ABSTRACTS

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PATHOLOGIC PHYSIOLOGY


The preferential use of intra-arterial or intravenous blood transfusions in the treatment of shock is an important clinical problem. The intra-arterial route has been favored because of the assumptions that: (1) this route produces a more rapid increase in systemic pressure as a result of a hydropic effect; (2) the perfusion of the coronary bed is more quickly and effectively re-established; and (3) that a larger volume of blood can be given without producing dangerous elevations of venous pressure and right ventricular dilatation. The experiments were designed to study the effects of comparable blood transfusions by the arterial and venous routes in the same dog, made hypotensive due to hemorrhage on systemic blood pressure, right ventricular end diastolic pressure, left ventricular end diastolic pressure, and coronary blood flow.

Twelve experiments were accomplished in mongrel dogs. Pressure determinations were made from the carotid artery, right ventricle, and left ventricle with Gregg optical manometers or strain gauges. Coronary blood flow was measured by a rotameter. Readings were taken before, during a hypotensive period (arterial pressure between 5 and 57 mm. Hg), and during reinfusion of blood intra-arterially or intravenously.

There were no significant differences between intra-arterial or intravenous infusion with respect to time required for pressure restoration or the final pressure level reached in the carotid artery, right ventricle and left ventricle. The two routes of infusion were equally effective in restoring coronary blood flow.

Wechsler


It has been shown that prolonged hypotension causes a depression of liver blood flow and metabolism, and it has been postulated that one result of this may be an accumulation of toxic materials, e.g., V.D.M., which may contribute to circulatory collapse. Changes in liver blood flow during hypotension were, therefore, measured in anesthetized rats by means of internal colorimetry (Grayson, 1952). Hypotension was induced by hemorrhage into a reservoir and then the blood was rein infused.

In 25 experiments, there was an initial rapid decrease and partial recovery in liver blood flow followed by progressive diminution. Interruption of the arterial blood supply to the liver (ligation of the coeliac axis) before bleeding failed to alter this response. Ligation of the hepatic nerves, along with the coeliac axis, prevented the initial rapid fall and partial recovery in liver blood flow. Interruption of nerve supply by tetraethyl ammonium bromide or dibenamine caused a more gradual drop in flow in response to hemorrhage. Intermittent graded reductions in arterial pressure (10 mm. Hg each) produced a transitory fall in flow lasting only a few minutes. After a critical level of blood pressure (approximately 60 mm. Hg) was reached, full recovery of flow did not occur. Separate interruptions of the arterial or portal blood supplies did not alter these results. Reinfusion of the blood brought about an increase in liver blood flow at rates substantially below those recorded at the beginning of the experiments.

These results suggest that the initial rapid fall and
partial recovery (transient reflex hepatic vasocostriction) in flow were nervously mediated in response to the low blood pressure. Because liver blood flow is maintained at near normal values despite the decrease in perfusion pressure to a critical level, an internal blood flow regulating mechanism in the liver is postulated. Hypotension causes progressive increase in hepatic resistance to portal blood flow which is independent of nervous influences and persists after termination of hypotension.

WECHSLER


Three cases of primary pulmonary hypertension are described. The main findings in these cases were (a) right ventricular hypertrophy, (b) dilatation of the main pulmonary vessels, (c) atheroma of these vessels, and (d) arteriosclerosis of the pulmonary arterioles.

The above changes are identical with those seen in the systemic circulation in essential hypertension. In both diseases the etiology is, as yet, unknown. In primary pulmonary hypertension, there would appear to be an increased tonus of the pulmonary arterioles. The right ventricular hypertrophy and the dilatation of the main pulmonary artery seen in the cases described would appear to be due to the elevated pulmonary pressure. Another feature in common between systemic hypertension and primary pulmonary hypertension are the identical changes in the respective vascular beds. These changes, in both instances, may range from normal vessels to obliterative arteriosclerosis. The hall mark of prolonged systemic hypertension is found in the arterioles, the changes in the pulmonary arterioles would therefore indicate pulmonary hypertension as the cause of the vascular sclerosis in these cases.

BERNSTEIN


Oxygen uptake as well as inorganic phosphate uptake by cardiac muscle were measured manometrically and the oxygen-phosphate ratio calculated. This was done on normal canine cardiac muscle and failed canine cardiac muscle. There was no difference in the phosphorylating ability noted between these two muscle preparations. The authors conclude that this indicates (if energy metabolism is concerned in failure) the defect is not in the production of energy-rich compounds.

HARVEY


The authors describe their method for determining Na and K transfers on and off a sulfonated polystyrene resin in isolated loops of small and large intestines of the rat. By employing the radioactive isotopes of Na and K, it was possible to calculate the absolute rates of transfer as well as the net exchange. In the small intestine, the net rate of Na uptake was 1.0 mEq. per Gm. per hour. In the large intestine, the transfer of Na off the resin exceeded the uptake, leaving a net transfer of –0.35 mEq. per Gm. per hour, while the net rate of K uptake was +0.38 mEq. per Gm. per hour.

These observations imply that exchange resin in the intestine acts as an additional electrolyte-containing compartment capable of coming into equilibrium with the exchangeable Na and K of the body. Transfers of these cations between the body and the resin occur in a constantly changing series of dynamic equilibria as the resin passes down the intestinal tract. Indeed, at equilibrium, the transfers on the resin equal the transfers off, so that there is no further net exchange in that segment of gut. The relative proportions of cations in the surrounding fluid is the main factor in determining the equilibrium concentrations of cations on the resin. The remarkably efficient Na-conserving ability of the colon is stressed. The mechanisms involved appear to be first reabsorption of the bulk of the water and electrolytes, and also a quantitative cationic exchange of K for Na.

ENSELBERG


Intra-esophageal pressure and tidal volume were recorded in normal subjects, patients with mitral stenosis, and patients with emphysema at varying grades of exercise up to the maximum they could maintain for six minutes. The results on normal subjects breathing without or against an inspiratory resistance, suggest that the factor limiting respiratory effort is the force exerted on the lungs. This dyspnea threshold is not affected by inspiratory resistance.

The patients with mitral stenosis or emphysema reached their limit of respiratory effort while exerting as great a force on the lungs as the normals but at a much lower rate of ventilation. For example, a patient with mitral stenosis who reaches his limit of respiratory effort when breathing 30 or 40 L per minute, may be exerting the same force on his lungs as a normal person whose limit is reached when breathing 120 L per minute. The results suggest that in order to satisfy a respiratory stimulus a person can increase the minute volume until he is limited by the force which he can apply to the lungs. The maximum rate of physical work he can perform will depend not only on the minute volume.
required at this rate but also on the resistance of the lungs to expansion.

**Enselberg**

**Merger, John H.; Miller, S. I. and Snyder, H.:**

Effect of Increased Jugular Pressure on Cerebral Hemodynamics. J. Appl. Physiol. 7: 245 (Nov.), 1954.

It has been suggested that cerebral blood flow might be impaired in heart failure as a result of increased venous pressure which is associated with this disease. The purpose of this study was to determine the effect of increased jugular venous pressure in cerebral blood flow and, therefore, to investigate the above hypothesis.

In seven patients, measurements of cerebral blood flow (by the N₂O technic of Kety and Schmidt), jugular venous pressure, cerebrospinal fluid pressure, mean arterial blood pressure, blood gases and hematocrit were made before and after five minutes after the jugular bulb venous pressure was raised to 124–300 mm of water. The jugular bulb venous pressure was elevated by raising the pressure in a blood pressure cuff securely fastened around the neck as a tourniquet.

The increased jugular venous pressure failed to change cerebral blood flow, cerebrovascular resistance, mean arterial blood pressure, pulse rate, hematocrit or respiratory rate. However, there was a significant increase in cerebral O₂ consumption, arterial O₂ content and cerebrospinal fluid pressure.

These results indicate that a moderate increase in venous pressure (not in excess of 300 mm. H₂O) does not affect the cerebral circulation.

**Wechsler**

**Guyton, A. C., Polizo, D. and Armstrong, G. G.:**


In this study action of the heart was stopped suddenly by ventricular fibrillation, vagus standstill or acute pulmonary artery occlusion. Immediately afterwards blood was perfused from aorta to external jugular vein. In normal dogs under these conditions the mean circulatory filling pressure was 6.3 mm. Hg (average). Total spinal anesthesia reduced it to 5 mm Hg. Continuous maximal injections of epinephrine to increase vasomotor tone increased it to 16 mm. Hg. Slow pulmonary artery occlusion gave a maximum mean circulatory filling pressure of 13 mm. Hg. This represented the sympathetic activity produced by the animal. Infusion of fluid before standstill was produced elevated the mean circulatory filling pressure.

**Oppenheimer**


A study on the renal excretory capacity for water in the immediate postoperative phase was performed on a group of patients undergoing major abdominal surgery and compared with the responses in a series of normal subjects. In each instance an intravenous infusion of 5 per cent glucose was given. The type of change suggested that following major surgery and anesthesia, posterior pituitary antidiuresis occurred, producing a diminished renal excretory capacity, a finding to be borne in mind in prescribing postoperative fluids.

**Abramson**

**PATHOLOGY**


In the laboring class endocardial fibrosis is the most frequent cause of congestive heart failure. It appears to occur as often in Arabs as in Negroes. Embolism from mural thrombi is often the "opening gun." Syphilis is clearly not a factor. Undernutrition or malnutrition cannot be incriminated. Eosinophilia was present in only two cases.

