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The History of Neurosurgery in the Hawaiian Islands

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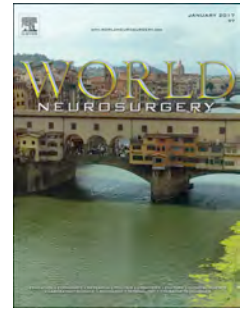
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Abstract:

The field of neurosurgery has a rich and fascinating history. The development of the specialty in Hawaii has been particularly unique, given the state's remote location, indigenous population, and military presence. The life of Dr. Cloward, Hawaii's most noted neurosurgeon, has received some attention in the literature. However, a comprehensive review of this history, including the pre-Cloward and post-Cloward era, is lacking. Thus, this article will review and chronicle the development of neurosurgery in Hawaii with special attention to three topics: the traveling neurosurgeons of the early 20th century, such as Dr. Frederick Reichert; Hawaii's first full time neurosurgeon, Dr. Cloward; and finally, the current state of neurosurgery in Hawaii.

Key Words: Cloward, Reichert, Neurosurgery, Hawaii, History

Introduction:

Since its formal inception in the early 20th century the field of neurological surgery has experienced rapid growth. This development has been traced on a variety of scales, including individual hospitals, universities, and states.¹⁻⁷ The history of neurosurgery in the Hawaiian Islands is particularly unique, given the state's remote location, indigenous population, and military presence. Documentation of this history has been limited. There was a brief personal reflection published by the noted Dr. Cloward, Hawaii's first full time neurosurgeon, in the late 20th century.⁸ However, a more comprehensive review of neurosurgical history in Hawaii has not been conducted. Notably, there has been no consolidated effort to detail the pre-Cloward era, as well as the trends in neurosurgical care at the University of Hawaii in the modern era. Thus, in order to fill this gap in the literature, this article will review and chronicle the development of neurosurgery in Hawaii. This analysis includes 3 major topics. These include a review of Hawaii's first neurosurgeons, with special attention to Dr. Frederick Reichert; a comprehensive review of Dr. Cloward's contributions to the field; and finally, a brief review of the current state of neurosurgery in Hawaii and the Pacific islands.

The Early 20th Century:

Information is relatively sparse on neurosurgical efforts in the Hawaiian Islands before Dr. Cloward. The limited neurosurgical care available during this period came in the form of traveling surgeons, who would come to the islands for brief periods of time to provide desperately needed services. A notable example is Dr. Frederick Reichert (Figure 1). Dr. Reichert trained under the prominent surgeon Walter Dandy, at Johns Hopkins, before moving to Stanford University to serve as faculty. He was appointed chief of neurosurgery at Stanford in 1926 and held the position continually until 1954 (Figure 2). It is known that Dr. Frederick would make annual trips to the Hawaiian Islands to provide much needed care to the local population.⁹ He was also involved with the Pan Pacific Surgical Association, although information on this collaboration is relatively limited.

Hawaii's First Full Time Neurosurgeon:

Any discussion of Neurosurgery in the Hawaiian Islands would be incomplete without an in depth review of Dr. Ralph B. Cloward, arguably the most influential neurosurgeon to practice in the State.^{8,11-22} He made extensive contributions to neurosurgical clinical knowledge, surgical techniques, and operative instrumentation. In his personal reflection, written in 1984, Dr. Cloward provides valuable insight into both his own career and the development of Hawaiian Neurosurgery.⁸ He describes moving to the Hawaiian Islands in 1926, at the age of 18, to accompany his father, an ophthalmologist and otolaryngologist for the U.S. Army. Soon after their arrival in Hawaii the senior Cloward transitioned from military medicine to the private sector, joining "The Clinic," which was later given its present name, The Straub Clinic.

The young Cloward remained in Hawaii for the start of his education. After finishing high school, he began his post-secondary education at the University of Hawaii, the eventual home of Hawaii's first and only medical school. After 2 years in Hawaii he transferred to the University of Utah. He began his medical school in Utah, before moving to Chicago to complete his education at Rush Medical College, graduating in 1934. He then received his residency training at the University of Chicago, where he trained under Percival Bailey, graduating in 1938.

