Raymond Madiford Peardon Donaghy

Raymond M. P. Donaghy was one of the true pioneers of modern neurosurgery. His restless dedication, innovation, and desire to humbly disseminate his knowledge facilitated the advancement of the field of microneurosurgery.

Donaghy was born in East Mann, Quebec, Canada, on August 8, 1910. In 1922 he moved from Quebec to Plain eld, Vermont. He academically distinguished himself in high school by finishing first in his class. During this period in his life, he aspired to study medicine and entered the University of Vermont in 1929 in the midst of the depression. While a medical student, he shadowed Dr. Leon Sample of St. Albans, Vermont. While rotating with Dr. Sample, he encountered a woman with a complicated neurological disorder. Intrigued, he extensively prepared the case for presentation to a visiting Montreal neurologist, Dr. McKye. Impressed with Donaghy's keen mind, Dr. McKye invited him to study neurology as an intern in Montreal. Donaghy accepted the offer and soon found himself lling a dual role while in Montreal, as an intern and as a resident in neurology (due to the illness of the current resident). Nevertheless, he was able to nd time to observe the revolutionary work of Dr. Wilder Pen eld, who became a mentor and inspiration. Following his first year in Montreal, Donaghy served as a surgical resident at the Children's Hospital of Montreal for 1 year, subsequently moving to the Montreal Neurological Institute to work with Dr. Arthur Elvidge After his experience with Drs. Pen eld and Elvidge, Donaghy decided on a career in neurosurgery. Initially, he desired a position at Queens Square in London. However, Pen eld, realizing that US involvement in WWII was inevitable, advised him to push forward with his neurosurgical training in the event he was called to duty. Heeding Penfield's advice, Donaghy traveled to Boston to continue his training, first at the Lahey Clinic, then as resident under John Mixter at the Massachusetts General Hospital. He also studied psychiatry and neuropathology as a Dalton Scholar, examining brain abscesses with Dr. Kubic. Donaghy's astute deductive reasoning skills were appreciated during this time: one attending was known to surrender his re ex hammer to Donaghy, saying sincerely, "you can obviously make better use of this than I" (L Wallman, personal communication).

When the US entered the war in 1941, following the strike on Pearl Harbor, Donaghy was ready for military neurosurgery. He was assigned to military training at Fort Sam Houston. It was there that he met Dr. Lester Wallman and where one of the rst neurosurgical units was established, Neurosurgical Team Number 4, 1st Auxiliary Surgical Group. Donaghy applied himself to military custom in Europe in WWII, receiving 5 battle stars as a leader of a mobile neurosurgical unit. He and Wallman became known for their sel ess contributions in treating both the American and German troops wounded in many integral battles. Their team would perform 269 operations between 1943 and Victory in Europe Day. He left the service as a captain in 1946. Wallman remained a close friend and would become a dedicated colleague of Dinghy's.

Following the war, Donaghy sought an academic neurosurgery position. He returned to his alma mater, the University of Vermont, at the invitation of Dean Wil- liam Brown, a military specialist in public health. Don- aghy refused the chairmanship of a new Department of the Nervous System, realizing that his neurosurgical in- terests might negatively affect the growth of the depart- ment's other disciplines of neurology and psychiatry. He did, however, accept the position of division chair, later in uencing Dr. George Schumacher to chair the Division of Neurology. By 1948, Donaghy believed it was impor- tant to establish surgical training and a research program in the newly formed Division of Neurosurgery. Unfor- tunately, the dean reported that there were no funds to support this endeavor. Nonetheless, Donaghy was able to procure laboratory space. Aware of the value of research in a nascent academic department, he invested his own earnings to supplement the rst years' humble budget of $25. He would eventually turn down an appointment as dean of the

University of Vermont because he believed that “it would be utterly impossible for me to carry on the duties of the deanship while performing the duties of pro- fessor in an expanding division” (R. Donaghy, personal communication).

