

The Autopsy Service

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THE AUTOPSY HAS a long and varied history. The word *autopsy* derives from the Greek and means “to see for oneself,” and its first documented use in the English language dates to 1651 (1), in the quotation “when by an observation, we get a certain knowledge of things.” The word *necropsy*, meaning specifically a postmortem examination, dates from 1856 (1). Examination of the deceased for various purposes occurred in antiquity, and dissection of the human body as well as dissection of animals for divination can be traced to as early as 3500 B.C.E. in Babylon and Egypt. Anatomic dissection for instruction in anatomy goes back at least to Galen in the second century C.E. Paracelsus (d. 1590), Giovanni Maria Lancisi (d. 1720), and Herman Boerhaave (d. 1738) had interests in the autopsy, and Giovanni Battista Morgagni (d. 1771) made systematic postmortem observations for clinical correlations for 60 years. Carl von Rokitansky (d. 1878) and Rudolf Virchow (d. 1902) were pathologists who pioneered the clinical utility of the autopsy in the nineteenth century, and their names persist to identify the two principal modes of dissection, the Rokitansky dissection, in which organs are removed en bloc, and the Virchow dissection whereby organs are removed individually. Manipulation of the deceased body by various mechanical means to prove death and prevent premature burial appeared as advertisements in the popular press in the eighteenth and nineteenth centuries; these

included systems of bells to be rung from the coffin of the person buried alive to call attention to the fact or, as an alternative, lying-in rooms for the recently deceased under observation by attendants until putrefaction was apparent.

This chapter describes five eras of the Autopsy Service at Massachusetts General Hospital (MGH): before the founding of the department, in 1896; 1896–1926, under Drs. James Homer Wright and Oscar Richardson; 1926–1951, during the tenure of Dr. Tracy Mallory as chief; 1952–1974, during the tenure of Dr. Benjamin Castleman as chief; and from 1975 to the present day. The chapter concludes with discussions of particular issues relating to the Autopsy Service: the autopsy suite, the handling of bodies and tissues, autopsy services provided to other hospitals, and forensic pathology.

AUTOPSY AT MGH BEFORE 1896: THE JACKSON AND FITZ YEARS

Autopsy at MGH can be traced to as early as 1835. MGH was the only hospital of Harvard Medical School (HMS) when the university Department of Pathology was officially established with the appointment of Dr. John Barnard Swett Jackson in 1847 as Professor of Pathological Anatomy and Curator of the Warren Anatomic Museum (chapter 1). Pathology at that time was in the hands of clinicians, and the subject was not required for a medical degree until 1856. HMS was the first

North American medical school to teach pathology as a special course. Pathology in the mid-nineteenth century revolved around the autopsy, and surgical pathology did not come of age until the late nineteenth century, as evidenced by the professorship endowed by George Cheyne Shattuck that was entitled the Shattuck Professorship of Morbid Anatomy in 1854; the title was not renamed the Shattuck Professorship of Pathological Anatomy until 25 years later, in 1879.

Dr. Jackson studied in Europe and practiced general medicine for his entire career, but his chief interest was in pathological anatomy. His fame rests in large part on his work as a curator for the Boston Society for Medical Improvement, where he developed a museum that ultimately was given to HMS under the name of the Jackson Cabinet and placed in the Warren Anatomical Museum. This museum was housed for many decades in Building A of HMS; it now resides in the top floors of the Countway Library at HMS. In 1847 Dr. Jackson published a descriptive catalogue of the Museum of the Society of Medical Improvement and, in 1870, a similar catalogue of the Warren Museum.

From 1835 to 1850 much discussion at the MGH about autopsies centered on who should perform them and when. As the records of the Medical Board of Massachusetts General Hospital relate, in 1835 a committee of MGH Trustees appointed an officer whose duties included admission of patients as well as obligations and duties assigned him by the hospital's physicians and surgeons (2). One such duty was supervision of examinations of the deceased. Dr. Jackson considered himself a "free agent," authorized to perform the examination in the manner and to the extent that he judged right. Nevertheless, the records state that he considered the wishes of the physicians regarding the time and circumstances of the autopsy. He examined all the chief organs and stated that no autopsy would be complete without a thorough examination.

The timing of the autopsy and the permission

for autopsy were debated over the years. Dr. N. J. Bowditch noted, "It is highly important to the cause of science that such examination should take place whenever it is practicable, but that they should never be performed contrary to the known wishes or directions of the friends or family of a patient and should naturally be communicated to the superintendent of the hospital" (3). On the other hand, the President and Directors of the hospital had allowed postmortem examination at times without consent or even knowledge of the family, and the benefits and challenges of this circumstance were reported. On the positive side was the fact that the distressed family would not be troubled by a request to allow the autopsy. On the negative side was the family's potential discovery of an autopsy having been performed without their knowledge. The Coroner's Office had the authority to perform autopsies without permission from the next of kin, and this was said to factor into the development of MGH policies (4).

The role of the MGH superintendent in obtaining autopsies was described in a somewhat conflicted manner:

The hardy cooperation of the superintendent—he should be relieved of all responsibility—in case of difficulty—should be encouraged by the trustees to secure as many as possible—under existing laws. He should be relieved, as far as possible, from the necessity of asking for permission from friends (of the deceased). They usually object—are more likely to if approached without great tact, and often much time is required to explain the circumstances of the cases—even with all willingness and enthusiasm on the part of the superintendent he may be away when the relatives come for the interview. (4)

At one point it was noted that the superintendent "was interested in procuring them—and by this tact, and with zeal procured many—I am not aware that the hospital incurred any loss thereby." The superintendent was instructed to secure as

many autopsies as possible. Furthermore, the instruction was “to order an autopsy on all bodies (with rare exceptions to take place 12 hours after death)—and refuse to deliver bodies, except in rare instances . . . and should be relieved from asking permission—but should order the autopsy. . . . Another suggestion was that there was no way to obtain autopsies, except—were it expedient to do so—to have as a regulation of the hospital that all persons dying in the institution shall be submitted to postmortem examination” (4). The opposite feeling was also expressed: “No autopsy shall be had within 12 hours after such notice (of death) shall have been sent, unless with the expressed consent of the family or friends of such deceased patient, and that no autopsy shall be had in any case where it shall have been expressly prohibited by the deceased patient or by his family or friends” (4). Over time the concerns about disclosure became increasingly apparent, and by the 1890s autopsies generally were not performed without permission. By hospital directive and by statute, that policy stands today.

From early times, the rate of autopsies at the MGH was of concern. Comparisons were made between the MGH and other academic institutions, including the University of Pennsylvania in Philadelphia and Columbia University in New York City. A letter on the matter at the time reads in part: “For several years previous to 1876 the annual ratio of autopsies to death at the Massachusetts General Hospital was between 48% and 56%, in 1876 the ratio was 55%, but since the percentage has rapidly fallen off, being 41% in 1877, 38% in 1878, 20% in 1879 and 21% in 1880.” The subject of more autopsies was vigorously debated in 1881 and again in 1886, but at neither time was any real advance made (5). It was added that “the hospital records would be rendered incomplete (without an autopsy), and the world at large would often lose the benefits to be derived from the valuable observations of the hospital staff.”