**McKusick**


The case of a man, aged 41 years, with dystrophia myotonica is described. Symptoms began about 10 years before he died quite suddenly. Clinical and electrocardiographic observations 10 days before his death disclosed atrial flutter with varying degrees of atrioventricular block. Microscopic examination of the myocardium of the left ventricle disclosed diffuse fibrosis with separation of muscle fibres by fairly dense, fibrous connective tissue. Hyper trophyd muscle fibres with large rectangular nuclei were scattered throughout the left ventricular myocardium. The coronary vessels were normal. It is felt that the cardiac involvement caused the patient's death.

**Rosenbaum**


This study was undertaken to ascertain what, if any, complications may arise in instances of myocarditis. Of 40 cases of myocarditis observed during the last eight years, 15 fulfilled the criteria of isolated myocarditis. Outstanding were the findings of minute emboli in the coronary arteries and cerebral vessels. The sources of these emboli were small mural thrombi in the heart, although these were found only in three cases. These thrombi were discovered by chance in the available section of the
myocardium and adjacent endocardium. The fact that often multiple emboli were present in several organs, speaks for the heart as the source of the emboli. The cause of these emboli is obviously the inflammatory changes close to the endocardium producing subendocardial edema or even localized foci of mural endocarditis predisposing to the formation of thrombi. It seems quite clear that multiple emboli constitute a serious complication contributing to the death of the patients.

BERNSTEIN


This paper reports the occurrence of pericarditis in patients with acute renal failure and compares this with the occurrence in chronic renal failure. The hospital records of 77 patients with acute renal failure of varying causes were reviewed. Pericardial friction rub was heard in 14 of 77 patients, or 18 per cent. Of this group six survived and eight died. Postmortem examinations done in six of the patients who died showed morphological evidence of pericarditis. Forty-three patients dying of chronic renal failure were studied. Twenty-two of these had pericarditis diagnosed clinically and at necropsy. Of the group of patients with acute pericarditis associated with acute renal failure pain was either absent or not mentioned in 13 of the 14 cases. Of the 22 patients with chronic renal failure and pericarditis, eight complained of pain. This study shows that pericarditis occurs in about 18 per cent of cases of acute renal failure but does not have the same grave prognostic significance as it has in chronic renal failure; and that pericarditis occurs in about half of the patients dying of chronic renal failure. In keeping with the findings of other studies these clinical observations suggest that precordial pain of a pleuritic type occurs in many patients with uremic pericarditis and pain referred to the left shoulder occurs in about half of the patients who have painful pericarditis.

KITCHELL

PHARMACOLOGY


Potassium antagonized the arrhythmia producing effects of the digitalis glycosides. However, it is questionable if K⁺ antagonizes other actions of the digitalis glycosides. This problem has both academic and clinical importance.

The contractile force and threshold of irritability of cat papillary muscle which was stimulated electrically was measured after adding K⁺ and ouabain at various concentrations. K⁺ either increased or did not interfere with the contractile force produced by ouabain. K⁺ did not change the threshold of irritability until the concentration of ouabain caused a decreasing inotropic effect.

These results indicate that K⁺ concentrations of 3.5 to 8.5 millimols per liter did not interfere with the inotropic action of ouabain and they protected the mammalian ventricular muscle against ouabain produced arrhythmias.

WECHSLER


It has been demonstrated that protoveratrine is not a single substance but is made up of chemically different substituents. It is important to know to what extent these substituents affect hypotensive potency. Arterial blood pressure was measured in anaesthetized dogs. Hypotensive potencies were determined by the carotid sinus pressor reflex procedure of Rubin and Burke (1953). The influence of slight structural differences of acid groups on hypotensive potencies was indicated by the facts that Protoveratrine A, Veralba and Germitetrine B have the same and greatest potencies, Protoveratrine B the next greatest, and Unitensen the least. Various substituents were given intravenously in order to compare the emetic and hypotensive activities. Protoveratrine A and Veralba were more potent emetics than Unitensen. There were no differences in the hypotensive emetic ratios and therefore no dissociation of hypotensive from emetic activity.

Studies on reflexes in dogs indicated that Protoveratrine A decreased blood pressure by acting on receptors whose impulses travel to the vasomotor center via the vagus and carotid sinus nerves.

WECHSLER


The authors analyze and discuss their experience with norepinephrine in patients with severe cardiovascular collapse of various etiologies. Some of the probable causes of the failures observed are discussed. In certain individuals, adequate pressor response can only be obtained with large doses such as 20 to 40 micrograms per minute and, therefore, inadequate dosage of norepinephrine may account for some failures. In other instances, the drug may fail to reach the site of action because blood is pooled in dilated vessels or the blood vessel may be unable to respond to the drug because of poor nutrition resulting from shock. Norepinephrine may also be ineffective because it is not properly distributed to the arterial circulation due to mechanical interference the venous blood return to the heart, inadequate blood volume, or cardiac failure. Al-
though norepinephrine is a valuable addition to the management of the patient in shock, the correction of the initiating factors still constitute the fundamental objectives in the treatment of shock.

SAGALL


When adrenergic blockade was severe enough to give a pure skeletal muscle vascular bed vasoconstrictor response with l-epinephrine, these experiments present evidence that constrictor endings are still being stimulated with an effectiveness by l-epinephrine equal to comparable doses of l-norepinephrine. The authors conclude that this persistent vasoconstrictor effect is masked by the simultaneous intense vasodilator response due to l-epinephrine.

OPPENHEIMER


Chronic emphysema of the lungs, particularly if associated with cardiac complications, has long posed a therapeutic problem. Treatment, until recently, has been limited to the supportive measures and the conventional management of cor pulmonale. The primary problems of defective alveolar ventilation, increased carbon dioxide content of the blood, and respiratory acidosis have remained unsolved. Diamox proved useful in the treatment of four patients with chronic emphysema of the lungs. The venous plasma carbon dioxide combining power was decreased about 6 mEq. per liter during therapy. This coincided with a remarkably increased exercise tolerance, decreased dyspnea, and statistically significant improvement in performance of pulmonary function tests.

KITCHELL


Seven patients were observed in whom acute hypotension developed after chlorpromazine administration. Hypotension detected early was easily reversed, but intensive therapy was required if the hypotension was of long duration. In one patient acute renal insufficiency subsequently developed, presumably a complication of the prolonged hypotension. Since some persons may be potential hypotensive reactors, blood pressure response should be determined at frequent intervals when the drug is first administered and whenever the dose is increased.

KITCHELL


A detailed historical survey of carbonic anhydrase and its inhibitors from the discovery of the former in 1932 is provided. In man over 70 per cent of an administered dose of Diamox is excreted unchanged in the urine by 24 hours. When given in the therapeutic range of oral dosage Diamox can be detected in the plasma for 6 to 12 hours after administration but is detectable in the red cells for several days. Renal clearance is about 1/5 of simultaneously determined creatinine clearance in dog. The drug is distributed in a volume corresponding to “somewhat less” than 40 per cent of body weight in man, with about one-twentieth as high a concentration in C.S.F. and aqueous humor as plasma.

In the dog at least a 1000:1 ratio exists between toxic and therapeutic dosage of Diamox. In the mouse the LD 50 for the sodium salt is approximately the same as for sodium lactate or chloride.

Drowsiness and deep sleep, which may be induced in man with higher dosages, could not be produced in dogs, rats or monkeys at 25 times that dosage. The CNS effects in man are apparently due to reversible inhibition of brain carbonic anhydrase. No explanation for the striking species difference was apparent. The CNS effects of sulfanilamide are probably analogous.

For treatment of edema interrupted dosage seems desirable whereas in the treatment of epilepsy and glaucoma continuous maintenance therapy may be necessary.

In the animals no changes were observed in the crystalline lens which contains more carbonic anhydrase than any other tissue except the erythrocyte. However, no detailed morphological study of the lens was undertaken.

McKUSICK


Normal subjects were studied as well as patients with congestive failure due to rheumatic heart disease, hypertensive heart disease and pulmonary heart disease secondary to bronchitis and emphysema. Diamox increased the urinary volume, urinary pH, and the excretion of bicarbonate, sodium and potassium. However, the efficacy of the drug as a diuretic is limited by its self-inhibitory action. On repeated administration a systemic acidosis is produced with reduction of plasma bicarbonate and compensatory increase of chloride. The maximum excretion rate of bicarbonate then becomes less than 25 per cent of the amount filtered at the glomeruli. Diamox increases the maximum rate of water
diuresis, probably by a depressant action on the proximal tubular reabsorption of bicarbonate. In mild cases of congestive failure the drug acts very much as it does in normal subjects. In severe cases of cardiac failure it has a grossly abnormal action, resulting in the retention of sodium and excretion of potassium in amounts equal to the excess bicarbonate. In the cases of emphysema the authors found the drug to be of no more value than in other varieties of heart disease.

The authors consider that Diamox is relatively ineffective as a diuretic because the diuretic effect depends on increase of bicarbonate excretion. At therapeutic dose levels the maximum excretion rate of bicarbonate was less than 25 per cent of the amount filtered. While a similar limitation with respect to chloride applies to mercurial diuretics, the fact that plasma chloride concentration is four times that of bicarbonate results in a much higher maximal excretion rate of chloride. The self-limiting action of Diamox involves a systemic acidosis and consequent reduction of plasma bicarbonate. This can be restored only by stopping the drug or giving excess fixed base as sodium bicarbonate. The similar reduction of plasma chloride in mercurial diuresis on the other hand is easily corrected by the use of ammonium chloride.

