Burr Holes & Bone Flaps on the West Coast

Lessons from Dr. Frank Turnbull, Pioneer Neurosurgeon

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Introduction

The word 'neurosurgery' can evoke a myriad of definitions and meanings. For patients, it can a daunting decision that can drastically alter the course of one's life. For others, it can be the punch of line of a joke or rhetoric ("it's not *brain surgery!*"). For prospective neurosurgeons, peeling back the onion to understand the different layers of meaning and how they've changed through the course of history can be an important exercise for elucidating the responsibilities and privileges inherent within the profession.

The specialty of neurosurgery originated early in the 20th century (1), and has progressed and evolved alongside a global landscape that encompassed two World Wars, and national health reforms in Canada. When recounting the origins of neurosurgery, names of the "founding fathers," such as Harvey Cushing, Wilder Penfield, Charles Drake, Walter Dandy, among others, come to mind. While the contributions to both medicine in general, and to the specialty of neurological surgery, of these exceptional men are undeniable, the tales of lesser known surgeons who played an integral role in the advancement of their specialty are not as often recalled. This paper explores the life and achievements – both inside and outside the operating room – of Dr. Frank Turnbull, a pioneer Canadian neurosurgeon. His life and career are well documented in an autobiography (2), and here I will amalgamate circumstances inside and outside his life, and attempt to paint the legacy that he left in order to answer my personal question of what neurosurgery can mean.

Early Life and Medical Training

Frank Alexander Turnbull was born on April 17, 1904, in Goderich, Ontario. He was the son of a well-respected local general practitioner and surgeon, and was named after his late

uncle, a physician as well, who had passed away tragically the year prior to Frank's birth. In 1907, the Turnbull's family decided to uproot and move west, eventually relocating to Vancouver, British Columbia. Ideas of a career in medicine slowly crystallized for Frank throughout his childhood and adolescence, with influences from his father playing a large role. One particular episode occurred in 1919 when he acted as his father's chauffeur, as the doctor treated the Spanish Influenza outbreak in the city. It was also from his father that he inherited an interest in neurology, and became convinced this would be the specialty he would pursue.

Frank Turnbull graduated with a degree in Arts from the University of British Columbia in 1923. Since there was no medical school in Vancouver at that time, he would follow in his father's footsteps and enroll at the University of Toronto Medical School – graduating in 1928. After obtaining his medical degree, Turnbull completed a junior internship, and then a senior year in medicine at Toronto General Hospital. The interest in the nervous system he had fostered since childhood persisted through medical school, and Turnbull had a firm idea that neurology was the specialty he was going to pursue. His senior year in medicine included four months on the neurology service; however, despite "keen anticipation,"[2] he was ultimately left disappointed with the experience. Turnbull remarked that "the only patients on the neurology ward who had much hope of recovery were those who were transferred to neurosurgery."[2] While at Toronto General Hospital, Turnbull had come to know Ken McKenzie, Canada's first neurosurgeon [1,3,4], and whom Turnbull approached about a training program in neurosurgery. At that time, McKenzie had never had a resident, and together with Ed Gallie, a senior surgeon at the Hospital for Sick Children who had theorized about what the training program for a surgical specialist should entail, McKenzie and Turnbull devised a plan for Turnbull's neurosurgical residency. [2] They agreed that Turnbull would spend three months in neuropathology, then one

year as a junior surgical intern at the Hospital for Sick Children, then one with Dr. McKenzie in neurosurgery, all to be culminated with one year of study abroad. His year abroad would be primarily divided into two rotations: firstly, at the National Hospital at Queen's Square, he worked as a clerk with expert neurologists Gordon Holmes, Donald Riddoch, and Charles Symonds; secondly, he spent time as an assistant to the German neurosurgeon Otfrid Foerster in Breslau. (4) It was here in Breslau that Turnbull developed an interest in the sensory system, and in particular, the treatment and surgical modulation of pain. This would later become his main focus as a neurosurgeon. (2,4) Following his year abroad, Turnbull returned home to Vancouver in 1933 and established a neurosurgical unit at Vancouver General Hospital. (1,2)

