Harvey Williams Cushing

Born

April 8, 1869 Cleveland, Ohio, US

Died

October 7, 1939 (aged 70) New Haven, Connecticut, US from complications of myocardial infarction. He was interred at Lake View Cemetery in Cleveland.[15]

An autopsy performed on Cushing revealed that his brain harbored a colloid cyst of the third ventricle.

Education

Yale University

Harvard Medical School

Johns Hopkins Hospital

Years active

1895-1935

Known for Pioneering brain surgery

Family

He married Katharine Stone Crowell, a Cleveland childhood friend, on June 10, 1902. They had five children: William Harvey Cushing; Mary Benedict Cushing who married Vincent Astor and later James Whitney Fosburgh;

Betsey Cushing, who married James Roosevelt and later John Hay Whitney; Henry Kirke Cushing; and Barbara “Babe” Cushing, the socialite wife of Stanley Grafton Mortimer and later William S. Paley

Although Cushing's experience with selected skull base pathology has been previously reported, the breadth of his contributions to operative approaches to the skull base has been neglected [1)].

Spouse(s) Katharine Stone Crowell (m. 1902–39)

Children William Harvey Cushing

Mary Benedict Cushing

Betsey Maria Cushing

Henry Kirke Cushing

Barbara Cushing

Parents Kirke Cushing

Bessie Williams

Harvey Williams Cushing was an American neurosurgeon. A pioneer of brain surgery, he was the first person to describe Cushing's syndrome.

He is often called the “father of modern neurosurgery.”

Dr. Cushing was born in Cleveland, Ohio. His parents were Bessie Williams and Kirke Cushing, a physician whose family came to Hingham, Massachusetts, as Puritans in the 19th century.

Harvey was the youngest of ten children.

School

As a child, Cushing attended the Cleveland Manual Training School which expanded his interest in science and medicine. The school’s emphasis on experimental training and a “physics-focused” approach to education played an important role in influencing Cushing towards a career in medical surgery. The school's manual dexterity training program also contributed to Cushing’s future success as a surgeon.

Graduation

He graduated with an A.B. degree in 1891 from Yale University, where he was a member of Scroll and Key and Delta Kappa Epsilon (Phi chapter).

Medicine

He studied medicine at Harvard Medical School and earned his medical degree in 1895. Cushing completed his internship at Massachusetts General Hospital and then did a residency in surgery under the guidance of a famous surgeon, William Stewart Halsted, at the Johns Hopkins Hospital, in Baltimore.

14-month Wanderjahr

Harvey Williams Cushing 14-month Wanderjahr had a profound effect on his subsequent personal career, which in turn ushered in the modern age of American neurosurgery. From July 1900 to August 1901, he traveled to European neurosurgical centers in England, France, Switzerland, Italy, and Germany. His excursion happened at a crucial moment in his trajectory; it was built on his existing

foundation of Halstedian surgical training and occurred at a time when interest in the special field of neurological surgery was emerging. The research and clinical experiences on his journey-good and bad-undoubtedly informed his fledgling neurosurgical practice. Salwi et al. present a concise account of Harvey Cushing's time in Europe that consolidates accounts from Cushing's travel journals, biographers, and other neurosurgeons.

The article of Salwi et al. highlights tensions in prior works and reveals new insights into the transformative nature of his Wanderjahr. Furthermore, he contextualizes his travels and achievements within the broader transformation of American medical education at the turn of the 20th century to elucidate how Europe influenced American medicine. They briefly consider the parallel benefits of Harvey Cushing's Wanderjahr and modern domestic or international training opportunities and present potential areas of implementation [2)]

After doing exceptional cerebral surgery abroad under Emil Theodor Kocher at Bern and Sherrington at Liverpool, he began private practice in Baltimore. During his time with Kocher, he first encountered the Cushing reflex which describes the relationship between blood pressure and intracranial pressure. Here, at the age of 32, he was made associate professor of surgery at Johns Hopkins Hospital, and at the hospital was placed in full charge of cases of surgery of the central nervous system. Yet he found time to write numerous monographs on surgery of the brain and spinal column and to make important contributions to bacteriology. He made (with Kocher) a study of intracerebral pressure and (with Sherrington) contributed much to the localization of the cerebral centers. In Baltimore, he developed the method of operating with local anaesthesia, and his paper on its use in hernia gave him a European reputation. He has also made important contributions to the study of blood pressure in surgery.

In 1911, he was appointed surgeon-in-chief at the Peter Bent Brigham Hospital in Boston.

He became a professor of surgery at the Harvard Medical School starting in 1912.

