

Pioneering Cardiac Anesthesia: The Life and Work of Emerson Moffitt, MD

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EMERSON A. MOFFITT (Fig 1) was born on September 9, 1924, in McAdam, New Brunswick. His higher education began in 1942 at the University of New Brunswick where he studied premedicine. In 1950, he earned the degree of Doctorate of Medicine from Dalhousie Medical School and, a year after graduating, began a 1-year internship rotating through Victoria General Hospital, Children's Hospital, and Aberdeen Hospital in Nova Scotia.

In 1951, working as a general practitioner with J.S. Munro in North Sydney, Nova Scotia, Moffitt began to develop an interest in anesthesia. A busy part of his practice had been delivering anesthesia at the North Sydney and Sydney Mines Hospitals. His technique involved administering open drop chloroform and ether to approximately 250 patients annually. He was also accomplished in neuraxial anesthesia and performed over 200 spinal procedures per year. After 3 years in general practice, Moffitt left to pursue additional training in anesthesiology. In October 1954, he began his postgraduate anesthesia training at the Mayo Clinic in Rochester, MN. The first year of his fellowship was primarily dedicated to developing his clinical skills under the expert tutelage of John Lundy and others.¹

In the years before Moffitt's arrival at Mayo, exciting progress had been made in the field of cardiac surgery. Through the 1930s and 1940s, John Gibbon in Philadelphia had been experimenting with several extracorporeal circuit designs and by 1947 was able to successfully place dogs on heart-lung bypass.² The first successful use of Gibbon's cardiopulmonary bypass machine in humans in May 1953 at Jefferson Medical College was a monumental advance in the surgical treatment of complex cardiac pathology. A surgeon by the name of John Kirklin (Fig 2) had aspirations of advancing the field of cardiac surgery at the Mayo Clinic. He organized a multidisciplinary collaboration of Mayo clinicians to request and review plans of Gibbon's mechanical pump oxygenator. This group proceeded to study and adapt the device in the biomedical laboratories at Mayo. A new Mayo-Gibbon-type extracorporeal circuit (Fig 3) was successfully used in March 1955 as Kirklin repaired a ventricular septal defect in a 5-year-old girl. The team went on to report the results of an 8-patient series later that year. By the end of 1955, the Mayo team completed 45 successful open-heart procedures.^{3,4}

MOFFITT AND CARDIAC ANESTHESIA

While still an anesthesia fellow, Moffitt started research with physiologist Jeremy Swan (Fig 4), an original member of Kirklin's team. The team's recent success with extracorporeal circulation opened new avenues of research. Together with Swan and cardiac anesthesiologist Robert Patrick, Moffitt studied the second 45 patients to successfully undergo open-heart

surgery using extracorporeal circulation.⁵ The initial article, published in 1957, summarized descriptions of the extracorporeal apparatus, anesthetic technique, and management of hemodynamics and coagulation of patients undergoing open-heart surgery using cardiopulmonary bypass.⁶ These findings were essential to the success of cardiopulmonary bypass because it was believed at the time that artificial oxygenators would never be safe because of their damaging effects on the blood. In the meantime, C. Walton Lillihei and his group at the University of Minnesota had performed several successful ventricular septal defect closures using a controlled cross-circulation technique with another donor. Despite success at the University of Minnesota, Alfred Blalock, and even Lillihei himself, acknowledged that the future of cardiac surgery lay not in cross-circulation techniques but mechanical pump oxygenators. The work done at Mayo during these years laid the foundation for safe, efficacious cardiopulmonary bypass techniques in cardiac surgery.²

In 1957, Moffitt presented a second article at the annual meeting of the American Society of Anesthesiologists detailing the pathophysiologic responses to extracorporeal circulation and total body perfusion.⁷ This article would eventually become his thesis and earned him a Master of Science in Anesthesiology from the Mayo Graduate School and the University of Minnesota. Moffitt's work helped outline the initial framework and understanding of cardiac anesthesia.

With residency complete, Moffitt joined the Mayo Clinic Department of Anesthesiology staff where his efforts continued to focus on the care of patients undergoing closed or open-heart surgery. In the years that followed, he and others continued to gain expertise in the physiology, pathology, bioengineering, and anesthesiology associated with open-heart surgery and cardiopulmonary bypass. This knowledge led to the redesign and refinement of the original Mayo-Gibbon pump oxygenator and the development of new intraoperative and postoperative monitoring techniques.

