1980 YEAR BOOK OF SURGERY

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The YEAR BOOK of

Surgery

1980

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Annual Overview

General Considerations – Hemostasis in massively transfused trauma patients has been evaluated. Factors V and VIII were the only clotting factors shown to deteriorate significantly in stored blood. The prothrombin and the partial thromboplastin time were predictive of bleeding only when they were markedly abnormal. Thrombocytopenia stands out as the major coagulation defect in these patients. Platelet concentrates should be used to reverse this situation. An increasing literature has been concerned with the adverse effects of heparin, including the indicators of thrombocytopenia, thrombosis and hemorrhage. Even the minidose regimen of prophylaxis has been shown to be associated with idiosyncratic reaction and arteriolar thromboembolism. The platelet count should be monitored in these patients.

The management of diabetic patients undergoing operative procedures is facilitated by an intravenous insulin regimen. This approach is particularly applicable in patients receiving steroid therapy. Transcutaneous electric stimulation, previously used for a variety of causes of postoperative pain, has been applied successfully to the problem of phantom limb pain. Metoclopramide, shown to be an effective emetic agent and an enhancer of gastric emptying, has been studied and shown to have little effect on the problem.

Fluid, Electrolytes and Nutrition – Continued clinical experience indicates that resuscitation of patients sustaining shock and major trauma must include some form of extracellular mimic in a significant volume. It is also becoming increasingly clear that the addition of supplemental albumin to resuscitative volume is not at all advantageous but is potentially harmful. Many studies continue to delineate the role, timing and sequencing of restoration of precursors to protein, carbohydrate, and fat salvage in patients who are severely injured or malnourished. More and more elegant studies on intermediary metabolism after severe injury continue to appear, and the optimal nutritional and metabolic support for the traumatized patient is being more clearly approached.

Shock – The literature of the past year relating to all forms of shock was not only increased in quantity but in quality. The papers published continue to show that this serious clinical entity remains a major problem. All forms of shock are being studied, but those seen most commonly, namely, hemorrhagic and septic shock, are receiving major emphasis.

Many papers published in the past year reported results from the use of albumin solutions in one form or another for resuscitation of patients in various types of shock, but particularly in hemorrhagic shock.

Patient studies clearly show that two forms of shock need to be differentiated in regard to resuscitation from hemorrhagic shock. Several very elegant investigations describe regimens for isovolemic resuscitation, such as would be used in patients undergoing a standardized but major elective operative procedure. The authors of three well-documented clinical studies concluded that the ideal replacement solutions for resuscitation for isovolemic hypovolemia or isovolemic replacement as hypovolemia is incurred do not include albumin. Studies from several groups show that optimal resuscitation was obtained by replacement with red blood cells and an extracellular fluid mimic in the form of Hartman's solution. Unquestionably, if albumin as 5% solution was added to the resuscitative solution, the colloid osmotic pressure of the serum could be maintained. However, when the resuscitative regimen was aimed at providing a constant pulmonary capillary wedge pressure, or a left-sided atrial pressure, the reduction in colloid osmotic pressure of the plasma that occurred in the absence of albumin was physiologically inconsequential. However, a rise in pulmonary capillary wedge pressure, which was easy to accomplish with minimal amounts of albumin-containing solution, quickly resulted in pulmonary insufficiency. The findings simply indicate that maintenance of serum colloid osmotic pressure with albumin infusions during isovolemic replacement of blood loss is unnecessary and potentially harmful. These studies were accompanied by assessments of the widespread and probably largely unnecessary practice in many hospitals of using increasing amounts of normal human serum albumin. Several other clinical studies appeared, indicating that such use was inappropriate at least 50% of the time, despite the prohibitive costs.