As It Was In The Beginning(5) – Turnbull and the Origins of Neurosurgery

At the time Frank Turnbull started his practice, neurosurgery was still a nascent specialty, and Turnbull had several intimate ties to its genesis. The origins of neurosurgery as a medical specialty were inauspicious and precarious. In 1879, William Macewen removed a meningioma, and this was the first documented case of a neurosurgical operation (1). While further developments in neurosurgery would occur in the two decades to follow, it was not until the early twentieth century and the time of Harvey Cushing that the specialty began to consolidate (6). Cushing's intellectual passion and technical proficiency not only allowed the scientific advancement of the field, but would have far reaching influences to help neurosurgery reach previously untouched parts of the globe. One particular case of this influence occurred in 1922, when the University of Toronto awarded the Charles Mickle Fellowship to Harvey Cushing. In return, Cushing decided to assign the $1000 honorarium from the fellowship to support a neurosurgical fellowship at Harvard Medical School for a Canadian physician (6-7). This paved the path for Kenneth G. McKenzie to enter into the specialty by spending one year under the

tutelage of Cushing in Boston. When McKenzie returned to Toronto in 1923, he became

Canada's first neurosurgeon, and under McKenzie, Toronto formed the first neurosurgical

program in the country (7). This was a prelude to neurosurgical residency training, which would

being in 1930. McKenzie's second resident, (1) in 1931, was a young man from Vancouver –

Frank Turnbull. When Turnbull completed his training and established a neurosurgical unit in

Vancouver in 1933, he became the first neurosurgeon to practice in Western Canada (8), and one

of the first neurosurgeons in the Pacific Northwest, and would contribute to the growth of the

specialty, both technically, and geographically.

The intimate connection Frank Turnbull had with the founding of neurosurgery was well

portrayed in a manuscript he wrote to commemorate the 50th anniversary of the Society of

Neurological Surgeons. (4,5) Despite the efforts and advances made by Cushing and his

colleagues, the specialty still occupied a unstable position within medicine in the 1930's.

Turnbull recounts that at the time, "every doctor in America knew that on rare occasions a daring

and skillful surgeon could remove a brain tumour or evacuate a brain hemorrhage, but the

available evidence did not suggest that surgery of the nervous system was approaching an era of

expansion. Most of the medical prophets suspected that neurosurgery was a hopeless endeavour."

(5) This perception of the role of neurosurgery was acknowledged by Cushing as a problem,

when in 1905, he declared that substantial progress in the field would never be achieved until

surgeons restricted their work to the nervous system alone (5). General surgeons who were

operating on the brain at infrequent intervals, did not have the knowledge or experience for

handling brain tissue. In the eyes of neurosurgeons, patients were not receiving the proper

treatment or care because the general medical perception was that there was no adequate cure for

neurosurgical cases, and it was for this reason that Cushing and 10 of his colleagues founded the

Society of Neurological Surgeons – the oldest neurosurgical society in the world – so that neurosurgeons could meet and discuss their shared problems (5). The initial group of members was highly selective, but because he had come to personally know each of the founding members of Society, in his address commemorating the Society's 50th anniversary Turnbull painted a picture of the intricacies and personalities which played such an integral role in the consolidation of neurosurgery.

Operating on the frontier(2)

When Frank Turnbull began his practice in Vancouver, most doctors in the city "took a gloomy view of neurosurgery," (2) and did not see its necessity. At the time, neurosurgery was stereotyped to be equated with brain tumours, and the perception of brain tumours was an incurable terminal illness. An extreme example of this came from one of Turnbull's colleagues – Arthur McLean. McLean was a neurosurgeon in Portland, Oregon who had been a student of Harvey Cushing, and had started his practice a few years before Turnbull's return to Vancouver. In 1936, McLean delivered an address, and later had it privately published, entitled "Brain Tumours Always Die." In the article, McLean lamented both the lack of neurological knowledge in Portland and the "ineptitude of certain senior surgeons who undertook operations on brain tumours." (2)

The negative perception of neurosurgery by the rest of the medical community hindered the adequate devotion of resources to the field. For example, McKenzie often had to perform general surgical cases until he received a full neurosurgical operating room in 1929.(1) Turnbull was faced with a similar lack of resources. Much of Dr. Turnbull's early work in Vancouver was that of Neurology(4) and operating time came by way of the ENT clinic. (2) At this time, even general anesthesia was not suited for neurosurgery because of a tendency to induce brain

swelling, and Turnbull recounts that the disconnect from the rest of the medical community made his operations feel "isolated and vulnerable." (2) There was no one to consult with about when and how to operate, and what would be best for patient care.

Despite the growing presence of neurosurgery in North America at that time, many of these landmarks were happening on the East Coast. In addition to the centre in Toronto, a new neurological institute was initiated in 1934 in Montreal under the guidance of Wilder Penfield. The fact that Vancouver still lacked a medical school compounded the lack of support for Turnbull. Many of his neurosurgical colleagues in the East were associated with a university medical school, and this allowed for continued involvement in teaching and research. Moreover, Turnbull was further confronted by external hindrances in the early stages of his career. Firstly, he had contracted tuberculosis as a child, and when it reoccurred in 1936, he was forced to take an entire year's leave. Furthermore, Turnbull's practice was affected by the Great Depression for a number of years. In addition to the paucity of patients who were being referred to his service in the first place, many of his patients were unable to pay their bill, either partially or in full. Turnbull recounts that he was not able to pay income tax until 1938 (2) – five years after having started his medical practice!