In addition to the knowledge gained through his Mayo appointment, he followed the Mayo tradition of seeking experience from others to become familiar with recent scientific

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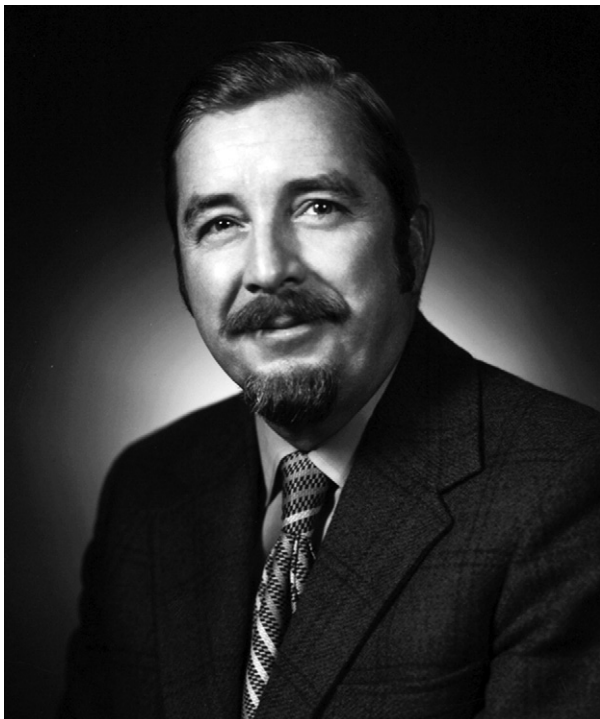


Fig 1. Emerson A. Moffitt.

advances. Early in his career as a cardiac anesthesiologist, he spent a month touring 6 major European medical centers prominent in open cardiac surgery. During that visit, he acquired and

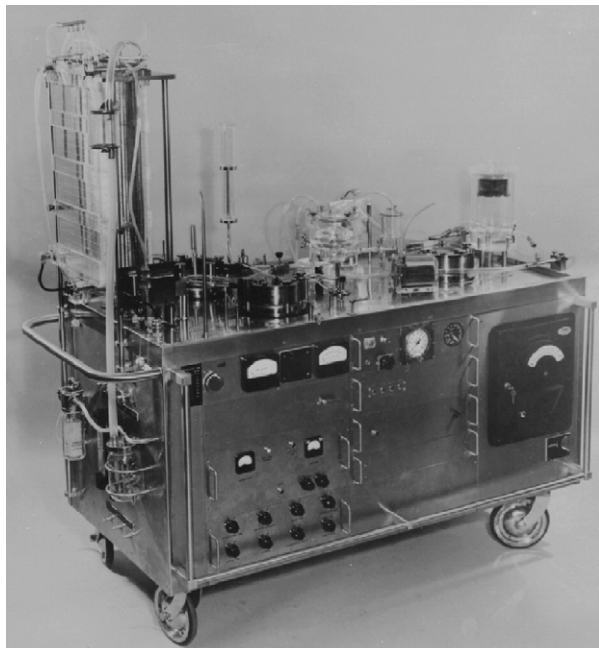


Fig 3. Mayo-Gibbon-type extracorporeal circuit.

shared ideas in cardiac physiology and cardiopulmonary bypass that helped him advance Mayo's practice.⁸

His research activities as a Mayo anesthesiologist produced 75 peer-reviewed publications in anesthesia and surgical jour-



Fig 2. John Kirklin in the early days at the Mayo Clinic.

