ABSTRACT

Introduction: Sir Hugh Cairns was an Austrian physician who contributed much to neurology and neurosurgical practices. He created the anti-impact helmet for motorcyclists, which led to a significant reduction in mortality due to head injury. Besides, he performed tests and antibiotic treatments on neurological infections. He has made many publications on neurosurgical techniques that are used to this day. Method: This article discusses his biography and its several discoveries and contribution to medicine and society. Conclusion: Hugh Cairns was the inventor of the anti-impact helmet responsible for reducing head injuries from motorcycle accidents. He was a founder of the neurosurgery specialty at Oxford University. His surgical techniques and studies are widely used in surgical and student practices nowadays.

Keywords: Hugh Cairns; Helmet; Biography; Neurosurgery; Historical review; British Neurosurgery

RESUMO


Palavras-chave: Hugh Cairns; Capacete; Biografia; Neurocirurgia; Revisão histórica; Neurocirurgião britânico

Acknowledgements

This article discusses his biography and its several discoveries and contribution to medicine and society.
Hugh William Bell Cairns (Figure 1) was born in South Australia on July 26, 1896, and died on July 18, 1952. He was the only son of a couple, an Australian mother and a Scottish father. At the University of Adelaide, he began his medical studies at the age of fifteen, which were discontinued one year before his graduation to join the Australian Army Medical Corps (AAMC) during World War I. In 1916, he returned to conclude his studies and received the South Australian Rhodes Scholarship to study medicine at the Oxford University. In 1917, he was declared captain of the AAMC and sent to the Middle East and France until the end of World War I. In 1919, he entered Balliol College, Oxford, where he studied physiology and was taught by Sir Charles Sherrington. Hugh Cairns conquered a position at the Radcliffe Infirmary, where he remained for one year, working as an anatomy demonstrator, and it was there that he met Sir William Osler (1849-1919). Osler introduced Cairns to the renowned American neurosurgeon Harvey Cushing in 1922.

In London, neurology professionals were interested in knowing and addressing Cushing’s principles on their patients, and Cairns already had a great deal of interest in neurology and was nominated by Lady Osler to Cushing on one of his visits to England. With that, Cairns won the Rockefeller Traveling Fellowship for a year as an assistant to Dr. Harvey Cushing at the Peter Bent Brigham Hospital, Boston, in 1926.

In 1927, Cairns returned to London as one of the city’s first neurosurgeons to master modern techniques. He learned how to examine the neurological system in detail, to evaluate visual fields, to interpret radiographs and ventriculograms of the skull, and to perform operations for intracranial tumors, as well as principles of Cushing’s surgical practice, which Cairns has adopted and has always used. In that same year, Cairns was recognized as associate member of the Society of British Neurological Surgeons.

In February 1928, he performed 15 operations on the brain and spinal cord, and only one-third of the patients died, this fact earned him financial support from the Rockefeller Foundation to invest in surgical equipment and to subsidize assistants and trainees in Neurosurgery.

At first, the ideas and techniques of Cairns were not accepted and adhered to by London professionals. It was only in 1933 that the London Medical Society became convinced of his principles, and he became the first full-time British neurosurgeon to be responsible for the Department of Neurosurgery at the London Hospital. This event marked the beginning of the specialty of neurosurgery in England. Later, in 1935, when the Rockefeller Foundation agreed to fund a new neurosurgery unit at Queen Square, Cairns was appointed to work at the two major neurological centers in London, as Honorary Neurological Surgeon at the Maida Vale Hospital (1931-1934) and the Queen Square National Hospital (1934-1937). Besides, in 1937, he became Professor of Surgery at Oxford, after Lord Nuffield, a philanthropist, financed Oxford’s Medical College to make it a research center, and also was the founder of the neurosurgical unit at the Radcliffe Ward, following the Cushing lines.
In 1938, Cairns was appointed advisor to the War Office for the treatment of skull wounds in the military population. Along with Sir Charles Symonds (consultant neurologist of the Royal Air Force – RAF), George Riddoch (Army neurologist who participated in World War I in the treatment of spinal and brain injuries) and Sir Farquhar Buzzard, who founded the Combined Services for the Head Injury Hospital, to attend the army and air forces at St Hugh’s College in Oxford. It was chosen because of its proximity to London and the Radcliffe ward. In this place were established several specialized units in the different medical areas, such as orthopedics, and treatment base for head trauma. The St Hugh’s Hospital was opened in 1940 with 50 beds and even housed 430 beds. The main objective was to take care of the military and reintegrate them into service. It was the first hospital to provide occupational therapy and rehabilitation to Red Cross recovery centers \(^2,^3,^5\).

