AUTOPSY PATHOLOGY

A Guide for Pathologists and Clinicians

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TO OUR WIVES

ANNA BUNZL REZEK, M.D. HEATHER MILLARD

With gratitude for their forbearance

Foreword

In his *Outline of Pathologic-anatomic Propaedeutics** Joseph Engel, the oldest pupil of Carl von Rokitansky, wrote that "pathologic anatomy can be taught but not learned without autopsies." It is surprising that such an ambiguous opinion could be expressed at a period when a modern pathology began to emerge from the integration of exact observations at the bedside and at the autopsy table; at a time when Rokitansky maintained that pathologic anatomy comprises everything of positive knowledge in medicine or fundamental to it.

Engel's statement does not sound as paradoxical today, when the course of pathology at our medical schools includes only a modicum of instruction at the autopsy table and in macroscopic anatomy. Morgagni's static search in the organs of the deceased for the *Seats and Causes of Diseases* had been found inadequate for the comprehension of their nature, and the recognition of the morbid process became the goal of inquiry of pathology during the nineteenth century. The understanding of the disease process was greatly promoted by the advances of the functional disciplines of medical science, while progress in anatomic pathology seemed to have reached an impasse if it remained limited to the gross aspects of alterations of organs and tissues. Cellular pathology was the redemption of morphologic pathology. Consequently, identification of cellular alterations and interpretation of microscopic tissue changes have substituted the exact definitions of gross organ lesions.

It seems generally agreed that an understanding of the morbid process, if accomplished at all by morphologic investigation, can come only from the most refined analysis of the most intimate changes of structure or from experiment. A trend of sophisticated research has gradually taken control of the explorations of structural alterations in disease. Classical morbid anatomy, pursuing the practical correlation of vital phenomena with those revealed at the autopsy table, has greatly lost appreciation except for the dramatic performance of the clinicopathological conference. Rokitansky's didactic aim of making the disease process tangible by demonstrating the correspondence of organ lesions with clinical symptoms has yielded to the rigorous demands of exact science.

The main problem the old time prosector met in the autopsy room was the question as to the relevance of the disclosed organ alterations to the clinical symptoms. To acquire by years of training the ability to answer such questions was the primary aim of the pathologic anatomist and it was the proof of his competence. This was the opportunity of the pathologist of the past and it did not make him worse an investigator.

The change in appreciation of macroscopic pathologic anatomy has resulted in the paradoxical situation that often, not the most experienced, but the youngest, member of the pathological department is delegated to autopsy duties. Pious deprecations will not change the system, which merely reflects the change of values in modern medicine. Only reassertion of unsophisticated observation as the pivot for the advancement of the practice and theory of medicine will restore gross pathologic anatomy to its dignified position in the curriculum of the profession.

The authors of this book are aware that this revival is desirable. From the fountainhead of their own experience and a judicious selection of modern literature, they have completed a treatise which competently surveys the usual and unusual alterations of the bodily regions as perceived at autopsy. They were careful not to confuse factual information of morbid anatomy with comprehension

*Propaedeutics: Preliminary instruction in an art or science.

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of facts. A textbook of applied autopsy pathology should not be a mere catalogue of organ lesions integrated with clinical manifestations. Beyond that it should guide the prosector in the way of how and what to observe at the autopsy table. Thus it will impart to the student the discipline of pathologic anatomic thinking in medicine. Those who will use this book in this spirit will soon appreciate the wisdom of Joseph Engel's remark that pathologic anatomy cannot be learned without autopsies.

PAUL KLEMPERER, M.D., Sc.D. (Hon.)

Preface

THOUGHTS of a book such as this lingered in the mind of the senior author for many years, stimulated by his training, his own experiences and by the excellence of the now unobtainable *Post Mortems and Morbid Anatomy* by Theodore Shennan. Influenced by this enthusiasm, the junior author was readily persuaded to join the not too onerous venture of bringing Shennan up to date. No sooner started upon this, we conceived the larger plan of a text in gross autopsy pathology with a clinical bias which would describe not only the common disorders, but also many of the interesting rarities which are the reward of attention to the routine.

The partnership has been a truly equal one and we dare to say that the continued amicability over the six years devoted to this work has not been excelled by any other combination of authors. Each of us sought out material from different sources and every chapter is the product of us both, often a balance of conflicting views. Inevitably the selection and balance of topics will not satisfy all readers and we shall be happy to receive criticism.

The present work now bears no direct relation to the original Shennan but acknowledges the path that was made for us. Some quotations of the original are incorporated. The text is not encyclopedic in the sense of being a "Handbuch" but includes much material which, while found in the clinical journals, is not in textbooks of pathology. Conscious that it is customary for reviewers to berate authors who dwell on minutiae, we nevertheless do so in an effort to help the pathologist with a limited library who finds an unusual lesion beyond his previous experience. Minutiae are not trivia.