It was at the age of 30, in 1938, that Dr. Cloward returned to Hawaii to practice neurology and neurosurgery at "The Clinic," where his father had worked. With his unique training background in a newly formed specialty Dr. Cloward was the first and only physician practicing neurology and neurosurgery in Hawaii at that time. His time at "The Clinic" was relatively brief and he opened his own practice in 1939. In his memoir, he describes his experience as Hawaii's only neurosurgeon as a "singular and personal one."⁸

Dr. Cloward extensively documented his early cases, publishing many of his findings in noted journals. His first case, for example, is of particular interest.⁸ He describes a 32 year old woman who had presented

with severe headaches, vomiting, and blurred vision. There had been no neurologists or neurosurgeons on the island at the time of her presentation, so she had been followed by a local pathologist. He had ordered imaging of her brain, which had revealed what he believed to be an enlarged sella turcica. From this, she had been diagnosed with a pituitary tumor. However, upon reviewing the case, Dr. Cloward was not convinced. He proceeded to examine the patient himself, at which point he had noticed that her visual fields were intact. Furthermore, she had continued to menstruate regularly. These findings, he postulated, would have been atypical if she was truly afflicted with a pituitary tumor. After much thought, Dr. Cloward concluded that the patient was suffering from a cerebellar tumor with obstructive hydrocephalus, which warranted operative intervention. His diagnosis was soon confirmed when he removed a cystic hemangioblastoma from the patient's cerebellum. This was the first of many lives that Dr. Cloward would go on to impact during his tenure in Hawaii.

Military Medicine:

The early years of Neurosurgery in Hawaii also had a large military component, much like the field as a whole. Recall, the founder of formalized neurosurgery, the esteemed Harvey Cushing, had practiced throughout World War I.^{8,10} Dr. Cloward was faced with a similar situation with the onset of World War II, soon after his arrival in Hawaii. It began on December 7th, 1941, with the Japanese attack on Pearl Harbor.^{8,20,21} In his memoir, Dr. Cloward recalls that he began operating soon after the attacks began. He rushed to the Tripler Army Hospital, which was already filled with numerous head traumas within an hour of the initial bombing. He describes a "3.5 day round-the-clock surgical marathon," in which he operated on the numerous traumatic head injuries sustained during the Japanese attack.⁸ He recalls that the majority of the wounds were a result of metallic bomb fragments, which created compound depressed skull fractures in the injured soldiers. His surgical technique, as he describes it, consisted of removing all fragments of bone and metal, followed by debridement of the brain tissue with a portable suction machine, which was borrowed from the neonatal unit at Tripler Army Medical Center. X-rays were then

used to reveal any residual metal fragments, which were removed with magnets. Finally, antibiotic coverage was provided with the only antibiotic option available to him, a powdered sulfonamide.

The Leprosy Colony:

Dr. Cloward's unique experiences in the Hawaiian Islands were not limited to military endeavors. Throughout the 1940s, he saw a variety of unique neurosurgical conditions at the Kalaupapa settlement, the leper colony in Hawaii.⁸ He describes multiple afflictions of the nervous system secondary to leprosy. These frequently included leprosy granulomas of the peripheral nerves, which produced both paralysis and pain in the victims. Fortunately, these tumors, he recalls, were often amenable to neurosurgical resection. They could be peeled off the nerve with minimal damage to the healthy nerve fibers, resulting in almost instantaneous relief of pain and return function. As the medical treatment of leprosy continued to improve the need for frequent visits to the leper colony decreased.⁸ However, it stands as a unique component of both Hawaiian history and the development of neurosurgery in the state.

The Legacy of Cloward:

Thus, the field of neurosurgery grew rapidly in Hawaii in the 1940s. In addition to his aforementioned work at Pearl Harbor and Kalaupapa, Dr. Cloward recalls treating many other conditions during his first decade of practice. These included poliomyelitis, hypertension, syphilis, stroke, subdural hematomas, and hyperhidrosis.⁸ The 40s also saw the arrival of additional neurosurgeons, including Dr. Thomas Bennet in 1948 and Dr. John Lowrey in 1950. Cloward states that this group of 3 surgeons worked together to provide neurosurgical care to the Hawaiian island for the next decade. They practiced at a variety of hospitals, including Queen's Medical Center, St. Francis, and Children's Hospital.