In 1879 Dr. R. H. Fitz (chapter 2), who had been trained by Virchow, became head of HMS

Pathology and continued in this position until 1892, when he was named Professor of the Theory and Practice of Physick. Much of Dr. Fitz’s seminal work in acute appendicitis and acute pancreatitis was based on his autopsy experience at the MGH. In his classic work on perforating inflammation of the vermiform appendix (6), Dr. Fitz described his experience on postmortem examinations of appendicitis cases at the MGH, including correlations of the pathological findings with the duration, location, and intensity of symptoms. He described 257 cases, although it is not clear that all these patients had autopsies. He described the peritoneal pathology in patients with peritonitis and contrasted the acute fatal cases with the chronic cases.

Dr. Fitz was succeeded as the Chair of HMS Pathology by Dr. William T. Councilman, who had received his M.D. degree at the University of Maryland, had worked under Professors Hans Chiari in Vienna, Julius Cohnheim and Carl Weigert in Leipzig, and Friedrich von Recklinghausen in Strasbourg, and had been on the faculty at Johns Hopkins University. Dr. Councilman felt strongly that the MGH should acquire a building for pathology and engage a full-time pathologist, and he recommended Dr. James Homer Wright, one of his trainees, for the position.

Additional evidence that autopsies constituted an important part of the work of the department is provided in the 1904 third edition of *Pathological Technique* by Dr. Wright and Dr. Frank Burr Mallory (another of Dr. Councilman’s trainees) (7). The book was divided into three parts, the first of which (52 pages of approximately 400 total) was devoted specifically to the autopsy, including illustrations of instruments, lines of dissection of the heart and lungs, and recommended contents for a travel bag for pathologists performing autopsies in private homes. The other two parts, on bacteriology and histology, were also geared as much to autopsy pathology as to surgical pathology, as shown by the types of specimens described.

THE WRIGHT AND RICHARDSON YEARS, 1896–1926

The first MGH autopsy for which detailed records still exist at MGH was performed in October 1896, the month Dr. James Homer Wright became Chief of Pathology. Some excerpts of the report are noteworthy for showing the striking similarity of the earliest autopsy report to modern reports. It begins with an external examination: the patient was an adult male of “good height, slender frame and slight musculature development.” There follows a gross description of the organs, concentrating on the lungs. This is followed by the six anatomic diagnoses, three of which are tuberculous (acute miliary tuberculosis, chronic tuberculosis of several lymph nodes groups, chronic localized tuberculosis of the lung) and three of which are probably due to tuberculosis (ascites, pleuritis, and miliary abscess of the kidneys). Sections from a necrotic area of

the spleen and a caseous lymph gland were cultured into a guinea pig. Seventeen days later the guinea pig was “found gasping.” The autopsy of the guinea pig showed tubercle bacilli on smears of necrotic lymphoid tissue.

The early bound volumes of autopsy reports have a title page identifying the pathologists involved with the cases. Not all the cases are signed individually. The first bound volume (figure 15.1) comprises 50 cases, which were performed over an interval of three and one-half months. The autopsy reports are entirely in ink, in flowing script, for the first four years. Beginning in June 1899, at autopsy number 400, typed entries become interposed with handwritten ones. By the following year, script disappears and the reports are entirely typewritten. Each report runs between 10 and 20 pages. No clinical history was provided unless it could be deduced from the external examination. The postmortem interval was recorded. Each volume has an index

coded by diagnosis and also by organ. Microscopic descriptions of selected slides, usually about 10 slides per case, are included. A written bacteriology report is present for most cases.

The first gross photograph appears in autopsy number 59 (March 9, 1897) and shows ulcerative endocarditis of the mitral valve with rupture of the valve associated with multiple embolic infarcts in the heart, spleen, and kidneys. The first photomicrograph (figure 15.2) appears in autopsy number 110 (June 18, 1897), in a young woman with

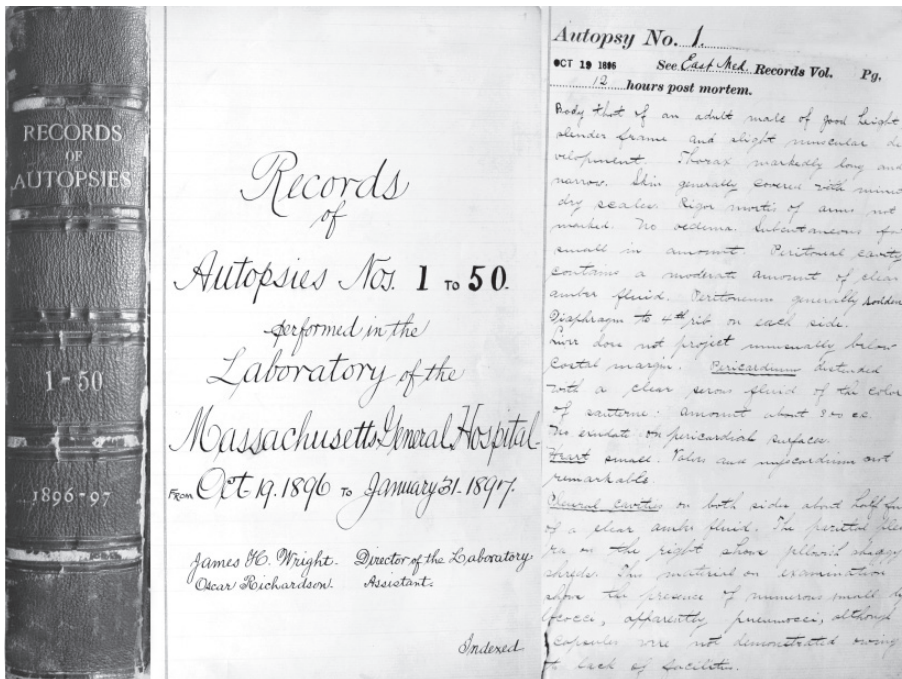


Figure 15.1 The first volume of Records of Autopsies, 1–50, 1896 and 1897. Spine (left), title page (center), inscribed with the names of James H. Wright and Oscar Richardson, and the first page of the first report (right)

