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Sir Ludwig Guttmann and the Beginnings of Neurourology

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Abstract

The 20th century was defined by the World Wars, which resulted in a rise in the incidence of patients with traumatic spinal cord injuries, who faced a 95% mortality rate within the initial two weeks following their injuries. Eighty percent of this mortality rate was related to urinary tract infections and urosepsis. This article aims to highlight the pioneering contributions of Ludwig Guttmann, who presented a comprehensive management approach for these patients, specifically focusing on the impact of spinal cord injury on the lower urinary tract. Guttmann introduced intermittent catheterization as a treatment for urinary stasis, leading to a significant reduction in the relative risk of mortality. Furthermore, he advocated for the integration of physiotherapy and exercise during the early stages of spinal cord injury treatment, which eventually led to the establishment of the Paralympic Games.

Keywords: *spinal cord injury; sepsis; neurogenic bladder; intermittent urethral catheterization; medicine history.*

The Century of World Wars

The acquisition and exploration of medical knowledge throughout history have played an indispensable role in the development of innovative tools aimed at enhancing patients' quality of life. Healthcare professionals have continually adapted their practices to address the multifaceted challenges inherent in patient care, taking into account the historical context, prevailing technology, and available knowledge.

The 20th century was deeply influenced by the World Wars, which resulted in an upsurge in the prevalence of individuals afflicted with traumatic spinal cord injuries. These patients faced a prognosis characterized by recurrent wound infections, sepsis, and confinement to either bed or wheelchair, making them entirely dependent on their caregivers. The mortality rate for such injuries reached up to 95% within the initial two weeks post-injury, attributable to urosepsis due to inefficient urine drainage. The gravity of this situation compelled healthcare providers to establish specialized units for the management of patients with spinal cord injuries.[1]

Consequently, centers specializing in the management and treatment of peripheral nerve injuries were established in Germany and the United States. In England, the first specialized unit for spinal cord injury care was founded in 1943 as an independent department. Previously, this type of service depended on other departments, such as neurosurgery, orthopedics, or urology, and was overshadowed due to the saturation of other hospital services. This circumstance made it necessary to develop medical research focused on the treatment of patients with post-traumatic spinal cord injuries.[1,2]

Parallel to these developments, Dr. Ludwig Guttmann conducted pioneering research on patients with spinal cord injuries at the specialized unit in Stoke Mandeville, England. As the head of rehabilitation and treatment, Guttmann focused on managing the neurogenic bladder and ensuring its proper drainage—a critical procedure that transformed the prognosis for these patients.[1,2]

From Poland to England

Ludwig Guttmann, born in 1899 in the town of Tost, North Silesia (present-day Poland), came from a Jewish family residing in the German Empire, where he completed his high school education. In 1917, the impact of the war in his native area led to a severe shortage of medical personnel, leading him to join the Accident Hospital for Coalminers. He had his first contact with spinal cord injury patients there, including war casualties and mining accidents.[1,3]

In 1918, Guttman commenced his medical studies at the University of Breslau, which he later completed at the University of Freiburg toward the of World War I. In 1924, he returned to Breslau for his postgraduate studies at the Wenzel Hanke hospital, working under the guidance of Otfrid Foerster, a German neurosurgeon who instructed him in neurology and neurological rehabilitation. This period coincided with the rise of antisemitism in Nazi Germany, which began to limit his medical career. He was dismissed from his position at a public hospital and subsequently assumed the role of director of the neurology and neurosurgery department at the Breslau Jewish Hospital, where he provided refuge to Jews during the infamous "Night of Broken Glass" in 1938. In 1939, he fled his homeland as a war refugee and settled in England.[1-4]

