OBITUARY

John F. Mullan, MD, 1925–2015: neurosurgery's modern statesman**Issam A. Awad, MD, MSc, Javad Hekmatpanah, MD, and David Frim, MD, PhD**

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ON June 3, 2015, John (Sean) Mullan, MD, died while surrounded by family members at his home in Hyde Park, the neighborhood where he had lived for a half-century, a few blocks from the University of Chicago. Emerging from a cast of neurosurgical leaders trained by founders of the specialty, he stood apart, ushering innovations unimagined by his peers. His life and career touched countless patients, trainees, and colleagues and left a lasting impact. He managed to inspire everyone around him through his integrity, humility, altruism, soft-spoken wit, creativity, and energy. And through it all, he remained true to his deep-rooted Irish values and persona.

Sean Mullan was born in Dungiven, County Derry, Northern Ireland, in 1925 and graduated from St. Columb's College, Derry, in 1942 and Queen's University of Belfast School of Medicine in 1947 where he was Londonderry University Scholar. After an internship in Belfast and housestaff training in neurology and surgery in Belfast and London, he joined Wilder Penfield in 1953–1955 for a neurosurgical residency at the Montreal Neurological Institute. While at Montreal, he observed researchers in various disciplines applying modern scientific tools and technical ingenuity to solve neurological problems. He would embrace this paradigm with fantastic contributions in the next half-century.

In 1955 Mullan came to the University of Chicago as an assistant professor of neurological surgery. He had envisaged a short stint helping Section Chief Joseph Evans. In this soil, he would lay deep roots, finding happiness and fulfillment, and would never leave Chicago. He was rapidly promoted to associate professor in 1959, professor in 1963, and section chief of neurosurgery from 1967 to 1992. For 2 years, 1970–1972, he served as acting chairman of the Department of Surgery. During his career, he published more than 180 scholarly papers—primarily focused on cerebrovascular disease, pain-relief procedures,

and the clinical use of isotopes—as well as more than 30 book chapters and a book, published in 1961, on *Essentials of Neurosurgery for Students and Practitioners*.

In 1959 he married Vivian Dunn of Cincinnati, Ohio, who was a neurosurgical nurse and would remain his life-long confidante and best friend. They had 3 children—Joan, an internal medicine specialist at Northwestern University; John, a Minneapolis-based neurosurgeon; and Brian, a clinical professor of radiology at University of Iowa Health Care—all graduates of the University of Chicago's Pritzker School of Medicine.

Mullan's contributions were widely celebrated, including the Olivecrona, Jamieson, and Penfield Medals for his research and the McClintock award for best teacher from the University of Chicago. He was a visiting professor at universities in Sweden, Australia, New Zealand, South Africa, and Lebanon. He was named the John Harper Seeley Professor at Chicago in 1970, a chair he would hold until achieving emeritus status in 1992. He received an honorary doctorate at the summer convocation at Queen's University of Belfast School of Medicine in 1976. In 1985 he was elected president of the Society of Neurological Surgeons, America's oldest neurosurgical organization. He served as assistant secretary (1981–1989), secretary (1989–1993), and honorary president of the World Federation of Neurosurgical Societies. He cherished editorial responsibilities, serving for many years (1975–1985) on the editorial board of the *Journal of Neurosurgery*, including as chairman from 1983 to 1984.

Mullan was an engaged faculty citizen at the University of Chicago. In the 1960s he helped mobilize philanthropic assets for the university's Brain Research Institute, and he served as the institute's first director from 1964 to 1984. He helped to conceive the Surgery-Brain Pavilion, housing the Brain Research Institute laboratories in proximity to faculty offices and clinic, inpatient beds, and an opera-

tive suite. Sean Mullan's oil portrait graces the Mullan Conference Room in the Surgery-Brain Pavilion, which still houses academic offices and laboratories of the Section of Neurosurgery (Fig. 1).

In retirement, Mullan enjoyed spending time at his walnut tree farm in Michigan, which he had designed and built singlehandedly over many years, including the house, the pool, and the plantings. He regularly visited his family's ancestral land in Ireland, and he frequently attended neurosurgery symposia at the university, where his presence and wit were celebrated until very recently before his death.

