

FOURTH EDITION



AUTOPSY

DIAGNOSIS AND TECHNIC



OTTO SAPHIR

AUTOPSY DIAGNOSIS and TECHNIC

by Otto Saphir, M.D.

*Pathologist, Michael Reese Hospital; Clinical Professor
of Pathology, University of Illinois Medical School, Chicago;
Consultant, Armed Forces Institute of Pathology*

FOREWORD BY LUDVIG HEKTOEN, M.D.

FOURTH EDITION



A HOEBER-HARPER BOOK

AUTOPSY DIAGNOSIS AND TECHNIC

FOURTH EDITION, 1958

Copyright © 1937, 1946, 1951, 1958, by Paul B. Hoeber, Inc.,
Medical Book Department of Harper & Brothers

Printed in the United States of America

All rights reserved

*For information address Paul B. Hoeber, Inc., Medical Book
Department of Harper & Brothers, 49 East 33rd Street,
New York 16, N.Y.*

I-H

Library of Congress catalog card number: 58-9980

FOREWORD

According to tradition the pathologist devotes himself to the recognition, explanation, and investigation of the structural changes produced by disease and injury of all kinds. He assists the clinician in reaching as complete an understanding as possible of the results of disease and injury, their recognition and treatment. In the medicolegal field the trained pathologist is indispensable. To determine the cause of death requires skill, thoroughness, experience, and wide knowledge. This is work that cannot be entrusted to the unaided tyro. So far as we can see now such services—scientific and practical—will be needed always.

In the present organization of medical teaching it is from the pathologist that the medical student as a rule receives his first introduction to the relation of functional disturbances and disease to changes in structure. The diagnostic and therapeutic efforts of the clinician are dependent largely, and in some respects wholly, on the structural changes, that is, the pathologic anatomy, of disease and injury. This is true even if we have passed beyond the concept that all disease is fast-rooted in the anatomic lesion and that treatment is limited to drugs designed to combat the lesion. Practically, much of the needed information with respect to current cases may be acquired vicariously through the auxiliary services of the pathologist.

There is need, then, for close cooperation between the clinician and the pathologist in practice as well as in teaching, and an important purpose of this book is to promote such cooperation by facilitating the understanding of students and clinicians of the methods and the disclosures and teachings of

the autopsy. The book will serve this purpose well. It tells competently how to make autopsies and how to study their revelations.

LUDVIG HEKTOEN

Chicago

PREFACE TO FOURTH EDITION

While neither the autopsy technic nor the basic anatomic lesions as encountered at autopsy have changed appreciably during recent years, it was still deemed necessary to enlarge certain chapters, add a few new illustrations, and include new information to bring this book up to date. This was done partly because of suggestions received from a number of colleagues and friends and partly because of new developments in the field of medicine.

Over the years, since completion of the first edition, the scope of this volume has been considerably enlarged and new material added. The pathologic findings peculiar to stillborn and newborn infants make up a special chapter, but the various diseases occurring in infancy are referred to throughout the text. Suggestions for evaluation of autopsies performed on embalmed bodies and bodies in various stages of post-mortem decomposition have been included. A short chapter, "Do' or 'Don't' and Certain Suggestions for Quick Orientation," is based on the author's own experience.

Though it is still felt that the ideal dissection method employs removal of organs en masse or in systems, a modified Virchow's method for removal and dissection of individual organs has been presented because of many requests.

The discussion of diseases of the breast has been greatly expanded. This has been done in the interests of the practicing pathologist since the incidence of breast lesions is high, and also for the student as a reminder of the vital need of examining the breast.

In this edition the chapter dealing with unexpected death and legal examinations has been considerably enlarged, and

the scope of the discussion on congenital anomalies of the heart has been broadened. A more comprehensive study is also made in the field of bone and joint diseases.

There are also three entirely new chapters. Because of the scarcity of published material and because it seemed a "must" even in a small handbook of this kind, a short history of the autopsy has been included. This was written by Dr. Sidney Farber and used with the permission of Charles C Thomas, Publisher, of Springfield, Illinois, to both of whom I am very grateful. Another new chapter deals with autopsies performed on bodies of patients who had been treated with radioactive isotopes. With the increasing use of this material in the diagnosis and treatment of disease, a discussion of precautionary postmortem methods in such cases is particularly important.

More and more use is made of certain tissues and structures removed at autopsy for "tissue banking" and transplantation purposes. Thus, it seemed important to deal in a third new chapter with removal and storage of the cornea and with blood vessel, bone, cartilage, and skin grafts—all for the undoubted benefit of the living patient.