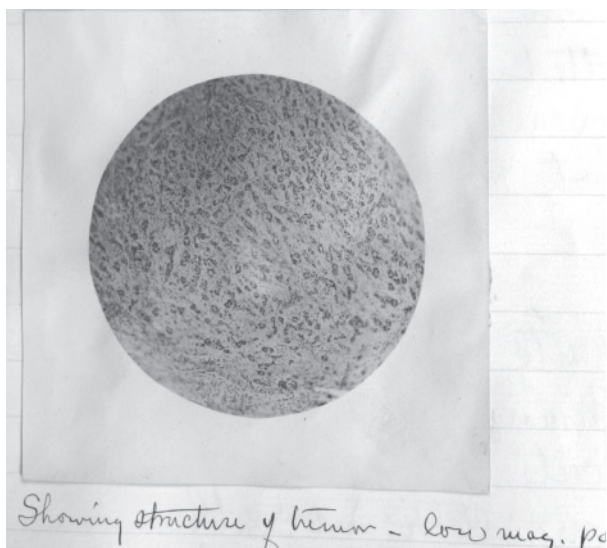


Figure 15.2 First photomicrograph in the autopsy records, 1897, showing infiltrating adenocarcinoma of the appendix

acute purulent peritonitis resulting from a perforated adenocarcinoma of the appendix. The first photomicrograph of infectious organisms appears in autopsy number 136 (August 13, 1887), of a young emaciated man with actinomycosis in the liver with extension through the diaphragm into the lung. The first hand drawing (figure 15.3) appeared in autopsy 141 (September 5, 1897), of a 74-year-old man with a shrunken brain whose cause of death was fracture of the atlas: the atlas fracture sites are illustrated. A gross photograph with fine detail (figure 15.4) appears in autopsy number 903 (July 25, 1903), of a fracture of vertebrae C3 and C4 with compression of the spinal cord after a diving accident in a 19-year-old patient.

At the conclusion of the first 10 years of the Autopsy Service, 1,849 autopsies had been performed by Dr. Wright and his assistant, Dr. Oscar Richardson, who continued to be the two pathologists performing most of the autopsies over the first two decades of Dr. Wright's tenure. Demonstrations of dissection took place in an amphitheater in the Allen Street Building (figure 15.5). By April 1921 the pair had performed

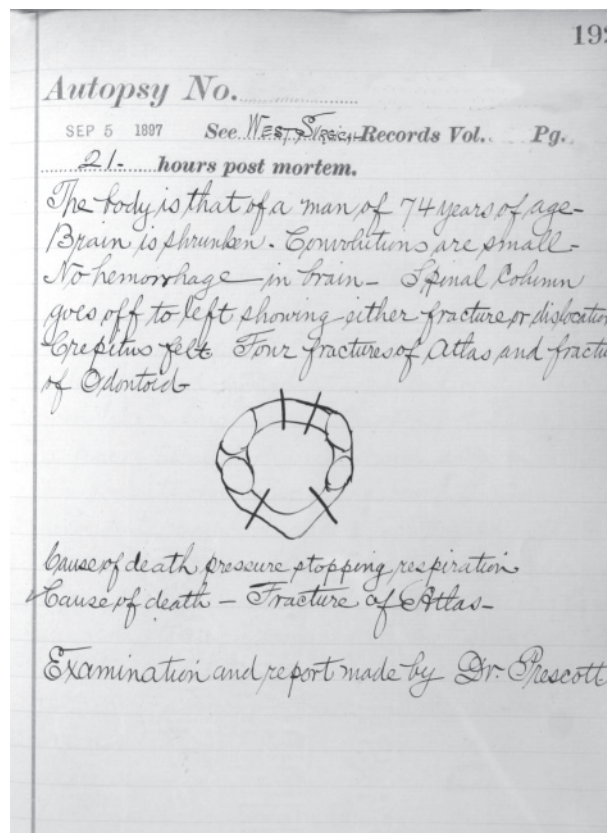


Figure 15.3 First hand drawing in the autopsy records, 1897, showing four fractures of the atlas and a fracture of the odontoid process

4,200 autopsies. Other assistants participating on the Autopsy Service after this time included Drs. William A. Hinton and George A. Buckley. Dr. Hinton went on to an illustrious career at HMS, developing the widely adopted Hinton test for syphilis (chapter 3), and was the first African American professor at HMS.

Autopsy reports throughout this era were replete with various forms of tuberculosis. Among the 200 cases performed in 1906 and 1907 were 69 cases of tuberculosis, including 6 cases of miliary tuberculosis, 3 cases of tuberculosis of the spine, 5 cases of disseminated tuberculosis, and 2 cases of tuberculosis of the adrenal gland. Syphilitic aortitis with fatal aortic insufficiency and congenital syphilis were well recognized. In 1916 and 1917 alone, there were 9 cases

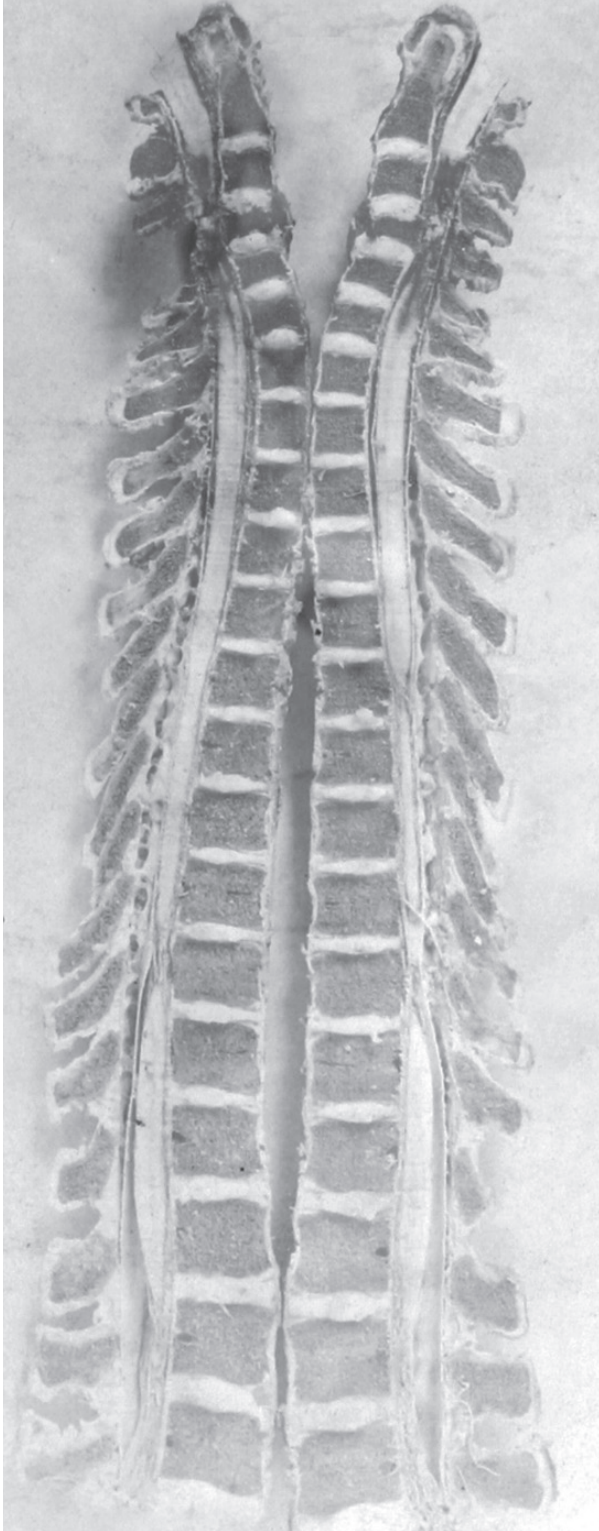


Figure 15.4 Gross photograph in the autopsy records, 1900, of a vertebral spine bisected with C3 and C4 fracture and a spinal cord compression

of syphilitic aortitis. Many other infections were documented, including pneumonia, meningitis, malaria, osteomyelitis, diphtheria, endometritis, typhoid fever, and streptococcal diseases.