Relentless Innovations and Impact

Mullan's first 5 publications in 1957–1959 previewed the range and depth of his eventual contributions. His first paper, “Neoplastic diseases of the spinal extradural space,” which was coauthored with Joseph Evans, his new section chief, appeared in the *Archives of Surgery* in 1957.¹² It reflected the collaboration and thoughtful analysis of clinical results that would become a common style of Mullan manuscripts. He soon followed with a paper, boldly authored alone at such an early stage in his career, on essential “don'ts” in craniocerebral trauma, dispensing gems gleaned from a novel analysis of the published literature and his own careful observations.⁸ His third paper, a review of intractable pain, appeared in a nursing journal, and its topic would fascinate and challenge him for many decades.⁷ His fourth paper, featuring the rigor of his newly launched laboratory work,¹⁸ described a novel model of experimental subarachnoid hemorrhage in dogs and analyzed the effect of hypothermia, a subject he would study for many years. And his fifth paper, written over several years with his mentor Wilder Penfield, tackled “illusions of comparative interpretation and emotion.”¹⁶ Not a bad early contribution by a young, shy, soft-spoken assistant professor with an Irish accent.

Mullan's body of scholarship during the subsequent 4 decades focused on laboratory studies of trauma and subarachnoid hemorrhage, including the role of hypothermia and rheological therapies. A chance observation of a spontaneously thrombosed cerebral aneurysm sparked a fascination with, and a lifelong interest in, intraaneurysmal thrombosis. Starting in the 1960s, he pursued various metals and electrical currents as means of enhancing intravascular thrombosis, and he developed aneurysm models in the dog femoral artery to test his concepts.^{10,17} He first tested the technique in open exposed aneurysms during craniotomy, with successful obliteration, and later with stereotactically placed needles, all guided by intraoperative angiography. In 1974 he published results accumulated over a decade in 16 patients, and he candidly recommended abandoning the rudimentary endovascular approach for aneurysms in favor of clipping.⁹ His pioneering work was more than 20 years ahead of the technology that would later allow safe and effective endovascular treatment of aneurysms. He was proud to have widely used intraoperative angiography and to have developed the first biplane neuroradiological localizing system.⁵ He never ceased urging young neurosurgeons to embrace and help advance neuroendovascular techniques.

FIG. 1. Oil painting on canvas by Robert D. Bentley. Commissioned by the University of Chicago in 1993. Reproduced with permission.

He applied the same pioneering approaches to the treatment of cerebral arteriovenous malformations and fistulas, devising clever strategies to occlude the venous side of these anomalies, resulting in curative occlusion.^{9,20} To this date, we encounter many patients in Chicago who return for unrelated problems and who had undergone staged procedures with amazing cures of complex cerebrovascular anomalies decades earlier. Mullan proved that there was no limit to the combination of astute clinical observations, ingenious concepts, experimental testing, and the courage to apply them in situations in which there was no other proven solution.

His work on endovascular thrombosis led to the study of antifibrinolytic therapy and its eventual application to prevent rebleeding after aneurysmal subarachnoid hemorrhage. He developed the concept in dogs and later applied it to patients. In 1968 he reported the results of a rigorous clinical trial confirming that ϵ -aminocaproic acid effectively reduced the rate of aneurysmal rebleeding.¹¹ In the 1970s he translated the results of many years of experimental work on cerebral ischemia to advocate hypertensive and rheological therapy for cerebral vasospasm after aneurysmal subarachnoid hemorrhage,¹ a concept widely adopted to this day. And he examined mechanisms and possible applications of other rheological and neuroprotective therapies for craniospinal trauma and stroke.^{3,4,6}

In parallel work with colleagues at the University of Chicago's federally funded Argonne Cancer Research

Hospital, he devised and tested a series of surgical approaches to treat cancers of the head, neck, and spine by inserting radioactive coils, wires, or needles directly into or around a tumor, a technique he later applied to create precise lesions in spinal tracts for pain management.¹³ He was also a leader in developing and popularizing the transoral approach for surgical problems located at the base of the skull,¹⁵ and he reported results of thalamic lesioning as a treatment for epilepsy in humans.¹⁹ He used statistical tools to predict outcome after craniocerebral injuries,² an approach ushering in widely used grading and risk stratification in neurosurgery. Later in his career, he applied his knowledge of neuroanatomy and his “love of tinkering” to invent a new operation, percutaneous balloon compression, to relieve the severe pain of trigeminal neuralgia.¹⁴ The Mullan percutaneous trigeminal ganglion microcompression set, produced by Indiana-based Cook Vascular Inc., is still in use.