Cairns initially persuaded the War Ministry to obtain all the surgical devices necessary for the use of the neurosurgeons of the army, because he feared that there would be a shortage of steel for the making of these instruments due to the war. St Hugh’s Hospital cared for approximately 13,000 patients with head injuries during World War II, and several neurosurgeons, neurologists, and specialist nurses took internships there \(^2,^5\).

The beginning of the war has caused a major increase in motorcycle crash rates in England. Cairns described that in the first 21 months of the war, the number of motorcyclists and passengers killed on roads was 2,279, 21% more than in the corresponding months in peacetime, an approximated value of three deaths per day, and most of the victims were members of the army. It was at this time, in November 1941, that Cairns introduced the mandatory use of helmets for all motorcyclists, as impact helmets were used only by racing motorcyclists, a measure that reduced the rate mortality by more than 50%. Thus, throughout England was introduced the use of impact helmets, which has spread by countries around the world \(^2,^3,^6-^8\).

The helmet was developed by Cairns and an Oxford physicist, the motorcycle enthusiast Holborn, after accidents studies and radiological and clinical findings in post-traumatic patients, many of whom had cranial lesions. Also, analysis of the pathophysiology, mechanisms involved in the injuries and investigations of the designs and models of materials used in the manufacture of helmets were performed\(^1,^2,^5\). The helmet consisted of a durable shell, an inner band and a hat band, a component that acted as the shock absorber\(^7\). The outer part of the helmet was smooth and had internal alloys and was capable of changing the local and general effects of head trauma, preventing the fracture of the skull and its complications. In 1940, the army already had some helmets, which were replaced by only a few motorcyclists. There were canvas helmets and another model that was used in armored vehicles. The largest decline in mortality occurred after November 1941, when emergency helmets became mandatory for the entire army of on-duty motorcyclists \(^3,^4,^9\).

Cairns, before experiencing the occurrence of several deaths of motorcycle patients who did not wear helmets, had already witnessed the care of an illustrious man who was a soldier of World War I, Colonel Thomas Edward Lawrence. In 1935, Laurence was injured in the countryside after a motorcycle crash and had a skull fracture and was taken, in a coma, to the Bovington Camp Military Hospital where the neurosurgeon Cairns was. Lawrence died five days later. This accident was added to Cairns’ experiences in the war, which were decisive in the creation of motorcycle helmets for the prevention of head trauma \(^4\).

Also during World War II, Cairns created mobile neurosurgery units (MNSU) where he worked as a neurosurgical advisor\(^1,^5\). These units allowed neurosurgeries to be performed within 24 hours of the injury, and his team consisted of a neurosurgeon, a chief assistant, two local surgeons, an anesthesiologist, a general pathologist, and an electroencephalograph. These centers operated until 1944\(^2,^5,^6\).

Also, during his medical career, Cairns, in addition to adjusting the use of anti-impact helmets, contributed to advances in the treatment of infectious processes in the nervous system. He underwent penicillin and sulphonamide therapy for meningitis cases, which were successfully reported, including 16 patients, of whom 12 survived. In addition to all these contributions and scientific publications on techniques...
and discoveries in Neurosurgery, it is noteworthy that, the neurosurgical principles of Cairns are used to the present day 3,5,6.

**CONCLUSION**

Hugh Cairns was the inventor of the anti-impact helmet responsible for reducing head injuries from motorcycle accidents. He participated in World War I, in which he can carry out many studies on the neurological impact of accidents, as well as the use of antibiotics in the treatment of neurological disorders and surgical practices. In addition to all this contribution, he was also one of the founders of the neurosurgical specialty at Oxford. His surgical techniques and studies are widely used in surgical and student practices nowadays.

**REFERENCES**

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