

# The history of neurosurgery in Memphis: the Semmes-Murphey Clinic and the Department of Neurosurgery at the University of Tennessee College of Medicine

## Historical vignette

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Neurological surgery was defined as a separate surgical specialty by Harvey Cushing and a few other surgeons, most of whom were trained and influenced by Cushing. One of these, Raphael Eustace Semmes, became the first neurosurgeon in Memphis, Tennessee, in 1912. After World War II, Semmes and his first associate, Francis Murphey, incorporated the Semmes-Murphey Clinic, which has been primarily responsible for the growth of the Department of Neurosurgery at the University of Tennessee Health Science Center in Memphis, as well as the development of select neurosurgical subspecialties in Memphis area hospitals. (DOI: 10.3171/2009.4.JNS09173)

**KEY WORDS** • neurosurgical history • Memphis • Semmes-Murphey Clinic • University of Tennessee

NEUROLOGICAL surgery was recognized and defined as a separate surgical specialty in 1905 when Harvey Cushing published “The Special Field of Neurological Surgery.”<sup>7</sup> Cushing was the first surgeon to devote his entire practice to the new specialty, and because of that focus, he was the most influential American neurosurgeon in the early 20th century.<sup>5</sup> Neurological surgery was developed further by a few exceptional young surgeons, most of whom were trained and influenced by Cushing. One of these, Raphael Eustace Semmes, became the first neurosurgeon in Memphis, Tennessee, in 1912 at the age of 27. After World War II, Semmes and his first associate, Francis Murphey, incorporated the Semmes-Murphey Clinic, which has been primarily responsible for the growth of the Department of Neurosurgery at the University of Tennessee Health Science Center in Memphis, as well as the development of select neurosurgical subspecialties in Memphis area hospitals.

*Abbreviations used in this paper:* AANS = American Association of Neurological Surgeons; CNS = Congress of Neurological Surgeons.

This paper will explore the early history of neurological surgery in Memphis and the subsequent development of the Department of Neurosurgery at the University of Tennessee College of Medicine and will chronicle the legacy of Semmes and Murphey.

### Ancestry of R. Eustace Semmes

In 1858, the Semmes family settled in Memphis, where Dr. Semmes’ grandfather, Benedict Joseph Semmes, or B. J. Semmes, moved from the Georgetown neighborhood of Washington, DC. B. J. Semmes established a successful wine and spirits business in Memphis and, at the outbreak of the Civil War, volunteered and served with distinction in the Confederate Army of Tennessee. During the war, he was wounded twice and eventually rose to the rank of major; he felt contempt and hatred for the Union forces because of the cruelties inflicted upon the Confederate forces

This article contains some figures that are displayed in color online but in black and white in the print edition.

and citizens of the South. He experienced these cruelties firsthand when Union forces under General William T. Sherman forcibly evicted his wife and children from their home in Memphis and confiscated all their possessions. Following the war, he returned to Memphis and established B. J. Semmes and Company, which included ownership of a distillery in Greenbrier, Tennessee, where “Yannisee” and Jo Blackburn sour-mash bourbon were made. In time, his 2 sons, Joseph Malcolm and Raphael Eustace (father of Dr. Semmes) were taken into the firm. Dr. Semmes later recalled that his grandfather, B. J., wore only suits of Confederate gray purchased from a company in Georgia.<sup>19</sup>

### Semmes' Early Years

Dr. Semmes was born in Memphis, Tennessee, on August 15, 1885, to R. Eustace Semmes and Maude Duval. His mother died giving birth to the family's sixth child. After his mother's death, Dr. Semmes' aunt, Miss Augusta Semmes, lived with the family to help raise the remaining children. The Semmes family spent winters in Memphis, but to escape the miasma and pestilence that plagued Southern cities in the summertime, the family spent summers in the Appalachian Mountains or on the coast of North Carolina. When Semmes was 8 or 9 years old, during one summer in North Carolina, his younger sister fell ill with a high fever, possibly typhoid. Because no one else was available, he shouldered the responsibility of riding over the mountain on horseback in the middle of the night to get the local doctor. This incident provided an early indicator of Semmes' character.

During one summer vacation on the Atlantic coast at Beaufort, North Carolina, Semmes met George LeFevre, a professor of zoology at the University of Missouri and the chief of the US Fisheries Research Laboratories at Beaufort, North Carolina, and Woods Hole, Massachusetts. Dr. LeFevre took the young Semmes under his wing and invited him on local expeditions, taught him how to use a microscope, and introduced him to the wonders of marine life. Despite the aggravations that a young boy can cause an adult (Semmes would later recall that LeFevre was probably frequently tempted to drown him), this association grew into a friendship through the years with the exchange of letters and even small presents at Christmas time (R. E. Semmes, “Random Thoughts in Retrospect,” Archives of Semmes-Murphey Clinic). More important, LeFevre helped guide and influence Semmes' education, which eventually grew into a prestigious medical career.

Semmes has stated that his high school grades at Christian Brothers High School in Memphis, where his father had attended high school, were only fair. (He also claimed that he specialized in football.) His schooling did not begin until he was 10 years old, so by the time he finished his junior year in high school his formal schooling had only lasted 7 years. When Semmes was 17 years old and a junior in high school, LeFevre suggested that he skip his final year of high school and attempt to enroll at the University of Missouri. Although Semmes felt unprepared due to his incomplete education, he applied and was admitted to the University of Missouri without an examination.