Over the ensuing decade, Donaghy’s interests fo- cused both clinically and academically to diseases of the cerebrovascular system. This interest was spurred by a patient with an MCA occlusion. Donaghy was intrigued with the idea of treating cortical strokes by opening a small thrombosed artery, removing the clot, and closing the artery. Dr. Julius Jacobson, a vascular surgeon well versed in surgical microscopy, suggested to Donaghy that the microscope might be of some use to him in his at- tempts to operate on small cerebral vessels. Donaghy ad- mitted he never thought of using microscopes in surgery but appreciated the value of magni cation as he often used droplets of water for magni cation during aneurys- mal surgery:

With Jacobson’s assistance, Donaghy established the world’s rst microsurgery research and training labora- tory in 1958.10,13 After laboriously practicing microvas- cular techniques using jeweler forceps and other instru- ments adapted to microscopic use, Donaghy was ready to try them in a patient. His rst resident, Martin Flanagan, recalls the opportunity. Flanagan was administering oral examinations when he received Donaghy’s call, “We’re going tonight.”13 That evening in 1960, he and Jacobson used the microscope to perform an MCA embolectomy, the rst documented case of human microneurovascular surgery.1 Unfortunately, the involved vessel did not re- main patent. Work in the lab was continued to re ne the techniques. Jacobson and Donaghy reported their experi- ence with microscopy and MCA embolectomy in 1962. In their case series, 2 of 9 MCAs remained patent according to postoperative angiography.12 By 1966, a patency rate of 58% was achieved in small arteries in an experimental rabbit model by Donaghy and his colleagues. Later, Pool, Rand, and Janetta also described the use of neurosurgi- cal microtechniques applied in intracranial aneurysm surgery.18 (single-head stereomicroscope) that was borrowed from the otolaryngology department (Fig. 3). It became quickly apparent that many changes in the microscope were re- quired to make it useful in neurosurgery. Such changes included the need for binocular vision, for documentation with still pictures and movies, for an automatic focusing device, and for maneuverability to adapt the microscope for use with deep as well as shallow structures and in varied surgical approaches. Several American optical companies were approached to help optimize the operat- ing microscope. Seeing no immediate market, these com- panies were unwilling to invest the money Jacobson and Donaghy believed was required. Fortunately, the Carl Zeiss Company saw value in their theories and sent Hans Littman, the engineer who developed the original single- head binocular operating microscope. Littman listened to their ideas and observed what they were able to do. He adapted beam-splitting technology developed in Ger- many during WWII to an OPMI series microscope, al- lowing the attachment of 2 accessories including a 35- mm camera, a television camera, a monocular observer tube, or a stereoscopic co-observer tube. The stereoscopic tube would give an assistant a 3D view, albeit with shal- lower depth perception due to the nuances of beam split- ting.8 Prior to Jacobson’s departure from Burlington, the diploscope they desired would be delivered.11 This oper- ating microscope is now in the Smithsonian’s Museum of American History in Washington, DC. The rst true double binocular microscope, utilizing 2 binocular optic systems rather than beam-splitting technology, would not be developed until after Donaghy retired. Jacobson and Donaghy rst performed microsurgery in their laboratories using a Zeiss OPMI-1 microscope Many of today’s most gifted neurosurgeons learned the art of microneurosurgery in Dr. Donaghy’s labora- tory. From 1965 to the mid-1980s, more than 500 physi- cians studied in the lab, and more than 200 practicing neurosurgeons completed his 2-week course (Fig. 4). One of the most notable young neurosurgeons to study in Dr. Donaghy’s lab was Dr. Gazi Yaşargil (Fig. 5), who was no stranger to the operating microscope:

Yaşargil was soon called on to emergently perform an embolectomy after he had diagnosed an occluded left-sided sulcus artery with carotid artery angiography. Yaşargil declined and apologized for his “incapacity in microvascular surgery.” He recognized the need to devel- op the microvascular technique and a reproducible ani- mal practice model.20 Searching for further training, he happened upon Professors T. Rasmussen, W. Feindel, and W. Sweet meeting among themselves at the VIII Sym-

[1].

The Extra intracranial bypass surgery (EIBS) has been proposed by Gazi Yasargil and Raymond Madiford Peardon Donaghy in 1967 to bypass an occlusive process in the arteries supplying the brain that is not accessible surgically in another way.

Many of his trainees–most notably Gazi Yasargil–continued to advance the field, developing innovative microsurgical instruments and techniques. The history of microneurosurgery is incomplete without a glimpse at the life of this remarkable man [2].

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http://thejns.org/doi/pdf/10.3171/2009.6.JNS09539
2)
Link TE, Bisson E, Horgan MA, Tranmer BI. Raymond M. P. Donaghy: a pioneer in microneurosurgery. J Neurosurg. 2010 Jun;112(6):1176-81. doi: 10.3171/2009.6.JNS09539. PubMed PMID: 19747045.