And finally in severe cases of cardiac failure, Diamox may fail to remove sodium despite increased excretion of bicarbonate which is excreted entirely as the postassium salt. This could be a factor in potentiating digitalis toxicity.

Enselberg
Rabbit hearts were damaged by vitamin E deficiency. Examination of these showed a reduction of creatine phosphate to 0.9 mg. per cent from control values of 6.1 per cent. Glycogen, inorganic phosphate and adenosine polyphosphate were unchanged. A rapid onset of dystrophy and weight loss was associated with the largest decreases in cardiac creatine phosphate.

Oppenheimer
Clinical evaluation of new drugs is one of the major issues in therapeutic progress. The effect of a drug varies greatly with the patient's mood. The effect may also be significantly altered with a change in the mood. Special attention was directed to the use of the placebo, the double-blind test, statistical analysis of the data and experimental design to eliminate bias. Emphasis was placed on the unconscious aspects of bias of the physician. The control of bias by the double-blind test is now recognized as imperative for the valid evaluation of drugs, not only with respect to the study of subjective symptoms such as cardiac pain, but also in studies involving so-called objective measurements such as iron in anemia, diuretic agents and anticoagulants in thrombotic diseases. The conventional design of the treated and untreated groups in a clinical evaluation of a medicinal agent is giving way to the plan which calls for treating all patients, where possible, with the agent in question or with a placebo, the two being indistinguishable in physical form or appearance and their identity unknown to patient or investigator during the experiment.

Harris
The principle of the method is as follows: CO₂ is bubbled at a constant rate through water containing indicator dye which changes color at pH 7. A standard amount of buffer (pH 9) is then added, changing the color of indicator. The hydration of CO₂ to H₂CO₃ neutralizes the added buffer and returns the indicator to its original color. In the absence of carbonic anhydrase this hydration process requires 62–72 seconds. When enzyme is added, the reaction time is decreased with a reproducible relationship between reaction time and enzyme concentration. By keeping the amount of added enzyme constant, the reaction time becomes a measure of the concentration of carbonic anhydrase inhibitor present.
The method is sufficiently sensitive (0.5 microgram per gram tissue) and accurate (±10 per cent) for determination of Diamox in biological samples.

McKusick
In Stage III of anesthesia, the plasma sympathin levels were reduced to about thirty per cent of the mean value for unanesthetized animals. The decrease in plasma sympathin during pentobarbital anesthesia could be explained by (a) a partial depletion of the adrenal gland of epinephrine and norepinephrine during induction, (b) a diminished central stimulation of the gland, or (c) a decreased production of the amines. The rapid disappearance of intravenous epinephrine from the plasma indicates that epinephrine was either (a) absorbed by tissues or red blood cells, (b) rapidly metabolized, or (c) excreted. Since the plasma level returned to normal after the initial rise following epinephrine administration, reversible storage by tissues seems unlikely.

Bernstein
PHYSICAL SIGNS


Pericardial tamponade results when accumulation of fluid within the pericardial sac or constriction of the pericardium by scar or tumor tissue seriously interferes with the pumping action of the heart. It has been known for many years that the essential mechanical fault is restriction in diastolic filling when the pressure of fluid or constricting tissue prevents full expansion of the chambers during the resting phase of the cardiac cycle. A complex interrelationship of reduced cardiac output, altered venousuricular pressure gradients (from the encompassing fluid or scar), and the fluctuating intrathoracic pressure of respiration is productive of an important physical sign, called pulsus paradoxus. This term refers to the fall in cardiac output during inspiration, the fall being measured with the blood pressure cuff or by palpation of the pulse. It is not actually a paradoxical effect but is an accentuation of the normal fall in output during inspiration. The other important circulatory effect of acute tamponade is increased venous pressure, which frequently produces liver enlargement. Ankle edema and ascites are rarely seen.

Seventeen cases of pericardial tamponade are reviewed. The diagnosis was frequently missed owing to misconceptions about the syndrome of tamponade and because of failure to recognize the important physical signs—pulsus paradoxus and pulsating neck veins. Dangers of acute tamponade are stressed. The procedures of pericardial tap and biopsy are discussed, and a section is devoted to the description of pleuropericardial "window." The use of all these procedures in diagnosis and treatment is outlined.

BERNSTEIN

PHYSIOLOGY


Cerebral hemodynamic studies, using the nitrous oxide technic, were performed before and after treatment in 16 of 22 subjects with hyperthyroidism, and in 8 of 11 subjects with myxedema. The functional status of the thyroid gland was evaluated by clinical findings, BMR, $^{31}$I uptake, and serum protein-bound iodine.

Hyperthyroidism was accompanied by diminished cerebral vascular resistance and increased blood flow. Myxedema showed the reverse findings. When appropriate therapy resulted in euthyroidism, the cerebral circulation returned to normal. Oxygen and glucose consumption by the brain was not altered.

These changes are not specific to the thyroid hormone but rather reflect the variations in cardiac output and total peripheral resistance that accompanies states of altered thyroid function. In short, the rate of cerebral metabolism is uninfluenced by thyroid hormone.

WAIFE


During exercise under anesthesia (direct stimulation of hind leg muscles for 15 minutes) ventilation increased as a rectilinear function (directly proportional) of oxygen use. Both rate and tidal volume participated in the increase. The cardiac output increase was curvilinear (concavity downward) as a function of oxygen use. Increases in rate and stroke volume had a role. The arteriovenous oxygen difference was increased. Increases in ventilation were greater than those in output. This increased the ventilation-perfusion ratio.

OPPENHEIMER


Inflow and outflow pressures were measured and blood flow observed in the left lower lung of dogs. Pulmonary vascular resistance varies inversely with inflow pressure and flow. Pressure flow and resistance-flow curves were not changed by denervation of the bronchus or positive-pressure ventilation even though the latter increased resistance.

OPPENHEIMER


This study correlates changes in blood pressure, blood flow and cardiac function with the duration and severity of hypoxia. Cardiac output, $O_2$ consumption, arterial $O_2$ saturation, femoral arterial, pulmonary arterial, and left arterial blood pressures were measured in 11 anesthetized dogs during various grades of hypoxia. Vascular resistance and ventricular work were calculated.

The results were divided into 4 groups depending on the degree of hypoxia. In mild hypoxia (arterial $O_2$ saturation from 90 to 76 per cent) vasconstriction with a variable arterial hypertension was the only significant change. Moderate hypoxia (arterial $O_2$ saturation from 27 to 60 per cent) increased cardiac output, left ventricular work and arterial blood pressure. Tissue $O_2$ extraction and vascular resistance were diminished indicating systemic and pulmonary vasodilation. Moderate hypoxia increases blood flow in order to maintain $O_2$ transport in spite of the decreased arterial $O_2$ content. Severe hypoxia
(arterial $O_2$ saturation 8 to 15 per cent) for 3.7 to 6.5 minutes increased cardiac output, left ventricular work, ventricular diastolic filling pressure and arterial blood pressure. There was a marked decrease in tissue $O_2$ extraction. Prolongation of severe hypoxia (average arterial $O_2$ saturation 12.5 per cent) for 10 minutes failed to increase cardiac output so that $O_2$ consumption decreased. Cardiac work was unable to increase enough to compensate for the low $O_2$ saturation so circulatory failure occurred.

$O_2$ consumption was maintained until protracted severe hypoxia caused circulatory failure. Increased left ventricular work could be maintained for long periods of time if arterial $O_2$ saturation was over 40 per cent and for short periods of time if this saturation was over 25 per cent.

**Wechsler**


Multiple, simultaneous records of the oxygen availability of the cerebral cortex in monkeys and cats have been made by the polarographic method simultaneously with cortical thermoelcetric records, the blood pressure record, and the EEG.

After occlusion of one or both carotid or vertebral arteries, the severity and duration of the ischemia of the cortex depends on the contribution of the anastomotic vessels.

Oclusion of the middle cerebral artery or of a small cerebral vessel is followed by a fall in the local oxygen availability in the distribution of the occluded vessel. There is also a bordering zone and an outer, anastomotic zone.

The area of ischemia is minimized by breathing pure oxygen and is increased by a fall in blood pressure. The collateral circulation is not improved by cervical sympathectomy, stellate ganglionectomy, or section of the seventh nerve roots, unless there is a coincident rise in blood pressure.

The maintenance of the systemic blood pressure at optimum levels and the administration of oxygen are the most potent aids to development of collateral circulation in the treatment of cerebral vascular occlusion. Sympathectomy does not appear to be of significant therapeutic value.

**Bernstein**


A well controlled study over a four-month period was done on a metabolic ward on six obese individuals of the effect of plant fat substitution for animal fat upon serum lipid level. Caloric intake was maintained and body weight remained constant. There was an approximate 20 per cent reduction in the concentration in the serum of free and esterified cholesterol and of phospholipids when plant fats were substituted for animal fats in the diet. There was no change in the level in the serum of neutral fats.

**Harvey**


Experiments were performed on dogs in which 2 polyvinyl catheters were placed in the carotid artery, one directed toward the heart and the other toward the brain. These were connected to a pump coil system which was capable of cooling the blood in the system. In this manner the brain alone could be cooled for varying periods of time.

It was shown that with the method, adequate central nervous system protection was produced against complete anoxia of 30 minutes duration.