### The University Years

At the University of Missouri, Semmes met and became close friends with Thomas Grover Orr from Kansas City and Walter Dandy from Sedalia, Missouri. All 3 students were interested in a medical career and received encouragement from LeFevre, who advised them to apply for admission to the Johns Hopkins University Medical School, arguably the best medical school in the country at that time.<sup>13</sup> During their senior year at the University of Missouri, the 3 young men concentrated on medical courses and were accepted into the 2nd-year class at Johns Hopkins because of their knowledge of human anatomy. They graduated from the University of Missouri in 1907. While in medical school, Semmes was taught Halsted's principles of surgical technique. His first exposure to Harvey Cushing was in his course in operative surgery, which was given for 3rd-year students in the “Old Hunterian” Laboratory. Cushing felt this course provided the most satisfactory and profitable source of contact between student and teacher.<sup>6</sup>

In 1910, Eustace Semmes graduated from medical school after only 3 years and was elected to the Phi Beta Kappa Honor Society (Fig. 1). Semmes, Orr, and Dandy all went on to stellar careers. Dandy, whom Semmes described as “a genius,” later became professor of neurosurgery at Johns Hopkins. Grover Orr became chairman of the department of surgery at the University of Kansas (R. L. DeSaussure Jr., R. Eustace Semmes Lecture. Annual Meeting of the Southern Neurosurgical Society, Scottsdale, Arizona, 1985).<sup>11</sup>



FIG. 1. Photograph of Semmes' Phi Beta Kappa key. The inscription on the key reads: “RE Semmes, Johns Hopkins, 1910.” Courtesy of Semmes family.

### Internship and Residency

Semmes graduated in the top 10 of his class and was selected as a surgical intern on the service of William Halsted and Harvey Cushing at the Johns Hopkins Hospital, Baltimore—a pivotal point in his career. Dandy did not do an internship, but was appointed as Cushing's research fellow in the Hunterian Laboratory of Surgical Research. Semmes later recalled that he was the only intern who had a specific interest in the nervous system and in working with Cushing. He considered himself fortunate to get the most experience on Cushing's service and added an extra rotation on that service by swapping with another intern who had no desire to face the arduous Cushing rotation. Cushing insisted that those operating on the nervous system should have a thorough knowledge of neurology and not depend on a neurologist for a diagnosis (R. E. Semmes, "Random Thoughts in Retrospect"). During this time, Conrad Jacobson, a contemporary of Eustace Semmes and the appointee to the Hunterian Laboratory succeeding Walter Dandy, was of the opinion that Cushing "was an extremely hard taskmaster and drove his men incessantly, almost to the point of exhaustion."<sup>16</sup> During this period Cushing was busy with his first major monograph on disorders of the pituitary gland and was also considering the offer of the position of Mosley Professor of Surgery at Harvard Medical School.

Even though Cushing was a demanding educator, his advice was practical and he was tenacious when treating his patients. During one operation for tic douloureux in which Semmes assisted Cushing, the middle meningeal artery was severed and blood squirted into Semmes' eye. He dodged quickly, and Cushing remarked without looking up, "That was a bad reflex." After regaining his composure, Semmes asked what he should do when blood squirted in his eye. Cushing replied, "Shut the eye." On another occasion, while Cushing was operating on a young boy with a cerebellar tumor, the patient stopped breathing and his blood became quite dark. Cushing instructed Semmes to get on the table and give artificial respiration. The anesthetist, assuming that the patient had died, gathered up his equipment and left the operating room. After the dura was opened and spinal fluid was drained, the patient began to breathe again and the operation was completed successfully. The following day, the anesthetist was told tersely by Cushing to visit the patient (R. E. Semmes, "Memories of Dr. Cushing," Archives of Semmes-Murphey Clinic).

After completing his internship, Semmes was appointed resident at the Women's Hospital in New York on Halsted's recommendation. He had an active surgical service there during which he "picked up everything of neurological or neurosurgical interest that came along" (R. E. Semmes, "Random Thoughts in Retrospect"). But he also had an interest in obstetrics and gynecology at the Women's Hospital. His daughter suggested that this interest might have stemmed from the fact that his mother died in childbirth (M. A. Gordon, personal communication). While he was in New York, Semmes was offered a residency at New York Neurological Institute, which had been organized only 3 years earlier (in 1909, but he had already planned to return to Memphis in 1912. Semmes believed that this was

probably due to a recommendation from Cushing (R. E. Semmes, "Random Thoughts in Retrospect").

### Establishing a Practice

After completing his year at the Women's Hospital, Semmes returned to Memphis in 1912. Several opportunities presented themselves to him at this time. While still in his last year of medical school, he had the chance to witness surgical procedures performed in patients with head injuries by 2 prominent general surgeons. But when he returned to Memphis to take his board examinations, he observed that brain surgery in Memphis was in a deplorable state. The surgeons Semmes observed at this time were not familiar with neurologic diagnosis and had no training in the meticulous techniques developed by Cushing. This was readily apparent to Semmes, who realized the need for a surgeon trained in neurosurgery in Memphis. (R. E. Semmes, "Memories," Archives of Semmes-Murphey Clinic). During this same period, significant changes in medical education occurred in Memphis. The University of Tennessee College of Medicine moved to Memphis in 1911. In addition, the College of Medicine absorbed 2 medical schools that had previously existed in Memphis: the College of Physicians and Surgeons in 1912 and the Memphis Hospital Medical School in 1913. These changes were directly influenced by Abraham Flexner's 1910 report, *Medical Education in the United States and Canada*,<sup>13</sup> and coincided with the 1912 opening of the new Baptist Memorial Hospital in Memphis, where Semmes would center the majority of his practice throughout his career.<sup>3,17</sup> At the time of the Flexner Report (1910), the result of which was to dramatically alter medical education in the US, the Tennessee Medical Department representing the University of Tennessee Knoxville was located in Nashville and was loosely affiliated with the University of Nashville. Neither of these had much merit. It was Flexner's opinion that medical education in Tennessee should be left to Vanderbilt University. Soon after the "report," the University of Nashville closed and gave all of its equipment to the Tennessee Medical Department, which moved to Memphis in 1911 and absorbed the 2 existing medical schools in Memphis: the College of Physicians and Surgeons and the Memphis Medical College. This combined institution thus became the University of Tennessee College of Medicine. The effect was that 4 underfunded and weak medical schools were merged into one stronger school as part of the University of Tennessee. Similar mergers and closures of inferior proprietary medical schools occurred throughout the US and Canada as a result of Flexner's study. In 1913, the University of Tennessee College of Medicine offered Semmes a position as assistant in surgery in charge of neurosurgery and a service at the Memphis General Hospital, which was renamed the John Gaston Hospital in 1936. Semmes practiced some obstetrics and general surgery, but as his reputation in the treatment of head injuries grew, his neurosurgical practice expanded.