In 1913, he was made an honorary F.R.C.S. (London). He was elected a Fellow of the American Academy of Arts and Sciences in 1914.

During 1917-9, he was director of U.S. base hospital attached to the British Expeditionary Force in France. While in combat, Cushing served as the head of a surgical unit in a French military hospital outside of Paris. During his time at the French military hospital, Cushing experimented with the use of electromagnets to extract fragments of metallic missile shrapnel that were lodged severely within the brain.[7] In 1918, he was made senior consultant in neurological surgery for the American Expeditionary Forces in Europe during World War I. He served in the U.S. Army Medical Corps, attaining the rank of Colonel (O6).

In that capacity, he treated Lt. Edward Revere Osler, who was fatally wounded during the third battle of Ypres. Lt. Osler was the son of Sir William Osler.

The need to secure unstable intracranial aneurysms was identified by Harvey Williams Cushing (1923) [3)]

Sir Charles S. Sherrington, Harvey Cushing and William Welch (from left to right). Photograph taken by Arnold Klebs after the First International Neurological Congress in Berne 1931 at his home in Nyon, the town in Switzerland where the Central Office of the World Federation of Neurosurgical Societies would be located seventy years later. (from J. Fulton: Harvey Cushing: a Biography)

From 1933 to 1937, when he retired, he worked at Yale University School of Medicine.

Cushing died on October 7, 1939 in New Haven, Connecticut, from complications of a myocardial infarction.

He was interred at Lake View Cemetery in Cleveland.

Interestingly, an autopsy performed on Cushing revealed that his brain harbored a colloid cyst of the third ventricle.

Legacy

In the beginning of the 20th century he developed many of the basic surgical techniques for operating on the brain. This established him as one of the foremost leaders and experts in the field. Under his influence neurosurgery became a new and autonomous surgical discipline.

Historical marker at Lake View Cemetery He considerably improved the survival of patients after difficult brain operations for intracranial tumors. He used x-rays to diagnose brain tumors. He used electrical stimuli for study of the human sensory cortex. He played a pivotal role in development of the Bovie electrocautery tool with W. T. Bovie, a physicist. He was the world's leading teacher of neurosurgeons in the first decades of the 20th century. Arguably, Cushing's greatest contribution came with his introduction to North America of blood pressure measurement. On visiting colleague Scipione Riva-Rocci, an Italian physician, Cushing was astonished at Riva-Rocci's non-invasive way to measure intra-arterial pressure. In 1896, Riva-Rocci developed a wall-mounted mercury manometer linked to a balloon-inflated cuff that would measure the pressure needed to compress arterial systolic pressure, i.e. systolic blood pressure measurement. Riva-Rocci's design was based on a more primitive version developed by French physician Pierre Potain. Cushing brought back a sample of Riva-Rocci's sphygmomanometer, and blood pressure measurement became a vital sign and its use spread like wildfire across the US and western world as a direct contribution by Harvey Cushing. Its use remained until Russian physician Nikolai Korotkov included diastolic blood pressure measurement in 1905 (after he discovered the famed “Korotkoff sounds”) with his modern sphygmomanometer, which also replaced the mercury manometer with a smaller, round dial manometer.

Cushing was awarded the 1926 Pulitzer Prize for Biography or Autobiography for a book recounting the life of one of the fathers of modern medicine, Sir William Osler.

In 1930, Cushing was awarded the Lister Medal for his contributions to surgical science. As part of the award, he delivered the Lister Memorial Lecture at the Royal College of Surgeons of England in July 1930.

Cushing was elected to the Royal Swedish Academy of Sciences in 1934, and a Fellow of the Royal Society of London.

He served as president of the History of Science Society in 1934.

In 1988, the United States Postal Service issued a 45 cent postage stamp in his honor, as part of the Great Americans series.

Aside from Cushings many accomplishments, he developed many surgical instruments that are still in use today, most notably the Cushing Forcep. This instrument is used to grasp the thick tissues of the scalp during crainal surgery. He also developed a surgical magnet while working with the Harvard Medical Unit in France during World War I to extract bullets from the heads of wounded soldiers.

The Harvey Cushing/John Hay Whitney Medical Library at Yale University contains extensive collections in the field of medicine and the history of medicine. In 2005, the library released portions of its collection online, including the Peter Parker Collection which consists of a collection of portrait engravings and 83 mid-19th-century oil paintings rendered by artist Lam Qua of Chinese tumor patients, and a biography of Harvey Cushing by John F. Fulton. In 2010, Yale placed on display Cushing's collection of brain specimens

There is also a collection of his papers at the National Library of Medicine.