Upon arriving in England, Guttmann's academic credentials were not recognized, leading him to focus on research with the support of Hugh Cairns, an English neurosurgeon. He initiated a research protocol centered on the study of the peripheral nervous system. Through his work, Guttmann gained the attention of George Riddoch, a captain in the English army and chief medical officer of the Empire Hospital in London. Riddoch was one of the few specialists in neurological rehabilitation during that time and had established a committee dedicated to the treatment of spinal cord and peripheral nerve injuries.[1,3,5] In 1944, Riddoch's committee set out to establish specialized units in England for the treatment of patients with traumatic spinal cord injuries, particularly those patients injured by firearms as a consequence of the war. It was during this period that Guttmann was appointed as the director of the Stoke Mandeville unit by the English government.[3,4]

A paradigm shift

One of the pioneering specialist units for spinal cord injuries in England was Stoke Mandeville, established in 1944, which grew rapidly due to the large volume of patients requiring medical attention. It was at Stoke Mandeville that Ludwig Guttman began to study the interplay between bladder distension and sympathetic mechanisms following spinal cord injury. His investigations led him to conclude that autonomic reflex mechanisms, such as sweating and cardiovascular disturbances, could serve as indicators of abnormal visceral activity.[1,4,6] The primary objective of the unit was to provide comprehensive treatment for patients with spinal cord injuries, which included physical rehabilitation as a fundamental aspect of the early-stage recovery process.[1-5] During this historical period, knowledge regarding spinal cord injuries was limited. The prognosis for these patients was disheartening, as urinary tract infections frequently led to high morbidity and mortality rates due to their evolution to sepsis. This circumstance sparked Guttmann's interest in the management of neurogenic bladder.[1,6-8] Consequently, he implemented the use of intermittent catheterization, a pre-existing method in general medicine, which consists of placing a bladder catheter to alleviate urinary stasis. At the time, no standardized approach existed for managing these patients, and various techniques, including cutaneous vesicostomy, had been proposed but were associated with multiple complications.[1,3,6,8,9]

Guttman began utilizing intermittent catheterization in patients with spinal cord injuries who experienced impaired spontaneous urination and presented a bladder balloon for up to 24 hours. He used a non-contact technique, described by himself, which effectively maintained urinary sterility despite the need for catheter placement two to three times daily. In contrast, permanent catheters became colonized within 48 hours of insertion and posed a greater risk of complications, including urethral necrosis resulting from catheter-induced pressure.[1,3,6,8,10]

After several years, evidence emerged that the early-stage mortality associated with spinal cord injuries could be mitigated through the implementation of intermittent catheterization. Since the introduction of this management approach in the 1940s, there has been a decrease in the relative risk of death attributed to urological aetiology.[2,8]

A lasting legacy

Ludwig Guttman's objective extended beyond patient survival; he aimed to restore their dignity and reintegrate them into society. His dedication earned him the nickname "Poppa" from his patients. Recognizing the benefits of sports in rehabilitation, Guttmann incorporated them into his treatment approach in 1944, emphasizing physical rehabilitation and exercise. Initially, individual sports such as archery and table tennis were introduced, as well as wheelchair polo and basketball as team sports.[1, 2, 5, 12]

A significant milestone occurred on the day of the opening ceremony of the 1948 London Olympic Games, when war veterans, both men and women, who were patients from units similar to Stoke Mandeville Hospital, came together in an archery competition that would be inscribed in the annals of disability history. Four years later, veterans from the Netherlands joined the competition at Stoke Mandeville,

marking the inception of the first International Games.[2,13] Later, in 1960, the games were relocated to Rome — where the Olympic Games would take place that same year— and renamed the first Paralympic Games. In this event, approximately 400 wheelchair athletes from over 23 countries participated in a variety of sports. From that point onward, the Paralympic Games gained global recognition and have been held every four years, paralleling the schedule of the Olympic Games.[12,13]

The current care of neurourological patients would not be the same without the contributions of Sir Ludwig Guttman. By examining the historical context, we can gain insight into the progression of events that have influenced the discoveries in medical science aimed at improving the quality of life for patients.

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