The 1950s saw continued expansion of the field in Hawaii. According to Dr. Cloward, the highlights of this period included the use of carotid angiography for diagnosing aneurysms and arterio-venous malformations, the development of treatments for Parkinson's disease, the refinement of posterior interbody fusion for lumbar disk disease, and the development of the anterior cervical approach for

diseases of the cervical spine.⁸ Dr. Cloward continued to practice in the 1960s and beyond, developing and subsequently refining his anterior cervical approach. This technique, which is used for the correction of cervical disk herniation, was ultimately termed the “Cloward Procedure,” in honor of its creator. The technique was described by Cloward in the *Journal of Neurosurgery* in 1958, as a means for treating ruptured cervical disks. His original article is based on review of over 600 cases and endorses a high cure rate and decreased length of hospitalization. He also developed novel operative techniques for posterior lumbar interbody fusion, as well as for the treatment of hyperhidrosis.²³ He first performed his lumbar technique in 1943, before subsequently presenting it to the Hawaii Territorial Medical Association. His original article called for spinal fusion in all lumbar disk operations, in contrast to the practice of many other surgeons at that time. He had an impressive operative history to support his assertions, with over 10 years of successful cases.

Dr. Cloward continued to practice and publish for many years. A search of his name in the PubMed (MEDLINE) database reveals 66 publications in his lifetime, ranging from 1937-1993, a selection of which are included in this manuscript’s bibliography. He was also actively involved in organized neurosurgery, including the Western Neurosurgical Society, which honors his legacy with an annual award.²⁴ In 2000, after many years of practice and service to Hawaii, Dr. Cloward passed away.

The Modern Era:

Neurosurgery has continued to develop in Hawaii since the retirement of Dr. Cloward. The John A. Burns School of Medicine at the University of Hawaii was founded in 1965 and named after the former Governor. It has a Division of Neurosurgery consisting of seven clinical faculty. The current chief, Dr. William Obana, was appointed in 1994 and has held the position continually since. The faculty operate at hospitals throughout Hawaii and the Pacific, including The Queen’s Medical Center and Straub Clinic, two operating sites specifically mentioned by Dr. Cloward in his various publications.^{8,12-22} The faculty teach residents in the General Surgery and Orthopedic Surgery residency programs, as well as medical students. Several from the latter group have gone on to neurosurgical residencies.

Although the number of neurosurgeons in the state fluctuates, there are typically 13-14 at any given time. They are based at nine hospitals, which include public, private, and military institutions. Due to the variety of practice settings, neurosurgical procedural data is not readily available. The majority of neurosurgical care is provided in Honolulu on the island of Oahu. However, neurosurgical services have also been available on the island of Maui for the past several years. The Queen's Medical Center in Honolulu is a Level 2 Trauma Center and is where the most complex procedures are performed.²⁴ Queen's has a full time neurointerventional radiologist, a 12 bed neuroscience ICU, 3 full time neurointensivists, and 2 full time epileptologists. It has been home to a neuroscience institute since 1996, which participates in numerous clinical trials and research projects. Given the remote location of the Hawaiian Islands, neurosurgeons are able to function with relative independence from mainland institutions. However, that is not to say that collaborations do not exist. A recent partnership between Queen's Medical Center in Hawaii and the M.D. Anderson Cancer Center in Texas has sought to expand the scope and quality of care available in the Pacific.

Conclusion:

From its humble beginnings in the early 20th century to the present day, neurosurgery has a rich and fascinating history in the state of Hawaii. The field first came to Hawaii in the form of travelling surgeons from California, such as Dr. Reichert. Then, in 1938, Dr. Cloward became the first full time surgeon in the islands. Dr. Cloward made substantial contributions to the field and worked in many unique environments while in Hawaii. Neurosurgery has continued to grow at the University of Hawaii and its associated training sites, making the state one of the Pacific's premier destinations for such services.

