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YEAR BOOK OF SURGERY® 1990

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1990 The Year Book of SURGERY®

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Journals Represented

Year Book Medical Publishers subscribes to and surveys nearly 700 U.S. and foreign medical and allied health journals. From these journals, the Editors select the articles to be abstracted. Journals represented in this YEAR BOOK are listed below.

Acta Chirurgica Scandinavica
American Journal of Epidemiology
American Journal of Otolaryngology
American Journal of Physiology
American Journal of Surgery
American Journal of Surgical Pathology
American Surgeon
Annals of Emergency Medicine
Annals of Internal Medicine
Annals of Surgery
Annals of Thoracic Surgery
Annals of the Royal College of Surgeons of England
Archives of Internal Medicine
Archives of Otolaryngology–Head and Neck Surgery
Archives of Pathology and Laboratory Medicine
Archives of Surgery
British Journal of Plastic Surgery
British Journal of Surgery
Canadian Journal of Surgery
Cancer
Cancer Research
Circulation
Circulatory Shock
Contemporary Orthopaedics and Related Research
Clinical Science
Critical Care Medicine
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Gastrointestinal Radiology
Head and Neck Surgery
Infections in Surgery
International Journal of Cancer
International Journal of Pediatric Otorhinolaryngology
Journal of Burn Care Rehabilitation
Journal of Cardiovascular Surgery
Journal of Clinical Oncology
Journal of Experimental Medicine
Journal of Hand Surgery (American)
Journal of Investigative Dermatology
Journal of Laboratory and Clinical Medicine
Journal of Otolaryngology
Journal of Parenteral and Enteral Nutrition
Journal of Pediatric Surgery
Journal of Surgical Research
Journal of Thoracic and Cardiovascular Surgery
Journal of Trauma
Journal of Vascular Surgery

Journal of the American College of Cardiology
Journal of the American Medical Association
Journal of the National Cancer Institute
Journal of the Royal College of Surgeons of Edinburgh
Lancet
Laryngoscope
Mayo Clinic Proceedings
New England Journal of Medicine
Otolaryngology—Head and Neck Surgery
Pediatrics
Plastic and Reconstructive Surgery
Proceedings of the National Academy of Sciences of the United States of America
Radiology
Scandinavian Journal of Thoracic and Cardiovascular Surgery
Southern Medical Journal
Surgery
Surgery, Gynecology and Obstetrics
Surgical Research Communications
Thorax
Transplantation
Transplantation Proceedings
World Journal of Surgery
Yale Journal of Biology and Medicine

Publisher's Preface

Publication of the 1990 YEAR BOOK OF SURGERY marks the end of an outstanding era of YEAR BOOK editorship by Erle E. Peacock, Jr., M.D. During Dr. Peacock's 19 years of editorship, the volume's readers have been treated to perceptive commentary of the highest caliber. Dr. Peacock has fulfilled Dr. Schwartz' mission for the editorial board as set out in the preface of their first edition in 1971: "We regard our position as a responsibility to provide an important service to surgeons and interested physicians . . . . The conviction of the importance of our task inspires our efforts." On publication of the 1990 edition, we extend our deepest appreciation for this service and for Dr. Peacock's truly inspired efforts.

Annual Overview

General Considerations

The issue of intra-abdominal surgery in patients with immunodeficiency syndrome has become increasingly important. Although many patients with AIDS have abdominal symptoms, relatively few require an operation. Acalculous cholecystitis occurs relatively frequently; appendicitis and intestinal perforations are also on the list of indications for surgical intervention. von Willebrand's disease represents a potential risk for surgical procedures, but modern substitute therapy has minimized this risk. The appropriate prophylactic therapy with fresh plasma should negate the complication of excessive bleeding. Aspirin should be avoided for 10 days before an elective operation. It has been shown that combining clinical data and thallium studies optimizes the preoperative assessment of cardiac risk before major vascular surgery. In diabetic patients the combination of distal arterial reconstruction and microvascular free tissue transfer avoids limb loss.

Fluid, Electrolytes, and Nutrition

Emphasis on nutritional support and the means by which to deliver such support continues. The relationship of such nutritional support to the newly explained mediators is also under intensive investigation.

One clinical article this year extols the virtues of total parenteral nutrition (TPN) in the treatment of significant acute pancreatitis. The addition of glutamine to commercial TPN solutions appears to have real benefit, and this is to be expected. Although glutamine is not an essential amino acid, it is a primary nitrogen donor, and it stands to reason that this should be a useful addition to parenteral feeding. Investigators continue to look at the reason for acalculous cholecystitis developing after trauma; more evidence accumulates to indicate that the gallbladder does not empty following trauma and, furthermore, it appears not to respond to cholecystokinin at that time.

