Atlas of PEDIATRIC SURGERY

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TO CHILDREN EVERYWHERE

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PREFACE

During the period that this Editor was in training at the Peter Bent Brigham Hospital, Cutler and Zollinger published the first edition of their *Atlas of Surgical Operations,* and at the time the Editor was Chief Surgical Resident at the Children's Hospital, Boston, Ladd and Gross published their equally successful text, *Abdominal Surgery of Infancy and Childhood.* Having been thus exposed to these two most stimulating experiences, it would appear quite natural that the Editor might one day aspire to publish an atlas of pediatric surgery. Such a project, however, necessitated years of practical experience and hence years of delay in accomplishment. Whereas at first it was my intention to write simply an atlas of general pediatric surgery, it became increasingly apparent that the book would be much more useful if it also included the various specialties.

The purpose of this *Atlas of Pediatric Surgery* is to make available in one readily accessible place a practical discussion and a detailed illustrative description of the operative procedures required in the surgical care of infants and children. An atlas cannot attempt to be a textbook of surgery. It is written rather with the intent of complementing the existing textbooks on pediatric surgery. There is no claim of originality. The general format is similar to atlases published on adult surgery. In the general discussion preceding each description of operative technique, the authors have been permitted considerable latitude and have been urged to present in "Grand Rounds" fashion the chief problems concerned with the particular surgical situation under discussion. Under Details of Procedure, they have been asked to describe the operative procedure which, in their experience, has produced the best results.

So as not to burden the text with repeated acknowledgements, references have been deliberately omitted. But material presented in a work of this sort must be gathered from the experiences of many authors. Recognition of these contributions is attempted by inclusion of as many of these authors as possible in the bibliography.

It is hoped that this *Atlas of Pediatric Surgery* will prove useful to students, house staff, and practicing surgeons.

The Editor is most indebted to his co-authors for their splendid contributions and for their cooperative efforts throughout the preparation of this book. I am also deeply indebted to Dr. William E. Ladd for his kindness in coming out of retirement long enough to write our introduction, and to Dr. Charles Rob, Professor and Chairman of our Department of Surgery, for writing the foreword. It is also a pleasure to express appreciation to Dr. W. J. Merle Scott, Professor of Surgery, Emeritus, for his encouragement and wise counsel during the early stages of this work.

The Editor and co-authors feel a tremendous debt of gratitude to our medical illustrators, Mr. Robert Wabnitz and Mr. Peter Ng. The illustrations are, with rare exception, original and were drawn at the operat-

ing table. The excellent portrayal of the various operative techniques attest to the talents of Mr. Wabnitz and Mr. Ng. We would also like to express our appreciation to Mrs. Martha Strain, Mrs. Betsy Reid, and Mrs. Barbara Muir for their lettering of the illustrations.

It is a pleasure to thank the secretaries of the co-authors, and especially to thank my long suffering Executive Secretary, Miss Pearl Alexander, for their technical assistance and devotion to the completion of this task.

Finally, the Editor would like to express his gratitude to the Blakiston staff of the McGraw-Hill publishing firm for their excellent cooperation, many courtesies, encouragement, and patience extended throughout the preparation of this book.

Robert R. White, M.D.

INTRODUCTION

It is an axiom difficult or impossible to refute that it is easier and perhaps more effective to describe an act by illustration than by words alone. This is particularly true of surgical operations and is one reason which makes an atlas such as has been compiled by Dr. White so valuable.

It has taken a long time to recognize that the child is subject to different pathological conditions from the adult and displays varied manifestations for the same conditions found in the adult.

More than twenty-five years ago, Sir Lancelot Barrington—Ward of London commented that "The adult can safely be treated as a child, but the converse can lead to disaster." Such teaching has met with considerable opposition and its value has not always been recognized.

The multiplicity of specialties has added complications and difficulties in getting a given patient into the care of the surgeon most competent to handle a given situation. Hospital rules vary in different localities. It must be remembered that specialities are defined largely on an anatomical basis rather than on training and ability.

I have known of patients with imperforate ani being referred to well-trained general pediatric surgeons familiar with such conditions. By hospital rules, such surgeons were not allowed to operate because they were not accredited proctologists. The patients were referred to the accredited proctologist, who had never seen an imperforate anus, and who in turn had to have the general pediatric surgeon show him how to perform the operation. Such ridiculous and harmful situations arise not uncommonly in many of the small specialities. From these facts it may be deduced that multiplicity of specialties is not always beneficial.

