Lawrence of Arabia, Sir Hugh Cairns, and the Origin of Motorcycle Helmets

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WHEN COLONEL T.E. LAWRENCE ("Lawrence of Arabia") was fatally injured in a motorcycle accident in May 1935, one of the several doctors attending him was a young neurosurgeon, Hugh Cairns. He was moved by the tragedy in a way that was to have far-reaching consequences. At the beginning of the Second World War, he highlighted the unnecessary loss of life among army motorcycle dispatch riders as a result of head injuries. His research concluded that the adoption of crash helmets as standard by both military and civilian motorcyclists would result in considerable saving of life. It was 32 years later, however, that motorcycle crash helmets were made compulsory in the United Kingdom. As a consequence of treating T.E. Lawrence and through his research at Oxford, Sir Hugh Cairns' work largely pioneered legislation for protective headgear by motorcyclists and subsequently in the workplace and for many sports worldwide. Over subsequent decades, this has saved countless lives.

(Neurosurgery 50:176–180, 2002)

Key words: Head injury, Hugh Cairns, Lawrence of Arabia, Motorcycle helmets

Traumatic injuries are a major worldwide public health concern and remain the leading cause of death in children and adults under 45 years. As a consequence, 142,000 lives are lost and 62 million people seek medical attention each year in the United States (8, 9). This places enormous strain on health care resources. In 1988, the total United States health care cost for injuries was estimated at approximately $170 billion (12). Despite the enormity of this problem, there has been characteristic delay in preventive and control efforts to reflect its magnitude.

The association of a traumatic head injury in a polytrauma victim remains the leading cause of mortality and morbidity. Although the advantages of adequate head protection during combat has been appreciated for more than 2000 years (1, 5), the public sector has been very slow to adopt similar measures and impose and maintain adequate legislation in this regard. The 1975 rescission of laws mandating the use of safety helmets by motorcyclists in the United States, resulted in a 40% increase in motorcyclist fatalities (10, 13). Although the forces motivating introduction of adequate head protection have undoubtedly been numerous, landmark events and subsequent studies and reports have been required for institution of such measures (2–4, 8–10, 14). One of these landmark events was the death of a motorcyclist in the Dorset countryside in England on May 18, 1935 and the subsequent involvement of a young Australian neurosurgeon.

T.E. Lawrence

Colonel Thomas Edward Lawrence, famous by the pseudonym "Lawrence of Arabia," was one of the most romantic and enigmatic figures to emerge from the First World War. Known to his family as "Ned," he was born in Wales in 1888, the second of five illegitimate sons to Sir Thomas Chapman, an Anglo-Irish Baronet, and Sarah Junner, a governess to his four legitimate daughters. The couple eloped, adopting the name Lawrence, and settled in Oxford, where Ned attended school at City of Oxford High School for Boys. He was awarded a Meyricke Exhibition to study history at Jesus College and gained First Class Honors in his final examinations, in part through a notable thesis on Crusader Castles, which necessitated a tour through Syria and Palestine. During a period as an archaeological assistant at the Hittite city of Carmesh on the River Euphrates, he was responsible for managing and motivating the locally recruited workforce. His success in the latter role, without help from military discipline or colonial authority, was to prove invaluable.

When the First World War began in 1914, Lawrence was posted to Military Intelligence in Cairo where he became an expert on Arab Nationalist movements. After a fact-finding mission to the Hedjaz region of Saudi Arabia, where Sherif Hussein of Mecca had revolted against Turkish imperial rule, the quality of his reports and his empathy with Arab leaders

led to his long-term role as British liaison officer in the Arab Revolt. He served with the forces of Emir Feisal. Their guerrilla warfare collaboration led to the successful disruption of the Turkish supply lines, the prevention of their withdrawal from Medina, and the stunning capture of Akaba and Wadi Itm. His great achievement was unifying the fierce and suspicious Bedouin people against their Turkish oppressors. These amazing exploits culminated in his triumphal entry into Damascus, clad in Arab garb, at the head of a great body of tribesmen (*Fig. 1*).

Until the war ended in 1919, Lawrence was virtually unknown to a British public numbed by the horrors of European trench warfare. At that time, an American journalist, Lowell Thomas, toured Britain with a lavish lecture series outlining his accomplishments. His romantic accounts of Bible-land victories rapidly transformed T.E. Lawrence into a popular hero.

After a brief spell at the conclusion of hostilities, during which he unsuccessfully advocated and promoted Arab independence (1919–1922), he returned to Oxford and a fellowship at All Souls College. There Lawrence began work as an author, and he produced the hugely acclaimed *Seven Pillars of Wisdom* (7). In 1923, after assisting Churchill as an advisor and being instrumental in the creation of the Kingdom of Trans-Jordan (later Jordan), he drifted into a perilous state of mind. He joined the Royal Air Force under an assumed name and 12 years later retired to Clouds Hill in Dorset.

