

THE YEAR BOOK of GENERAL SURGERY

(1959-1960 YEAR BOOK Series)

EDITED BY

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With a Section on
ANESTHESIA

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THE PRACTICAL MEDICINE YEAR BOOKS

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Dentistry

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INTRODUCTION

During the past year there has been continued lively interest in many areas of surgery with increasing intensity of research activities along both clinical and experimental lines of endeavor. While this general trend of increasing activity has been maintained, it is readily apparent that a higher degree of interest exists in some areas than in others. Moreover, even in these fields of more intense activity some shifts in emphasis may be observed. As indicated in the last YEAR BOOK, such shifting interest and emphasis characterize the progressive movements in medicine.

This is well reflected by the field of cardiovascular surgery, in which there has been an increasing intensity of investigation, providing many notable advances over the past decade. The artificial heart-lung apparatus is now being widely used for an increasing number of congenital and acquired cardiac lesions with results that are steadily improving. More clinical experience has provided further improvements and refinements in the technical procedures. There has been some shift in emphasis away from cardioplegic procedures, except for special purposes, and toward the combined use of hypothermia with the artificial heart-lung apparatus. Further studies are being directed toward some of the problems concerned with the various types of oxygenators in an effort to elucidate some of the physiologic alterations associated with "open heart" surgery.

Continued high interest has also been maintained in the surgical approach to acquired disease of the aorta and major arteries. Here again sufficient experience has been accumulated to provide better evaluation of various surgical methods and to establish certain concepts. Synthetic vascular replacements as substitutes for homografts have now become widely accepted. The concept that atherosclerotic occlusive disease may be well localized and segmental in character, may involve major arteries other than those supplying the lower extremities (such as those of the gastrointestinal tract, the kidneys and the brain) and may be treated successfully by proper surgical methods has now been well docu-

mented. Accordingly, increasing interest has been devoted toward application of these surgical methods designed to restore normal circulation in a wide variety of disorders resulting from occlusive disease of these major arteries. Long-term results are beginning to be reported, and while some of these reflect a note of discouragement, this is contrary to our own experience.

Increasing interest may be noted in the use of venous shunting procedures for the treatment of cirrhosis of the liver. Information is gradually accumulating to aid in defining the true value of portacaval shunt in the management of bleeding esophageal varices, and there has been a revival of interest in the use of this procedure for the treatment of ascites. There is need, however, for more experience and investigation in regard to the latter condition before this issue is finally settled.

Steady progress is also being made in the field of homotransplantation of living tissue. At present, there are a number of experimental technics by which animals may be made tolerant to the transplantation of skin or organs. Some of these, including the injection of splenic cells into newborn animals, are discussed in this volume. A few years ago it appeared that these might be applicable to the human patient, but the technics that enhance the acceptance of transplants have, in many instances, a deleterious effect on the host so that maldevelopment or even death may result. As a consequence of these untoward reactions, human studies have been limited. Thus, the most practical application of transplantation today remains the transplanting of skin or organs between identical twins. An evaluation of this procedure is included in the report by Joseph Murray and his associates on renal homotransplantation (p. 20).

Despite the dangers of transplantation of splenic or marrow cells, some clinical studies are being carried out. In France, for example, several scientists who were exposed to potentially lethal doses of irradiation were treated with homotransplantation of bone marrow. The transplanted cells survived for only a few weeks, but it is possible that homotransplants served to sustain the patients until their own marrow systems could regenerate. Also, in some patients with advanced malignant disease, large doses of total body

irradiation are being administered, followed by marrow transfusions, in heroic attempts to control an otherwise fatal disease. As a corollary, technics developed to prepare and preserve marrow are being used to store autologous bone marrow before treatment with drugs or irradiation in doses large enough to depress the patient's bone marrow. Following treatment, the marrow may be repopulated with the patient's own cells with the use of marrow infusions, thus allowing the use of larger doses of antitumor agents than could be used safely in the past. Significant advances in this fascinating field will be documented in future issues of the YEAR BOOK.

Once again I should like to thank Mr. William A. Keville, Managing Editor, for his assistance and unlimited patience during the preparation of this volume. I should also like to extend my grateful appreciation to Dr. George L. Jordan, Jr., Associate Professor of Surgery at Baylor University College of Medicine, and to Miss Sara Meredith, Editorial Assistant, for their untiring and thoughtful help.

MICHAEL E. DE BAKEY

GENERAL CONSIDERATIONS

Hypnosis in General Surgery is evaluated by Elmer Hoffman¹ (Johns Hopkins Univ.). Hypnosis can play an important role in averting or converting a patient's preoperative apprehension and anxiety. Preoperative hypnosis can give many patients comfortable rest on the preoperative night. Hypnosis can relieve the discomfort and enable the patient to meet his difficulties in a better frame of mind. By adding posthypnotic suggestions the surgeon can prolong the action of his suggestions.