### World War I

When the US entered World War I, 2 hospital units composed of Memphis physicians and surgeons were or-

ganized and sent to France. The dean of the University of Tennessee College of Medicine requested that Semmes and 2 other surgeons be allowed to remain in Memphis to help maintain the teaching responsibilities of the university (R. E. Semmes, "Random Thoughts in Retrospect"). General William Gorgas, the US Army surgeon general, reorganized the medical professional services of the American Expeditionary Forces in June 1918, and for the first time, neurological surgery was made a separate subservice of general surgery. He requested 10 experienced neurosurgeons for the American Expeditionary Forces, and Semmes volunteered and was commissioned as a first lieutenant in the Medical Corps. These 10 surgeons were sent to the New York Neurological Institute for a 3-month crash course under the supervision of Dr. Charles Elsberg and Dr. Frederick Tilney. (Elsberg's special interest was diseases and tumors of the spine.) For these officers, the War Department published a small monograph, *War Surgery of the Nervous System*.<sup>31</sup> Material in the monograph that covered injuries to the brain was taken from Cushing's book, *Surgery of the Head*,<sup>8</sup> and material that covered injuries of the spine and spinal cord was taken from the works of Elsberg<sup>12</sup> and Dr. Charles Frazier;<sup>15</sup> Sir Gordon Holmes wrote the section on peripheral nerves. In addition, the monograph contained a compilation of abstracts from recent European literature on war injuries to the nervous system.

On August 1, 1918, Semmes was ordered to report to Camp MacArthur in Waco, Texas, for assignment to Base Hospital 87 in France. After a hazardous trip across the Atlantic, during which another ship collided with his, Semmes and the other members of the contingent of Base Hospital 87 physicians landed in Brest, France, and were then sent to Toul to work in a 1000-bed hospital. Semmes found that the supply of surgical instruments at the hospital was insufficient. For example, he found 22 pairs of rongeurs but no scissors. A resourceful sergeant obtained the needed instruments from nearby French hospitals. On another occasion, it was necessary to break into a warehouse to obtain analgesic medication for injured troops because the hospital at Toul had run out of pain medicine (R. L. DeSaussure, Semmes Lecture, 1985). Meanwhile, thousands of unused and unwanted army blankets were readily available. During an epidemic of meningococcal meningitis, which lasted about 2 months, the treatment serum supplied to the American military hospitals proved ineffective while the French serum was effective. Semmes commented on seeing deaths of soldiers from influenza while in France. He did not become infected with the virus, however. Cushing did have the "Spanish flu," which was followed some weeks later with a severe polyneuropathy affecting both the upper and lower extremities, the major symptoms lasting several months. Although Semmes' service at Base Hospital 87 was a rare experience, he considered it time wasted from the neurosurgical standpoint.

On May 5, 1919, while serving in France, Semmes was promoted to the rank of captain in the Medical Corps. Earlier that year, Dr. August Wittenborg, chairman of the Department of Anatomy and dean of the College of Medicine, wrote the Surgeon General to request that Semmes be released from active duty because his services were needed

as instructor in clinical surgery in the College of Medicine. Later in 1919, Semmes was discharged. When Semmes returned to Memphis, he borrowed \$75 from a cousin to reopen his office in the Union Planters Bank Building in downtown Memphis. During his duty in France, Baptist Memorial Hospital had added a wing in 1918 and increased its capacity to 250 beds (R. E. Semmes, tape-recorded memoirs for the Mississippi Valley Archives of the John Willard Brister Library of the University of Memphis, February 21, 1981).

### The Years Following World War I

When he returned to Memphis, Semmes dropped general surgery completely from his practice and devoted all his time to neurosurgery. Most of his operations were performed using local anesthesia. During this time, he continued his friendship and correspondence with Walter Dandy, who, after completing his residency under Halsted, had been given charge of the Neurosurgical Service at Johns Hopkins Hospital. Semmes said that when he traveled to the eastern part of the US, he would routinely stop in Baltimore for 2 days and visit Dandy. It was said of Dandy that he felt more comfortable with Semmes than with any other neurosurgeon.<sup>4,11</sup>

In the early years of his practice, Semmes would spend a week or two in Boston—usually in the summer months—observing Cushing's work. Recognizing Semmes as one of his own, Cushing would order gown and mask for him, and Semmes would stand at Cushing's shoulder during his operative clinics while most other visitors were seated in the amphitheater (Fig. 2). On occasion, Cushing would invite Semmes to dinner, with the stipulation that he must leave promptly at 9 p.m., so that Cushing could do his writing (R. E. Semmes, "Memories").

Semmes' responsibilities at the University of Tennessee during these early years focused on teaching general practitioners and students how to treat head injuries and how to recognize the symptoms of brain tumors. In the 2 decades after World War I, Semmes was the only neurosurgeon in Memphis and, therefore, was exceedingly busy. He said that he spent almost every Saturday evening "taking dents out of skulls" (R. E. Semmes, "Memories"). Although Semmes published few papers overall, during this period he published papers on intracranial pressure<sup>35</sup> and his experiences with head injuries,<sup>33</sup> spinal cord surgery,<sup>38</sup> trigeminal neuralgia and brain tumors,<sup>39</sup> and intracranial complications of ear, nose, and throat infections<sup>36</sup> (in this last paper, he described his operative technique for the treatment of brain abscesses). Like Dandy and a few other neurosurgeons, Semmes favored the conservative technique of careful canula aspiration and drainage of brain abscesses as opposed to the radical excision of large areas of cerebral cortex. Time would prove the results of his method to be the most favorable.