Hypertonic saline has been evaluated after standardized operative trauma and is useful as far as normal fluid and electrolyte maintenance is concerned. However, the associated hyperosmolality in one third of the patients, necessitating a change in the regimen, suggests that, as in the burn patient, this solution has to be so carefully monitored that its general utility is in serious doubt.

Several studies indicate that patients are more susceptible to infection if they are receiving TPN. Furthermore, it appears that when the bowel is totally at rest, there is an increase in translocation of either mediators or bacteria, which triggers mediators in response to sepsis at some other site. As more investigations continue it should become increasingly clear how and when one can manage the mediators either by reducing their activity with monoclonal blockers or antagonists, or suppressing their generation by not allowing bowel injury and increased permeability to affect the initiation of endogenous mediators, largely from macrophages.

Shock

The pathogenesis and better management of shock continue to be of major interest. Studies on pathogenesis are focused largely on the role of the various lipid mediators. Access, mode of administration, and type of fluids required for better resuscitation are areas of interest. Several papers evaluated the use of blood warming and fluid warming devices in the patient who needs massive transfusion and fluid replacement. Because hyperthermia is a serious problem interfering with platelet function, most trauma surgeons now avoid hypothermia by using blood warming devices. Of the several evaluated, it appears that countercurrent heat exchangers are the most valuable; they afford rapid thermal clearance and have been modified recently to afford large volumes of fluids and even packed red blood cells. These devices work with little damage to the red blood cells, as measured by a lack of hemolysis.

Central line placement is associated with high morbidity; better avenues for access for rapid resuscitation are sought. One large series reported excellent results using the common femoral vein with a large catheter for volume replacement.

Several more articles appeared this past year comparing crystalloid versus colloid resuscitation; crystalloid solutions were most desirable. One study specifically examined the effects of additional albumin on renal free water clearance, finding that albumin, in addition to resuscitative fluid, decreases sodium and free water excretion and leads to a higher incidence of renal failure.

Several groups are evaluating smaller volumes of hypertonic saline, particularly in conjunction with colloid, but one critical article appeared this past year indicating that in uncontrolled bleeding the use of hypertonic saline, a potent vasodilator, increased blood loss and early mortality. These authors warn that the use of hypertonic saline as an immediate resuscitative fluid should be monitored very carefully because of the potential hazards in its use.

The evaluation of several drugs for treatment of shock continues. It appears that naloxone has a pharmacologic effect in septic shock, and that the blood pressure can be elevated, but there is no increase in survival when this drug is administered. Other articles have evaluated the addition of triiodothyronine in hemorrhagic shock, with some encouraging results. The deleterious effects of morphine sulfate in the presence of shock have been documented again as promoting an increase in the low flow state.

The evaluation of crystalloid versus colloid solution in the presence of brain injury revealed that the intracranial pressure response to either solution was not significant in increasing the brain edema that inevitably occurs at the direct side of injury.

The role of the lipid and nonlipid mediators continues to undergo extensive evaluation in the pathogenesis of shock. It appears still that cachectin is a primary mediator turned on by lipopolysaccharide, but it is also activated by other forms of injury as well. Platelet-activating factor

is also a proximal mediator and can reproduce the signs and symptoms of sepsis and septic shock with subsequent elevation of other leukotrienes. Further work on the role of lipopolysaccharide in activating bowel translocation of mediators in bacteria continues to indicate that this may be a potent source of infection in the patient who is stimulated by lipopolysaccharide in a remote site of infection. Further studies on the comparison of crystalloid versus colloid solutions in resuscitation from sepsis and septic shock indicate that crystalloid solution, while reducing osmotic pressure, does not increase pulmonary edema in the face of sepsis.

Trauma

It is encouraging to see the continuing accumulation of good sound control in clinical research studies in the specific area of management of the severely injured patient. Another carefully designed, prospective, randomized evaluation of military antishock trousers (MAST) has been carried out. This study indicated not only no benefit from the MAST device, but an increase in mortality in patients in whom it was used whose initial blood pressure was 90 mm Hg or less. These investigators have now banned the use of MAST in their urban transport system.

Another study found that the prehospital administration of fluids is preferably carried out during transport, with results similar to those when fluids are started at the scene. The disadvantage of fluid administration at the scene is the delay in transport time, and this can no longer be justified.