Neurosurgeons are often identified with traits such as arrogance and hubris syndrome. However, the true legacy of neurosurgeons is excellence. Harvey Williams Cushing, the pioneering neurosurgeon of the United States, is largely responsible for this legacy of excellence. Eminent personalities have agreed that sincere and hard work is necessary to achieve excellence.

Excellence in surgical work should be measured comprehensively and over long follow-up periods using tools such as functional outcomes and quality of life instruments besides morbidity and mortality. For excellence in neurosurgical research, one can use the help of indices such as the h index and i10 -index. No single measure, whether for surgical excellence or excellence in research, however, incorporates a measure of qualities such as empathy, integrity and mentorship. These intangible qualities should be an integral part of the assessment of a neurosurgeon and his/her work. Cushing's attributes of meticulous record keeping, attention to detail, and maximal utilization of opportunities should guide us in our pursuit of excellence. In recent years, it has been suggested that excellence is not the result of an innate talent but can be aspired to by anyone willing to adopt a work ethic that involves several hours of “deliberate practice,” feedback and passion. Neurosurgeons should continue to pursue the legacy of Cushing especially in present times when medical professionals are frequently depicted as being driven more by avarice than by Hippocratic principles [4].

Harvey Cushing's management of hydrocephalus

Few are aware that Cushing treated childhood hydrocephalus. Examples of these treatments include the placement of ventriculo-subgaleal shunts, ventriculo-jugular shunts, ventriculo-superior sagittal sinus shunts, and at least 12 lumbar cistern-to-retroperitoneal shunts that, as he put it, had “a considerable measure of success.”

Although decades went by before reliable treatments for hydrocephalus were established, Cushing pioneered both the thought processes and surgical options for this disease [5)].

Mehta et al., describe Cushing's treatment of 6 children, in all of whom Cushing established a diagnosis of “birth hemorrhage.” By reviewing Cushing's operative indications, techniques, and outcomes, the authors aim to understand the philosophy of his pediatric neurosurgical management and how this informed his development of neurosurgery as a new specialty [6)].

Following IRB approval, and through the courtesy of the Alan Mason Chesney Archives, the surgical records of the Johns Hopkins Hospital, from 1896 to 1912, were reviewed. Patients operated upon by Harvey Cushing were selected for further analysis. Within this cohort, Chesler et al., recovered all available records for a single patient with hydrocephalus and spina bifida, who was treated with a ventriculosubgaleal shunt prior to repair of the spina bifida.

A 3 month-old infant presented with hydrocephalus associated with spina bifida. Cushing performed serial lumbar and ventricular punctures. Following this, Cushing took the patient to the operating room for placement of a ventriculosubgaleal shunt. The patient subsequently underwent excision of the myelomeningocele sac, with post-operative mortality due to unspecified causes.

Cushing's publications document a preference for translumbar-peritoneal drainage in patients with congenital hydrocephalus, particularly those with spina bifida. Although the placement of ventriculosubgaleal shunts has become an accepted practice for contemporary neurosurgeons, this case illustrates the challenges that early neurosurgeons faced in developing operative approaches for the treatment of congenital hydrocephalus [7)].

Harvey Cushing's management of pediatric brainstem glioma

Dmetrichuk et al., describe Cushing's early experience with a pediatric brainstem glioma during his time as a young attending physician at the Johns Hopkins Hospital. The case, presented in 1909, described the clinical events in a 15-year-old schoolgirl who presented with signs of a cerebellopontine lesion. A suboccipital exploration was performed by Cushing; his findings and surgical approach are described.

Harvey Cushing's early contributions to the field of pediatric neurosurgery, and to the operative treatment of pediatric brainstem gliomas have remained largely unknown. The case presented here represents the early work of the American “Father of Neurosurgery.” [8)].

Pituitary

Cushing's name is commonly associated with his most famous discovery, Cushing's disease. In 1912 he reported in a study an endocrinological syndrome caused by a malfunction of the pituitary gland which he termed “polyglandular syndrome.” He published his findings in 1932 as “The Basophil Adenomas of the Pituitary Body and Their Clinical Manifestations: pituitary Basophilism”.

Pituitary metastases (PM) is a rare complication of advanced malignancy, first reported by L. Benjamin in 1857 as a case of melanoma spread to the pituitary identified in an autopsy [9] and later in 1913, Harvey Williams Cushing [10]

In 1915, before the Clinical Congress of Surgeons in Boston, he showed the possibility of influencing stature by operating on the pituitary gland.

Harvey Cushing Medal

Harvey Cushing Medal

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