Observations uncommon today included cranial trepanations, Addison's disease, and acute rheumatic heart disease. Endocarditis of varying forms markedly outnumbered cases of coronary artery disease or myocardial infarct. A variety of cancers, ruptured duodenal ulcers, gangrene of the lung, amyloid, and pericarditis were recorded. The distribution of carcinomas among the various organs overall was similar to that encountered today, but lung carcinomas were rare (see chapter 7).

From September 24 to October 24, 1918, during the global pandemic sometimes termed the Spanish flu, 22 autopsies were performed on patients who had either a clinical diagnosis of influenza or a pathological diagnosis of pneumonic influenza. The autopsy protocol of these cases was shortened from six to eight pages (already shorter than the 10–20 pages in the earliest autopsy reports) to an average of one and a half pages. The lung in influenza was described histologically as extensive hemorrhagic fibrin formation and a relatively sparse infiltrate of inflammatory cells. Influenza was identified as histologically distinct, its appearance not that of the usual organizing pneumonia.

During the latter part of the Wright and Richardson era, the clinical history usually included only one sentence, describing the state of nutrition of the patient, history of recent surgery, age, sex, and race. The cases came from the East Medical Service and the West Medical Service, which were the entirety of the Medicine department at the time, and there were virtually no surgical cases coming to autopsy.

An important development to publicize the value of the autopsy came in 1910. Dr. Richard Cabot (8; chapter 24), who had promoted the notion of the modern hospital as a bedside laboratory and honed his skills in the laboratory to



Figure 15.5 Demonstration of an autopsy at Allen Street by Oscar Richardson (in white gown), watched by David Edsall (in suit and tie), Chief of Medicine at MGH, ca. 1912–15

become one of the most respected clinicians in the hospital, issued a report that year that was based on approximately 1,000 autopsies performed at the MGH (9) (see figure 3.8). The report revealed conspicuous diagnostic inaccuracies on the part of clinicians and reinforced the influential Flexner Report of 1910 (10), which documented the need for greater scientific input in medical education and a heightened role for universities in medicine.

THE MALLORY YEARS, 1926–1951, AND THE COCOANUT GROVE FIRE OF 1942

During the tenure of Dr. Tracy B. Mallory from 1926 to 1951, the pathologists signing out autopsies included, in addition to Dr. Mallory, Drs. Benjamin Castleman, Winfield S. Morgan, Ronald Sniffen, and Edward A. Gall, as well as two

or three house officers at any one time. The anatomic diagnoses appeared on the first page of the report rather than toward the end, as had been the practice previously. A more detailed clinical history became part of the report, as did the clinical diagnoses and the death report. Postoperative cases accounted for a significant number of the cases, including orthopedic, gynecologic, and neurologic, as well as breast surgery. Coronary artery disease became more frequent than it had been in earlier decades, rheumatic heart disease continued, glomerulonephritis was an occasional cause of death, and cervical carcinoma was regularly observed. When Dr. Charles Kubik became the first neuropathologist on the Autopsy Service, the number of neuropathological diagnoses increased, particularly with regard to gliomas.

An insight into the function of the Autopsy

Service in those years is provided by the Coconut Grove disaster (II; chapter 22). The fire was widely covered in the press, the MGH was galvanized into unified action for therapy of these patients, and new insights into the physiology of burns came from the Autopsy Service as well as the Medical and Surgical Services. The Coconut Grove was a one-story nightclub with low ceilings and inflammable hangings in the Bay Village section of Boston, near Park Square. On the evening of November 28, 1942, the club was filled with an overcapacity Saturday night crowd of people. A fire started in the lounge and resulted in panic. There was great loss of life, both immediate and delayed. Between 10:30 P.M. and 12:45 A.M. 114 casualties were received in the MGH emergency room, of whom 75 were either dead on arrival or died shortly thereafter.

Six autopsies were performed either at the MGH or at the Northern Mortuary of Suffolk County, which was part of the Medical Examiner's Office (see below) and adjacent to the hospital. The six cases were examined personally by Tracy B. Mallory and the Chief Medical Examiner, William J. Brickley. Three of the patients were dead on arrival, and three died after varying but comparatively brief periods (40 to 62 hours) of treatment. Standard autopsy protocol was followed. Notable in some cases was brilliant, cherry red discoloration of skin and muscles due to carbon monoxide poisoning. Histologic findings not specifically attributed to thermal burns in the extant English literature included hemorrhagic tracheitis and bronchitis, pulmonary hemorrhage, and lakes of serum between the epithelium and basement membrane of the skin with spontaneous detachment of the epithelium. The clinical and pathological descriptions of these autopsies are particularly vivid and serve as fine examples of descriptive medical writing. Some examples are given here in paraphrased form.

Autopsy 10617-B was described as a terribly burned young woman estimated to be about 25 years of age, hair singed and burnt to stubble,

entire neck and face bloated, carbon monoxide 42 percent saturation.

Autopsy 10617-C was performed by Benjamin Castleman. Diagnoses were third-degree burns of both scapular and right thigh and extensive second-degree and first-degree burns as well. Dr. Castleman commented that this was the only one of five cases dying within seventy-two hours of the catastrophe that showed definite bronchopneumonia. A note was made that the patient became unconscious while attempting to escape from the Coconut Grove fire, was received on the operating floor at 2:00 A.M., where Vaseline strips were placed on face and hands and triple dye on the legs. The patient received antibiotics and morphine but died at 5:35 P.M.

Autopsy 10618, performed by Drs. E. D. Churchill and Shields Warren, was a 46-year-old white man with first-, second-, and third-degree burns of the head, face, neck, and hands and membranous laryngitis and tracheitis and bronchitis. The patient was extremely hyperactive on arrival at the hospital with respiratory embarrassment requiring intermittent oxygen, impending shock, and cherry-red color of denuded surfaces, estimated total third-degree burn 80 percent, with inhalation burns and corneal burns. He received five units of plasma on day one; his blood pressure remained normal for a short time, but then he died. (Dr. Churchill was a senior surgeon at MGH, and Dr. Shields Warren was later to become Professor of Pathology and Chief of Pathology at New England Deaconess Hospital, but it is unclear how he became involved with this single case.)