FIGURE 1. Dressed in full Arabian garb, "Lawrence of Arabia" in Damascus at the end of his successful campaign against the Turks in 1917.

Lawrence loved speed. His motorcycle (one of many)—a Brough Superior, given to him by his friend, George Bernard Shaw—had power and acceleration that outstripped its handling and braking characteristics (*Fig. 2*). On May 13, 1935, he rode his motorcycle through the South Dorset countryside. He wore no helmet, which was not unusual except during a race. As he returned to his cottage, he swerved to avoid two boys on bicycles and pitched over the handlebars, landing in front of his machine and fracturing his cranium. He was taken to Bovington Camp Military Hospital in a coma, where the best specialists in the country were rushed to save him. One of them was the young neurosurgeon Hugh Cairns. Lawrence died 5 days later, without regaining consciousness, at the age of 47 years. This motorcycle accident was to have major ramifications for thousands of future motorcyclists. Hugh Cairns was profoundly moved by the tragedy of this famous First World War hero dying inexorably at such a young age from severe head trauma. Having been powerless to save Lawrence, Cairns characteristically set about identifying, studying, and solving the problem of head trauma prevention in motorcyclists.

Sir Hugh W.B. Cairns

Hugh William Bell Cairns was born in Port Pirie, South Australia, on June 26, 1896. He was the only son of a Scottish father and an Australian mother. He was brought up in Adelaide, where he did well in high school and at university. During the First World War, he served in the army, first in the ranks and then, after qualifying in Adelaide in 1917 at the age of 21 years, with a commission in the Australian Army Medical Corps. He experienced active service in the Middle East and in France. Cairns then attended Balliol College, Oxford as

FIGURE 2. Lawrence astride his Brough Superior motorcycle in 1935, the year of his death. Helmets were rarely worn. He owned several of these powerful machines, and the one pictured is the motorcycle involved in his fatal accident.

a Rhodes Scholar in 1919 and rowed in the Oxford boat in 1920. He worked first as an anatomy demonstrator and then as house surgeon at the Radcliffe Infirmary before going to the Royal London Hospital in 1921. In the same year he took his FRCS examination. As an operator, he was distinctly slow and he was intelligent rather than especially clever, but he was alert, inquiring, and utterly dependable: a strong man for whom nothing was too much trouble (11). After deciding on a career in the new field of neurosurgery, he was sent to Boston on a Rockefeller Traveling Fellowship in 1926, through the insight of George Riddoch. There he received training as assistant to Harvey Cushing, on whom he was to religiously model his operating style for the remainder of his career. Trainees then came from abroad to learn the skills Cairns had brought back with him (6). Having earned a great reputation, he was appointed to the two principal London neurological hospitals at Maida Vale (1931–1934) and Queens Square (1934–1937). After coming into contact with Lord Nuffield, he later became the first Nuffield Professor of Surgery in Oxford and founder of the neurosurgical unit there at the Radcliffe Infirmary (*Fig. 3*). When the Second World War intervened, Cairns became the Ministry of Health advisor on head injuries and consulting neurosurgeon to the Army with the rank of Brigadier (11). Aside from other notable achievements, such as initiating the first clinical trials of penicillin for Howard Florey and devising and training the mobile neurosurgical units deployed in the Second World War, Cairns is best remembered for his work on the prevention and treatment of head injuries (2–4, 6). As a result of his work, the death rate for in the British army from such injuries was lower than in any other army.

FIGURE 3. Cairns as the first Nuffield Professor of Surgery in Oxford and founder of the neurosurgical department at The Radcliffe Infirmary.

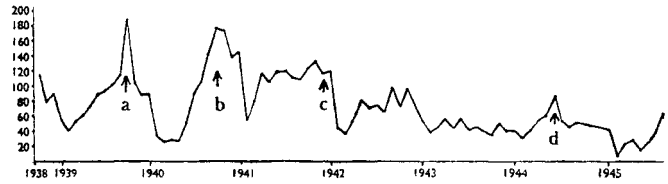

FIGURE 4. Graph showing monthly totals of motorcyclist fatalities in Great Britain from 1939 to 1945 from figures issued by the Ministry of War Transport. Events influencing death rates were: *a*, outbreak of war; *b*, preparation for a German invasion; *c*, crash helmets were made compulsory for army motorcyclists; and *d*, preparation for the Normandy invasion.