Another set of elegant clinical research papers looked further into the use of extra albumin during resuscitation of patients from already sustained hemorrhagic shock. Albumin supplementation again maintained total serum protein and serum albumin levels at normal; however, there is a remarkably negative inotropic effect on the heart of adding albumin to fluids for resuscitation from hemorrhagic shock. One good clinical study indicated that when supplemental albumin was added to a standard resuscitative regimen, including blood and saline solutions, the subsequent or postshock need for whole blood replacement increased because of the reduction in coagulation factors caused by the albumin used in the initial resuscitative phase. These same investigators also found that there was more impaired salt and water excretion after supplemental albumin used for resuscitation from hemorrhagic shock. One group of investigators had previously shown that the use of resuscitative fluid with added albumin in primates increased interstitial pulmonary edema as compared to resuscitation with blood and saline fluids. The objection to their work was removed in this current study in which albumin of baboon origin, as opposed to human origin, was used, with essentially the same findings.

Studies from Denmark indicate that frank hemorrhage, muscle trauma by standardized trauma, and regional ischemia all produced irreversible shock without the development of shock lung. This study

seems to add one more nail to the coffin of shock lung, indicating that unrecognized pulmonary injury, sepsis most commonly, and aspiration are the usual causes of posttraumatic pulmonary insufficiency and that the term "shock lung" should probably be replaced by the term "septic lung."

Several interesting studies assessing the role of micropore filtration on pulmonary function after hemorrhagic shock and massive blood transfusion have appeared. The conclusions at present are that the 40 μ micropore filters currently in use are totally inadequate for removing microaggregates. In one study, only 12% of microaggregates in blood were removed from the first unit of transfused blood. By the tenth unit, the filter was actually adding microaggregates to the blood the patient was receiving. Whether the removal of all microaggregates will, in fact, help reduce the incidence of posttraumatic pulmonary insufficiency is yet to be determined.

Several other interesting studies measured different aspects of cellular response to shock injury. It appears from these studies that a devastating but potentially reversible cellular injury occurs in patients with any significant degree of sustained hemorrhagic shock. Warning studies concerning aggravation of cellular injury by the use of vasopressors and anesthesia in patients who have had severe hemorrhagic shock are well taken.

Preliminary data on the loss of white blood cell function and immunologic competency by patients in hemorrhagic shock (much less in septic shock) are continuing to appear. Some of these elegant studies offer convincing evidence that immunoactivity in the injured patient is decreased in many ways and quite soon after injury.

Similarly, these same changes in function of white blood cells as well as immunologic response have been shown in septic shock in man and animals. There is continuing and more diverse evidence of reversible but significant cellular injury. It is heartening to see more and more studies in which live organisms are used instead of the unreliable endotoxic concentrate obtained from gram-negative organisms.

Much work continues to center about the devastating pulmonary insufficiency resulting from septic shock. One sophisticated study used the Staub sheep model to investigate the pulmonary response to sepsis and septic shock. It indicates that the turnover rate of albumin at the pulmonary capillary level between intravascular and interstitial space is remarkably increased in septic shock. Furthermore, when resuscitation was accompanied by albumin in the resuscitative fluid, the albumin flux indicated a true increase in interstitial albumin. This shows that the extravascular lung water after resuscitation from sepsis was increased when albumin was used in addition to some form of saline resuscitation.

Trauma—The increased interest of surgeons in better clinical efforts at resuscitation of patients with severe trauma and the growing number of sophisticated studies on the total body response to severe injury are gratifying. Several papers indicate that an integrated transport-resuscitation system in any community is a massive joint effort.

Without doubt, the severely injured patient brought as quickly as possible by trained individuals to a trauma center has a much better chance of survival than one brought to an institution not truly equipped in manpower, equipment and training to respond immediately to his needs.

Several excellent studies are further unfolding the circumstances of decreased immunologic competence produced by major trauma. One such study examines the ability to determine whether surgical trauma was major or whether it was minor enough not to invoke delayed hypersensitivity to common-recall antigens as well as immunosuppressive serum. The mechanism of reduced responsiveness in patients with severe thermal injury appears to be a reduced response to phytohemagglutinin, a T cell mitogen. Suppressive cells are increased in many thermally injured patients, and one study identified the suppressive cell arising after thermal injury as a T cell and characterized the phytohemagglutinin hyporesponsiveness as being mediated by an inhibitory monocyte. These studies suggest the ability of regulatory cells to depress immunocompetence in traumatized patients. Other studies have even related the severity of the reduction in T cell count to the severity of the traumatic episode.