Autopsy 10620, performed on December 1, 1942, was a 29-year-old, powerfully built young man with second- and third-degree burns of the face, scalp, hands, and ankles and laryngeal stenosis. On arrival he was maniacal and uncontrollable and vomiting with evidence of smoke inhalation. He was treated with paraldehyde and died early on the third day of hospitalization.

The deaths from the Coconut Grove fire were identified in the autopsies as specifically due to

the fire for only one month after the event. After that, any fatal complications that arose from the conflagration were not specifically linked to the fire in the autopsy records. Still, these autopsies were important in understanding the cutaneous and pulmonary effects of thermal injury, as well as the indirect damage to other organs from hypoxia and infection, and thus formed a baseline for study by later physicians.

THE CASTLEMAN YEARS, 1952–1974

When Benjamin Castleman became Chief of Pathology in 1952, his strong interest in the autopsy was readily evident. The department work would begin every weekday with his directing the autopsy conference, sometimes referred to as the “organ recital,” from 8:15 to 9:15 A.M. precisely. Woe to the resident who did not finish the presentation by 9:15, because at 9:15 Dr. Castleman would rise from his chair without hesitation and ascend the two flights to his office. He

typically ran the conference seated at the head of a circular metal table, with Dr. Walter Putschar (chapter 12) to his immediate left and the staff pathologist signing the cases out for that week to Dr. Putschar’s left. The attending pathologists would rotate on a weekly basis and included the majority of the staff pathologists, both surgical and research, as well as chief residents or qualified senior residents who might have the privilege to sign out autopsies for the week. Upon Dr. Castleman’s departure from the conference at 9:15 or in his absence, Dr. Putschar would move into Dr. Castleman’s chair and unhurriedly complete the conference. If other staff were called on to complete the conference, they would generally remain in the place in which they were already seated.

Every case was presented by the prosector, and X-rays were usually shown by a radiology resident on rotation. Dr. Castleman would make observations (figure 15.6) and only occasionally ask for input from the attending staff, but he would quiz



Figure 15.6 Autopsy conference, probably 1962–1963, with Benjamin Castleman, Karoly Balogh, and Walter Putschar (seated, left to right). Also identified, standing, left to right, are Sheldon Baddock (hand on face, behind the person leaning over the table at the left), Jónas Hallgrímsson (standing behind Dr. Castleman), John Barlow (standing behind Drs. Balogh and Putschar), James Gibson (standing in the right foreground).

the resident on what he or she had found. Dr. Castleman had some favorite questions, such as whether the parathyroid glands were enlarged, whether the chordae tendinae were thickened, and whether there was thrombus in the atrial appendages. He might probe for a patent foramen ovale, while the prosector prayed that Dr. Castleman did not discover one that the resident had not found.

Dr. Castleman described the conference as follows: “The entire staff meets every morning at 8:15 and for up to one hour, I personally check all the gross material of the autopsies of the day before. This is a very popular exercise and almost every morning various members of the clinical staff, both house and members of the visiting staff, appear to take part when their case is coming up” (12). In 1956, Dr. Castleman instituted the post-sophomore fellowship, and during their year in the department, students from HMS rotated on the Autopsy Service as an important part of their training.

During the 1950s the rate of autopsies at the MGH declined from about 60 to 50 percent of patients who had died at the hospital. Comparable teaching hospitals had autopsy rates that declined from about 20 to 10 percent. Dr. Castleman commented on this trend:

Explanations that had been offered for this phenomenon include the removal of the requirement by the hospital accrediting agencies for a specified percentage of consents for autopsies, the belief that major advances in clinical diagnostic techniques have rendered autopsies unnecessary, fear of information being uncovered that might be damaging in malpractice suits, and a decline in emphasis on the teaching of pathology in medical schools. Nevertheless, I believe autopsies continue to provide important information in the quality of patient care, including findings that are useful in the evaluation of effectiveness and hazards of new forms of therapy. In addition, autopsies are necessary for the training of pathology residents. (12)

Staff pathologists with a special interest and expertise in autopsy pathology in the Castleman era included Dr. Jónas Hallgrímsson, who became Professor and Chief of Pathology at the University of Iceland; Dr. Kilmer McCully, who became Chief of Pathology at the West Roxbury Veterans Administration Hospital, West Roxbury, Massachusetts; Dr. William Thurlbeck, who became Professor first at McGill University in Montreal, then at the University of Winnipeg, and then at the University of British Columbia, Vancouver; Dr. Harold Dvorak, who became a Professor at HMS and Chair of Pathology at Beth Israel Hospital in Boston; Dr. John Blennerhasset, who became a Professor and Chair of Pathology at Otago Medical School, Dunedin, New Zealand; Dr. Robert Fienberg, who was Chief of Pathology at Beverly Hospital, Beverly, Massachusetts, for approximately 40 years; Drs. Robert Harper, Lewis James, and James Gibson, a triumvirate who were the heart and soul of Memorial Hospital in Worcester, Massachusetts, for decades; and Drs. Alan L. Schiller and Eugene J. Mark (see below).

During this period the bound volumes of autopsy reports that had been used for the Case Records of the MGH (chapter 24) included the printed pages of the *New England Journal of Medicine* for that case. By 1960 staff members were no longer listed on the first page of the bound volumes. In this era autopsy diagnoses were given a coding number for retrieval. The database for retrieval of the diagnoses was a collection of index cards on a Rolodex, which resided in a sign-out booth in the residents’ laboratory.

THE RECENT YEARS, 1975 TO THE PRESENT DAY

The tradition of the morning autopsy conference as the first item of business for the day changed over the next decade, shifting to two afternoons a week, then to one afternoon a week, then to once a week at noon. This reflected both a decline in the number of autopsies and less interest on

the part of the clinical services and the Pathology faculty. The recent era also brought forward new types of challenging cases. These included autopsies for patients with AIDS; pathology of transplantation from the active transplant services (pulmonary, cardiac, liver, kidney, and pancreas); newly appreciated viral infections, including SARS and H1N1 influenza; complex cardiovascular surgery; endovascular grafts; and the pathology of graft-versus-host disease in patients undergoing bone marrow transplantation and stem cell therapy. Beginning in the 1980s autopsy reports were computerized, and soon the reports were available in electronic form only.

During the 1960s and into the 1980s, Dr. Walter Putschar would routinely stroll into the dissecting room, even though he rarely was formally responsible for signing out cases. He took it upon himself to give a demonstration of an autopsy for the incoming house staff and took pride in showing how an autopsy could be done in as clean a manner as possible (figure 15.7).