While there has recently been some criticism of the value of routine autopsies, the teaching value of the autopsy remains uncontested. Besides the possibility of studying early stages of disease and their spread, the autopsy still provides the only means of determining whether the clinical diagnosis was correct. And, as every prosecutor knows, there still are many lesions found at autopsy that have been either overlooked or misdiagnosed clinically. It is not only that the modern prosecutor points out the diseased anatomic structure which, of course, must be found and recognized, but he also correlates these with the clinical signs and symptoms and abnormal function referable to the morphologic abnormality. The "death house" as a symbol no longer exists for the pathologist. Beyond the anatomical changes and this death, he sees his goal—help that others may live.

My thanks are due to Drs. Max Appel and Albert Rubenstone for their assistance in the revision of this edition and to Mrs. Nancy Arnold, Mrs. Barbara Lumbert, and Mrs. Rosalyn O'Cherony for the preparation of the manuscript.

O. S.

Chicago

PREFACE TO FIRST EDITION

The primary purpose in writing this manual is to meet the obvious need of the student for an outline of autopsy technic and diagnosis of diseased organs and structures as seen at the autopsy. In other words, what a handbook of "bedside diagnosis" is for the clinician, this manual is intended to be for the performer of an autopsy. The medical student who observes a postmortem examination may be aided in following the steps of the autopsy and in the diagnosis of the pathologic lesions encountered. The intern in the pathology laboratory and the young assistant may be guided during the course of the autopsy. The physician in general practice who may be compelled to perform an autopsy after having been away from this field for a number of years may likewise find this manual of value.

Only one method of autopsy technic is described. This method, modified from Rokitansky's, has been used by the author for fifteen years and has, in his experience, advantages over others. Descriptions of other methods would be confusing to the beginner or to one who performs an occasional autopsy, and would transgress the scope of a practical manual.

It should be emphasized that the intention was not to write a textbook of pathologic anatomy and that this handbook should not be used as such. It may, however, be useful as a supplement to a textbook. It gives merely a diagnostic outline of the various gross lesions most commonly encountered in structures and organs. Histopathologic lesions are not mentioned. Nor was it the author's intention to write a text on medicolegal autopsies. Nevertheless, it would have been an omission not to have taken these into consideration whenever

the occasion arose. Emphasis on medicolegal cases is particularly stressed in instances of sudden (unexpected) death.

The accompanying tables may be used for rapid orientation. The author is well aware of the inadequacy of the tables. They often indicate the appearance in only one of the various stages of pathologic lesions which may be continuously changing. Whenever necessary, associated lesions in other organs are mentioned during the discussion of the organ which is the seat of the primary disease. In pursuance of this discussion, stress is laid upon the necessity of regarding seemingly unrelated, yet intimately associated, lesions whenever possible, as one unit in the explanation of the disease and of the death.

Explanations of primarily functional abnormalities present during life, whose existence cannot be deduced from the examination of the organs, are avoided, and emphasis is placed only upon anatomically demonstrable lesions. The modern student, as a result of his training, resorts too quickly to functional abnormalities as an explanation of disease and death, and therefore overlooks anatomic lesions. The primary purpose of the autopsy is to explain the disease and the death of the patient on anatomic changes which must be demonstrated. Throughout the text, therefore, whenever the occasion arises, particular stress is laid upon what seems to the author a fundamental principle, namely, that every demonstrable morphologic cause of disease and death must be sought, carefully evaluated, and ruled out, before an explanation is given based on functional disorders.

I wish to express my thanks to Dr. Ludvig Hektoen for writing the Foreword; to Dr. Howard T. Karsner for his valuable suggestions and criticism; to Drs. Marion Corrigan, I. Davidsohn, Maurice Lev, and Leo Spector, for their interest and time in going over the manuscript; and to Miss Anna-Maie Scott for the illustrations.

O. S.

Chicago

CONTENTS

| | |
|--|------------|
| Foreword by <i>Ludvig Hektoen</i> | xvii |
| Preface to Fourth Edition | xix |
| Preface to First Edition | xxiii |
| 1. HISTORICAL INTRODUCTION | 1 |
| 2. AUTHORIZATION FOR AUTOPSY | 14 |
| 3. GENERAL TECHNICAL CONSIDERATIONS | 35 |
| 4. UNEXPECTED DEATH FROM NATURAL CAUSES, ACCIDENTAL DEATH, AND MEDICOLEGAL CASES | 53 |
| 5. AUTOPSY ON PATIENTS WHO HAVE BEEN EX- POSED TO OR TREATED WITH RADIOAC- TIVE ISOTOPES | 78 |
| 6. EXTERNAL EXAMINATION: EXAMINATION OF THE BREAST AND SEROUS CAVITIES; REMOVAL OF ORGANS | 82 |
| Breast | 99 |
| Peritoneal Cavity | 111 |
| Thoracic Cavity | 118 |
| Pleural Cavity | 121 |
| Pericardial Cavity | 123 |
| Removal of Organs | 128 |
| 7. EXAMINATION OF THE INTERNAL ORGANS AND TISSUES | 151 |
| Veins | 151 |
| Lymph Vessels | 154 |
| Celiac Plexus | 157 |

