.C., and
H. WILLIAM CLATWORTHY, JR., Columbus, Ohio

In children, which technique of total esophageal replacement functions best? At present, the colon appears to be the substitute of choice. However, other questions must be answered. Should the interposed colon be: Right, transverse, or left colon? Iso- or anti-peristaltic? Retrosternal or intra-pleural? In order to answer these questions concerning technique and to evaluate mechanical function of the transplant and its effects on somatic growth, this study was undertaken. From 1960 to 1965 a total of eleven children have had total esophageal replacement for atresia or caustic stricture at the Children's Hospital, Columbus, Ohio. All patients were evaluated clinically and with detailed cinefluoroscopy. Evidence will be presented for the following conclusions: 1) A single stage colonic interposition is preferable. 2) The interposition operation should be delayed until the child is ambulatory and has been taught to chew and eat. 3) There is no discernable difference in function between right and left colonic segments and between anti- and iso-peristaltic arrangements. Small bowel segments do retain peristalsis, but of a segmenting rather than propulsive type. 4) The interposed colon acts not as an esophageal substitute but as a conduit only. Gravity, not peristalsis, governs the flow of ingested material.

47. Post-Operative Changes in Regional Pulmonary Blood Flow

LESTER R. BRYANT*, Lexington, Ky., FRANK C. SPENCER,
New York, N.Y., ROBERT H. GREENLAW*, PONOSIRI PRATHNADI*,
and JOHN BOWLIN*, Lexington, Ky.

Lung scintiscans with macroaggregated radioalbumin were performed in 80 patients on the 1st or 2nd, and the 7th day following thoracic (25 cases) and abdominal (55 cases) operations to detect pulmonary emboli and changes in distribution of pulmonary blood flow. Chest roentgenograms, arterial blood gas studies and pulmonary arteriograms were made at the same time. The initial scintiscan was abnormal in 45 patients (56%) but returned to normal by the 7th post-operative day in 32. The principal changes were: 1) wedge-shaped defects, simulating emboli; 2) absence of blood flow in the lung periphery, and, 3) decreased blood flow to the lung bases. These changes were usually associated with a normal roentgenogram but with mild decreases in pO₂ (50-63 mm.Hg) and oxygen saturation (86-92%). The pulmonary arteriograms demonstrated small emboli in only 2 patients, but clinical evidence of atelectasis or pneumonia occurred in 12 patients with abnormal scintiscans and in only 2 patients with normal regional blood flow. The frequency of unsuspected transient changes in regional pulmonary blood flow limits the diagnosis of pulmonary emboli by scintiscanning alone, and suggests that post-operative atelectasis may be preceded by changes in regional blood flow.

48. Pulmonary Embolectomy. Eighteen Months' Experience at Brompton Hospital

M. PANETH*†, London, England
Sponsored by JOHN W. KIRKLIN

An account will be given of emergency pulmonary embolectomy with cardio-pulmonary bypass. The clinical material has been gathered from a number of hospitals in and around London and consists of more than 12 cases. The factors affecting a successful outcome will be analysed. The importance of the history, physical signs and of simple investigations will be pin-pointed leading to an accurate clinical diagnosis. Physiological data will be presented, both experimental and clinical, relating to pulmonary embolism with particular reference to its effect on the function of the right ventricle. Late results of untreated massive pulmonary embolism with survival will be shown and a surgical approach to these cases will be indicated.

49. Coronary Artery: Bight Heart Fistulas

RODMAN E. TABER, HENRY H. GALE*, and CONRAD R. LAM, Detroit, Mich.