Despite these setbacks, Turnbull continued with his practice and played a large part in changing the perception of neurosurgery in Vancouver. This started with his first operation in 1933, within two weeks of his arrival. A patient presented with the singular complaint of headache, and Turnbull localized a possible lesion to the right frontal lobe. There were no methods of imaging available to confirm his suspicions, so Turnbull decide to perform a right fronto-temporal bone-flap and explore. The operating room had a large galley for visitors, and on this occasion it became packed with nurses and medical staff from Vancouver General Hospital.

Perhaps none of them had ever seen a cranial operation, much less a neurosurgeon in action, and had decided to see what the fuss was all about. Despite exploration, Turnbull was unable to find the tumour. This did not seem to deter the audience, who left having been favourably impressed – the removal of the tumour for them would have been a "miraculous bonus." (2)

By 1940, Turnbull shifted his work from the ENT operating room to the main OR. His academic isolation was alleviated in 1936, when he was admitted to the Harvey Cushing Society – a new neurosurgical society born in 1931 by the newer generation of neurosurgeons who were excluded from the limited membership of the Society of Neurological Surgeons (9) - on the sponsorship of his friend and mentor Ken McKenzie. (2,4) The Harvey Cushing Society would later become the American Association of Neurological Surgeons, and Turnbull described it as "the most stimulating focus of [his] professional career." (2) Because many of his academic encounters occurred at societal gatherings, Turnbull would come to relish such opportunities throughout his career. He commented that much of what he learned about his craft at these meetings would come after the programs had ended, during the conversations he would have with his colleagues late into the night. His interest in organizational proceedings would result in multi-organizational memberships throughout his career, and would eventually extend to involvement with medical politics.

A Time For War(2)

War had a curious relationship with neurosurgery, and many of the early neurosurgeons played some role in one or both of the World Wars. (1,2,5) It was after World War I that neurosurgery became a specialty – largely due to the technologic advances in surgery achieved during the war. Between the end of the First World War and the start of the Second, neurosurgery toiled as an "exotic and frustrating endeavour."(2) However, it was the progress

made during World War II in the ancillary techniques of surgery, such as anesthesia, blood transfusions, and antibiotics, that had a profound and beneficial impact on neurosurgery.

For Frank Turnbull, the Wars had a much more personal effect, as he experienced both World Wars in completely separate stages of his life. During World War I, Frank was an adolescent, and the realities of war dawned on him insidiously, first, through the long casualty lists that would appear in the daily newspaper, and second, through his classmates at UBC, most of whom were returned soldiers. During his year abroad as part of his neurosurgical training, Frank experienced the beginnings of the Nazi reign in Germany. As the tensions heightened before the start of the Second World War, memories of "their arrogance, efficiency, and brutality" (2) were still vivid, and Turnbull enlisted with the Non-Permanent Active Militia. In 1938, he joined the 12th Field Ambulance Medical RCAMC with the rank of lieutenant. After the start of the war, Turnbull was allowed to continue to perform his civilian services, as well as becoming a consultant at an official military hospital. Later, he became Acting Lieutenant Colonel in charge of neurology and neurosurgery for the Western Command. In 1943, Turnbull became a member of the Section of Traumatic Injuries of the Nervous System, and began attending meetings at the National Research Council in Ottawa. His new duties included surveying recent literature on the treatment of peripheral nerve injuries – including translations of Russian and German reports. Afterwards, Turnbull was sent overseas to Europe to tour Canadian medical establishments as well as attend a conference in Pairs with American neurosurgeons regarding differences in the management of spinal injuries. In his autobiography, Turnbull confessed that there never appeared to be any certainty as to what his mission overseas was. He was able to help settle the discrepancy between Canadian and American policy on the

management of acute spinal cord injuries, and felt that his greatest contribution thereabouts was in boosting the morale of doctors he encountered in Canadian hospitals on the Continent.