### Neurosurgical Societies

The Society of Neurological Surgeons was organized in 1920, and at that time was the only educational neurosurgical society in existence. Semmes was nominated for mem-

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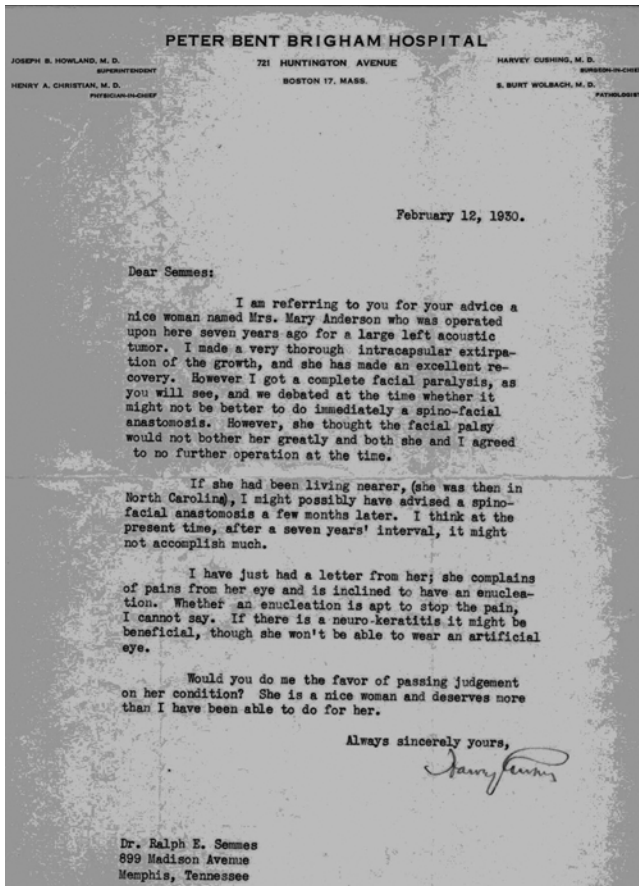


FIG. 2. Photocopy of letter from Cushing to Semmes indicating their mutual respect. Published with permission of the Semmes-Murphey Clinic.

bership in 1930, but only Dr. William Cone of Montreal was elected that year.<sup>40</sup> Dr. Charles Dowman of Atlanta wrote to Semmes after the 1930 meeting, communicating his distress that Semmes had not been elected, and noting that the admissions committee was, “ultraconserva-

tive in recommending new members.” He reported that Semmes, Dr. Glenn Spurling, and Dr. J. R. Learmonth had been put on the waiting list and promised to do everything in his power to get Semmes elected the following year (C. E. Dowman, letter to R. E. Semmes, June 19, 1930). In 1931, however, only Dr. Leo Davidorf and Learmonth were elected. Dandy never joined the Society of Neurological Surgeons because of his resentment toward Cushing, despite Semmes’ urging him to get over the resentment.<sup>40</sup> Despite practicing neurosurgery for almost 20 years, not becoming a member of the only neurosurgical society in America was frustrating to Semmes. To remedy this situation, Semmes soon joined with 3 younger neurosurgeons who, like him, had not been elected to the “Senior Society.” Semmes met with Spurling, Dr. William P. Van Wagenen, and Dr. Temple Fay at the Hotel Raleigh in Washington, DC, on October 10, 1931, for the purpose of forming a new neurosurgical society. The four decided to name the organization “The Harvey Cushing Society,” with the approval of Cushing, who invited the organization to hold its first meeting at his clinic in Boston the following year, 1932 (R. E. Semmes, “Memories”).<sup>18</sup> Semmes took enough Jo Blackburn sour-mash bourbon to the Washington meeting to buck up the resolve of the four to proceed with formation of a new neurosurgical society (F. Murphey, “Dr. Semmes and his Whiskey,” address given at 50th Anniversary Meeting of the American Academy of Neurological Surgery). On May 6, 1932, 23 charter members gathered at the first annual meeting of the Harvey Cushing Society (Fig. 3).<sup>1</sup> Semmes was eventually elected to the Senior Society in 1933.<sup>40</sup>

The Harvey Cushing Society eventually became the AANS, which is now the largest neurosurgical society in America and the active spokes-organization for neurosurgery.<sup>18</sup> Semmes was elected president in 1940, and 4 of his associates in the Semmes-Murphey Clinic would subsequently serve as president also: Francis Murphey (1965–1966), Richard DeSaussure (1975–1976), James T. Robertson (1991–1992), and Jon H. Robertson (2007–2008). The brothers Robertson were both trained in the Semmes-Murphey/University of Tennessee neurosurgery



FIG. 3. The first meeting of the Harvey Cushing Society, May 6, 1932. Reprinted with permission of the AANS.

program and are the first brothers to have served as presidents of the AANS.

Semmes later lent his encouragement to the formation of the American Academy of Neurological Surgery. He was also the initial driving force in the formation of the Southern Neurosurgical Society in 1949. Semmes served as the first president of the Southern Neurosurgical Society and remains the society's only honored member. Other Semmes-Murphey members who have served in the society's leadership include Francis Murphey (president, 1964), Richard L. DeSaussure (vice president, 1966), Jon H. Robertson (vice president, 1999), Clarence B. Watridge (president, 2003–2004), Frederick A. Boop (secretary, president, 2004–2005), and D. J. Canale (historian, 2004–2007).

Semmes was also instrumental in the formation of the CNS, which was formed to serve the interests and education of younger neurosurgeons. The CNS had its beginning in Memphis when Dr. Semmes encouraged Drs. DeSaussure, Schultz, and other neurosurgeons from Memphis to form the society. Dr. Semmes also suggested the emblem in the seal of the Congress. Memphis neurosurgeons who served the CNS as president include Richard L. DeSaussure (1962), Roy Tyrer (1963), and James T. Robertson (1975).