Prospective medical data on the use of seat belts in automobile injuries reveal what would be suspected—a far higher severity score index in patients who are unbelted at the time of accident, resulting in higher mortality, a longer hospital stay, and increased costs. A review of the use of helicopters for medical transport shows that even if the transport time is the same as with ground transport, morbidity and mortality are lower because of the availability of a team and a medically equipped helicopter for critical resuscitation en route.

Interesting studies on the current use of trauma severity scoring indicate that, although these scores predict outcome and give a sense of survival versus nonsurvival, they are not useful as predictors of the onset of sepsis. The addition of some measure of bacterial contamination and immunologic competence should be added to the trauma severity scoring system.

Many articles continue to evaluate the usefulness of abdominal sonography or CT scanning as opposed to peritoneal lavage in the diagnosis of intra-abdominal injury in the patient who sustains blunt trauma. The net result of these studies is the finding that although sonography is a decent screening procedure, its accuracy, specificity, and sensitivity are not as good as those of peritoneal lavage. The two procedures might be complementary. The CT scan is a complementary study in the hemodynamically stable patient for delineation of certain specific injuries. Once again,

however, it does not have the specificity, sensitivity, or accuracy of diagnostic peritoneal lavage.

The usefulness of early, presumptive, single-drug antibiotic therapy in the patient with abdominal trauma continues to be described in the literature. This approach has now been advocated for several years and should become the standard therapy in the management of patients with significant abdominal injury.

Significant efforts continue in patients with splenic injury to avoid subsequent septic episodes. The techniques for splenorrhaphy are better detailed, and it appears that splenic autotransplantation into an omental pouch is successful as far as growing tissue is concerned. Whether this proves successful in terms of prevention of infection is yet to be shown.

The usefulness of percutaneous catheter drainage for abdominal abscess developing after trauma is documented with more proponents. One new modality of controlling massive bleeding from intra-abdominal injury is use of a femoral artery placed via intra-aortic balloon. This technique has proved successful and has avoided thoracotomy in many instances.

Wound Healing

One of the most interesting reports in the wound healing field in 1989 was that topically applied silicone gel reduces the size and modifies the appearance of hypertrophic scars in human beings. The mechanism of action is not clear, but the results are impressive and justify more widespread clinical trials as well as basic investigation. The old problem of a scar that becomes wider over time was restudied last year. The most recent data confirm earlier impressions that a permanent subcuticular suture can reduce the tendency of a tight scar to widen during secondary remodeling. Data refuting this fundamental concept in plastic surgery appear now to have been misinterpreted. Reports documenting that polypropylene mesh can be placed in infected abdominal wounds to prevent evisceration, and that wound closure is possible after granulation tissue grows through the mesh, still appear. Long-term problems remain significant, however; despite early success it does not appear advisable to place a synthetic material in a deeply infected wound.

More enthusiasm appeared in 1989 for no-tension repair of all sorts of abdominal hernias. Polypropylene mesh and Gore-Tex are being used most effectively to prevent tension during repair jof ventral and groin defects. Reconstitution of skin by combining cultured epithelial cells with cryopreserved allogeneic dermis still suffers at the basement membrane level. The unique juncture of epithelium and dermis in normal human skin has not been reproduced satisfactorily in artificial skin.

The search for a practical use for various growth factors continued in 1989. In a tightly controlled study, topical application of epidermal growth factor shortened the time of reepithelialization of human split-thickness skin graft donor sites. The reduction, although statistically significant, was not practically as dramatic as some think possible. Transforming growth factor-beta partially reversed Adriamycin-impaired heal-

ing. Much of the activity in this field seems to be directed toward correction of wound healing defects; little work is being done on acceleration of normal wound healing. Topical antimicrobial agents have been known for some time to interfere with skin healing; the mechanism was shown recently to be specific interference with fibroblast function and replication. Closure of a previously difficult wound—midline sacral decubitus ulcers—has been simplified by continued modification and refinement of V-Y advancement gluteus maximus flaps. A refreshing simplicity in technique for resurfacing lower extremity defects is the use of local fasciocutaneous turn-down flaps.

Infection

Local infusion of antibiotic solutions was again reported to be effective in preventing infection after closure of heavily contaminated wounds. It is not clear from these reports whether mechanical débridement was a confounding factor. In addition, preincisional, intraparietal injection of augmentin was compared in 1989 with intravenous administration of the same antibiotic. The investigators concluded that intraparietal injection was more effective than intravenous administration in preventing wound infection. The old concept that a "load of antibiotics should be on board" before abdominal surgery involving heavy contamination or infection was challenged by studies in 1989 which showed that intravenous administration of antibiotics at the time the need becomes apparent was just as effective as preoperative prophylactic administration.