Every pathologist realizes that when he performs an autopsy he is doing much more than taking out the organs for an interested clinician. He is asked constantly to interpret what he sees, to explain why it happened, to state whether a certain complication was to have been expected. After certain kinds of surgery, he hopes to be able to demonstrate what went wrong. Above all, he receives the daily query, "Why did the patient die?"

We hope that answers to much of this interrogation will be found in the forthcoming pages. This is why we may appear at times to have overstepped some imaginary boundaries by describing rather clinical or theoretical considerations. They are there to assist understanding and for that reason a whisper of microscopy may have crept in from time to time. A pathologist in a smaller hospital often has to encompass what seems to be the whole of medicine and we have tried to help him discuss his cases equally well with, say, the cardiologist and the gastrointestinal surgeon.

In an effort to be of further assistance, anatomical regions which are not usually discussed in their own right have been described in as much pathological detail as possible. The vertebral column and the retroperitoneum are examples of such entities.

The practicalities of the dissection are attended to, although not in any way competitively with Saphir's outstanding text. Indications are given as to the tissue blocks to be cut in certain diseases, special direct smears to be made, or chemical and cultural investigations to follow. The anatomical knowledge required is presented as part of the organ system being investigated and will usually be found to obviate the need for reference to anatomy books, except perhaps for illustrations. Some of the more important types of abdominal surgery are described to help the unraveling of mysteriously transplanted loops of bowel. A little of cardiac surgery is also presented.

Discussion of the obvious types of dead-on-arrival legal pathology is considered

out of place here, but the more subtle types of delayed death (such as late effects of head injury) are in their appropriate place.

The references have been chosen for their outstanding quality, because they upset some previously held ideas or because they review a great deal of earlier work. Some are included because they contain far more detail than most textbooks of pathology. We have tried to restrict their number and therefore not all statements are documented. On the other hand, we have given full accounts of some important contributions. A glance at the references will show how much material of importance to the pathologist appears in journals of medicine, surgery and the other specialties. It is also an indication of the wide ramifications of modern pathology and of the need clinicians have for our work. Even more it is a hint to neophyte pathologists for them to be abreast with knowledge of the clinical sciences.

Many months of pondering led us to the conclusion that photographs are not equally valuable to all kinds of books. Our readers assuredly have a selection of the standard texts on their shelves with pictures of many diseases, and they are aware of the aspects of numerous tumors and diseases. Because we have much to say, we have refrained from trying to illustrate every condition, and, particularly, each one of its variants, as the space is needed for our discussion. Professor Ian Aird was more courageous in his *Companion in Surgical Studies.* It has no illustrations in its more than one thousand pages and his comment in the introduction is, "There is no doubt that the commonest type of memory is that which relies on visual impressions, yet too close a dependence on visual memory enchains the intellect; the highest faculty of the intellect and the finest communication is language."

The photographs used, unless bearing specific acknowledgment, come from the general files of the University of Miami, Department of Pathology, Jackson Memorial Hospital.

The book is written to follow the usual order of performance of an autopsy. The reader will not be surprised that this scheme breaks down here and there. When one cuts into a lung what does one look at first—the edema, the congestion, the fibrosis or the tumor? Moreover, etiological grouping is often abandoned for a morphological one since differential diagnosis needs a discussion of granular kidneys or nodules in the lung.

In a wider sense we are presenting an apologia for the autopsy which in certain institutions has fallen upon hard times. We consider that it is as much a consultation as is the interpretation of slides. From accumulated data, both old and new therapies can be constantly evaluated. The fertile mind can always glean new ideas or even new diseases from observations at the autopsy. Happy is the pathologist whose colleagues visit him while he works rather than waiting to read his reports.

Acknowledgments

BOTH our senior colleagues and our residents have rendered valuable service in making suggestions and criticisms for various sections of this book. Many ideas came in coffee shop conversations.

The entire manuscript was flawlessly typed by our secretary, Frances Levy, who cheerfully accepted changes in the "final" copy. The excellence of the photographs is a tribute to the work of Mr. William Atkinson of the University of Miami Medical Illustration Department at Jackson Memorial Hospital.

It is a pleasure to acknowledge the valuable assistance of Mrs. Anna B. Rezek for her painstaking review of the galleys and page proof.

We have made free use of the knowledge accumulated in many textbooks. Some are referred to in individual chapters. The rest we would like to acknowledge below.

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Prologue

WHY PERFORM AUTOPSIES?