### Diagnosis and Treatment of Ruptured Discs

One of Semmes' most significant contributions to neurosurgery was the diagnosis and surgical treatment of herniated lumbar and cervical discs. While visiting Dandy in the late 1920s, Semmes watched him remove a ruptured lumbar disc. He told Dandy that he had recently operated on 2 similar cases himself, whereupon Dandy mentioned that he had already written up 2 other such cases for publication (D. J. Canale, personal communication). Dandy's paper, "Loose Cartilage from Intervertebral Discs Simulating Tumor of the Spinal Cord,"<sup>19</sup> was published in the *Archives of Surgery* in October 1929. In this classic paper, Dandy noted that these ruptures, "offer a pathologic basis for cases of so-called sciatica." William Jason Mixter and Joseph F. Barr, however, would get most of the credit for describing the nature of disc ruptures in their *New England Journal of Medicine* article of 1934, in which they reported 19 cases.<sup>21</sup>

Semmes, nevertheless, made a major contribution to the diagnosis and surgical treatment of herniated lumbar discs, and his method would become the standard operative approach for lateral lumbar disc herniations. His paper, "Diagnosis of Ruptured Intervertebral Disc without Contrast Myelography and Comment upon Recent Experience with Modified Hemilaminectomy for their Removal,"<sup>32</sup> was presented at the Eighth Annual Meeting of the Harvey Cushing Society in April 1939, at New Haven, honoring Cushing's 70th birthday. Semmes reported 16 cases of ruptured disc surgically treated under local anesthesia and diagnosed on clinical grounds without the necessity of lipiodol myelography. (Actually, 4 of the patients had negative lipiodol myelograms.) More importantly, Semmes described the operative approach of a modified or partial hemilaminectomy with excision of the ligamentum flavum at the L4–5 level. Complete or total laminectomy was cus-

tomary at this time. Medical historians writing on the history of surgery for lumbar disc disease have largely overlooked this classic paper, perhaps because it was published in the *Yale Journal of Biology and Medicine*.<sup>32</sup>

After publication of this paper, which cited only the work of Mixter and Barr, Dandy wrote Semmes a sarcastic letter, chiding him for not recognizing his own paper. Dandy went on to say that his own 1929 paper was the beginning of the "attack on the lesion," and that Mixter had added almost nothing.<sup>14</sup> Arguably, the 2 papers, the first by Dandy (1929) and the second by Semmes (1939), were the landmark papers.

Semmes was a strong proponent of local anesthesia, using techniques he learned directly from Halsted and Cushing during his internship at Johns Hopkins. Semmes preferred to use novocaine (procaine) and was convinced that it was the safest and best form of anesthesia for neurosurgical procedures. In general, this was true in the early years before general anesthesia was really on a sound footing. In the early years of neurosurgery, general anesthesia consisted of open drop ether or chloroform as the general anesthetic. With this technique, it was more difficult to control the level of anesthesia, and the problem of postoperative coughing and vomiting was hazardous for patients undergoing brain surgery. The modern techniques of monitoring the heart and oxygen saturation were not available. Cushing and his trainees, including Semmes, became very skilled at using local anesthesia, and monitoring a patient under local anesthesia was much safer. His careful preparation of the patient and his meticulous technique in administering the local anesthesia were important for a successful result. Semmes estimated that he used local anesthesia in more than 95% of surgical cases during his first 40 years in practice (R. E. Semmes, American Association of Neurological Surgeons, Leaders in Neuroscience Video—Interview Series No. 35, interview conducted by Dr. James T. Robertson; R. E. Semmes, lecture presented to the New York Society of Neurosurgery, May 21, 1957).<sup>37</sup>

### Taking on a Resident

In 1933, while on his way to a meeting in New Orleans, Dr. Paul Bucy visited Semmes in Memphis. Semmes confided to Bucy that he was desperately in need of help and wanted a bright young man untrained in neurosurgery so he could train the man himself.<sup>4</sup> Bucy, who was associated at this time with Dr. Percival Bailey in the Department of Neurosurgery at the University of Chicago, called Dr. Francis Murphey, one of his interns in Chicago and told Murphey to come to Memphis to talk with Semmes. Murphey had previously informed Bucy that he was interested in a career in neurosurgery and was even thinking of practicing in Memphis (P. C. Bucy, "Pappy," the R. Eustace Semmes Lecture, delivered at the meeting of the Southern Neurosurgical Society, Dallas, Texas, 1969).

Francis Murphey was born in 1906 and attended school in Macon, Mississippi, and later graduated from Vanderbilt University with a B.A. degree. Accepted by both Vanderbilt and Harvard medical schools, he chose Harvard. He stated that he was probably accepted to Harvard because they had never before accepted a Missis-

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sippian for admission to the medical school. (The noted Johns Hopkins surgeon, J. M. T. Finney, born in Natchez, Mississippi, had actually graduated earlier from Harvard Medical School.) Murphey received his M.D. in 1933, and was given the opportunity to be one of the last students on Cushing's service, which had a lasting influence on him. While a third-year student on Cushing's service in Boston, he was told by Cushing that he would have an internship at the Peter Bent Brigham Hospital on graduation from Harvard. If Cushing had not agreed years before to retire at age 63, Murphey, who had that certain quality of "Geist" (German for spirit and intelligence), would possibly have been selected as Cushing's fellow in the Laboratory of Surgical Research at Harvard, and subsequently, his assistant resident. However, Cushing had retired by Murphey's 4th year, and the appointment never materialized (F. Murphey, AANS, Leaders in Neuroscience Video Interview, Series No. 23, interview conducted by James T. Robertson).

In 1933, Murphey chose to intern at the University of Chicago, where Dr. Percival Bailey was professor of surgery in charge of neurosurgery. Bailey had just published his classic monograph on brain tumors.<sup>2</sup> Later, Murphey said that interning there was the luckiest thing that ever happened to him because it led to his becoming Semmes' first resident. In 1934, after his internship, Murphey came to Memphis to assume that appointment, which began an association that continued throughout the professional careers of both men (Fig. 4). Semmes said later, "It turned out that Francis was just what I wanted. Having a large neurosurgical practice in his favorite city was also what Francis wanted" (R. E. Semmes, "Memories").

The establishment of the Department of Neurosurgery was marked by the appointment of Semmes as professor of neurosurgery in 1932. He continued in that position until Murphey succeeded him in 1956. The Semmes-Murphey Clinic has continuously supported the department since its inception in 1932. The chairman of the department has always been a member of the Semmes-Murphey Clinic. James T. Robertson followed Murphey, and Jon H. Robertson, the current professor and chairman, succeeded him. The American Board of Neurological Surgery was formed in 1940, and Semmes was one of the original 50

neurosurgeons certified without examination. He served as a member of the board for 6 years (1942–1948).