Further studies on the prevention of pulmonary embolism in the traumatized patient by the judicious use of a small amount of substance such as dextran 70 to inhibit fibrinolysis appeared during the past year. Several papers continue to refine and define the usefulness of clinical diagnostic peritoneal lavage after blunt injury. This has certainly proved to be a useful adjunct in the initial diagnosis and management of patients with significant intra-abdominal injury. Many articles increasingly detail the acceptable limits of good clinical management of specific injuries, such as neck injuries, abdominal trauma of all kinds (including venous injuries within the abdomen and colon injuries), and the need to explore retroperitoneal hematomas.

Several articles try to define the problem of postsplenectomy sepsis, particularly as it occurs in young patients. Postsplenectomy sepsis is far more common after splenectomy for hematologic disease. The true incidence of postsplenectomy gram-positive sepsis after splenectomy for trauma, even in young children who have not had hematologic disease, is yet to be determined. However, until more concrete data are obtained, there will continue to be a remarkable effort to salvage a portion of the spleen, particularly in young children, when this is technically possible. It is also clear, however, from this year's study that injured spleens not operated on once the diagnosis of splenic rupture has been made may be potentially very hazardous. Several articles begin to document the presence of a strange immunologic disease, almost of an autoimmune character, with resultant fatality if splenic injury is diagnosed and operation is deferred.

One interesting new approach to resuscitation being advocated by several authors is immediate or emergency department thoracotomy for patients who are basically dead on arrival but in whom the vital signs were just recently lost. A surprisingly good yield is being report-

ed from several major centers now when this is done with specific indications.

Wound Healing – Although the surgeon has long recognized that skin grafts will not take and rotation flaps will not adhere on smooth, bursa-like surfaces, the fundamental biology involved has not been clear. The problem has been partially clarified by studies that indicate the importance of fibrin formation to the deposition and incorporation of collagen fibers. Fibrin does not become fiber. Nevertheless, the ability of a wound to lay down a fibrin network has been shown to be a fundamental prerequisite to normal healing, including take of a skin graft.

The previous notion that split-thickness skin cannot be used to resurface a weight-bearing area such as the plantar surface of the foot has been shown *not* to be true. The critical factor in selecting grafts for the bottom of the foot is not thickness of the skin graft, but the presence of underlying tissue between the graft and bone which will make it possible for the graft to move across bone. If there is no cushion that allows movement of the graft, weight-bearing literally wipes the graft off the bone regardless of the thickness of the graft. Even thin split-thickness skin grafts have been shown to function satisfactorily on weight-bearing surfaces if there is deep tissue between the graft and bone which will allow some movement of the graft each time pressure is applied.

Evidence has been reported that blood breakdown products affect survival of overlying skin significantly. A hematoma beneath a flap of skin with marginal blood supply exerts an adverse influence over and above the pressure caused by blood in a closed space. Such data strongly suggest that hematomas should be drained as quickly as surgeons drain collections of pus.

Reports suggesting that abdominal dehiscence can be prevented by the skillful use of large retention sutures continue to appear. It is critical in evaluating such reports to understand and recognize the difference between dehiscence and evisceration. There is no question that retention sutures protect against evisceration, but there are no data yet supporting the idea that retention sutures protect a patient from wound dehiscence. Closure of the perineal wound after excision of the rectum continues to produce satisfactory results, but basic studies on regeneration of peritoneum have not been applied to the pelvis yet. There is still unnecessary emphasis on closing the pelvic peritoneum – a procedure that is responsible for many postoperative complications after removal of the rectum.

Additional information continues to accrue suggesting that the macrophage is the "missing link" in the process of starting wound healing. The trigger that overcomes entropy appears now to be located in stimulated macrophages.

Additional reports showing that early debridement of an electric burn can be carried out accurately should make the surgeon more aggressive in managing electric burns. It is becoming increasingly obvious that an electric burn is of no more significance than any other thermal burn except that the temperature is much higher than that