The increased susceptibility to pneumococcal infection of patients who have had splenectomy may be reduced by administering pneumococcal vaccine. Protection apparently is the result of improved pulmonary clearance of live bacteria in the circulation. Serum elastase α_1-proteinase inhibitor was shown to be a sensitive indicator of sepsis; in patients with peritonitis, a persistent increase may be correlated with the necessity to reoperate because of undrained pus.

An encouraging report evaluating single-agent antibiotic treatment of intra-abdominal sepsis revealed that treatment with cefotetan alone was as effective as combinations of ampicillin, gentamicin, and metronidazole. The results were no different in patients with positive blood cultures.

Studies in 1989 emphasized the need to resect small bowel when multiple perforations occur during the treatment of peritonitis. The etiology of perforations often is not clear, but reluctance to resect bowel in the presence of active peritonitis is usually not good judgment. Although there remains controversy over the risk of performing splenectomy, more data were presented to support the conclusion that there is a life-long risk of severe infection and thromboembolism after removal of the spleen. Postoperative necrotizing fasciitis still goes unrecognized and undiagnosed early because the surgeon does not think of the condition and perform a biopsy on suspected tissue. The diagnosis of necrotizing fasciitis must be made by tissue biopsy to afford the optimum chance for control.

Burns

There was a timely reminder in 1989 that acute cholecystitis, often the result of pharmacologically induced spasm of the sphincter of Oddi, can complicate the early treatment of burned patients. Emergency cholecystectomy sometimes can be avoided by paralyzing the sphincter with an appropriate nerve block. The intravenous catheter remains a high-risk source of infection; *Pseudomonas* and coagulase-negative *Staphylococcus aureus* are the most common organisms recovered from intravenous catheters. Interestingly, the incidence of infection associated with catheters was reported to correlate inversely with distance from the site of catheter insertion.

A report that propranolol improves myocardial oxygenation in burned children yields some insight into why digitalization has never seemed to help cardiac function in burned children and young adults with heart failure. A report showing that fish oil is not a remedy for postburn metabolic defects, and that it does not improve immunologic function, should put that previously popular concept to rest.

Further scientific evidence was presented in 1989 to show that early excision of burned tissue is important from an immunologic as well as metabolic and wound healing view. Excision of eschar may partially mediate immune changes and prevents splenic hypertrophy and lymphocyte alteration. The search for plasma substitutes continued in 1989 with demonstration that pentastarch in relatively small amounts can be equal, or even superior, to albumin in burn resuscitation. Pentastarch, like albumin, however, results in increased bleeding and prolonged clotting times.

The need for whole-tissue biopsy specimens to evaluate infection accurately was emphasized; acridine orange staining was recommended along with fluorescent staining in quantitative culture techniques. Most of these techniques are available in the usual hospital setting.

Contour deformities developing tangential excision of burned tissue and grafting were shown to be preventable by altering the depth of excision of the edges of a burned wound and by careful consideration of the thickness and type of graft. Prolongation of skin allograft survival was accomplished by administering cyclosporine. None of the patients treated with cyclosporine had increase susceptibility to infection while creeping substitution of the allograft occurred. Glycerol-preserved nonviable cadaver skin combined with wide expanded autografts was shown to be effective in the treatment of very extensive third-degree burns.

Transplantation

Cyclosporine has proven to be a highly effective immunosuppressive drug. Although the drug is expensive, its use has resulted in considerable improvement in the outcome of all types of organ transplants, with substantial reduction in the costs of hospitalization. Nephrotoxicity, the principal complication of cyclosporine treatment, remains a problem. The report from UCLA (Abstract 8–26) of the long-term follow-up of children with successful liver transplants is especially disturbing, in that

the children treated with cyclosporine demonstrated a progressive loss of renal function. The search for better immunosuppressive drugs, more specific and less toxic, continues.

One of the newest drugs, FK506, seems promising in that excellent graft survival and even "rescue" from progressively severe rejection resistant to other therapy, has been noted. Although phase I studies in animal models were complicated by severe toxicity, patients seem to tolerate the drug but nephrotoxicity did develop to some degree. Further clinical trials seem indicated. Monoclonal antibodies to the CD3 antigen of helper T cells, OKT3, have been most effective in treating rejections, although the usefulness of this agent is sharply limited when the host develops antibodies against the monoclonal antibody. A new type of monoclonal reagent, directed against the CD4 antigen of helper T cells, seems to suppress this troublesome humoral immune response and may even be immunosuppressive and tolerogenic.