### World War II

In 1942, shortly after the US became involved in World War II, Murphey enlisted in the US Army and was made chief of neurological surgery at O'Reilly General Hospital in Missouri, a center for peripheral nerve injuries. Murphey later became a recognized authority on the treatment of such injuries. By the time of his discharge, he had attained the rank of lieutenant colonel.<sup>10</sup> In 1943, Semmes and Murphey published their landmark paper, "The Syndrome of Unilateral Rupture of the Sixth Cervical Intervertebral Disc."<sup>42</sup> In this paper, they reported 4 cases of unilateral rupture of the sixth cervical disc. Surgery was performed in 3 of these cases, the first by Murphey. This study proved that lateral cervical disc rupture caused neck and arm pain associated with numbness in the index and middle finger. These symptoms had heretofore been ascribed to scalenus anticus syndrome, brachial neuritis, angina, and other conditions. Prior to this 1943 report, most cervical disc ruptures reported in the literature were thought to be large central ruptures with spinal cord compression. In subsequent years, Semmes and Murphey published additional reports on ruptures of the cervical and lumbar intervertebral discs.<sup>20,24,25,28,30,41,45</sup> Semmes' only monograph, "Ruptures of the Lumbar Intervertebral Disc: Their Mechanism, Diagnosis and Treatment,"<sup>37</sup> was published in 1964.

During World War II, Semmes was alone again, but acknowledged help he received from Dr. Kate Constable, a neurologist from the Neurological Institute of New York, who worked with him while her husband was stationed in Memphis at the Kennedy Veterans Administration Hospital. Semmes was also assisted by Dr. Antonio Grenio, a Spanish neurosurgeon, who, according to Semmes, served on the wrong side of the Spanish Civil War and escaped to Mexico before coming to Memphis. Semmes also served patients with neurosurgical needs at the downtown US Marine Hospital, Methodist Hospital, and St. Joseph Hospital.

### The Semmes-Murphey Clinic

Dr. E. C. (Dutch) Schultz joined Semmes and Murphey in 1948 upon completing his residency at the University of Virginia at the recommendation of Dr. Gayle Crutchfield, chief of the Department of Neurosurgery at Virginia. Dr. Richard DeSaussure who also trained at Virginia accepted the position of neurosurgeon at the Kennedy Veterans Administration Hospital in Memphis at Schultz's suggestion. A year later in 1950 he joined the practice with Semmes, Murphey, and Schultz (R. L. DeSaussure, personal communication), and Schultz suggested the name Semmes-Murphey Clinic. A few years after the establishment of the Semmes-Murphey Clinic, Semmes published "In Favor of Simplicity: Applied to Medicine in General and Neurosurgery in Particular,"<sup>34</sup> which reflected his philosophy concerning medicine and surgery and is recommended reading especially for incoming residents. Dr. James C. H. Simmons joined the group after completing neurosurgical residency with the Semmes-Murphey Clinic/University



FIG. 4. Photograph of Eustace Semmes (left) and Francis Murphey (right). Published with permission of the Semmes-Murphey Clinic.

of Tennessee and was one of the first residents trained by Semmes and Murphey.

Several medical advances were developed from the influence of Semmes-Murphey Clinic. These neurosurgeons believed that neurosurgical patients required specialized nursing care, and the clinic was responsible for initiating the first intensive care unit for neurosurgical patients at the Baptist Hospital in Memphis. In 1973, CT became available, and in 1975 the Baptist Hospital agreed to purchase a CT scanner at the suggestion of the Semmes-Murphey Clinic (R. L. DeSaussure, personal communication). As the field of neurosurgery began to expand, the decision was made to encourage subspecialization at the clinic. Dr. Morris Ray, who later became the chairman of the Semmes-Murphey Clinic (1984–2002), was sent to study with Dr. Gazi Yasargil in Switzerland and became the cerebrovascular specialist. Dr. James T. Robertson subspecialized in pituitary tumors, acoustic tumors, and carotid artery disease. Dr. DeSaussure subspecialized in percutaneous methods for pain and trigeminal neuralgia. Each Semmes-Murphey Clinic physician has been encouraged to have a general neurosurgery practice and also to develop an area or areas of interest in which they become particularly facile and contribute to the development of those areas of neurosurgery.

In the mid-1970s, the Semmes-Murphey Clinic owned land with a duck blind and a lake house that was used by clinic members for family and friend recreation as well as entertainment for referring physicians. (History has it that much Ol' Jo Blackburn whiskey was consumed on the premises and that one resident's duty was to ensure the safety of the attendees.) The medical malpractice crisis of that time made it necessary for the Semmes-Murphey Clinic to divest itself of these amenities and use the proceeds as one of the major investors in the physician-owned State Volunteer Mutual Insurance Company (R. L. DeSaussure, personal communication). This company continues to be the professional liability company covering the majority of Tennessee physicians as well as many physicians in the surrounding states. Semmes-Murphey also leased offices from the Baptist Hospital. The X-Ray Department occupied the floor below the clinic but needed to make some space occupancy changes. As a result Semmes-Murphey Clinic procured the radiographic equipment and created its own imaging department in the early 1970s. Since that time other ancillary services required for the diagnosis and treatment of the neurological patient have been developed.

Semmes and Murphey also influenced other areas of the practice of neurosurgery. Semmes' surgical treatment of meningiomas was motivated by his desire that surgical procedures not cause harm to his patients. He would remove enough of a meningioma to relieve symptoms, but was prepared to return another day to remove more if symptoms or conditions required. Like his mentor, Cushing, Semmes treated many patients with trigeminal neuralgia, continuing the middle cranial fossa approach to the gasserian ganglion. Murphey had a keen interest in cerebrovascular disease. His interest in brain hemorrhage and keen observational skills led to the term "Murphey's teat," a term now used by almost all individuals to refer to an outpouching of an intracranial aneurysm on arteriography as the likely site of rupture in a patient suffer-

ing subarachnoid hemorrhage (J. T. Robertson, personal communication). Murphey made a number of contributions to the medical literature in regard to cerebrovascular disease but more importantly influenced many of his residents in their interest in these neurosurgical problems.<sup>22,23,26,27,29,43,44</sup> Among these were Dr. James T. Robertson and Dr. Thor Sundt.