**Abramson**


After evaluating pulmonary function data on 24 patients with chronic pulmonary emphysema studied before and after a six to eight week period of diaphragmatic breathing training, the author concludes that such training is an effective adjunct in the treatment of pulmonary emphysema and that such training can be expected in most instances to produce objective improvement in pulmonary function.

Increased diaphragmatic excursion, accomplished by this training, resulted in a striking increase in tidal volume at a lower respiratory rate and respiratory mid-position. More effective alveolar ventilation was accomplished without significant increase in total ventilation except in those instances in which it was decreased prior to training. Improved alveolar ventilation was indicated by increased oxygen removal rate, increased arterial oxygen saturation, decreased arterial pCO$_2$ and increased exercise tolerance with less dyspnea.

**Harris**

Glaviano, V. V.: Changes in Cardiac Output During the Transition From Closed to Open A-V Fistula in the Unanesthetized Dog. Am. J. Physiol. 179: 208 (Nov.), 1954.

When a unilateral femoral A-V fistula is suddenly opened in a dog there is observed a tachycardia and increased stroke volume. These increases are very rapid in onset. Fall in systemic pressure due to an open A-V fistula produces cardiodynamic responses
from which an increase in output ensues. Atropine and vagotomy eliminate the tachycardia after acute A-V fistula.

OPPENHEIMER


A digital plethysmographic method is described for observing variations in tone of the venous side of the vascular bed of intact man. Venous tone of the finger tip of patients with advanced chronic congestive heart failure was found to be elevated. The rates and volumes of inflow, outflow, and difference between inflow and outflow for the finger tip were reduced in the patients with chronic congestive heart failure. Simultaneously recorded curves of the time courses of rates and volumes of inflow and outflow and of the difference between the rates and volumes of inflow and outflow are illustrated, which, upon careful study, reveal many interesting physiologic aspects of digital inflow and outflow in congestive failure.

During the course of these experiments it was again observed that the systemic venous tone in all of the patients with chronic congestive heart failure was elevated considerably. It was suggested that the increase in venous tone was due in large part to a generalized increase in sympathetic venoconstrictor activity. The relationship of the elevated venous tone to the clinical manifestations of congestive heart failure is discussed. An accidental observation was that the intravenous administration of hexamethonium for purposes of experimentally reducing venous tone produced considerable to even dramatic improvement in the clinical symptoms and signs of advanced congestive failure; the degree of the improvement tended to be directly related to the degree of reduction in venous pressure, but the causative relationship of these two phenomena has not been determined.

BERNSTEIN

RHEUMATIC FEVER, RHEUMATIC HEART DISEASE, COLLAGEN DISEASES


The serum vitamin A level of rheumatic children is found to be decreased (a) during the acute and early subacute stages of the disease, (b) in patients with passive congestion of the liver, (c) during upper respiratory infections, (d) in patients with acute exacerbation of rheumatic processes, and (e) in those with an inadequate vitamin A and carotene intake of some duration. Corticotropin and cortisone profoundly affect the levels of serum vitamin A and carotene in different ways during the various stages of active rheumatic fever. Vitamin A, either in aqueous or oily medium, was well absorbed by children in varying stages of rheumatic fever.

BERNSTEIN


Twenty-eight children with an acute exacerbation of rheumatic fever were treated with 300 mg. per day of corticotropin, intramuscularly, for a period of 14 to 18 days. On cessation of therapy, no significant rebound phenomena or flare-up of rheumatic activity took place. Within 24 to 48 hours after the first injection of corticotropin, both right and left ventricles became markedly dilated. The heart lay on the underlying diaphragmatic surface like a sack of meal. The contractions were much less forceful than the previous tumultuous contractions and showed an undulating, almost accordion-like motion. These changes persisted throughout the entire course of treatment. Within 48 hours after the abrupt cessation of corticotropin, however, they disappeared rapidly, and the ventricular dilatation, "meal-sack" drooping, and accordion-like contractions could no longer be seen. A follow-up period of 12 to 30 months revealed no increase in the size of the various heart chambers, suggesting that progressive rheumatic activity had been checked or prevented.

BERNSTEIN


C-reactive protein determinations were performed on the sera of twenty-four patients in order to help determine the presence or absence of activity. Follow-up was done on these patients by the same group of pediatricians and cardiologists. X-ray films, fluoroscopy of the heart, and electrocardiograms were frequently made at the onset of the disease and on an average of once a month during convalescence. The white blood count, erythrocyte sedimentation rate, and plasma fibrinogen were done at least once a week. The cephalin-cholesterol flocculation, zine turbidity, thymol turbidity, and gamma globulin precipitation tests were also done once a week. In this study, the absence of activity was judged by the complete and persistent subsidence of all clinical and laboratory manifestations of the disease.

There was a close correlation between the inactive state and a negative C-reactive protein determination. However, there were two instances of a negative C-reactive protein in the presence of rheumatic activity. A positive test in Sydenham's chorea should suggest the presence of an associated
carditis. The C-reactive protein determination was a better guide to activity than the sedimentation rate which showed protracted elevation despite the inactive state.

Rinzler


An analysis was made of 40 electrophoretic determinations of the serum proteins in 37 patients with rheumatic fever. Beta globulin elevation was encountered in seven out of thirty patients with rheumatic fever, whereas this fraction is rarely elevated in the postinfectious period of normal individuals (one out of 36 patients). Changes in the alpha-1, alpha-2 and gamma globulins were variable and nonspecific in rheumatic fever. A normal electrophoretic pattern may be obtained in the presence of rheumatic activity. It is concluded that electrophoresis is of little absolute value in determining rheumatic activity.

Rinzler


One hundred seventy-one patients with mitral stenosis, seen from 1937 to 1941 in the public wards of the Toronto General Hospital, have been followed up to death or to the spring of 1953. Patients with tight mitral stenosis should be treated by commissurotomy as early as possible, and symptoms of "severe pulmonary congestion" as possible Survival rates indicate that 16 per cent of the patients died within six months after the appearance of severe pulmonary congestion. The risk of operation is in the vicinity of 6 per cent in similar cases. The average age onset of severe pulmonary congestion in this series was 40.1 years; 50 per cent of these patients were dead by the end of five years, and 80 per cent within 15 years. Pregnancy commonly precipitates severe pulmonary congestion. Approximately one-third of these patients died within ten years; one-third survived ten years but had severe disability; and one-third reverted to a benign stage of their disease. The evidence indicates that pregnancy per se has no delayed deleterious effect on the course of rheumatic heart disease. Right heart failure appeared, on the average, two years after the onset of pulmonary congestion. Twenty-four per cent of these patients were dead in six months, 50 per cent in three years, and 91 per cent in 15 years. Auricular fibrillation is evidence of advanced disease; the average age of onset was 43.3 years. Sixteen per cent were dead in six months, 50 per cent in five years, and 91 per cent in 15 years.

The best indications of the prognosis in a case are the heart size and functional capacity. Of the 65 per cent of the patients with a cardiothoracic ratio over 60 per cent, only 35 per cent were still alive in five years and 22 per cent in ten years.

Bernstein

ROENTGENOLOGY


This report is intended to emphasize the fact that, in many cases, it is possible to determine the nature of centrally located mediastinal or juxta cardiac shadows by means of angiocardiography and without thoracotomy, particularly to determine the relation of such shadows to the heart and great vessels. Much of the usefulness of the method of angiocardiography rests upon the demonstration of progressive degrees of opacification and the comparison of a number of successive films which may show quite subtle differences. These points are illustrated by a series of nine cases including instances of (a) pulmonary artery aneurysm, (b) absent left pulmonary artery, (c) dilated right subclavian artery lying between the esophagus and aorta, (d) coarctation of the aorta, (e) persistent left superior vena cava into which the pulmonary veins were emptying, (f) hypertrophic lymph nodes lying near the left cardiac border near the pulmonary artery, (g) an enlarged thymus in a child, and (h) a probable anomalous right subclavian artery in a patient with a small primary carcinoma of the upper cervical esophagus. The author points out that this method strengthens the case for mediastinal exploration in some patients and indicates that in others thoracotomy is unnecessary and possibly a dangerous procedure. Furthermore, in those cases in which thoracotomy is done, the surgeon is provided with additional valuable information regarding the vascular structures in the thorax prior to the exploration.

Rosenbaum


There are contradictions in the literature regarding the question of blood storage in man, and the locations of blood stores if they do exist. In an effort to clarify the problem, the authors resorted to radiologic methods to study changes in lung vascularity and in the size of the liver and spleen after hemorrhage. Eight healthy young men were rapidly bled of 420 ml., and six subjects acted as controls. Rigidly standardized radiologic technics were used, the x-ray films of the chest and upper abdomen were made in triplicate and viewed by a radiologist who was completely unfamiliar with the conditions of the experiment. After bleeding, the size and number of lung vessels diminished in all subjects, and in seven sub-
jects, the size of the liver shadow. The results were statistically significant, whereas, in the controls, the changes were compatible with random distribution of spontaneous fluctuations. Changes in splenic outline approached, but did not achieve, statistical significance. The authors conclude that the lungs and liver are “blood-stores,” and that the storage of blood in man may take place in macroscopic vessels.