The “Mullan Charm” and a Tender Family Life

Mullan’s first love was family, then neurosurgery. He is said to have kept his neurosurgical life separate from his family life for the most part. His neurosurgeon son, John, recalls that he did not get a real glimpse of his father’s neurosurgical career until his senior-year elective at medical school. Never did Mullan’s family hear him complain about getting called in at night. He never discussed patients at home, not even with his wife, who was a nurse. There were times when friends and acquaintances would come up to members of his family and express gratitude for some favorable outcome, which would baffle his wife because she knew nothing about it.

His family often heard Mullan say, “there’s always room at the top.” He believed it, and that’s where he aimed—and he encouraged his children to do the same. They recall his advice that “if a task is worthwhile, the amount of work required to complete it is not important.” They remember other favored quotes: “Experience is cheap at any price” and “Any complication has already been made; there is no need to repeat it.”

His children, all physicians, uniformly attest that he taught them how to treat people well, which came naturally for him, and they saw the results. He treated animals well too. Some of the operating room nurses referred to the “Mullan charm.” He was polite and knew how to make people feel at ease. He loved to talk but was aware of his accent and tried to speak slowly. He taught his residents to do so as well.

He was a tinkerer, designer, and builder. He took his son’s Erector set to the laboratory to build a device to coat copper wire to make it more thrombogenic. He later designed a farm house and built a swimming pool. He was extremely self-confident. He was very sure of his opinions—to him they were facts. Family and colleagues recall his endless energy. He reviewed papers and grants in the evenings at home. He was always up early. On the weekends, he worked outdoors on the tree farm. About trimming trees, he said he could do it with less care because “they didn’t ask questions and they usually recovered.”

Mullan was naturalized as a United States citizen in

1962, and he was as proud of his new home as of his Irish roots. His family recalls that he bought American cars because his “patients were Americans”; he felt strongly that he needed to return their support. He and Section Chief Joseph Evans had a policy in the 1950s of limiting surgical fees to a certain percentage of a patient’s salary.

A Teacher and Role Model

One of the authors (J.H.) reflects on 30 years of cooperation, collaboration, and friendship, remarking that Dr. Mullan’s accomplishments were not achieved through hard work alone; he had conviction, dedication, and courage. He had a purpose in life: to diminish pain and suffering among fellow humans. Some of the accolades and titles mentioned above would surprise many close to him, for he never showed off and he seldom talked about himself. Above all, he was an outstanding technical surgeon; he operated for hours without signs of fatigue, and he always sought ways to reduce mortality and morbidity. The residents saw him not just as a teacher, but also as a role model, one with whom to identify. All throughout his professional life, his patients loved him, his residents respected him, and his colleagues admired him.

Mullan’s wife recalls that he worried about the lives and successes of his residents while they were working with him, and he continued written contact with many of them until he became ill. He looked forward to their replies and Christmas notes. He often entertained trainees in his home. When one of the authors (I.A.A.) was recruited to the University of Chicago as the new director of neurovascular surgery, Dr. Mullan reached out from his retirement with welcoming notes and followed up on many occasions with encouragement and advice. At the age of 88 years, Mullan reflected thoughtfully on academic continuity and legacy at the investiture of the John Harper Seeley professorship, which he had long held.

Neurosurgery’s Modern Statesman

Dr. Mullan’s 25-year term as section chief of neurosurgery at the University of Chicago was by far the longest among a group of illustrious neurosurgical leaders who had held that position before him. Though largely a testament to his physical vigor and innate energy, Mullan’s lengthy tenure also reflected his love of mentoring trainees as well as his attitude toward neurosurgery as a family of colleagues working together to better the lives of patients. At the University, Mullan was an impeccable representative of neurosurgical caregivers and a tireless advocate for collaboration within the hospital as a means of improving patient care. In contrast to an ever-changing neurosurgery landscape in the city and its often flamboyant voices at other Chicago institutions, his voice was calm, steady, yet powerful, advocating for cooperation on local neurosurgical issues. Mullan’s leadership years within the Society of Neurological Surgeons nationally and the World Federation of Neurosurgical Societies internationally were rife with further opportunities to expand connectivity among neurosurgeons and enhance neurosurgical training. While Mullan’s shoes are very hard to fill, those following in his footsteps have benefited from a well-trod path advanc-

ing the discipline through collaboration, mentoring, and family-based values.

Sean Mullan was an innovator who saw ahead of his contemporaries and an authentic scientist who dared to dream of novel solutions to neurosurgery's most vexing problems. He reflected the idea of modernity, thinking anew and changing prevailing concepts. Throughout his life, he also embodied statesmanship as defined by Otto Von Bismarck: listening carefully to the footsteps of God through history and walking with Him a few steps of the way.

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Disclosures

The authors report no conflict of interest.