

Profiles in Cardiology

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John W. Kirklin (1917–2004)

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The second half of the twentieth century witnessed the emergence of many outstanding cardiac surgeons. John W. Kirklin, one of the pioneers of open-heart surgery, had a profound influence on the field. Indeed, his many contributions were so numerous and significant that it is difficult to identify other individuals who had a greater impact on the development of cardiac surgery.

John Webster Kirklin (Fig. 1) was born in Muncie, Indiana, in 1917. In the late 1920s the family moved to Rochester, Minnesota, when his father, a radiologist of growing distinction, was recruited by Will Mayo for their clinic. Graduating from the University of Minnesota with a B.A. degree in 1938, John then headed for Harvard Medical School for his medical degree (1942). It was there he first had an opportunity to observe Robert E. Gross of patent ductus fame, who opened up the possibilities of a career in cardiac surgery to Kirklin.

Following medical school, rather than opt for a straight internship, which was rapidly becoming the mode for aspiring academic physicians, Kirklin, in an early demonstration of his individualistic—some would later characterize as his idiosyncratic—approach, enrolled in a rotating internship at the University of Pennsylvania. He simply thought that this would provide better training and maintained this view throughout his career.

He then took a residency in surgery at Mayo, interrupted by 2 years service in the U.S. Army (1944–1946). There he was assigned to a neurosurgical unit, experience he found very helpful when he later embarked upon his cardiac work. Upon completion of his Mayo residency, Kirklin added

another 6 months of training with Gross in Boston in order to develop skills in the promising new field of cardiovascular surgery before returning to Rochester. His career at the Mayo Clinic, from surgical assistant to departmental chairman, ended in 1966, when he accepted the chair of surgery at the University of Alabama at Birmingham medical school (UAB). There he continued his investigative work in surgery and developed a strong department. His organizational ability and vision led to the establishment of a private foundation at UAB to support the expansion of the medical school and hospital. This led eventually to his recruiting of the distinguished architect I.M. Pei to design the superb clinic that now bears Kirklin's name. No doubt building on the somewhat earlier work of Tinsley Harrison in the Department of Medicine, Kirklin established UAB as one of the leading clinical and academic medical centers in the nation. He stepped down as chair in 1987, remaining in an emeritus position until the time of his death in 2004.

Although John Gibbon certainly deserves recognition for his development of the heart-lung machine, the introduction of open-heart surgery into clinical practice largely became what has been called a tale of two cities: not world capitals, but Minneapolis and Rochester, Minnesota, in the heartland of the United States. Because of initial technical difficulties with the early machines, the University of Minnesota group headed by C. Walton Lillehei at first devised the cross-circulation approach using humans, usually parents, as the supporting "machine" for these procedures. Kirklin and his group at Mayo, which included such valuable individuals as Earl H. Wood in physiology and cardiologist Howard Burchell, opted to persist with the mechanical approach despite much criticism and carping among the medical community. While government support was not readily available for such ventures, the Clinic wisely supported the efforts of Kirklin's group that would eventually prove to be so fruitful. With a modification of Gibbon's device they completed the first continuous series of open-heart procedures for congenital defects.¹ This undoubtedly helped break the dam of resistance and encouraged other groups to enter the field of open-heart surgery.

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FIG. 1 John W. Kirklin, M.D. (1917–2004). Photograph supplied by Dr. Albert D. Pacifico.

As congenital heart disease was the major concern of early open-heart surgeons, many of Kirklin's over 700 papers were devoted to this field. Prominent among his contributions was the promotion of single-stage surgery for tetralogy of Fallot,² closure of all types of ventricular septal defects was also a major interest.³ In some of these and in other defects, in which surgical correction threatened the conduction system of the heart, Kirklin's group early on recognized the problem of surgically induced heart block.⁴ Characteristically, once he defined the problem, Kirklin methodically and thoroughly pursued a solution, spending time with the expert pathologist on this, Maurice Lev, and, in the process, even contributing to new knowledge on the pathologic anatomy of congenital heart disease.⁵ As enthusiastic as he was about the possibilities of open-heart surgery, Kirklin was ever mindful of the possible adverse effects of such procedures upon cardiac performance⁶ and dedicated much of his subsequent work to the amelioration of these factors.

Kirklin's work was greatly aided by the addition of Eugene Blackstone to his staff, with Blackstone's great grasp of statistics and outcomes analysis in addition to his medical qualifications. Kirklin's group introduced a surgical intensive care computerized monitoring system. They also instituted

a non-M.D. surgical assistant program in response to staffing problems in an increasingly busy and complicated surgical practice. Both of these innovations have been widely emulated elsewhere.

Among all his accomplishments it is likely that Dr. Kirklin looked upon his textbook of cardiac surgery as his greatest contribution and it quickly became the standard in the field. With Brian Barratt-Boyes of New Zealand he published the first edition in 1986,⁷ the second edition appeared in 1993.⁸ By the time the third edition appeared in 2003, a year before Kirklin's death, the two original authors had been replaced by five other men—four of whom, however, had been trained by Kirklin.⁹

Some individuals found working with Kirklin quite challenging. His capacity for hard work and long hours was legendary and he expected all who worked with him or for him to follow his lead. As one former resident remembered this experience, "The pace was unrelenting."¹⁰ Kirklin's intensity of focus and rigorous dedication often made him appear distant and even "mechanical" to those who did not know him well. But for those close to him, there was no doubt about his attachment and concern for his patients, his profession, and for the many surgical residents and fellows who have followed in his footsteps. His son, James K. Kirklin, carries on the family tradition as chief of the cardiac transplantation team at the University of Alabama at Birmingham.

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