When Dr. Castleman stepped down as chief, the duties of directing the Autopsy Service were taken by Dr. Alan L. Schiller (see figures 13.1 and 13.2). Dr. Schiller's primary interest in surgical pathology was orthopedic pathology, and at that time he was already a renowned expert in this field. He was also a superb general anatomic pathologist and an exciting teacher, and he wanted to spur the interests of the residents, clinicians, and medical students in the autopsy. He ran the autopsy conference much as Dr. Castleman had.

After several years Dr. Schiller wished to spend more time on his work in bone and soft tissue, and Dr. Eugene Mark, who was interested in pulmonary pathology, was appointed Director of the Autopsy Service. Since much of pulmonary disease at that time was heavily dependent on gross pathology, particularly chronic obstructive pulmonary diseases, the combination of pulmonary pathology and autopsy pathology was practical. Dr. Mark changed the structure of the



Figure 15.7 Walter Putschar dissecting emphysematous lungs at demonstration for new residents, ca. 1985

conferences; attendees no longer sat around a table but stood and used a hand lens as the organs were passed around on small trays. He made the autopsy conference more interactive by adopting a Socratic method, asking for descriptions and differential diagnoses of the gross pathology by the resident, an approach that resembled the surgical pathology conference at that time.

Dr. Schiller served a second term as head of the Autopsy Service from 1978 to 1984. He was then succeeded by Dr. Frederick ("Fritz") C. Koerner from 1984 to 1990. Dr. Koerner (see figures 13.2 and 16.10), like Dr. Schiller, was renowned for his teaching ability. He particularly encouraged residents and staff to contribute their observations at the conference. He would present cases as unknowns before providing any clinical history. Dr. Koerner eventually wished to devote more time to surgical pathology, and he went on at the MGH to become an internationally known expert in breast pathology.

Dr. James Southern was director from 1990 to 1996. Southern's expertise was cardiac pathology, and his abilities to combine autopsy pathology and cardiac pathology proved fruitful. He was an expert in the field of congenital anomalies of the

heart. Together with Dr. Thomas Aretz, another cardiac pathologist, and later Dr. Stuart Houser, a cardiac surgeon who retired early to pursue a second career in pathology, he championed post-mortem injection studies of the coronary artery system to correlate atherosclerotic lesions with myocardial infarcts and study the successes and failures of coronary artery bypass surgery.

When Dr. Southern left in 1996, Dr. Eugene Mark was invited to undertake a second tour of duty as director. He declined the first two invitations and finally accepted the third under the encouragement of Dr. Nancy Harris, who was at the time Director of Anatomic Pathology. Dr. Mark promoted an interactive approach at the autopsy conference; streamlined the autopsy protocol; stressed macroscopic analysis, using visual, tactile (palpating the lung for consolidation), olfactory (alcohol breakdown products), and even auditory (sound of the knife scraping the prostate in prostate cancer) senses to lead to a diagnosis; and initiated a consensus conference for autopsy pathology. He added an element of drama to the autopsy conference with “CTD” (cross the table diagnosis), whereby residents from a distance of several feet might still be able to make the diagnosis. He stressed formal delivery of the clinical history, which was how surgery residents presented at Surgical Grand Rounds in the Bigelow Amphitheater. To augment teaching, he had residents memorize short stanzas from poetry that would be applicable to the case, to be delivered at an appropriate time in the discussion (on secret signal!) to catch the audience unawares. He was a deputized Medical Examiner for the Commonwealth of Massachusetts and integrated forensic issues into the autopsy conference.

At the time of writing of this book, Dr. Mark has stepped down after his long second tenure as Director. The new Director is Dr. James Stone, who has been head of cardiac pathology at MGH for the past six years.

THE AUTOPSY SUITE: THE PHYSICAL PLANT

The Allen Street House, on Allen Street (now Blossom Street), was on the hospital side of Allen Street, just west of the western end of the Bulfinch Building. In 1920 building numbers 56, 57, 58, and 59 on Allen Street behind the hospital were purchased, and these buildings were the site of the morgue and autopsy room as well as the Histology Laboratory. Numbers 57 and 58, being in poor condition, were torn down in 1937. Numbers 56 and 59 were used for storage until being torn down around 1952. The hearse entrance was attached to the Allen Street House. The name Allen Street persists today in the euphemism of “he went to Allen Street last night” (instead of “he died last night”) and “Allen Street conference” (instead of “mortality conference”).

MGH Pathology moved into the newly constructed Warren building in 1956 (chapter 7). The autopsy suite occupied the majority of the basement and included the dissecting room with two tables in the main room (figure 15.8) and a third table in a separate room for infectious cases. The morgue for holding bodies was down the hall from the dissecting room. The diener’s office was in the same area, as was the pathology photography laboratory. Around the corner was a large incinerator, which was used for incinerating both autopsy and surgical tissue, at that time a common means of disposal of tissue. Across another hallway was a formalin room, in which brains and lungs were kept and tissue was stored.

Originally the autopsy conference room was across the hallway from the photography laboratory. The conference room had viewing boxes for the radiologist on rotation and seats for approximately 20 individuals. The conference room was converted to an expanded photography laboratory around 1980, and the conference room was moved across the hallway.

The autopsy dissecting room in the Warren



Figure 15.8 Autopsy room, as it appeared from the 1950s through 2005 (photograph ca. 2000)

Building was relatively unchanged from 1956 to 2005, at which time an extensive renovation was accomplished (figure 15.9). The main dissecting room now has two L-shaped dissecting tables and operating room lights (figure 15.10). The southern one-third of the dissecting room (toward Cambridge Street) was walled off and used to create a new conference room. This conference room uses the same trapezoidal metal tables that were used for decades in the earlier conference rooms. A large, curtained window separates the new conference room from the dissecting room to permit observation of autopsies without the necessity of dressing for universal precaution. There is a bathroom with shower on the corridor leading from the main hospital corner to the dissecting room. Access to the autopsy area now requires an electronic pass.

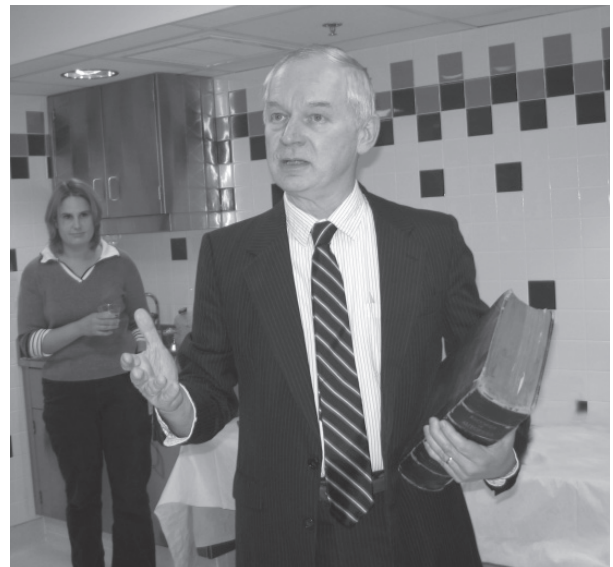


Figure 15.9 Formal opening of the renovated autopsy suite in 2008; Eugene Mark is holding volume 1 of the autopsy reports. In the background is Mindy Hull, a resident who went on to a career as a medical examiner in Boston.