ENSERBERG


Complete motor and sensory paralysis below the level of the eighth thoracic segment occurred in a patient after aortography with 70 per cent sodium acetrizoate (Urokon) for demonstration of a possible aortic aneurysm. The patient later regained sensory, bladder, and partial motor function. Two lessons can be learned from this case. One is that improvement in technique for aortography must be carried on unceasingly. Secondly, that aortography is not without some risk. The study therefore should not be done unless the information to be gained will influence the diagnosis, prognosis, or therapy enough to justify the risk. The probable cause of paralysis in this case was thrombosis of the anterior spinal artery or direct toxic action of the sodium acetrizoate on the spinal cord.

KITCHELL


From experience with over a thousand arteriographies of the abdominal aorta, performed by the translumbar route, the author has arrived at the conclusion that this method yields valuable information with a high degree of safety. Definite information as to the presence and sites of thromboses and aneurysms can be determined; arteriovenous fistula can be demonstrated and the diagnosis of renal infarction can be made.

SCHWEDEL


The author believes that percutaneous vertebral arteriography can render numerous real services, sometimes irreplaceable, and that it is relatively benign, if one makes the injections gently.

The conclusions were based on 162 percutaneous vertebral angiographies made since 1948 in the Neurosurgical Clinic of the Pitie. The author describes the normal radiological anatomy. He also describes the most characteristic pathological aspects, insisting on the value of vertebral arteriography in the diagnosis of tumors in the region of the cerebello-pontine angle and of the clivus.

BERNSTEIN


The accuracy of roentgen diagnosis of arteriosclerosis of the thoracic and abdominal aorta was correlated with post-mortem studies without knowledge of the individual radiologic report. Calcification of the thoracic aorta was diagnosed if a definite crescent-shaped density in the knob or a linear streak over one centimeter long in the descending portion of the aorta was visualized. A density of the aortic knob which was neither typical in shape or position was classified as questionable. Calcification of the abdominal aorta was diagnosed in the presence of either linear densities at least one centimeter in length, or multiple and sometimes parallel linear densities, or solid shadows, in an area parallel and anterior to the lumbar spine. Pathologically, only gross calcification was noted.

Roentgenologic demonstration of aortic calcification proved to be an accurate method for the diagnosis of atherosclerosis. It usually indicated an advanced degree.

Posteroanterior chest films were taken at a distance of 6 feet at one-twenty seconds of a second, using an average of 300 ma. and 70 kv. Lateral abdominal films were taken with aucky grid at a distance of 40 inches, at 1½ seconds, using an average of 300 ma. and 78 kv., centering the tube at the level of the first and second lumbar spine.

RINZLER

SURGERY IN HEART AND VASCULAR SYSTEM


The indication to mitral commissurotomy is based on criteria derived from clinical, roentgenologic, electrocardiographic and hemodynamic data. In a limited number of cases these data may be contradictory and the evaluation for surgery may become difficult. In very exceptional cases the data may be misleading and lead to erroneous conclusions.

In a series of 40 cases the preoperative diagnosis based on these data was found correct at surgery in 37. In 2 cases in which clinical findings suggested predominant mitral stenosis, the x-ray and electrocardiogram were consistent with this diagnosis whereas the pulmonary wedge pressure curve suggested mitral regurgitation in one. At surgery mitral insufficiency was found in both without appreciable degree of stenosis. The remaining case was very unusual. There was a loud first and reduplicated second sound at apex, left auricular enlargement on x-ray, auricular fibrillation and right axis deviation.
in the electrocardiogram, and pressure elevation in both the pulmonary artery and pulmonary capillaries. The only major expected sign of mitral stenosis which was absent was a diastolic murmur.

At surgery left auricular pressure elevation was confirmed by direct measurement. However, the mitral valve was completely normal, without any deformation of the orifice, with normal subvalvular structures. In the absence of any evidence of an aortic lesion, of chronic pericarditis and of hypertension, the symptomatology of this unusual case is ascribed by the authors entirely to left ventricular failure of unknown etiology.

**Pick**


Fifty cases of mitral valvular disease were reviewed as to the relative value of physical signs and laboratory methods in the diagnosis of mitral stenosis and/or mitral insufficiency. In 84 per cent of the cases the presence of mitral insufficiency was correctly diagnosed, or excluded, by using auscultation, ordinary x-ray study, the electrocardiogram and the angiocardiogram. In the experience of the authors an apical systolic murmur, grade III–IV, in the absence of hypertension and aortic insufficiency, strongly suggests the presence of a dynamic mitral regurgitation. A vertical axis in the electrocardiogram and a small left ventricle on the other hand, rule against it. In 16 per cent the authors had to resort to cardiac catheterization and angiocardiography and the latter proved more reliable in the differential diagnosis of the two conditions. Reference is made to direct puncture of the left atrium, combined with selective angiocardiography, which in the future may provide the most reliable information in doubtful cases.

**Pick**


Lung biopsies from twenty-three patients with mitral stenosis who were studied by cardiac catheterization prior to mitral commissurotomy were examined histologically. A positive correlation existed between the degree of vascular alteration and the pulmonary arteriolar resistance and mean pulmonary arterial pressure in the more severe cases of pulmonary hypertension. The hemodynamic pattern varied considerably in patients who exhibit less severe vascular lesion. The pathologic findings in the majority of cases were prominent fibroelastic intimal thickenings of the muscular arteries and arterioles, and in 32 per cent the media appeared hypertrophic. Such pathologic findings were also found in autopsy specimens of the lungs of patients with mitral stenosis. The control patients in the young age group, who were free from pre-existing lung or heart disease, with one exception, showed only mild changes at most. The patients from 50 to 70 years of age with arteriosclerotic or hypertensive heart disease, but without primary lung disease, showed somewhat more advanced changes than those in the older patients who had no heart disease.

It was considered that surgery for mitral stenosis should not be denied the patient either on the basis of data obtained by cardiac catheterization or because of pulmonary vascular lesions, which are not usually severely obstructive although almost always present.

**Rinzler**


Several previous reports had noted the infrequency of coronary artery disease among certain African groups. A review of post mortem material at a non-European hospital in Johannesburg, South Africa, revealed a lower incidence of severe atherosclerosis than in Danish or American hospital populations. The population which this hospital serves is habituated to a low fat, high residue diet.

**Waife**


Contrary to previous experience, the authors were able to induce generalized atherosclerosis in rats by combined feeding of cholesterol or oil with induction of hypothyroidism or production of a perinephritis. Histologically, the lesions produced closely resembled those considered as characteristic of atherosclerosis in other species of experimental animals and in men. The authors feel that some of the conditions under which atheromatosis was produced in these experiments are more comparable to conditions present in humans than experimental sclerosis produced by cholesterol feeding alone.

**Pick**

Gilfillan, R. S., and Berry, J. D.: Diagnosis and Surgical Treatment of Arteriosclerosis. Geriatrics 9: 409 (Sept.), 1954.

The authors are concerned with two main types of changes in the peripheral vessels: (1) narrowing and irregularity produced by subintimal debris and
subsequent calcification, and, (2) thrombosis. The
diagnosis of arteriosclerosis clinically is based on
the absence or diminution of one or more peripheral
arterial pulsations. A systolic bruit may be heard
over the terminal aorta, iliac or femoral artery.
Roentgenograms of the abdominal aorta or periph-
eral vessels may reveal flaky calcifications.

The treatment of acute arterial obstruction and
chronic peripheral arterial insufficiency is discussed.
The authors recommend immediate heparinization
for acute arteriosclerotic obstruction. If surgery is
contemplated, protamine can then be used to re-
verse the anticoagulant action of Heparin. Medical
vasodilators (Priscoline, Papavarine, tetraethyl-
ammonium chloride) are of little use. Sympathecto-
my is probably contraindicated. Arteriography is
not considered harmful and may reveal that the
arteriosclerotic involvement of the peripheral vessel
is such that thrombectomy will be difficult unless
thrombendarterectomy is performed coincidentally.

The authors list the important conservative
measures for patients with chronic arterial occlu-
sion. They suggest that endarterectomy should be
limited to those with a severe claudication in whom
the peripheral tissues are in jeopardy or in whom
tissue necrosis has already taken place. Candidates
should not present signs of severe myocardial,
 cerebrovascular, or renal changes. The mortality
for this procedure in their hands has been 7.8 per
cent.

RINZLER

Landen, C. and Bayer, O.: Further Investigations
Concerning Pulmonary Function Tests in Mitral
Kreislaufforsch. 43: 651 (Sept.), 1954.

Spirographic data at rest and after exercise on
50 patients submitted to mitral surgery were com-
pared with respective data recorded before surgery.
This comparison revealed that in 70 per cent of the
cases impairment of pulmonary function demonstra-
table at rest had completely disappeared after the
operation and was of much lesser degree in the rest.
In almost all the respiratory data revealed some
improvement in the capacity to perform work of
moderate degree. This was found 6 to 10 weeks after
surgery and persisted, with 3 exceptions, over a
period of one-half to two and one-half years. The
authors emphasize the value of pulmonary function
tests for the pre- and post-operative evaluation of
patients with mitral disease.

PICK

Mudd, J. G., Inkley, J. J. and Hanlon, C. R.: Myocardial Ischemia During Mitral Commis-

From an electrocardiographic study of thirty
patients undergoing surgery for mitral stenosis
the records of five patients with electrocardiographic
evidence of myocardial ischemia during clamping
of the left auricular appendage are presented. It
was not definitely established whether these changes
were due to direct pressure on the left coronary ar-
tery or to traction on the surrounding structures
of such degree that the artery was secondarily con-
stricted. In many cases it would appear due to
direct pressure on the left coronary artery by the
rotation of the clamp toward the right side of the
patient in the hands of the first assistant. The
authors stress the advisability of careful electro-
cardiographic observations during certain phases
of the operation, since these changes indicative of ische-
emia may be a premonitory sign of impending ven-
tricular fibrillation during mitral commissurotomy.
Among the interesting electrocardiographic changes
was the appearance of Q waves in conventional
leads, simulating myocardial infarction but of tran-
sitory nature. This observation again raises ques-
tions concerning the significance of the Q wave.