Further studies of the mechanism of the immunosuppressive effects of blood transfusion have focused on prostaglandin production. The power of the transfusion effect has also been documented in attempts to induce tolerance through peritransplant infusion of nucleated stem cells from the donor; Barber et al. (Abstract 8–18) report a successful clinical trial using this strategy.

The role of the antigen-presenting cells in inducing allograft rejections remains of considerable interest. Modulation of the antigen-presenting cells, or their elimination from the allograft, is an effective means of delaying or averting rejection. Studies of fetal organs during phases of development in which proper antigen-presenting cells are absent corroborate the modulation experiments; when these cells are not present, rejection does not occur.

The graft-infiltrating lymphocytes include populations of macrophages. The importance of induction of class II antigen expression on the graft cells; the presence of lymphokines, including the products of the activated macrophages, and the interactions of the graft-infiltrating lymphocytes and the graft, are not entirely clear. The induction of intercellular-adhesion molecules by cytokines produced by activated infiltrating cells may be of considerable importance at the outset of graft destruction, and their inhibition by steroids may provide an explanation for some of the immunosuppressive effects of these drugs.

Much progress has been made in short-term liver preservation with the use of a perfusate developed after years of steady work by Belzer and his associates (Abstract 8–22). This agent, the "UW solution" has made it possible to transport livers over longer distances and provides hours to prepare the recipient and perform the operation under optimal conditions. The organ most in need of an effective short-term preservation method is the heart; no real progress has been made, although the report of Bando et al. (Abstract 8–29) concerning oxygen free radical scavenging and the use of perfluorocarbons is encouraging.

The major problem facing transplantation is the organ donor shortage. The significant problems associated with the use of anencephalic infants

as heart donors have been thoroughly discussed but remain unresolved. Many patients, at least 25% on the waiting lists for liver and heart transplants, die before an organ becomes available, and only those most desperately ill receive transplants. The failure of the Routine Inquiry legislation to improve the rate of organ donation among patients who are brain dead, is most disappointing. The problem seems to be at the professional level, with lack of interest and involvement on the part of physicians caring for comatose patients with irreversible brain injury. A means to encourage organ donation must be found if the achievements of improved immunology, immunosuppression, and organ preservation are to be realized.

Oncology and Tumor Immunology

The more we learn about the peculiarities of the immune response to tumors, the more complex this system appears. The simple rules of classic immunity, wherein immunization with antigen results in a cytotoxic immune response mediated by cells or by specific antibody, do not seem to apply. For instance, in the first paper reviewed in this section, tumor-infiltrating lymphocytes were obtained from tumors, expanded with interleukin-2 infused into patients with advanced cancers. Those that responded to this treatment (patients with melanoma or renal cell cancer) did not have heavy infiltration of their tumors with lymphocytes but, rather, seemed to develop heightened cell-mediated immunity in general with resultant tumor control. The effects appeared to be systemic rather than local.

The relative inefficiency of the immune responses generated by tumor antigens have been studied by several investigators who seek to manipulate the antigens to create a more effective response. One of the most promising new approaches has been to create a mirror-image of the antigen by immunizing against monoclonal tumor-specific antibodies (anti-idiotypic antibodies). These newly generated antibodies reflect the tumor antigen, and when inoculated into the patient prove to be much stronger immunogens than the tumor itself. Clinical trials of this anti-idiotypic antibody treatment are underway, using a mouse system to generate the monoclonal antibodies for later injection into patients.

Lymphokines and other mediators continue to be of real interest. One of the areas newly identified are the cell surface adhesion molecules (CAMs), which may be activated by cytokines, and, in the case of endothelial cells, provide the sites for adhesion and penetration of tumor vessels by activated lymphocytes. Some of the effects of adoptive immunity may be to activate the CAMs and interfere with tumor blood supply. Activation of CAMs and cell adhesion may also be responsible for pulmonary toxicity during interleukin-2 infusion.

The adverse impact of blood transfusion on length of survival in patients with malignancies has been the subject of numerous studies reported during this past year. Although all studies to date have been retrospective and uncontrolled, circumstantial evidence is accumulating to show that blood transfusion diminishes host defenses and abbreviates