Beginning as a single specialty practice of neurological surgery, the Semmes-Murphey Clinic realized the benefit to patients of having other specialties within the group to treat patients with neurological conditions and diseases. Neurologists were added to the clinic together with specialists in neuropsychology, physical medicine, and pain management. In addition to the professional services of these medical specialists, the clinic provides most diagnostic services needed to evaluate patients with neurological conditions (Fig. 5). With the addition of the ambulatory surgery center, many needed surgical procedures can be provided "in house."

### Training the Next Generation

One of the missions of the Semmes-Murphey Clinic was set in place by Semmes and subsequently Murphey—to educate and train the next generation (Fig. 6). Many residents around the nation and several international graduates have developed their neurosurgical and neurological skills at the Semmes-Murphey Clinic and the University of Tennessee. The neurosurgical academic training program is currently based in the Methodist University Hospital with Dr. Jon Robertson as chairman and Dr. Frederick Boop as training program director. Dr. William Pulsinelli is the



FIG. 5. Photographs of the modern Semmes-Murphey Clinic. Published with permission of the Semmes-Murphey Clinic.





FIG. 6. Reunion photograph of Semmes-Murphey neurosurgeons, circa 1971. Notable attendees included Eustace Semmes (front row, seated fourth from left), Francis Murphey (front row, seated second from right), Thor Sundt (front row, seated at far right), James T. Robertson (last row, standing 13th from left), Jim Simmons (front row, second from left), and Morris Ray (standing, 11th from the left). Published with permission of the Semmes-Murphey Clinic.

Semmes Chairman of Neurology at the University of Tennessee, while Dr. Michael Jacewicz serves as the neurology training program director. Other hospitals in which students, residents, and fellows receive instruction are the Regional Medical Center, which includes the Elvis Presley Level 1 Trauma Center, the Veterans Administration Hospital, Methodist LeBonheur Childrens' Hospital, and the Baptist Hospital System. The largest pediatric brain tumor program in the US is based at LeBonheur Childrens' Hospital with a strong affiliation with St. Jude Childrens' Research Hospital. Dr. Robert A. Sanford is responsible for building this program with participation of the other 3 pediatric neurosurgeons, Michael Muhlbauer, Frederick A. Boop, and Stephanie Einhaus.

The interest of neurosurgeons in spinal disorders dates back to Semmes' and Dandy's contributions. As neurosurgeons have further expanded the understanding and treatment of spinal conditions and the role of stability, Drs. Kevin Foley and Maurice Smith have made significant contributions to the understanding and treatment of complex spinal disorders as well as minimally invasive spine surgery. Many of the current techniques taught to all neurosurgeons completing contemporary neurosurgical programs have been influenced in some way by these individuals and their students. Spinal deformity has generally been a condition treated by orthopedists, but Dr. Julius Fernandez has an active practice in treating this condition.

Dr. Allen Sills has a special expertise in neurooncology and has been responsible for the establishment of a multidisciplinary brain tumor conference. As many brain tumors may have treatment alternatives involving focused radiation, the Memphis Regional Gamma Knife Center is frequently consulted for expertise in this modality. Dr. David Cunningham serves as the medical director for this service, and many of the other neurosurgeons have training in this field.

In addition to the contribution to training the young, the Semmes-Murphey Clinic developed a surgical teaching laboratory, the Medical Education and Research Institute, a not-for-profit organization for the education of surgeons as new methodologies emerge. This laboratory

was founded by the Semmes-Murphey Clinic and Methodist Hospital, and Dr. Kevin Foley has been its driving neurosurgical force. The Baptist Hospital became a sponsoring member a few years after the establishment of the laboratory.

Semmes-Murphey Clinic accomplishments and endurance have been the result of missions set forth by its founders. Semmes continued in practice through his 70s and operated until Murphey and the group encouraged him to stop. He continued to come to the clinic and hospital daily and was frequently delivered to the office from the doctors' cafeteria where he had fallen asleep. In 1982 he died of respiratory failure as a consequence of a broken hip. Murphey had a reputation of being "maybe wrong but never in doubt." Expression of his desires and thoughts was never his failing. Throughout his career he exhibited an inquisitive mind and encouraged others to do the same. He practiced until age 65 then abruptly departed. He visited the clinic from time to time, never refraining from offering his opinion. He died in 1994 from heart disease. He too had had a broken hip, which was the onset of his decline.

### Conclusions

As the first 100 years of neurosurgery in Memphis draw to a close, there is much to remember and much still to learn. The Semmes-Murphey Clinic has had the good fortune to draw talent from many other programs. The cross-fertilization that comes from bringing in fresh and new ideas has served the clinic well and has been a key to avoiding the negative influence of "in-breeding". The founding principles set forth by Semmes and Murphey—diligence, excellence, honesty, teaching, and sharing—have served Memphis neurosurgery well and continue to be driving forces for the contemporary Semmes-Murphey Clinic.