Figure 15.10 The new autopsy suite during renovations, 2006

HANDLING OF BODIES

Since the Jackson era, interactions between funeral directors and the hospital have proven variously cordial, neutral, or testy, and a few local funeral directors have come to be well known to the dieners. The delivery of bodies for many decades took place through a garage backing onto Allen Street. After the construction of the Warren Building, the hearse entrance for undertakers was in that structure, in a garage below street level, off Blossom Street, with parking for two vehicles. A tunnel connected the garage to the autopsy suite and allowed transport of bodies from the morgue to the hearse. (Dr. Castleman, and only Dr. Castleman, had permission to park his own car in this garage!) With new hospital construction, the delivery of bodies switched to an area at the basement level of the Phillips Building (now Founders House). This provided convenient,

direct access from the morgue to the hearse. In 2006 this route was closed because of new construction, and now bodies are transported along the basement corridor of the Warren Building through a private and inconspicuous door that opens onto Charles Street.

Under Dr. Mark's direction, the department has just begun a collaborative study with the Radiology Department to perform whole-body high-resolution CT scans. The results of the CT scans will be available during or immediately after the dissection, so that further analysis of the tissues can be performed at that time to elucidate unexplained lesions on the CT scan. Such CT scans, which have been termed "virtopsies," may in the future supplement some aspects of the autopsy.

The morgue has been virtually unchanged since the Warren Building opened. But today's Autopsy Service is involved in planning for mass disaster. The morgue can handle approximately

10 stretchers, but provisions have recently been made to store more bodies in a mass casualty situation. There are also arrangements for refrigerated trucks to supplement the morgue in the event of mass casualties.

The number of autopsy technicians has varied from five to one. The hospital has been fortunate to have recruited exceptionally dedicated individuals to the position of Chief Autopsy Technician (“Chief Diener”). In this regard, it is notable that only five Chief Autopsy Technicians have essentially covered an era of more than 50 years (table 1). The duties of the autopsy technician have been melded to some degree with those of pathology assistants and technicians on the Surgical Pathology Service. During the years of the Second World War, the work of a diener was performed by conscientious objectors.

Table 1. Chief Autopsy Technicians (“Chief Diener”)

Pre-1960s	“Jake the Diener” (name, unfortunately, unknown)
1960s–1970s	Walter Havey
1970s–1980s	Joseph Stukas
1990s	Doris Dewing
1990s–2010	James Taralli

HANDLING OF SPECIMENS

Gross photographs of the organs from the autopsy had been taken in the pathology photography room, across the hallway from the autopsy room, through the 1950s into the 1980s. In the 1990s a photography station was put into place in the autopsy conference room so that organs need not leave the autopsy suite. This was an improvement logistically and for infection control. Film for gross photographs was the standard until approximately 2005, when digital photography became the standard.

Apart from the fact that tissues were fixed in formalin and embedded in paraffin, details of preservation of specimens before the 1940s are not available. Specimens would be shown at

clinicopathological conferences in the 1920s, and a few specimens would be preserved for museum exhibition. Pediatric hearts would be kept as wax models. Lungs would be cut into Gough sections and mounted between 8 x 11-inch pieces of plastic. Some slides and blocks have remained from the early 1900s, but movement of specimens among storage facilities and the expense and legal issues of retaining specimens brought about less storage and for shorter periods.

During the Castleman era, all specimens were available for presentation at the morning conference, even if not shown. Both lungs were routinely inflated with formalin. Most other specimens were kept in an unfixed state for a limited time. There were few concerns about universal precautions for infections other than for tuberculosis. Since the mid-1990s, almost all tissue in formalin is discarded after one year.

The numbers of blocks taken per case has varied widely. A standard for many years in the 1960s and 1970s was a minimum of six blocks of tissue (heart, lung, liver, spleen, kidney, adrenal). This aspect of the service has changed over the years, and in the 1990s and 2000s an average of 20 blocks of tissue has been examined histologically on each case. Additional preservation of tissue is accomplished through various research projects with the appropriate institutional approval.

The Autopsy Service functioned seven days a week through the last half of the twentieth century. Almost no other hospitals perform autopsies on Sundays, and in 2006 the service stopped that practice. There has always been provision for emergency autopsies at any time to obtain fresh or frozen tissue vital for research studies and, rarely, for clinical management of next of kin in cases of infectious disease.

Over the years, increasing interest by the general public in the autopsy has generated concern about permission for autopsies as well as preservation and disposal of tissue. Although such concerns have been present at the MGH since the 1830s, a new era began in the 1980s, when

retention of organs in Britain and to a lesser extent in the United States prompted litigation about such retention when the next of kin were unaware of it. At the MGH the terms for autopsy permission were changed; a family had three choices: unrestricted autopsy; restrictions dictated by the next of kin; organs to be returned to body with only tissue samples retained. The third choice has been increasingly frequent and has prevented additional sampling when further questions arise in the days immediately after the autopsy.

AUTOPSIES FOR OTHER HOSPITALS

The adjacent Massachusetts Eye and Ear Infirmary (MEEI) is well known for surgery of the middle and inner ear, and this expertise is based in part on decades of clinicopathological correlation by Dr. Hale Truncic and his colleagues. The collaboration benefited from the MGH Autopsy Service, since patients who had an examination of the brain might also have the removal of the middle and inner ear using a customized circular saw, and these specimens were handled by special decalcification procedures at MEEI. The procurement, processing, and study of human temporal bones constitute a time-consuming and costly endeavor that lies outside the purview of most pathology departments and is therefore performed in laboratories devoted to the study of the temporal bone. The Otopathology Laboratory at MEEI was established by Dr. Harold F. Schuknecht in 1961, when he was recruited as Chairman of the Department of Otology and Laryngology at HMS and Chief of Otolaryngology at MEEI. The research in the laboratory has led to improvement in understanding cochlear anatomy, biology of the spiral ligament, genetic deafness, developmental defects of the ear, and the molecular basis of otosclerosis.

The Autopsy Service has also interacted with the MEEI Eye Pathology Service. Deceased patients with ophthalmic diseases, particularly tumors, have had eyes removed and examined at

the time of the general autopsy. A primary consultant for many years in eye pathology was Dr. Walter Putschar, who among other interests had a strong understanding of ophthalmic anatomy and pathology from work he had performed in his student days in Germany. He stated that he had become interested in pathology of the eye because no one else had been interested and it appeared that the opportunities for original investigation were great.