"Diseases may be the subject of anatomical research in any of their phases as long as there is not too sharp a line drawn between morphology and biology" (ROKITANSKY).

"It would be unfortunate if anatomical investigation would be limited to the dead material, the observation of final states . . . if its entire result would be description and classification of certain natural historic objects. The experiment is always the sure control for the pathologic anatomic conclusion" (VIRCHOW).

"He who as a Pathologic Anatomist neglects the autopsy and puts his faith in experimental pathology has built on sand" (ASCHOFF).

IN 1956, Starr raised the temperature in our cool morgues by suggesting that the autopsy has reached its nadir, that no-one really wants to perform one, that the examination is performed without any imagination, that the standard of the technique has dropped off and that "the new professor of pathology in my school, an expert experimenter, has washed his hands of the whole business and has declined to be responsible for the routine autopsy service any longer. . . ." Starr felt that most of the microscopy was wasteful, and that the aim of the autopsy might be restricted to "securing information of immediate utility to the clinicians in charge of the case. . . . Perhaps the autopsies would be better performed by the physicians and surgeons personally interested in the cases." He believed that the autopsy in the future should serve the experimental physician or surgeon and provide the material for the study of chemical pathology of diseased organs.

The immediate ire aroused by this attack subsided into a number of well-written answers in the *Journal of the American Medical Association* by some of the leading pathologists in the country. They pointed out that modern histochemistry is already working on the chemical study of diseased organs, that the newer lessons learned in the morgue come from microscopy. From the morgue in recent years have come our understanding of cystic fibrosis of the pancreas, of congenital megacolon, carcinoid syndrome, perinatal deaths, emphysema. Apart from the small proportion of cases having a needle biopsy how else can we evaluate renal or hepatic disease? Klemperer, who provided the quotations heading this section, trained 200 young physicians and surgeons at New York's Mount Sinai Hospital, giving each of them one year of pathology in preparation for their life's work. Bohrod reminds us of the radiopaque perfusion experiments performed on organs, inflation studies of lungs, the photography and injections; he recalls, too, that from his autopsies Klemperer introduced the concept of the collagen diseases. Lev, joining in the discussion, is too modest to point to the immense strides in cardiac surgery which followed the careful examination of congenital heart disease made by himself and many other pathologists. Cannon stresses the role of the autopsy in evaluating the increasing repertoire of iatrogenic disease (transfusion reactions, drug mishaps and marrow failure, for example) and also in weighing the effectiveness of new therapies: "even the weights of the adrenal glands are meaningful in relation to the current use of cortisone and corticotrophin."

Enterline has figures to indicate that the autopsy corrects an important but misguided clinical impression in 5 to 30 per cent of cases. Moreover no papers on neoplasia or other serious diseases are complete without a study of the fatal cases.

Do we have to state that the autopsy is an essential part of the training of pathologists as well as a research tool? So far we have not heard of any move

among surgeons to advocate the abolition of the study of anatomy. Burn provides a suitable conclusion. "One of the principle reasons for the attiude regarding pathology has been the unusual and often unwise appointments to the chairs of pathology in some medical schools of today. . . . An experimentalist, a physicist or perhaps a clinician from a remotely related department is appointed to the full professorship of pathology. . . . (They) rarely enter the portals of the autopsy room and even refuse to perform an autopsy."

To those pathologists fighting the scorn of sceptics we offer two practical suggestions:

(1) Make clinicians welcome at daily organ reviews of the previous 24 hours' material.

(2) Have the autopsy slides prepared and studied in a week or two, and if necessary push through key slides overnight with the surgicals.

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CHAPTER 1

Of Death and Dying

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THE PATHOLOGIST is probably more conscious of his secret thoughts about death than are most men engaged in peaceful occupations. Yet after a long career he does not feel he has been able to read further into truths hidden from others. Even when running a busy autopsy service his thinking is attuned to life, for through his hands the dead do serve the living.

In so many cases we see that death was inevitable while at other times we ask each other "but what was really the cause of death?" This question is more than a search by logical minds, it inquires about mechanisms which one day we may hope to see reversed or held in abeyance. Writing in the early part of this century Adami pointed out "rarely do we see this natural process—the passing of the quiet sleep of exhausted old age imperceptibly into death." Rather the exitus is likely to come from secondary infection. And again, "it is the prevalence of terminal infections that gives force to Osler's dictum, that the individual rarely dies of the disease from which he suffers save, it may be added, when that disease is in itself of the nature of an acute infection."

In a way this is recognized in our death certificates which take cognizance of the concept that a person's death is not the result of a single cause. Provision is made for the insertion of a chain of secondary or tertiary or contributory causes. The necessity under some circumstances of denoting a single cause strains truth too much and produces a misleading statistic. Treloar (1956) has discussed this problem at length and urges that official statistics record the causes of a patient's death in more complex fashion.