Congenital fistulas between a coronary artery and the right side of the heart may present physical findings which are difficult to differentiate from those of patent ductus, aorto-ventricular fistula or aortic insufficiency. Right-sided cardiac catheterization will establish the presence of a left-to-right shunt in these patients, but coronary arteriography must be relied upon to identify the exact site of the fistula and permit closure with minimal disturbance of the normal coronary circulation. Four patients successfully underwent closure of fistulas between the right coronary artery and right side of the heart. The shunt was between the sinus node branch of the right coronary artery and the right atrium in three patients. An anterior branch of the right coronary artery and the right ventricle were involved in the fourth patient. The fistulas were divided in three patients and over-sewn in one. Although electrocardiographic signs of myocardial ischemia were not uncommon in the immediate postoperative period, all four have recovered and are free of cardiac murmurs.

50. Direct Coronary Artery Surgery with Endarterectomy and Patch Craft Reconstruction: Clinical Application and Technical Considerations

DONALD B. EFFLER, LAURENCE K. GROVES, ERNESTO SUAREZ*, and
RENE G. FAVALORO*, Cleveland, Ohio

Between January 1962 and December 15, 1965, 51 operations were performed in the Cleveland Clinic Hospital for direct relief of coronary artery obstruction. Eleven deaths occurred at or immediately after operation; each death is attributable to induced myocardial infarction and represents surgical failure. Nine of the 11 deaths occurred in the 17 operations on the left coronary artery. Indications for the direct approach are greater than anticipated. Our initial experience includes endarterectomy

*By Invitation

†Everts A. Graham Memorial Traveling Fellow, 1956-57

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RALPH ADAMS R. G.
 FERGUSON
 GEORGE M. CURTIS JAMES H.
 FORSEE
 H. MORRISTON DAVIES
 LAWRENCE M. SHEFTS
 GEORGES DESHAIES

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THE AMERICAN ASSOCIATION FOR THORACIC SURGERY

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June 7, 1917

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ANNUAL MEETING DATES

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Meetings of the American Association for Thoracic Surgery

1918-Chicago President, Samuel J. Meltzer
1919-Atlantic City..... President, Willy Meyer
1920-New Orleans President, Willy Meyer
1921-Boston..... President, Rudolph Matas
1922-Washington President, Samuel Robinson
1923-Chicago..... President, Howard Lilienthal
1924-Rochester, Minn... President, Carl A. Hedblom
1925-Washington President, Nathan W. Green
1926-Montreal President, Edward W. Archibald
1927-New York.. President, Franz Torek
1928-Washington President, Evarts A. Graham
1929-St. Louis President, John L. Yates
1930-Philadelphia..... President, Wyman Whittemore
1931-San Francisco. President, Ethan Flagg Butler
1932-Ann Arbor..... President, Frederick T. Lord
1933-Washington President, George P. Muller
1934-Boston President, George J. Heuer
1935-New York... President, John Alexander
1936-Rochester, Minn... President, Carl Eggers
1937-Saranac Lake.... President, Leo Eloesser
1938-Atlanta. President, Stuart W. Harrington
1939-Los Angeles President, Harold Brunn
1940-Cleveland President, Adrian V. S. Lambert
1941-Toronto President, Fraser B. Gurd
1944-Chicago. President, Frank S. Dolley
1946-Detroit President, Claude S. Beck
1947-St. Louis.... President, I. A. Bigger
1948-Quebec. President, Alton Ochsner
1949-New Orleans President, Edward D. Churchill
1950-Denver President, Edward J. O'Brien
1951-Atlantic City..... President, Alfred Blalock
1952-Dallas. President, Frank B. Berry
1953-San Francisco President, Robert M. Janes
1954-Montreal.. President, Emile Holman
1955-Atlantic City..... President, Edward S. Welles
1956-Miami Beach. President, Richard H. Meade
1957-Chicago..... President, Cameron Haight

1958-Boston.. President, Brian Blades
1959-Los Angeles..... President, Michael E. De Bakey
1960-Miami Beach. President, William E. Adams
1961-Philadelphia... President, John H. Gibbon, Jr.
1962-St. Louis..... President, Richard H. Sweet (Deceased 1-11-62)
..... President, O. Theron Clagett
1963-Houston. President, Julian Johnson
1964-MontrealPresident, Robert E. Gross
1965-New OrleansPresident, John C. Jones