Dr. White has admirably solved this obstacle in his atlas by employing as collaborators only those specialists who are thoroughly trained in the conditions of early life in their particular fields.

By adopting such sound principles, Dr. White has produced an atlas which, with its splendid drawings, should be of great interest to all pediatric surgeons and should prove invaluable to the general surgeon who is by unavailability of a pediatric surgeon forced to operate on a condition of childhood with which he is unfamiliar.

Dr. White is to be congratulated on his success in making such a valuable contribution to the surgery of early life.

William E. Ladd, M.D.
Professor of Child Surgery, Emeritus, Harvard Medical School

FOREWORD

A surgeon who has been trained to modern standards operates only after his patient has been studied in detail and the need for operative intervention confirmed by careful clinical and laboratory investigations. The development of these investigations, coupled with better pre- and postoperative care, has led some to decry the importance of the actual surgical operation. Improvements in surgical technique by making operative surgery so much safer and so much more successful have aided those who feel that the actual operation is of decreasing importance. This is a false doctrine. The operation is of vital importance for the well-being of the patient. For this reason every effort should be made to make sure that surgeons are adequately trained in operative technique and that surgical operations are properly performed.

The best way to learn how to carry out a surgical procedure is to assist a master surgeon on several occasions and for him then to assist his trainee perform the operation. The residency system is designed to achieve this goal. Unfortunately, all surgeons cannot learn all operations in this way and new operations are introduced after a surgeon has completed his residency training. An illustrated atlas of surgery is a good way to meet this need and to instruct surgeons in the all-important technical side of operative surgery.

Dr. Robert R. White and his colleagues from the University of Rochester Medical Center are to be congratulated upon the production of this fine *Atlas of Pediatric Surgery.* It should be of value not only to the surgeons in training but to all who operate upon infants and children. A study of this book will, at the very least, stimulate surgeons to think about their own technique. It is unlikely that a surgeon who is an expert in a particular operation will turn to this book for advice about that operation, but it is to be expected that the same man may well obtain useful information from this fine book when called upon to operate in a less familiar field.

Charles G. Rob, M.D.
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PRE- AND POSTOPERATIVE CARE

As one of the newer branches of the surgical art, pediatric surgery has had to develop its own set of pre-and postoperative principles, and its own special diagnostic criteria. There was a time when children, and particularly infants, were considered poor operative risks, when diagnosis was poorly understood, when the underlying nature of many defects was not known, and when satisfactory means of operative repair were not available. The last few decades have wrought a change: The surgeon has caught up with the embryologist, the pediatrician has unraveled the intricacies of fluid and electrolyte balance, and both have become adept at diagnosis. The techniques of anesthesia have improved. The distillation of these endeavors has resulted in the maturation of pediatric surgery as a discipline, the happy consequence being far better care for children than was dreamed of in the past.

Several concepts are now established. The first is the realization that the same general principles of pre-and postoperative care apply here as in the adult. The differences pertain more to body size and metabolic rate—factors governing the amount of administered drugs and fluids; to the speed with which certain events occur—dehydration and postoperative convalescence are two which immediately come to mind; and to the approach to the patient, who in his tender years cannot be viewed with the detachment formerly employed toward the adult. The adult seeks out the surgeon because of his own discomfort or incapacitation; the child is usually brought to the surgeon by a third party, the parent.

Moreover, the child tolerates surgical procedures as well, or perhaps better, than the adult, and clinical observation shows that infantile tolerance of surgical trauma is high, provided that due care is taken to avoid such obvious problems as excessive blood loss and marked changes in body temperature.[1] The ease with which newly born infants seem to withstand such major operations as repair of tracheo-esophageal fistula is now widely recognized. One exception to this rule is massive bowel resection, for in this situation satisfactory postoperative care still constitutes a challenge to the surgeon and pediatrician.

A third realization is that the general types of surgical disease differ in the main from those encountered in the adult. The predominance of congenital defects, foreign-body lesions, and acute trauma contrasts with the high incidence of vascular and degenerative disease and of malignancy in the older adult.