Examination of an acute abdomen, especially with respect to the pelvic and rectal portions, can be performed more easily in hypnoidal or light-trance states. Hypnosis has been used as an anesthetic agent for a long time. Hypnoanesthesia is not true anesthesia, but is analgesia. It should not take the place of the technics and agents of modern anesthesiology. Hypnoanesthesia can be produced in 1 of every 4 patients on the first trial. With further training of the patient, this percentage of success can be increased. Hypnoanesthesia is indicated in patients sensitive to local anesthetic agents. Regardless of the area of the body being operated on, this method is effective to the same degree.

Position maintenance during many surgical procedures and examinations can be more uncomfortable or painful to the patient than the procedure itself. This may be true in any of the endoscopies. Hypnosis or relaxation helps the surgeon and the patient. Operations within the mouth, or the buccal mucosa, pharynx or tongue, which require a painful constant position by the patient, can be made easy with the aid of hypnosis. If desired, the entire operation can be carried out under suggestion and relaxation without any anesthetic.

Use of hypnosis can aid or prevent many painful or distressing postoperative situations. These situations include: pain that is increased by apprehension; delay in ambulation because of fear of pain or fear of disability; stimulation of cough postoperatively, especially in abdominal and thoracic

(1) Am. Surgeon 25:163-169, March, 1959.

surgery; elimination of fear and pain in rectal surgery; elimination of urinary retention secondary to spasm and fear of exerting intra-abdominal pressure; multiple painful dressings, as in burn cases, infected wounds and removal of packs or drains; and elimination of self-made fears, such as those concerning removal of stitches or adhesive tape.

Surgical Aspects of Fibrinolysis. According to J. Fenimore Cooper² (Kaiser Found. Hosp., Los Angeles), serum proteolytic activity probably is essentially a homeostatic mechanism concerned with lysis of superfluous fibrin and other humoral debris of protein origin. In the steady state, there is a delicate, precise balance between proteolytic and anti-proteolytic factors in the serum. Under normal conditions, the blood manifests no fibrinolytic activity. Under stress, such as trauma and major surgery, considerable serum proteolytic activity may become clinically apparent.

Fundamentally, serum proteolytic activity results from interaction between plasminogen, an enzyme precursor in the blood, and a system of activators of diverse origin. A proteolytic enzyme, plasmin, that is capable of hydrolyzing fibrin, fibrinogen, prothrombin, antiplasmin and other serum proteins is consequently liberated. The degree of activation obtained may depend on the relative concentrations of activator, plasminogen and inhibitor that are present at the site of activation.

The development of plasminemia in surgical states is probably as physiologically homeostatic as the process of coagulation, but less fully understood. Actual induction of serum fibrinolysis in surgical states may be considered a local or general process dependent entirely on the degree of activation of plasminogen initially by liberated tissue activator. In addition, the intrinsic antiproteolytic titer of the individual is of equal importance in localizing and inhibiting exuberant fibrinolytic factors in operation. In most surgical procedures, some fibrinolytic activity can be detected clinically by suitable laboratory technics. Surgical procedures on specific organs, such as the prostate, lung, uterus and pancreas, can at times induce strong fibrinolytic activity because of the unusually high tissue activator present in these organs. Despite variation in the tissue activator pres-

(2) Surg., Gynec. & Obst. 108:417-435, May, 1959.

ent, the development of fibrinolytic activity is a well-controlled process in most surgical procedures.

Regional Heparinization and Heparin Inactivation by Erythrocytes. Regional heparinization is administration of heparin into a vessel at a rate that prevents thrombosis in the heparinized vessel and its ramifications without elevating clotting time of blood in the vascular system other than the vessels into which the heparin is injected.

Prolonged regional heparinization of a large artery with blood flowing rapidly through it is often attended by general heparinization. This happens because inactivation of heparin in the artery takes place more slowly than circulation time of the blood through the extremity. Nonetheless, regional heparinization could be assuredly produced by neutralizing the heparin given intra-arterially before it enters the general circulation. This effect was produced by Gordon and his associates by infusing heparin into the femoral artery and protamine into the respective femoral vein.

David A. Ohlwiler and Earle B. Mahoney³ (Washington Univ.) tested the feasibility of regional heparinization over 5 hours by using varied infusion rates and found that it can be obtained only transiently even with slow rates of intra-arterial injection; general heparinization ultimately occurs. Erythrocytes were capable of inactivating heparin *in vitro*. If they possess this capacity *in vivo* they may well be an important factor in *in vivo* inactivation of heparin, in addition to the serum enzymatic destruction of heparin. Whether this phenomenon is related to destruction of heparin by an intracellular enzyme, the binding of heparin to the red blood cells or some other action is unknown. The clotting time of blood from vessels into which cannulas or needles were placed was remarkably shortened.