HARRIS

Wade, O. L., Bishop, J. M. and Donald, K. W.: The
Effect of Mitral Valvotomy on Cardio-Respira-

Ten patients were studied before surgery and
again six to nine months after operation. Clinical
improvement was evident in all but two, both of
whom had mitral insufficiency. There was little
change in radiologic feature in the group, and no
important electrocardiographic changes in most
instances. In one case, in which resting and exercis-
ing pulmonary artery pressure was markedly reduced, a
pre-operative pattern of right ventricular preponder-
ance disappeared.

In general, profound changes in the direction of
normality were demonstrated in those patients who
showed clinical improvement. The most striking
changes involved cardiac output and A-V oxygen
differences. Changes in ventilation during exercise
were equally striking. Pulmonary arterial pressures,
however, remained elevated though usually some-
what reduced. Possibly a better correlation might
have been found with "pulmonary capillary" pres-
ures had they been measured in all the cases. In-
creased pulmonary arterial resistance was not always
reversed, even in patients showing considerable
reduction in "pulmonary capillary" pressures.

The slight reductions in pulmonary arterial pres-
sures during exercise resulted in only slight reduction
of right ventricular work. Indeed, as many patients
are now capable of increased exertion without dis-
comfort, the right ventricle may be performing much
more work than before operation. It is possible that
this may lead to further right ventricular hyper-
trophy and right heart failure. The authors point to
the possible dangers of re-establishing an increased
cardiac output and exercise tolerance after ap-
parently irreversible pulmonary hypertension has
occurred.

ENSSLER

The authors describe a method for placing a polyvinyl sponge prosthesis in the mitral valve orifice. The study was performed on 30 dogs, of which 20 survived the operation and were then sacrificed 4 to 10 months afterward. The purpose of the investigation is to determine the reaction of the heart to the prosthesis with the idea in mind that such a procedure could be applied to human subjects with mitral insufficiency. The prosthesis is suspended across the ventricular portion of the mitral valve orifice between the commissures and parallel to the opposing edges of the leaflets. Its ends are pulled through the myocardium at the apices of the two papillary muscles, and anchored to the epicardial surface of the heart. According to the authors, the prosthesis provides a baffle which deflected the blood stream out of the atrium at the proper time, i.e., during ventricular contraction, and also functions as a ball mechanism, moving back into the ventricle during diastole so as not to obstruct ventricular filling.

It is the authors' opinion that the results of the experiments justify the use of this method in patients with mitral insufficiency.

Abramson


The authors studied a series of 139 patients with mitral stenosis before and after commissurotomy, in order to attempt to establish criteria for future selection of cases. They point out that the presence of left heart enlargement, as a result of either significant aortic valvular disease or mitral insufficiency, was a poor prognostic sign. On the other hand, they place little credence on auscultatory evidence of mitral insufficiency, since in a high percentage of cases the existence of an apical systolic murmur was not associated with actual regurgitation, as determined at the time of surgery.

Abramson


The authors reported on the results of resection of the aortic bifurcation and replacement with a lyophilized aortic homograft in 22 patients with thrombo-obliterative disease of the aorta. The average age in the group was 49 years, with a range between 33 and 63 years. The average duration of symptoms for the patients with complete occlusion was four and a half years, and for the group with incomplete occlusion, two and a half years. Angiography was found of value in determining the degree of obstruction. Histologic examination of the specimens removed at the operation supported the view that the thrombotic process began in the common iliac arteries and in the region of the aortic bifurcation and involved more proximal segments by propagation.

Besides aortic homografts, homografts were also placed into the iliac bifurcation in four cases, in the external iliac artery in three, in the common femoral artery in two, and in the superficial femoral artery in one. Two deaths occurred. All but four of the remaining patients experienced striking improvement, with complete restoration of pulses in the lower extremities.

The authors conclude that the complete occlusive form of thrombo-obliterative disease, generally confined to the terminal aorta and bifurcation, was ideally suited for resection with homograft replacement. On the other hand, the partially occluded process, tending to be less localized, did not warrant such a surgical approach, particularly when associated with peripheral arteriosclerosis obliterans.

Abramson


The authors discuss the medical management of patients with rheumatic mitral stenosis in a university hospital before, during, and after mitral valvuloplasty, on the basis of experience of 95 cardiotomies with an operative mortality rate of only .43 per cent. Preoperatively congestive heart failure is controlled, and the presence of rheumatic activity or infection is excluded. During the operation cardiac mechanism is monitored electrocardiographically and left atrial pressure pulse waves are recorded.

In the immediate postoperative period patients are watched carefully for evidence of failure of expansion of the left lung, myocardial decompensation, cardiac rhythm disturbance, and arterial embolism.

Except for incisional pain, the only troublesome last postoperative complication has been a 10% incidence of a brief, febrile intrathoracic disease process characterized by chest pain, tachycardia, malaise, and sometimes congestive heart failure. They believe this to be nonrheumatic and suggest that multiple small pulmonary infarcts and secondary pleuritis may be important factors.

Bernstein

The authors report two instances of saddle embolism of the aorta occurring in the period immediately after finger-fracture of the mitral valve for mitral stenosis. In one patient a successful embolectomy was performed thirty-four hours after the mitral valvulotomy surgery. In one patient, the initial change was increasing apprehension and dyspnea whereas in the other it was progressive drowsiness. These general symptoms led to careful studies of the lower limbs and ultimate correct diagnosis of aortic embolization when the pulses, temperature and color of the legs were found to change. The careful evaluation of the peripheral pulses both before and after surgery is important in these patients. It is emphasized that embolectomy is the treatment of choice for aortic, iliac or femoral emboli but to be successful it must be carried out within eight to ten hours after the occurrence of the complication.

**Rosenbaum**


This report concerns 131 patients with mitral stenosis who have undergone mitral commissurotomy. There were 11 hospital deaths, giving a mortality rate of 8.4 per cent. Of the patients surviving operation, 87.2 per cent either achieved an excellent result or were significantly improved. A significant factor influencing postoperative results with the anatomic status of the mitral valve. In only 6.6 per cent of patients with pliable valves was the operation a failure, while 43.2 per cent of those with scarred, immobile, often calcified valves either died subsequent to operation or were not improved.

Hemodynamic changes occurring during mitral commissurotomy include a decrease in left atrial and pulmonary artery pressure. Hemodynamic changes present three weeks after operation include a reduction in pulmonary arteriolar resistance and an increase in the ability of patients to increase their cardiac index on exercise. These changes persist in most instances and may become more marked a year or more after operation. The changes post commissurotomy, for various physiologic variables, give objective evidence which corroborates the functional improvement that these patients experience clinically.

**Bernstein**


The authors discuss the selection of candidates for aortic valvulotomy, classification of patients with aortic stenosis, and contraindications to the operative procedure. In addition the surgical technique and problems encountered in treating this group of patients are discussed.

In selecting patients to undergo aortic valvulotomy, only those with a relatively pure aortic stenosis should be considered for operation by present technics. Many of these patients have a diastolic murmur representing some degree of insufficiency. However, if significant insufficiency is present, valvulotomy should not be performed. The diastolic pressure should be normal or only slightly diminished, and there should not be excessive left ventricle enlargement, which characteristically accompanies aortic insufficiency. Age is not necessarily a determining factor in the selection of patients for operation, but those older than 50 or 55 years should be considered carefully. Congenital aortic or subaortic stenosis should be operated upon when the diagnosis is carefully established. Finally calcification of the valve does not contraindicate operation.

The problems associated with aortic valvulotomy are considerably more complex than those encountered in treating mitral stenosis. A patient with aortic stenosis who is asymptomatic to any degree should be considered a candidate for operation because, unlike a patient with mitral stenosis, he may die of intractable acute heart failure, a relatively short time after the onset of symptoms. There is an additional problem regarding the surgical approach. One school advocates the retrograde approach on all patients with pure aortic stenosis. The other prefers the ventricular approach. There are advantages and disadvantages to both methods. The authors prefer the ventricular approach and report on thirteen cases in which aortic valvulotomies were performed. There was one operative death in a 63 year old patient who died while a retrograde approach through the innominate artery was being attempted.

The question of a dual stenotic lesion presents the problem as to which valve should be opened first. It is the authors' impression that the valve which seems to be most significantly affected should be opened first. For example, if the patient's primary symptoms have been angina and pounding, the aortic valve is opened first; whereas if pulmonary edema and dyspnea are present, the mitral takes precedence. One should carefully evaluate patients with severe mitral stenosis who are thought to have only minimal aortic stenosis, because relieving the mitral stenosis will greatly accentuate what may seem to be minimal aortic stenosis.

The complications which may arise from surgery are hemorrhage, ventricular fibrillation and acute heart failure. All these are imminent at the time of operation. In the immediate postoperative period an embolus, possibly from a calcified valve or from a thrombus in the ventricle or left auricle, is always a possibility. Reactivation of rheumatic fever may occur somewhat later. As to whether or not there will be recurrence of the stenosis, only time can tell. The authors do not believe that a heavily calcified valve is likely to reunite.