The Initial Evaluation

The same principles of a careful history and physical examination for the adult apply to the infant and child. The major differences involve emphasis on *family history* and on the circumstances of *gestation* and *birth*. For example, such conditions as cleft palate and cystic fibrosis of the pancreas (the latter may present as meconium ileus) are known to be hereditary. We have seen one instance in which extensive intraperitoneal adhesions occurred in more than one member of a family. Rubella in early pregnancy may lead to defects of the infant's eye and heart. The birth process can result in significant trauma to the infant. Babies born of diabetic mothers, and those whose birth weight is low for gestational age, have a higher incidence of congenital anomalies.

Certain hemorrhagic disorders may not be manifest in the child until surgery is carried out. The single most important method of detecting

[1]Rickham, P. P., *The Metabolic Response to Neonatal Surgery*, Harvard University Press, Cambridge, Mass., 1957.

the existence of such disorders is studying the *history*. Routine determinations of bleeding and clotting times are useless as screening tests. Of the known hemophilias, two types (classical—deficiency of anti-hemophilic globulin, and Christmas disease—deficiency of plasma thromboplastin component) are inherited as sex-linked recessive traits. Hence, the only affected members of the family will be the male siblings, the mother's male relatives, or possibly the father. Other rarer types of hemophilia, such as deficiency of plasma-thromboplastin antecedent, vascular hemophilia, and deficiencies of stable factor and labile factor, are inherited as Mendelian dominants.

A most important consideration is the initial approach to the patient. Young children are wary of strangers, and their natural apprehension is enhanced when they are under the impression that the doctor constitutes a threat of mutilation or dismemberment. Whatever can be done by the parent and doctor to convey the idea that the surgeon is going to help rather than hurt is well worth the effort.

The approach should be deliberate, kindly, nonthreatening, and unhurried. Many children object to being completely disrobed, not so much from a sense of modesty as from the fact that they have learned to associate clothing with parental approval, as well as warmth; moreover the child's clothes are *his* possessions, and a brisk order to disrobe completely, particularly in the presence of a stranger (the physician) may have frightening connotations. A more gradual disrobement is more productive of cooperation.

The fear uppermost in the minds of young children is that of separation. Most toddlers and pre-school-age children will cooperate better if the initial phase of the examination takes place while they are seated on their mother's lap. Reserve the bare examining table for absolutely essential purposes. Leave the most unpleasant portions of the examination until the last, and one of the most unpleasant of all is the inspection of the posterior pharynx. Children will tolerate rectal examinations, and sometimes venipunctures, better than they will the tongue blade. A modest present offered at the end of the examination will make subsequent sessions more cooperative. Dr. Bradford taught me the power of the toy-airplane technique (made with tongue blades and adhesive tape). At a follow-up session six months later, one five-year-old proudly announced that he still had the first airplane at home!

The parent—preferably the mother—should be present throughout the examination, and particularly during painful procedures such as venipuncture. Rarely should she be sent from the room; her presence mitigates the unpleasantness.

Certain procedures, particularly fundiscopic visualization and the obtaining of blood pressure, present great difficulties. For the former, children under five are apt to be uncooperative and quite unable to fix their gaze. Dilatation of the pupils is the only answer. The first blood-pressure determination often results in a value, for both systolic and diastolic, that is too high.

It is difficult to overrate the value of careful inspection of the infant or child as a physical diagnostic tool. The reaction of the patient, his overt behavior, the character of the cry and of the respirations, the contour of the abdomen, the color of the skin and mucous membranes—these and numerous other more subtle clues often tell the observer a great deal about the seriousness of the disease process, as well as its probable location. Moreover, the child's overt behavior may forecast quite accurately his reaction to hospitalization, perhaps even his reactions during induction of anesthesia. At the same time, one can assess the parent's response to the child, a factor of utmost significance in determining his tolerance for hospitalization and surgery and for postoperative convalescence. One of the great myths of medicine is that patients should feel kindly toward, and show unswerving respect for, the physician; the patent transparency of this myth is revealed most clearly when one is dealing with children, who have not yet learned to disguise their true feelings.

A word should be said about diagnostic roentgenology and the requirement for special skill in the techniques of obtaining pictures in infants where cooperation is usually lacking. Satisfactory pictures are much more likely in situations where radiology personnel have been trained to handle pediatric patients. Of equal importance in this day of widespread x-ray ex-