There is the half-truth also that comes from summarizing gross and even microscopic autopsy findings without reference to the clinical course. How meaningless it is to write baldly: "pulmonary congestion and edema, myocardial hypertrophy with moderate fibrosis, arteriolar nephrosclerosis." Fortunately most of us have been converted to the necessity for making a clinical, biochemical and pathological synthesis.

Death has been classified under a number of headings, as for instance by Schorr (1927). Rarely seen is *physiological death,* the culmination of all aging processes. Most persons have a *pathological death,* insofar as they die "before their time" of various diseases. In this large second group is included *accidental and violent death,* a self-explanatory category in which external physical, electrical, chemical and similar forces terminate life before it has attained its full expectation. Also under this heading are *sudden death* (unexpected death from disease in a very short time, to be considered on pg. 8) and *ordinary death,* which is the usual exitus for most of us after some illness. While

under the last circumstance death tends to be gradual, it may be accelerated by superimposition of another factor, as when cardiac failure is added to pneumonia, or intravenous fluid is given too rapidly to a patient with renal impairment. Other hastening factors may become apparent for the first time at autopsy, for example an incompleteness of the circle of Willis in a case of unilateral carotid artery thrombosis. Quite often a person with a lingering disease suffers sudden death, particularly if developing a pulmonary embolus.

Therefore it is apposite to list not only the basic disease in individual organs, but also effects of aging in various organs, evidences of disturbance of nutrition (and some time in the future, post mortem biochemistry), superimposed complications and other diseases. We hope we are now past the stage of inventing diagnoses such as "senility" or "disordered action of the heart." (*"In the absence of ideas, a word stands ready to be used"*—Goethe.)

With regard to death, we must remember that we cannot be sure of the moment at which it occurs. We are accustomed to pronounce a person dead when by auscultation of the heart no beats are heard. Yet under some circumstances a "dead" person can be snatched back by artificial respiration, thumping of the chest, cardiac massage or electrical stimulation of the heart. Therefore it is wrong to assume that the body has died when the heart appears to have stopped; if this were so, such methods of revival could not succeed.

It comes naturally to think of death as originating from cardiac failure. However it may be mediated through respiratory or cerebral failure and the three react upon one another. In addition, certain circulatory mechanisms are able to affect the heart, particularly in shock and other forms of vasomotor collapse. We endeavor to illustrate this interplay in Figure 1.

In turn the figure can be amplified by consideration of the role of the autonomic system, which may be regarded as an extension of the central nervous system that can affect circulation. This is seen in Figure 2, and may be a means whereby we can explain the "acute brain death" which sometimes follows several days of intense excitement and psychomotor hyperactivity in cases of schizophrenia. The autopsy is always unrevealing.

It appears to be valid to invoke "reflex (vagal) death" or "inhibition" in certain instances. Well known amongst these are the instant death which follows the striking of the larynx by a solid foreign body or even by water and the unexpected death that rarely follows the striking of a sensitive membrane like the pleura by a needle point. Somewhat more controversial is the view that death from embolization of a major pulmonary artery is reflex in nature; it is difficult to understand

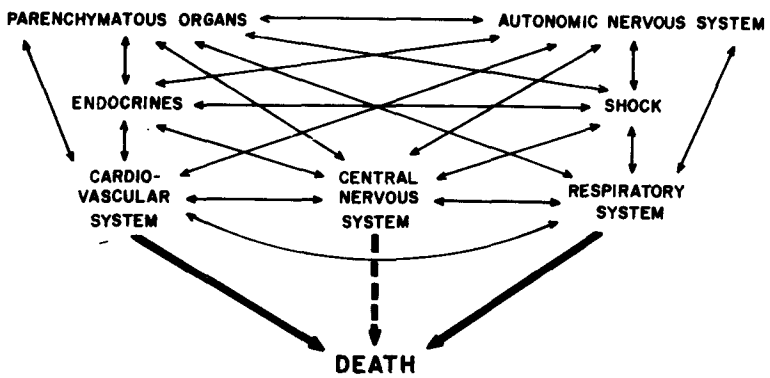

Fig. 1. *The Pathway of Death.* One or more of three vital systems fail, the cardiovascular, central nervous or respiratory. These may interact, as when respiratory disease is responsible for myocardial hypoxia. The other systems of the body cannot directly cause death but have a deleterious effect on one of the three functions. There is some doubt whether central nervous system damage, even sudden massive destruction, can itself cause death. In other words, does a large cerebral hemorrhage cause death primarily, or does it do so by its effect on respiratory and cardiovascular mechanisms?

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