**Dennis**

The results of 60 operations on 47 patients were evaluated. Thirty-one of these were excisions of L-2 and L-3 ganglions and 29 were excisions of T-12 through L-3. In evaluating the effects of the low thoracic high lumbar sympathectomy, it is shown that results differ little from those of the usual lumbar sympathectomy. The higher sympathectomy permitted below-knee amputations in seven out of nine cases compared to one out of eight cases in the regular series. With this one exception the higher sympathectomy was of no greater benefit than the usual lower operation. Therefore, it is not recommended. It is suggested that future efforts to improve the results of sympathectomy should be directed toward interrupting the accessory pathways along the trunk.

KITCHELL


This report is concerned with 45 instances of cardiac arrest occurring in 44 patients over a period of 5 years at the Grace-New Haven Community Hospital. Cardiac massage was carried out with the chest open in all but four cases in which massage was performed from the abdominal cavity through the diaphragm. In one case the heart began beating spontaneously 36 seconds after the onset of arrest and in two patients the heart was found to be beating when the chest was opened. In one patient cardiac resuscitation was carried out on two separate occasions, 16 days apart. Arrest occurred 7 times in 260 cardiac surgical procedures and in other types of surgery the incidence was 1 in every 3000 cases. The authors considered the major factors responsible for sudden cardiac arrest in this series to be vagal stimulation, anoxia, hypercapnia and drug sensitivity. The importance of vagal-reflex inhibition of impulse formation at the sino-atrial node, probably potentiated by hypoxia and hypercapnia is emphasized. The vagal reflex influence of intubation, extubation and tracheal suction are mentioned as possible important precipitating causes of cardiac arrest. Ventricular fibrillation occurred as a primary arrhythmia only once in this series, although it developed during resuscitation in several others. Although defibrillation could almost always be accomplished, no patient with this disorder survived. The authors indicate that procaine or procaine amide are now used by them only when there is evidence of myocardial hyperirritability, since it is their impression that the arrested heart with normal irritability may be resuscitated more easily than one rendered unresponsive by these drugs.

ROSENBAUM

THROMBOEMBOLIC PHENOMENA


The principal manifestations of the superior cav vein syndrome are reported to be dilatation of the veins of the head and neck, distention of the collateral veins of the thorax, cyanosis and edema of the face, dyspnea and pressure in the head, especially on exertion. If there is occlusion of the azygos vein, pleural exudate tends to occur, particularly on the right. The demonstration of an elevated venous pressure in the upper extremities together with a normal venous pressure in the lower extremities makes the diagnosis quite certain. Three cases are reported, one attributed to a blunt injury to the thorax with widespread hemorrhage, another due to a congenital deformity of the superior vena cava and the third following a febrile course and probable mediastinitis after a diphtheria vaccination. Venous angiography, particularly when done electively by catheter, was especially helpful in localizing and delimiting the areas of thrombosis in all three cases. Thoracotomy was performed in two cases and in one of them, a child with a probable congenital anomaly of the superior vena cava, an anastomosis was created between the azygos vein and the right auricle with a good clinical response over a three-month follow-up period. It is believed by the authors that this is the first case on record in which surgical treatment has been carried out successfully.

ROSENBAUM


There was no consistent effect of this agent ("Priscol") on cerebral blood flow as measured by a modification of the Kety-Schmidt method in 14 patients with cerebral arteriosclerosis.

Mckusick


The syndrome associated with slow, progressive thrombosis of the aorta at its bifurcation is called insidious thrombosis by the author. It is a commoner condition than has been formerly thought. The disease is characterized clinically by increasing fatigability and claudication of the lower extremities which extends into the buttocks. Low back pain is frequently present, impotence is common, and lower extremity arterial pulses are absent. Arteriosclerotic degeneration of the bifurcation of the aorta is the usual predisposing lesion. When
untreated, thrombosis may extend up the aorta to the renal arteries causing death from uremia or produce such severe ischemia of the lower extremities as to lead to gangrene. Lumbar sympathectomy is now recognized as an insufficient form of treatment. Thromboendarterectomy, when successful, has given satisfactory results. Increasing experience in vascular surgery has led to the perfection of a technic of resection of the aortic bifurcation and common iliac vessels with insertion of an arterial homograft. This procedure now appears to be the therapy of choice. Prolonged anticoagulant therapy which is necessary with thromboendarterectomy may not be necessary following aortic grafting. Long-term successful results of both thromboendarterectomy and resection of the involved segment and insertion of a homograft must still be awaited.

Rinzler


A study was made on 200 patients with a history of one or more arterial embolic episodes over a 17-year period of observation. The cases were divided into 2 groups: one consisting of embolic episodes occurring between 1937 and 1946 and the other, between 1947 and 1953. Only about 12 per cent of the emboli were in patients in whom no source was clinically evident. Approximately 76 per cent of the emboli were to limb arteries, about one-half being located in the lower extremities. The incidence of embolism as a complication of nitrous oxide surgery was 16 per cent. Surgical treatment was undertaken in 47.7 per cent of cases in the later period (1947-1953) and 22.7 per cent in the earlier (1937-1946). A higher rate of limb survival was obtained in the former group.

Abramson


The author set up certain criteria to be utilized in selecting patients for surgical treatment of segmental occlusion of the lower portion of the aorta. The first was the presence of patency of the vessels distal to the bifurcation of the popliteal artery as determined by arteriography. Extensive arteriosclerotic involvement of the anterior and posterior tibial arteries and calcification of the aorta and common iliac arteries, as visualized by soft-tissue x-ray technic, were considered to be contraindications to operation. Most important in the final decision was the state of the heart and kidneys. Generally, patients more than 60 years of age were believed unsuitable for reparative surgery.

In the author's series, 8 patients were treated by thromboendarterectomy and 2 by excision of the occluded portion with replacement by homologous arterial grafts. It was his opinion that thromboendarterectomy was the procedure of choice in cases of segmental aortic and iliac occlusion.


The authors presented 2 cases of fat embolism and then described the results of a study on rabbits in which fracture of the femur and muscle contusion were performed in an attempt to produce fat embolism experimentally. The results suggested that an important source of fat emboli is circulating fat globules which are held much of the time in the capillary bed of the general and pulmonary circulation. The authors presented the view that the circulating fat probably had its origin from the chylomicra. They believed that such states as shock and anesthesia relaxed the vascular bed, allowing the circulating fat, together with the fat from the fractured bones, to be washed through the pulmonary bed into the general circulation. The lodgment of this material in the vessels in the brain was considered to be the probable cause for the cerebral symptoms.

Abramson


Pulmonary embolism becomes an increasingly important problem as the extent of its incidence becomes unveiled. The study of vital statistics is not a good indicator of the incidence of pulmonary embolism because of inevitable errors in diagnosis and inadequate number of autopsies. Clinical surveys provide significant presumptive data regarding relative incidence of pulmonary embolism in hospital practice. Autopsy series study in general hospitals and in custodial institutions is important. Custodial institution studies provide unique information regarding the general incidence of terminal illness because the pattern of terminal illnesses in such an institution mostly parallels that in the general population. In 512 autopsies the author noted 132 cases with thromboembolic disease, 25.7 per cent of the total. The study points out that pulmonary embolism has a far wider occurrence than is generally realized. It is one of the commonest direct causes of death in the aged. Its incidence will probably increase as it is primarily a disease of old age and the older age group is growing because many types of bacterial terminal illness are being controlled at present. Three clinical patterns are distinguished in cases of pulmonary embolism. First, sudden death, involving the major branches of the pulmonary arterial tree; a subacute form, with involvement of the large and medium sized pulmonary arteries; and a chronic clinical form usually incident to prolonged terminal illness in which only the small arteries are included. Three factors influencing the occurrence of pulmo-
nary embolism are age, sex and periods of enforced bed rest. The greater incidence in women than in men is unexplained. This study tends to dispel the supposition, deeply rooted in medical thinking, first, that pulmonary embolism is mainly a postoperative complication, and second, that it is a sudden and rapid form of death characteristically. The vast majority of these cases occurred in medical patients and only a small percentage died suddenly. As the clinical picture becomes recognized and as criteria for diagnosis becomes clarified, pulmonary embolism will be diagnosed more often and prophylactic and therapeutic measures will be pursued.

Kitchell


Review of the clinical and roentgenographic features of twenty-three cases of carotid artery thrombosis, seven cases of middle cerebral artery thrombosis, and one of posterior cerebral artery thrombosis. Cerebral arteriograms are often helpful in localizing the site of blockage.

Schwedel


A case of aortic bifurcation thrombosis is reported in which proximal and distal extension of the process occurred, as demonstrated at autopsy. According to the clinical story and the findings, the patient survived several episodes of mesenteric thrombosis, focal myocardial infarction, and a number of major operative procedures. Death was due to massive infarction of the kidneys, liver, spleen and bowel, with peritonitis from rupture of a gangrenous gall bladder.

The author called attention to the need for early diagnosis of aortic bifurcation thrombosis, at a time when adequate surgical intervention offers some hope of prolonging the life of patients with this disorder.