### Disclaimer

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### References

- American Association of Neurological Surgeons: **History of the American Association of Neurological Surgeons. Seventy-Fifth Anniversary**. Virginia Beach: Donning Co., pp 14–15, 2007
- Bailey P: **Intracranial Tumors**. Springfield, IL: Charles C. Thomas, 1933
- Bruesch SR: Medical education, in Stewart MJ and Black WT (eds): **History of Medicine in Memphis**. Jackson, TN: McCowat-Mercer Press, 1971, pp 318–320
- Bucy PC: Editor's comments, in Bucy PC (ed): **Neurosurgical Giants: Feet of Clay and Iron**. New York: Elsevier, 1985, p 435
- Canale DJ: William Osler and "the special field of neurological surgery." **J Neurosurg** **70**:759–766, 1989
- Crowe SJ: **Halsted of Johns Hopkins: The Man and His Men**. Springfield, IL: Charles C. Thomas, 1957, p 71
- Cushing H: The special field of neurological surgery. **Bull J Hopkins Hosp** **16**:77–87, 1905
- Cushing H: Surgery of the head, in Keen WW (ed): **Surgery: Its Principles and Practice**. Philadelphia: WB Saunders, 1908, Vol 3, pp 17–276
- Dandy WE: Loose cartilage from intervertebral disc simulating tumor of the spinal cord. **Arch Surg** **19**:660–672, 1929
- DeSaussure RL: Biography of Dr. Francis Murphey, in Winkins RH (ed): **Clinical Neurosurgery**. Baltimore: Williams & Wilkins, 1973, Vol 20, pp xvii–xx
- DeSaussure RL: Raphael Eustace Semmes. **Surg Neurol** **6**: 311–312, 1976
- Elsberg CA: **Diagnosis and Treatment of Surgical Diseases of the Spinal Cord and its Membranes**. Philadelphia: WB Saunders, 1916
- Flexner A: **Medical Education in the United States and Canada**. New York: Carnegie Foundation, 1910
- Fox WL: **Dandy of Johns Hopkins**. Baltimore: Williams & Wilkins, 1984, p 213
- Frazier CH: **Surgery of the Spine and Spinal Cord**. New York: D Appleton, 1918
- Fulton JF: **Harvey Cushing: A Biography**. Springfield, IL: Charles C. Thomas, 1946, p 316
- Groner FS: Baptist Memorial Hospital, in Stewart MJ, Black WT Jr (eds): **History of Medicine in Memphis**. Jackson, TN: McCowat-Mercer Press, 1971
- Hauber CH, Philips CA: The evolution of organized neurological surgery in the United States. **Neurosurgery** **36**:814–826, 1995
- Humphreys A, Guenther C: **Semmes America**. Memphis, TN: Humphreys Ink, pp 333–365, 1995
- Josey AI, Murphey F: Ruptured intervertebral disk simulating angina pectoris. **JAMA** **131**:581–587, 1946
- Mixter WJ, Barr JS: Rupture of the intervertebral disc with involvement of the spinal canal. **N Engl J Med** **211**:210–214, 1934
- Murphey F: Extracranial occlusive disease of the carotid arteries in Conn HF (ed): **Conn's Current Therapy**. Philadelphia: W. B. Saunders, pp 507–509, 1961
- Murphey F: Extracranial occlusive disease of the carotid arteries in Conn HF (ed): **Conn's Current Therapy**. Philadelphia: W. B. Saunders, pp 495–497, 1962
- Murphey F: Rupture of intervertebral discs, in Speed JS, Smith H (eds): **Campbell's Operative Orthopedics, ed 2**. St. Louis: CV Mosby, 1949, Vol 2, pp 867–877
- Murphey F: Ruptured intervertebral discs in the lower lumbar region, in Conn HF (ed): **Current Therapy**. Philadelphia: WB Saunders, 1949, pp 608–610
- Murphey F, Maccubbin DA: Carotid endarterectomy: a long-term follow-up study. **J Neurosurg** **23**:156–168, 1965
- Murphey F, Maccubbin DA: Carotid endarterectomy: a long-term follow-up study. **Clin Neurosurg** **13**:291–311, 1966
- Murphey F, Meade WH: Unilateral ruptures of lower cervical intervertebral discs. **J Omaha Mid-West Clin Soc** **7**:69–72, 1946
- Murphey F, Miller J: Carotid insufficiency: diagnosis and surgical treatment; a report of twenty-one cases. **J Neurosurg** **16**: 1–23, 1959
- Murphey F, Simmons JCH: Ruptured cervical disc. Experience with 250 cases. **Am Surg** **32**:83–88, 1966
- Office of the Surgeon General, Division of Brain Surgery, Section of Surgery of the Head: **War Surgery of the Nervous System**. Washington, DC: War Department, 1917
- Semmes RE: Diagnosis of ruptured intervertebral disc without contrast myelography and comment upon recent experience with modified hemilaminectomy for their removal. **Yale J Biol Med** **11**:433–435, 1939
- Semmes RE: Head injuries. **Mississippi Doctor** **15**:38–41, 1938
- Semmes RE: In favor of simplicity: applied to medicine in general and neurosurgery in particular. **J Neurosurg** **15**:1–3, 1958
- Semmes RE: Intracranial pressure. **Memphis Med Monthly** **40**:4, 1919
- Semmes RE: A review of the intracranial complications of ear, nose and throat infection from the neurosurgical standpoint. **Trans Am Laryngol Rhinol Otol Soc** **33**:517–521, 1927
- Semmes RE: **Ruptures of the Lumbar Intervertebral Disc: Their Mechanism, Diagnosis and Treatment**. Springfield, IL: Charles C. Thomas, 1964
- Semmes RE: Spinal cord surgery. **Memphis Med J** **6**:179–181, 1929
- Semmes RE: Trigeminal neuralgia and brain tumor. **South Med J** **21**:484–490, 1928
- Semmes RE: Walter Dandy: his relationship to the Society of Neurological Surgeons. **Neurosurgery** **4**:1–2, 1979
- Semmes RE, Murphey F: Symposium on neurologic surgery ruptured intervertebral discs: cervical, thoracic, and lumbar, lateral and central. **Surg Clin N Amer** **34**:1095–1111, 1954
- Semmes RE, Murphey F: The syndrome of unilateral rupture of the sixth cervical intervertebral disc. **JAMA** **121**:1209–1214, 1943
- Sundt TM Jr, Murphey F: Clip-grafts for aneurysm and small vessel surgery. 3. Clinical experience in intracranial internal carotid artery aneurysms. **J Neurosurg** **31**:59–71, 1969
- Sundt TM, Nofzinger JD, Murphey F: Arteriectomy patching by means of intraluminal pressure sealing venous autografts: a preliminary technical report. **J Neurosurg** **23**:452–454, 1965
- Whiteleather JE, Semmes RE, Murphey F: Roentgenographic signs of herniation of cervical intervertebral disk. **Radiology** **46**:213–219, 1946

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