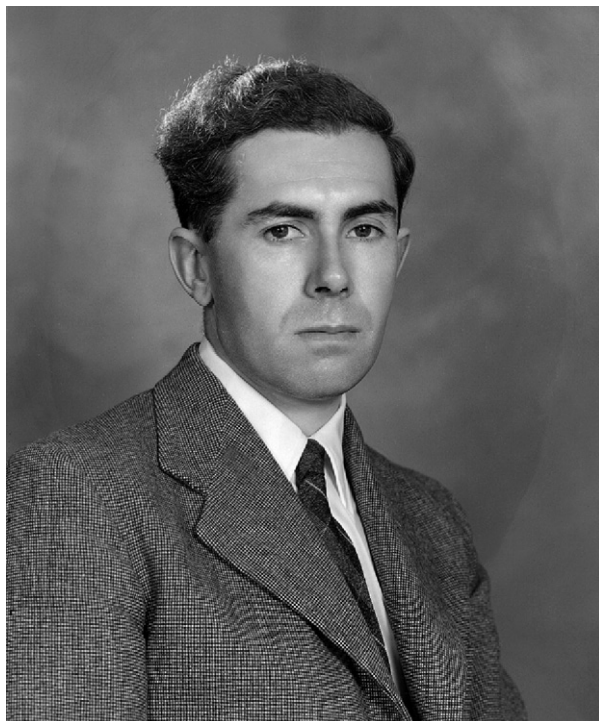


Fig 4. H. Jeremy Swan while working at Mayo.

nals as well as several book chapters in cardiac surgical texts. His efforts in understanding cardiac physiology earned him a National Institutes of Health grant in 1966 entitled "Myocardial and Whole Body Metabolism in the Critically Ill."¹ During his 15-year tenure at Mayo, Moffitt progressed through the academic ranks to the status of Associate Professor of Anesthesia. He went on to serve as Chair of the Department of Anesthesia at Saint Mary's Hospital from 1966 to 1971.

BACK TO CANADA

In 1972, after a productive and rewarding 15-year career at Mayo, Moffitt accepted a position as Chair at the Department of Anesthesiology at Dalhousie, his medical school alma mater. This new position offered him the opportunity to rebuild a struggling anesthesia department while continuing his research endeavors.⁹ As at Mayo, his main clinical and research focus continued to be on patients undergoing open cardiac and aortic operations. In addition to his efforts through the anesthesia department, he was an integral participant in the reorganization of Dalhousie's Division of Cardiac Surgery.¹⁰

His responsibilities as chairman did not hinder his academic productivity. He continued to actively study cardiac surgical patients, the majority of which were cared for at Victoria General Hospital. To complement his research at Dalhousie, he once again traveled in pursuit of the latest scientific knowledge. This time, he spent an 8-month sabbatical with his former mentor, Jeremy Swan, and Drs Willie Ganz and Jack Matloff at Cedars-Sinai Hospital studying myocardial preservation during cardiopulmonary bypass in patients undergoing coronary artery bypass grafting. This fertile collaboration led to 15 peer-reviewed publications.¹

During his tenure at Dalhousie, Moffitt was prolific, producing a total of 128 publications and 148 professional presenta-

tions. In addition, he was awarded 3 research grants, including one from the Heart and Stroke Foundation of Nova Scotia. From May 1980 until he accepted part-time status in 1989, Moffitt spent more than 40% of his time studying the intricacies of cardiac physiology. Upon retirement, he was named Professor Emeritus by Dalhousie University.¹

His years of dedication to anesthesia research and education earned him professional respect and an international reputation. In 2000, Moffitt was named among the top "2000 Outstanding Scientists of the 20th Century" by the International Biographical Institute in Cambridge, England. The same year, he was named one of the "1000 World Leaders of Influence" by the American Biographical Institute in Raleigh, NC.¹¹

CONCLUSIONS

Emerson Moffitt spent most of his adult life striving to improve the specialty of anesthesia. His contributions to the understanding of cardiovascular physiology, cardiac anesthesia practice, and academic anesthesia comprise an important legacy to those entering the specialty. And as much as the anesthesia community has been rewarded by his efforts, he has been equally rewarded by the satisfaction derived from his achievements. Today, both patient care and the profession profit from his dedication and perseverance.

The career of Emerson Moffitt stands as testimony to the spirit of lifelong learning so necessary to the successful physician. Moffitt strove to better understand the unique physiology of cardiac bypass, and having witnessed the procedure from almost the beginning, he had a novel historical and clinical perspective. His career also clearly illustrates the importance of seizing presented opportunities to improve patient care. Emerson Moffitt remains a classic model of a career in anesthesiology, demonstrating the highest forms of professionalism.

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