Abramson


Intramuscular trypsin has been observed to shorten the course of acute superficial or deep thrombophlebitis, enabling early ambulation and return to full activity. This study reports 18 patients with chronic thrombophlebitis of 2 to 9 years duration in both men and women, ranging in age from 32 to 79 years. All these cases had had previous treatment with dicumarol or heparin but thrombi persisted for 2 to 9 years in spite of such therapy. After prolonged administration of a preparation of crystaline trypsin in oil (Parenzyme) the blood clots disappeared. On termination of trypsin therapy in 15 of the 18 cases thrombophlebitis again developed. This cleared with a short, intensive course of trypsin given intramuscularly and has not recurred since the patients have been given maintenance doses. Prior to trypsin therapy, seven patients had at least one episode of embolism and three had several. There have been no pulmonary emboli in these patients since treatment with trypsin was started. It is suggested that trypsin functions by activating an inadequate fibrinolytic system.

Wessler


A program is outlined for successful conservative surgery in peripheral arteriosclerosis. The success of surgery is largely dependent on the integrity of the arteries below the bifurcation of the popliteal. Preoperative clinical and arteriographic examination will determine with a fair degree of accuracy the collateral blood flow potential of an extremity upon which the beneficial effect of sympathectomy is largely dependent. The benefits and limitations of lumbar sympathectomy are enumerated and the indications for and the results to be expected from thromboendarterectomy are discussed. Brief case reports with arteriograms are included to illustrate the various types and degrees of occlusion encountered in peripheral arteriosclerosis.

Wessler

The author reports a group of cases of avascular necrosis of the phalanges of the hands, all in members of six generations of one family. This condition generally affects the proximal interphalangeal joints of the middle fingers of both hands, with less frequent involvement of the second, third and fourth fingers, and occasionally the fifth fingers. The changes are first noted in late childhood and during adolescence, the onset usually being insidious and at times associated with trauma or exposure to cold.

The condition is differentiated from rheumatoid arthritis by the absence of redness and heat in the involved joints and the lack of systemic symptoms. It differs from osteoarthritis because of the location of the pathologic alterations in the fingers and the early age of onset.

The pathogenesis consists of an osteochondritis of growing epiphyses, although the cause is unknown. The disorder results in very little incapacitation.

**ABRAMSON**

**Bornstein, F. P.:** Dissecting Aneurysm of the Thoracic Aorta Due to Trauma. Texas State J. Med. 50:720 (Oct.), 1954.

A case of a partial traumatic rupture of the aorta followed by a dissecting aneurysm is presented. From the autopsy and clinical findings, it can be established that this man suffered a tear in the intima and media at the time of accident and that a dissecting aneurysm developed in the following four hours. Upon rupture of this aneurysm, death occurred.

**BERNSTEIN**


The authors reviewed the autopsy protocols and clinical records of a large general hospital of all cases with pathologic diagnosis of aneurysm of the aorta. The over-all incidence of this condition was 1.4 per cent (221 cases). Syphilis was the etiologic factor in 189 patients, the lesions being located in the thoracic aorta in 89 per cent of the cases and in the abdominal aorta in 11 per cent. Of the 20 aneurysms in the abdomen, 2 were located below the renal arteries and the remainder above this level. Death was due to the aneurysm in at least 49 per cent of cases.

There were 32 aortic aneurysms due to arteriosclerosis. Of this number, 12 were located in the thoracic aorta and the remainder in the abdominal aorta. In 25 per cent of the cases, the aneurysm was the cause of death.

**ABRAMSON**


A study was performed on 545 diabetic patients and 574 nondiabetic patients to determine the incidence of vascular disease. A greater prevalence was found in the former after the fifth decade. The vascular changes were commoner among those who required insulin, and increased with the duration of the diabetes. Retinopathy and albuminuria were much higher with poor than with fair control of the condition.

**ABRAMSON**


The authors summarize material published since 1949 from 331 publications concerning peripheral vascular disorders. Concerning peripheral arteriosclerosis they mention that lumbar sympathectomy is still the major therapeutic measure in the treatment of arterial insufficiency of the lower extremities. Since it was observed that ether anesthesia causes a fall in skin temperature of a previously sympathetomized limb, it is recommended that when bilateral, two-stage lumbar sympathectomy is performed, the second side should be done under some other anesthetic agent, such as spinal, rather than ether. The use of blood vessel grafts in peripheral arteriosclerosis is discussed at length and the authors think that the method is of value especially in the presence of short segmental areas of occlusion in the superficial femoral artery to relieve intermittent claudication and to save some extremities that otherwise would require amputation because of ischemic lesions of the feet and the lower leg. Arteriography is said to be adding to the knowledge regarding arterial disease in young patients and many persons previously considered to have Buerger's disease are now known to have peripheral arteriosclerosis. Lumbar sympathectomy together with cessation of smoking is considered the most effective treatment of thromboangiitis obliterans. Many types and techniques of vascular transplants have been developed in recent years. The authors feel that it is too early to tell which type of grafts will stand the test of time without degenerative changes that may lead to obliteration or aneurysmal dilatation. It is thought that autogenous grafts are most likely to survive with least change since they remain as living tissue with some elastic and muscular tissue, whereas the homologous grafts are replaced by the host's connective tissue. Most workers report little benefit from therapeutic venous ligation in acute arterial occlusion but intermittent venous occlusion, properly administered, is considered valuable in an effort to save ischemic limbs in this disorder, when other methods such as vascular grafts are not possible.

The authors report observations from their own laboratory which disclosed that in several cases of Raynaud's disease the critical temperature, producing arteriolar spasm in each patient, was not significantly lowered by sympathetic block or sympathectomy. However, this does not negate the value of this procedure, for a drop in the vessel temperature to the critical level is more difficult to produce when the patient's peripheral vessels are constantly
maximally dilated and heated by the warm blood coursing through them. In the surgical management of Raynaud's disease it is recommended that a radial sympathectomy be done, including the inferior cervical and the first three dorsal ganglions and also the second and third spinal nerves within their roots in order to assure removal of the efferent pathways and to reduce the facility of regeneration to a minimum. To be adequate, it is said, the operation must produce a Horner syndrome. Linton's report concerning saphenous ligation emphasizes six principles: early operation; direct and adequate exposure of the site of embolism; occlusion of the artery distal to the embolus before the artery is disturbed; avoidance of damage to the intima; and complete control of the arterial inflow both proximal and distal to the arteriotomy so that a meticulous intima-to-intima closure can be accomplished. The publications, concerning the management of aneurysms, are summarized by the statements that those of the abdominal aorta distal to the renal arteries, as well as those involving the iliac, femoral, popliteal, subclavian, brachial and carotid arteries, are treated best by extirpation of the aneurysm with restoration of the arterial continuity by the use of some type of blood-vessel graft. Aneurysms of the aortic arch, descending, thoracic and upper abdominal aorta may sometimes be partially resected, aortic continuity being maintained. Some aneurysms of the thoracic aorta are handled best by intrasacular wiring, a method often giving good results with a relatively low operative mortality.

Disorders of the veins and lymphatics have been taken up in many publications. The most effective method of treating varicose veins appears to be stripping of the long and short saphenous systems, along with any accessory venous trunks. It is concluded that neither an anticoagulant nor ligation is the ideal prophylaxis or treatment for venous thrombosis; venous interruption, though not as effective, seems less dangerous than an anticoagulant. There are said to be few, if any, indications for lumbar sympathectomy in the treatment of the postphlebitic syndrome.

Portal hypertension is another condition which is reviewed at length. For active bleeding from esophageal varices which do not respond promptly to transfusion, a balloon tamponade is suggested, followed within several hours by transhepatic transesophageal ligation of the bleeding source. Selection of patients for portacaval or splenorenal anastomosis should include careful evaluation of the extent of any liver disease because those patients, with severely depleted hepatic function, present a grave operative risk.

Other conditions included in this review are vascular spasm, causalgia, frostbite, arteriovenous fistula and lymphedema.


The authors report observations of the actions of various autonomic drugs in protecting rats against experimentally induced stress situations.

Protection against drum trauma shock by significant prolongation of survival rate with premedication was shown for only three drugs: (1) S C 2150 (Searle), a ganglionic blocking drug; (2) dibenzyline, a predominantly adrenergic drug, and (3) atropine, a predominantly anticholinergic drug. The protection did not appear to be related to the particular major autonomic blocking property of the drug. In hemorrhagic shock experiments, pretreatment with the same drugs also showed similar protective phenomena. In the latter experiments, the protection was not a function of the increased tissue blood flow created by autonomic blockade. It is suggested that true pharmacologic protection in stress is probably a function of a combination of the properties of the protective drugs, including changes induced at the cellular metabolic level.


A controlled study was performed on rabbits to determine the effect, if any, caloric restriction had on the pathogenesis of atherosclerosis in rabbits. Two groups of rabbits were fed a standard diet with cholesterol added but in the one group the caloric value was approximately half that in the other group. Cholesterol, lipoprotein, and phospholipid levels in the blood were measured over a period of time; when the animals were sacrificed, the aortas were carefully examined and the atheromatous changes carefully graded. Rabbits on the severe caloric restriction showed statistically significant higher levels of cholesterol, phospholipid, and lipoproteins than the controls. The atheromatous changes in the aortas were greater in these underfed animals than in the control group.


Experience with 62 cases of pulmonary embolism secondary to venous thrombosis have led to the following conclusions: Anticoagulant therapy alone is inadequate; vein interruption and complimentary anticoagulant therapy are strongly recommended. The vein interruption should be performed at a level above the clotting process, but at the same time, as many normal, major venous return channels as possible should be spared.
ABSTRACTS

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