| | |
|---|------------|
| Lymph Nodes | 157 |
| Suprarenals | 160 |
| 8. MALE GENITOURINARY TRACT | 167 |
| Kidneys | 167 |
| Pelves and Ureters | 191 |
| Urinary Bladder and Urethra | 193 |
| Prostate | 197 |
| Testis, Epididymis, Spermatic Cord, Seminal Vesicle, Scrotum, and Penis | 200 |
| 9. RECTUM | 209 |
| 10. FEMALE GENITALIA | 210 |
| Vulva | 214 |
| Bartholin Gland | 216 |
| Vagina | 216 |
| Cervix and Uterus | 217 |
| Fallopian Tubes | 222 |
| Ovaries | 223 |
| 11. NECK ORGANS AND ORAL CAVITY | 229 |
| Parathyroid Glands | 229 |
| Thyroid | 235 |
| Oral Cavity, Tonsils, Palate, Pharynx, Salivary Glands, Malignant Tumors of the Epipharynx, and Teeth | 239 |
| 12. NOSE AND ACCESSORY SINUSES | 250 |
| 13. ESOPHAGUS, LARYNX, TRACHEA, AND BRONCHI | 254 |
| Esophagus | 254 |
| Larynx, Trachea, and Bronchi | 256 |
| 14. CHEST ORGANS | 262 |
| Thymus | 262 |
| Lungs | 264 |
| Heart and Aorta (Arteries) | 283 |
| 15. GASTROINTESTINAL TRACT | 325 |
| Intestines | 328 |
| Stomach | 342 |

| | |
|--|------------|
| 16. GALLBLADDER AND BILE DUCTS | 349 |
| 17. LIVER | 354 |
| 18. PANCREAS | 366 |
| 19. SPLEEN | 371 |
| 20. SKULL, MENINGES, EAR, BRAIN, HYPOPHYSIS, AND PINEAL BODY | 383 |
| Dura Mater (Pachymeninx) | 387 |
| Pia and Arachnoid (Leptomeninges) | 390 |
| Hypophysis | 417 |
| Pineal Body | 420 |
| 21. SPINAL CORD | 421 |
| 22. PERIPHERAL NERVES | 426 |
| 23. SKELETAL AND MUSCLE SYSTEM | 428 |
| Bones | 428 |
| Cartilage | 443 |
| Joints | 444 |
| Skeletal Muscles | 448 |
| Tendon and Fascial Sheaths and Bursae | 451 |
| 24. BLOOD DYSCRASIAS | 453 |
| 25. AUTOPSIES ON STILLBORNS AND INFANTS | 459 |
| 26. ANATOMIC FINDINGS IN VITAMIN DEFICIENCIES | 470 |
| 27. NOTES ON CERTAIN TROPICAL DISEASES | 475 |
| 28. AUTOPSY TISSUE BANKING TECHNIQS | 482 |
| 29. "DO" OR "DON'T" AND CERTAIN SUGGESTIONS FOR QUICK ORIENTATION | 492 |
| 30. NOTE ON AUTOPSIES ON EMBALMED AND DE- COMPOSED BODIES | 501 |
| 31. WEIGHTS AND MEASUREMENTS OF ORGANS | 507 |
| INDEX | 513 |

ILLUSTRATIONS

| | |
|--|-----|
| 1A. Form of Autopsy Authorization (Front) | 28 |
| 1B. Form of Autopsy Authorization (Reverse) | 29 |
| 2. Postmortem Instruments: Scissors and Knives | 37 |
| 3. Postmortem Instruments: Saws | 38 |
| 4. Postmortem Instruments: Hammer, Needle, Chisel, Bone Rongeur | 39 |
| 5. Postmortem Instruments: Rib Knife, Brunetti's Chisels | 40 |
| 6. Primary Incision Most Commonly Used | 96 |
| 7. Primary Incision Continuing to the Middle of the Groin | 97 |
| 8. Removal of Skin and Muscles from Thorax | 98 |
| 9. Cutting Through First Intercostal Space | 116 |
| 10. Method of Opening Thoracic Cavity | 117 |
| 11. Removal of Sternum and Attached Cartilaginous Portions of Ribs | 117 |
| 12. Cutting Through First Rib | 118 |
| 13. Method of Opening Sternoclavicular Joint | 119 |
| 14. Cutting Through Sternoclavicular Joint | 120 |
| 15. After the Rectum Has Been Freed | 129 |
| 16. Cutting Through Left Portion of Diaphragm | 130 |
| 17. Cutting Through Right Portion of Diaphragm | 130 |
| 18. Severing Large Branches of Aorta, Trachea, Esophagus, and Soft Tissues Down to Spinal Column | 131 |
| 19. Cutting Through Tissue Between Aorta and Spinal Column | 132 |
| 20. Primary Incision in Presence of Previous Operative Incision | 135 |