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Figure Legends:

Figure 1: Dr. Frederick Reichert (Date Unknown)

Figure 2: The Appointment of Dr. Reichert (The Stanford Daily, Volume 69, Issue 30, 9 April 1926)

Figure 3: Dr. Ralph Cloward (Date Unknown)

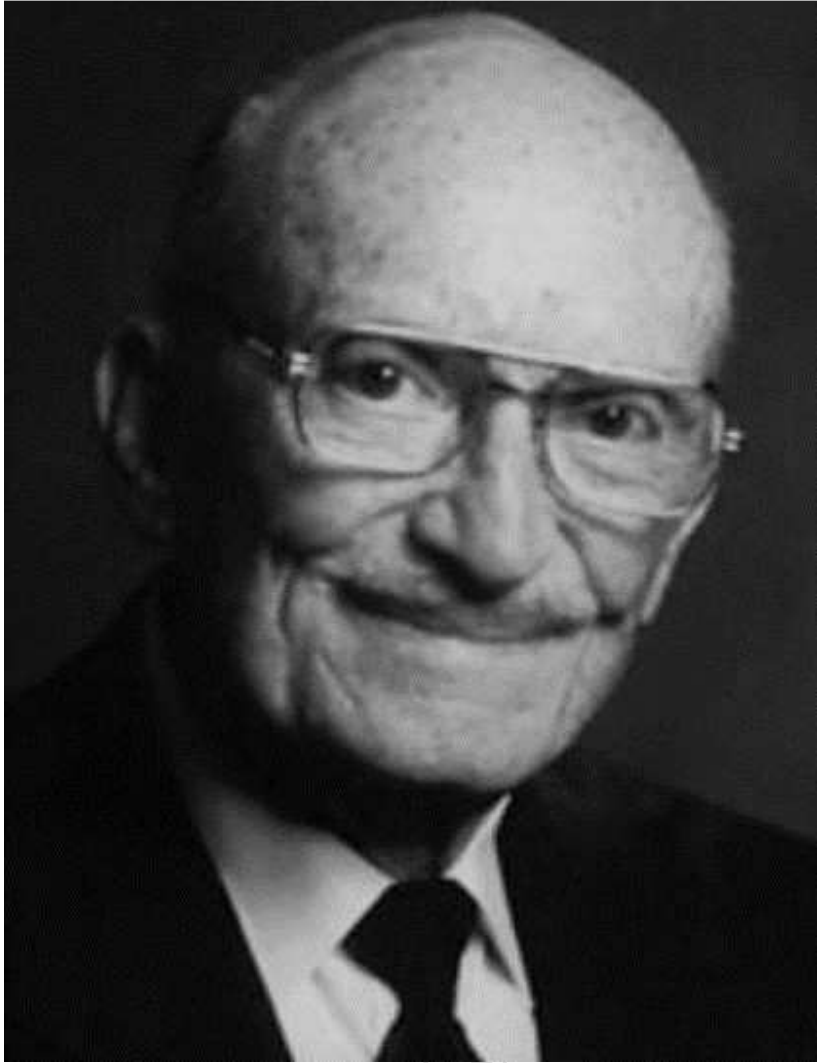


ACCEPTED MANUSCRIPT

FREDERICK REICHERT TO SUCCEED TOWNE AT MEDICAL SCHOOL

Dr. Frederick Leet Reichert has been appointed associate professor of surgery in the Stanford Medical School and will begin his work next October, succeeding Dr. Edward Bancroft Towne who has announced his resignation to take effect at that time, according to an announcement from the President's office following action by the Board of Trustees.

Dr. Reichert is a young surgeon and experimental investigator in his line. He was graduated in 1920 from the Johns Hopkins Medical School and spent a year engaged in surgical research at the Hunterian laboratory carrying on experiments primarily relating to collateral circulation following surgical operations. For three years after that he was assistant resident in surgery at the Johns Hopkins Hospital and is now finishing his second year as instructor in surgery at the Johns Hopkins Medical School and as resident surgeon in the hospital. Last year he spent three months touring the principal clinics of the East and before coming to Stanford plans to devote four months to a similar tour of Europe.



Highlights:

- Hawaii has a rich neurosurgical history
- Dr. Frederick Reichert was an early traveling neurosurgeon in Hawaii
- Dr. Cloward was the first full time neurosurgeon in Hawaii
- Dr. Cloward made significant contributions to the field in the form of novel surgical techniques