Surgical Management in Hemophilia and Hemophilioid Diseases is evaluated by Ivan W. Brown, Jr., Wirt W. Smith and Ralph M. Howse⁴ (Duke Univ.). The first principle of treatment of hemophilia and hemophilioid states is to restore and maintain the patient's blood-clotting mechanism at a satisfactory level before operation and until healing of the wound or injury is sufficient that bleeding will

(3) Surg., Gynec. & Obst. 107:353-358, September, 1958.

(4) Ann. Surg. 149:721-736, May, 1959.

not occur when all forms of treatment are discontinued.

Only 5-10% or less of antihemophilic globulin is required to maintain hemostasis in the uninjured otherwise healthy hemophiliac, yet it may be necessary to raise this level to 10-20% of normal to maintain hemostasis in hemophiliacs with severe injuries or large operative wounds.

The dosage of fresh blood or plasma required for proper hemostatic effect will vary with: (1) the severity of the patient's bleeding tendency or his own level of antihemophilic globulin; (2) the extent of the injury and the rate of blood loss; and (3) presence of tissue necrosis or infection.

The patient's antihemophilic globulin level can be raised about 1% by 1 cc. fresh normal plasma/kg. body weight. However, in hemophilia and in the other hemophilioid conditions, because of the variables involved, it is best to regulate blood and plasma administration according to the response of the partial prothrombin time test. After the test shows a favorable level by significant shortening of the partial prothrombin time of the patient's plasma, the amount and frequency of transfusion can be fairly accurately determined.

Minor wounds and injuries present no problem so long as hemostasis is properly controlled and so long as the patient is not denied, out of fear of the disease, the same treatment that would be given to a nonbleeder with an identical lesion. Treatment of hemophilic hemarthrosis and arthropathy is largely nonsurgical. Traction, physical therapy and corrective plaster casts can do much to minimize or correct the crippling deformities. In dental surgery, hemorrhage can be minimized by preparing beforehand an impression of the operative site, including a sufficiently large intact area on each side. After the extraction, suturing the gum margins should not be attempted because this may result, if arterial bleeding occurs, in a dissecting hematoma. The empty socket may be packed with Gelfoam® moistened with thrombin and dipped in dry thrombin powder. Hemorrhage into the retropharyngeal tissue, the tongue, larynx, fauces or the floor of the mouth can cause swift death by asphyxia. Maintenance of an adequate airway is paramount. Tracheal intubation is probably the method of choice.

Until potent animal or human antihemophilic globulin

concentrate becomes readily available, perhaps only the most desperate cases or patients with the milder form of the disease should be subjected to major abdominal surgery. Surgical care of diseases of the genitourinary tract in the hemophiliac presents no special features.

Neonatal Asphyxia Pallida Treated with Hypothermia Alone or with Hypothermia and Transfusion of Oxygenated Blood was investigated by Björn Westin, James A. Miller, Jr., Rune Nyberg and Erik Wedenberg.⁵ Six babies with asphyxia pallida were cooled in running water at temperatures between 8 and 14 C. Total time in the water varied between 4 and 39 minutes. Minimum colonic temperatures were 23-30.4 C. In 3 babies, regular breathing began spontaneously without further treatment 14-23 minutes after birth and at body temperatures of 27-34 C. The other 3 infants were given 75-150 ml. oxygenated blood when it appeared that cooling alone might not be adequate. These began breathing at 18-79 minutes after birth and at temperatures between 32 and 23 C. Hearing tests performed between 12½ hours and 22 days demonstrated no loss of acuity between 500 and 4,000 cycles per second. This is in sharp contrast to records previously obtained from babies that had recovered from severe asphyxia with or without neurologic symptoms. Of the 6 infants, 1 died at 30½ hours, apparently from aspiration of vomitus; 5 are alive, growing and apparently normal.

Hypothermia has been a lifesaving measure in experimentally asphyxiated newborn animals. It played the same role in these human newborns. Recovery is possible from apneic periods of over 1 hour when hypothermia is combined with injections of oxygenated heparinized blood. These 6 patients with asphyxia neonatorum treated with hypothermia bring the human infant into line with other newborn mammals in which cooling has been demonstrated to be a lifesaving procedure. The original rationale for its use is van't Hoff's law, which states that the rates of chemical reactions vary with the temperature. Thus, by reducing the rate of consumption of energy stores, it was postulated that drastic cooling would greatly prolong asphyxial survival.

(5) Surgery 45:868-879, May, 1959.