| | | |
|-----|---|-----|
| 21. | Incisions into the Isolated Heart | 142 |
| 22. | Cutting the Right Atrium Between the Openings of the Superior and Inferior Venae Cavae | 143 |
| 23. | Opening of the Right Ventricle Along the Margo Acutus | 144 |
| 24. | Opening of the Pulmonary Artery | 145 |
| 25. | Opening of the Left Ventricle and Aortic Valve | 147 |
| 26. | Relationship of Femoral Artery, Vein, and Nerve | 152 |
| 27. | Diagram Showing Sites of Origin of Retroperi- toneal Tumors | 156 |
| 28. | Section Through Kidney | 169 |
| 29. | Removal of Capsule of Kidney | 169 |
| 30. | Method of Opening Uterine Cavity | 211 |
| 31. | Method of Opening Right and Left Horns of Uterus | 211 |
| 32. | Anomalies of Uterus | 213 |
| 33. | Anomalies of Uterus | 214 |
| 34. | Location of the Parathyroids | 230 |
| 35. | Structures of Anterior and Posterior Cervical Triangles | 233 |
| 36. | Single and Double Incomplete Cleft Lip | 240 |
| 37. | Cleft of Entire Hard and Soft Palate; Tripartite Cleft | 240 |
| 38. | Complete Single Cleft of Entire Soft and Hard Palates | 241 |
| 39. | Section Through Lung (Left Upper Lobe) | 265 |
| 40. | Section Through Lung (Right Upper and Middle Lobes) | 266 |
| 41. | Section Through Heart; Opening Left Ventricle | 284 |
| 42. | Section Through Heart; Cutting Through Right Ventricle and Atrium | 285 |
| 43. | Continuation of Section Through Right Heart; Opening Pulmonary Valve and Artery | 286 |
| 44. | Continuation of Section Through Left Heart; Opening Mitral Valve and Left Atrium | 287 |

| | | |
|-----|---|-----|
| 45. | Continuation of Section Through Left Heart; Opening Aortic Valve and Aorta | 288 |
| 46. | Distribution of Coronary Arteries as Found in 80 Per Cent of Adult Human Hearts | 290 |
| 47. | Location of the Sinus Node, the Atrioventricular Node, and the Right Bundle of His | 291 |
| 48. | Location of the Left Bundle of His | 292 |
| 49. | Normal Aortic Valve | 322 |
| 50. | Insufficiency of Aortic Valve | 322 |
| 51. | Stenosis of Aortic Orifice | 322 |
| 52. | Involvement of Aortic Valve in Syphilitic Aortitis | 322 |
| 53. | Severing of Uppermost Portion of Jejunum | 326 |
| 54. | Cutting Mesentery Close to Its Attachment to Intestines | 326 |
| 55. | Method of Opening Small Intestine | 327 |
| 56. | Method of Opening Large Intestine | 327 |
| 57. | Abnormalities of Anus | 328 |
| 58. | Method of Opening Duodenum and Stomach | 342 |
| 59. | Portal Ligament and Adjacent Structures | 350 |
| 60. | Section Through Liver | 355 |
| 61. | Section Through Spleen | 372 |
| 62. | Primary Incision Through Scalp | 384 |
| 63. | Line of Opening Skull | 385 |
| 64. | Opening Longitudinal Sinus | 386 |
| 65. | Incision into Dura | 387 |
| 66. | Cutting Through Tentorium | 394 |
| 67. | Incisions for Removal of Block Containing Hypophysis and Internal Carotid Artery | 395 |
| 68. | Diagram of Base of Skull | 396 |
| 69. | Lines of Incisions for Demonstrating the Auditory Apparatus | 397 |
| 70. | Dissection of Fresh Brain; Removal of Hemispheres | 402 |
| 71. | Dissection of Fresh Brain; Dissection of Lateral Ventricles | 403 |

| | | |
|-----|--|-----|
| 72. | Dissection of Fresh Brain; Removal of Corpus Callosum | 404 |
| 73. | Dissection of Fresh Brain; Completion of Dissection of Ventricles | 405 |
| 74. | Dissection of Fresh Brain; Lines of Cutting Through Cerebellum | 405 |
| 75. | Vertical Cross Section Through Formalin-Fixed Brain | 406 |
| 76. | Structures of Brain To Be Examined Histologically for Rabies | 411 |
| 77. | Removal of Spinal Cord | 422 |
| 78. | Various Types of Fractures | 434 |
| 79. | Diagram Showing Osseous Development of Infant at Full Term, and Development of Ossification Centers in Weeks | 462 |
| 80. | Location of Venous Sinuses of the Base of the Skull, the Vein of Galen and the Veins of the Orbit | 465 |