Over the years the MGH has assisted both community hospitals and government hospitals that have needed coverage for autopsies. Dr. Castleman had colleagues in many hospitals in the Boston area and reached out to provide both autopsy and surgical pathology services. Massachusetts hospitals that availed themselves of MGH's service included Emerson Hospital in Concord; Brockton Hospital in Brockton; Chelsea Soldier's Home in Chelsea; Dever State School in Wrentham; Fernald State School in Waltham; and McLean Hospital in Belmont. The Dever, Fernald, and McLean sites were hospitals mostly for nervous system diseases, but in almost all cases a full general autopsy was performed. These prosecutions would usually be performed at the hospital by a resident without attendant staff or diener. The general pathology resident and neuropathology resident would travel by taxi, perform the autopsy in the morgue while the taxi waited, and return with the organs. Transporting the organs in large cases sometimes caused anxiety on the part of the taxi driver. The residents would carry their large, square cases through the main lobby of the White Building, no doubt puzzling onlookers. (A vivid and entertaining story of a winter taxi trip to Brockton Hospital to perform an autopsy is provided by Dr. Fairfield Goodale in his autobiography [13].) The organs would be presented to Dr. Castleman and his associates at the next morning conference. Slides and report would be prepared in the normal manner and become an official MGH case.

The residents going to these distant hospitals

would receive a small honorarium, usually about \$25, for the extra work involved in travel and time away from the department. When the senior author of this chapter returned from the Fernald School and presented a case the following morning in which the only finding was modest coronary artery disease, Dr. Castleman turned to him and said, "Is that all you have to show?" Dr. Mark replied, in a manner intended to be humorous, "What do you expect for \$25?" Dr. Castleman was surprised and silent. He was not a person to carry a grudge or even hard feelings, but Dr. Mark has always been sorry for that flip-pant comment.

More recently, as morgues in community hospitals have closed, contracts have been established to perform autopsies for hospitals in eastern Massachusetts. These have included Newton-Wellesley Hospital in Wellesley; North Shore Medical Center in Salem; Caritas Good Samaritan Hospital in Brockton; Lowell General Hospital in Lowell; and Youville Hospital in Cambridge. The Pathology group at Cambridge Hospital (Cambridge Health Alliance) is closely related to MGH Pathology, and the Cambridge autopsies are done at MGH by pathologists whose primary appointment is at Cambridge Hospital.

Dr. Mark performed autopsies for the Department of the Army while on active duty in Germany in the early 1970s, then in the 1980s and 1990s at the Cutler Army Hospital at Fort Devens, Massachusetts, before Fort Devens closed. The department also occasionally performs private autopsies for families and for other HMS hospitals upon request and consults on histopathologic findings on autopsies performed elsewhere, such as those by the Office of the Chief Medical Examiner for the Commonwealth of Massachusetts.

FORENSIC AUTOPSIES AND RELATION TO THE OFFICE OF THE CHIEF MEDICAL EXAMINER

The position of Medical Examiner was created in Massachusetts in 1877 to replace the coroner

system. The successful effort to replace coroners with medical examiners had been driven by the Massachusetts Bar Association and the Massachusetts Medical Society, both of which were in agreement that the physician looking into the cause of death must be removed from involvement in possible criminal investigation and the lodging of charges. The Suffolk County Southern District Medical Examiner was initially based at Boston City Hospital. In 1913 a second floor was added to the original building, and the Medical Examiner's quarters remained there for many years. That location was considered beneficial in part because of Dr. Frank Mallory and the cooperative and progressive nature of the Boston City Hospital Pathology Department. After being in the Mallory Building at Boston City Hospital for two decades, the Medical Examiner's Office was relocated in 1995 a few hundred yards north and east to 720 Albany Street, adjacent to Boston Medical Center. An annex, the Suffolk County Northern District Medical Examiner's Office, was for many years on Allen Street, adjacent to the MGH.

The Office of the Chief Medical Examiner (OCME) for the Commonwealth of Massachusetts was established by legislation in 1983. The OCME and its forerunners have maintained a relationship with MGH for many years, and Dr. Oscar Richardson (chapter 3) served as Associate Medical Examiner for Suffolk County from 1913 to 1921. The closest continuous relationship with the OCME was with Dr. Leonard Atkins (chapter 16). Dr. Atkins, who was a board-certified medical examiner and had an important role in autopsy pathology and cytogenetics at MGH, performed so-called views without dissection and did some dissections in the department, particularly on weekends, when he took calls for the OCME. At other times a body would be taken to the Medical Examiner's Office, where he would do the autopsy. Most forensic cases were not done with the resident. Over the years, consultants in forensic pathology to the MGH Autopsy Service

have included Drs. George Burgess Magrath (1909–1912), William J. Brickley (1951–1959), Michael A. Luongo (1952–1960s), Victor Rosen (1950s–1980s), George Katsas (1980s–1990s), Eva Patalas (1990s), and Mindy Hull (late 2000s).

Dr. Victor Rosen was a pleasant and mild-mannered individual, who, some time after completing his training at MGH, became interested in forensic pathology. He studied under the celebrated Los Angeles forensic pathologist Dr. Thomas T. Naguchi, who was a technical adviser to the popular medical-detective television drama *Quincy, M.E.* Dr. Rosen wrote the plots for some episodes (personal communication, Dr. Robert E. Scully).

Dr. George Katsas was another connection of the department to the OCME. He gave a series of about six lectures per year in the 1980s and 1990s to the residents. Dr. Katsas was the Chief of Pathology at Waltham Hospital and also a board-certified medical examiner. He loved the analytic aspects of forensics and lectured at many conferences across New England and farther afield. In more recent years, Dr. Eva Patalas, who is currently a pathologist at Cambridge Health Alliance, performed forensic autopsies and lectured on forensic pathology at MGH.

The OCME occasionally calls on specialists at MGH for expert autopsy opinions, particularly in obstetrical cases and pneumonias. For the last few years, Dr. E. Tessa Hedley-Whyte has done brain-cutting sessions at the OCME.

CONCLUSION

The autopsy has a history longer than any other facet of pathology. This history provides a valuable insight into the continuity of medical knowledge and laboratory science and a beacon for future development in understanding human disease—whether for quality assurance, clinicopathological correlation, development of new surgical techniques or devices, instruction for all levels of training and disciplines of medicine, and

molecular medicine. Important clinicopathological correlations from the MGH Autopsy Service include appendicitis (6), the radiographic presentations of pulmonary infarcts (14), and organizing pneumonia (15). And, as documented recently (16), the autopsy has served as a basis of knowledge for the hundreds of residents in training who have passed through the department since the 1930s. Over the space of approximately 175 years and with more than 50,000 recorded autopsies, the MGH Autopsy Service has contributed to the advancement of knowledge both for MGH patients and staff and for the medical community worldwide.

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