On Being Accountable(2)

Once the war was finished, Turnbull returned to Vancouver. The neurosurgical unit had grown with the addition of Peter Lehman to the staff in 1944 (1-2), who took over hospital duties while Turnbull was overseas. In the years following the Second World War, Turnbull's involvement with medical organizations expanded. In addition to his surgical acumen, he displayed exceptional organizational thinking, a sense of social duty, and political volition. Stirred by his personal experiences with medical economics early in his career, he came to understand that the methods of delivering and paying for medical services in his time needed revision. (2) He would go on to assume leadership roles in multiple organizations. He first became the president of the Vancouver Medical Association in 1945 – a role which Turnbull described as requiring "little political activity," (2) but which served to introduce him to the world of medical politics. Subsequently, Turnbull became president of the British Columbia Medical Association in 1954, and was nominated President-Elect of the Canadian Medical Association in 1963, assuming the role of president of the national body of physicians in 1964. He was the first – and to date, only – neurosurgeon to have served in this role (8).

His term as President presided over a tumultuous time in Canadian medical economics (8). The Royal Commission on Health Services had been established in 1961, with the expressed goal to:

"... inquire into and report upon the existing facilities and the future need for health services for the people of Canada and the resources to provide such services, and to recommend

such measures, consistent with the constitutional division of legislative powers in Canada, as the Commissioners believe will ensure that the best possible health care is available to all Canadians ..."(10)

Volume I of the Report of the Royal Commission became available just before the Canadian Medical Association's 97th Annual General Meeting in June 1964, where Turnbull would be installed as President. The Report "envisaged far-ranging changes in Canadian health services," (2) and resulted in active discussions at the meeting. Universal prepaid health care in all provinces was ultimately established by federal decree in 1968 (2). Undoubtedly, Frank Turnbull's vision and dedication played an important role in the transition into the health care system that Canadian's still use today.

In addition, Frank Turnbull would go on to become President of the Harvey Cushing Society in 1949, and was also President and founding member of the North Pacific Society of Neurology and Psychiatry, the Canadian Neurological Society, and the Western Neurological Society (4). In 1946, Turnbull was also elected to the UBC Senate, and served two consecutive three-year terms which coincided with the eventual founding of the UBC Medical School in 1950. Turnbull served on multiple committees dealing with matters related to the proposed medical school at UBC, either representing medical organization or the Senate, and helped to navigate the political hurdles that had aborted a previous attempt at establishing a medical school in 1920. (2)

Neurosurgery Is What You Make It (2,11)

The life and experiences of Frank Turnbull offer many humbling experiences for a nascent medical professional such as myself. These lessons are profound because of the

foundations that are in place for myself as a medical student, as a result of the dedication and achievements of Dr. Turnbull. The title of this article, and many of the subheadings, are taken from titles of Turnbull articles, or from chapters of his autobiography, as an homage to his lasting legacy.

As outlined earlier, neurosurgery expanded slowly from a precarious and uncertain beginning into the established surgical specialty it is today. Although the career trajectory of early neurosurgeons was unstable, there was also the flexibility and the opportunity to mould the specialty. To accomplish good neurosurgery in the face of adversity and uncertainty, Turnbull remarked that it required a "certain tenacity of purpose." (11) Moreover, in the face of uncertainty, the fundamental principles must always be held in high regard. For a surgeon, these principles include aspects such as standards of skin preparation, draping, and wound closure. These two lessons are applicable to us all, in areas of medicine and in life, when we are invariably confronted with adversity and uncertainty.

Frank Turnbull believed that the neurosurgeon had a responsibility to the medical profession as a whole. This is not because training in neurosurgery endows "any special ability to lead medicine," (11) but rather that the neurosurgeon is a lone specialist who has made the acquaintances of many doctors, but is not often in competition: "the relative absence of competition and the special facilities for hospital work that are usually enjoyed by the neurosurgeon, are privileges to be repaid, if privilege is to remain." (11) He would recall how Sir William Osler once said that he was a friend to all in medicine, because he was in competition with none. Turnbull recognized that few physicians are formally trained to deal with issues of politics, ethics, and economics, but called on physicians from all branches of medicine to speak up and represent the profession as a whole, rather than vaguely hoping for good leadership.

Turnbull's actions within, and perceptions about medical politics stir one's thoughts about how to handle such changes in the future.

Neurosurgery in British Columbia has become what it is today because of Frank Turnbull's pioneer work. It has expanded from a singular individual into a province-wide network involving seven centres, and encompasses medical education at both the undergraduate and postgraduate level. Neurosurgical care has advanced significantly for patients, and many highly trained surgeons have practiced and continue to practice in what was once a very barren neurosurgical scene in the Pacific Northwest. Indeed, one of the neurosurgeons to have practiced in Vancouver was Ian Turnbull, Frank's son. When prospective neurosurgeons such as myself look towards the future and try to delineate what a career in neurosurgery might mean, the lessons from Frank Turnbull indicate that the best answer to this question may in fact lie in the motto of his alma mater, the University of British Columbia: *Tuum est* – it is up to you.

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