During the Second World War, Cairns recognized the unnecessary loss of life among the dispatch riders of the British Army, even before the actual start of hostilities. The importance of this was compounded by restricted radio communications and the introduction of blackout regulations. In 1941, his first and most important article on the subject was published in the British Medical Journal. He observed that 2279 motorcyclists and pillion passengers had been killed in road accidents during the first 21 months of the war, and head injuries were by far the most common cause of death. Most significantly, however, Cairns had only observed seven cases of motorcyclists injured while wearing a crash helmet, all of which were nonfatal injuries (2, 4). His 1946 article on crash helmets charted the monthly totals of motorcyclist fatalities in the United Kingdom from 1939 to 1945 (3). The obvious decline in the number of fatalities took place after November 1941, when crash helmets became compulsory for all army motorcyclists on duty (*Fig. 4*). His article concluded: "From these experiences there can be little doubt that adoption of a crash helmet as standard wear by all civilian motorcyclists would result in considerable saving of life, working time, and the time of hospitals" (3). Regrettably, not until 1973, 32 years after his first scientific article on the subject, were crash helmets made compulsory for all motorcycle riders and pillion passengers in the United Kingdom.

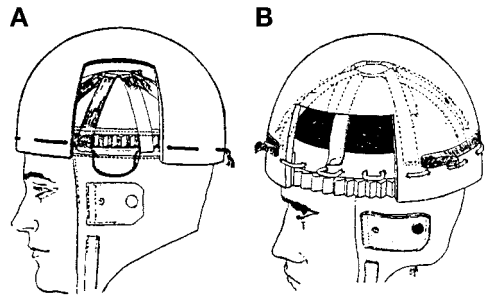

FIGURE 5. Designs of the two types of helmets in use by British army dispatch riders. *A*, a vulcanized rubber helmet; *B*, a pulp helmet.

The research of Cairns (2, 3) and Cairns and Holbourn (4) incorporated a statistical analysis of motorcycle accidents and the associated morbidity and mortality. In addition, their work also included an analysis of the pathophysiology, mechanisms of injury, and investigation of the various designs and materials used in the construction of helmets and the relative protection these afforded (*Fig. 5*).

CONCLUSION

The evolutionary design of the protective helmet for motorcycle users, begun by Cairns in Oxford during the Second World War and originally concerned with the helmets worn by the dispatch riders of the British Army, has expanded into research on all types of helmets for civilian and military personnel. It may be said that the death of "Lawrence of Arabia" fueled Cairns' lifelong passionate interest in the prevention of head injuries to motorcyclists, and that with his demise, the story of motorcycle helmets began. As a result, during the decades, countless lives have been saved.

Received, April 17, 2001.
Accepted, July 9, 2001.
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COMMENTS

This splendid, brief historical vignette outlines an important contribution to the prevention of head injuries among motorcycle riders. That it was prompted by the death of a fascinating historical figure makes it all the more interesting. Colonel Thomas Edward Lawrence ("Lawrence of Arabia") has left many legacies, and this one may be the most important of all.

Edward R. Laws, Jr.
Charlottesville, Virginia

The authors very nicely summarize not only the astute powers of observation but also a trait that characterized Sir Hugh Cairns throughout his career in London and subsequently at Oxford. Cairns' perseverance—as documented by the 32 years it took for the wearing of motorcycle helmets to be made compulsory—was a trait recognized by all who knew him. Having had the opportunity to have part of my training at the Radcliffe Infirmary in Oxford with Mr. Joe Penybaker and Mr. John Potter, both students and disciples of Cairns, I experienced firsthand the identical technical lessons he acquired from Cushing and passed on to all of his students. The stories of his tenacity and perseverance as well as his international clientele were legendary.

I think that the single most important part of the article is its description of the profound ramification of Cairns' emotional distress regarding the death of Lawrence and his determination to do all that he could to prevent the head injuries that he had observed in motorcyclists in the war as well as in civilian life. The compulsory helmet laws that were promulgated in the United States and in many countries in Europe on the basis of Cairns' work have saved countless lives. The authors have performed a service to neurosurgery by bringing these facts to light in such a clear and succinct manner.

Joseph C. Maroon
Pittsburgh, Pennsylvania

This well-written and well-illustrated historical article is of great interest. It contains much data about motorcycle accidents in the 1930s and 1940s and early crash helmets. It contains a clear lesson for today's reader because of the epidemic of motorcycle injuries occurring in Africa and Asia.

David G.T. Thomas
London, England

This article reports a most remarkable story on two important figures in the history of medicine. Sir Hugh Cairns is certainly well known to the neurosurgical community, and his contributions have been well documented. I was certainly not aware of his association with Lawrence of Arabia and even less so of the introduction of the helmet for motorcycle riders. It is truly a treat to read this history and learn how these

important individuals intermingled and, even more important, contributed to modern legislation regarding motorcycle helmets. The authors quite clearly describe the decline of head injuries in motorcycle riders after the introduction of the helmet. It is interesting to note that several American states are currently considering rescinding mandatory cycling helmet laws because some motorcyclists consider it an invasion of their personal rights. One could argue that Lawrence might be still alive and contributing to the world today if only he had worn a helmet on the day he rode over a hill and then swerved to avoid two children.

James T. Goodrich
Bronx, New York

Photograph of Spiegel and Wycis performing an early stereotactic procedure. Courtesy, Time-Life Warner.