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Cardiac Surgery 1

Dwight E. Harken, M.D. | Guest Editor

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Editor's Commentary

The history of cardiology is punctuated by a host of brilliant surgical accomplishments contributed by a coterie of perspicacious and skillful surgeons. In my own view, the cardiac surgical advances made thus far in the 20th century will leave an enduring imprint on the clinical practice of cardiology for generations to come. Thus, I am enormously proud of this issue and the one to follow. The various chapters highlight virtually all of the important cardiac surgical advances made in the 1900's, and the authors have all played important roles in the elaboration of the medical and/or surgical developments which they describe. I am grateful to each of them for their participation, and I am especially proud that Dwight Harken has shaped these two issues. Doctor Harken has been and continues to be a towering figure in this vitally important subspecialty area.

The initial papers in this issue deal mainly with historical perspectives and indications for cardiac surgery; subsequent papers elaborate various surgical aspects of congenital and valvular heart disease. The issue to follow, *Cardiac Surgery 2*, will detail surgical intervention for coronary artery disease and its consequences, heart block, pericardial disease, tumors and trauma; other papers will discuss cardiac transplantation, postoperative care, and cardiopulmonary substitution.

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Prologue

Paul Dudley White, M.D.

Every so often I am privileged to express my thoughts about cardiovascular surgery and to pay tribute to the constantly growing number of new pioneers in the field as well as to my old friends and colleagues with whom I myself have grown up. And so I am grateful for this opportunity early in the decade of the 1970s.

Although my prologue does not attempt to present the history of cardiac surgery, which is the subject assigned to the author who follows me, it does concern my personal involvement with various surgical colleagues along the way. First of all, I shall pay special tribute to one who has not only greatly helped many of my own patients in the last quarter century but is now entering a new period of his own career, and is the Guest Editor of the present issue of *Cardiovascular Clinics*, Dwight E. Harken himself.

Dwight Harken has been and still remains one of the most important cardiac surgical pioneers of all in the history of cardiology as he retires from his active teaching position on the Faculty at the Harvard Medical School as Clinical Professor of Surgery Emeritus. He has led all the way during the last thirty years, first in the skillful extraction of foreign bodies from the hearts of our seriously wounded soldiers in World War II without a single fatality, second, in the introduction, along with Charles Bailey in 1948, of the closed technic of mitral valve surgery, third, in helping the initiation in the 1950s of Mended Hearts Clubs all over the world, fourth, in introducing the prosthetic aortic caged ball valve in 1960 and the most physiologic prosthetic mitral valve in 1967, fifth, in sharing with his medical colleagues the credit of success in electrically converting ventricular fibrillation to normal rhythm, sixth, in collaborating with others in the development of the implantable demand pacemaker, and seventh, very recently (December, 1970) at a New York meeting of the American College of Cardiology, in announcing and showing a film of the successful excision of a very irritable myocardial infarct to save a patient from the constant repetition of critical arrhythmias uncontrolled by medical measures. But Dwight Harken is also many-sided. He is still effectively interested in chest surgery of the lungs, in pulmonary tuberculosis, in lung cancer, in the successful campaign against tobacco, and in teaching medically and surgically all over the world. He is a gifted teacher and has made a great impression on his generation of medical and surgical colleagues and students alike and on the public at large.

This specialty of cardiovascular surgery really started in very limited degree before I was born. When I was a young medical pioneer in the new field of cardiology, which we hardly dared to label as such, it was still very primitive. But there were some brave and brilliant explorers here and abroad in the 1920s, such as Eliot Cutler and Claude Beck his assistant, who, with Souttar of London, dared to invade the heart to open stenosed valves. The high mortality of the operations, their inadequate technic, and the opposition of their colleagues postponed further efforts for over two decades. The heart, like the brain when Harvey Cushing started, was still sacred ground not to be penetrated by man.

During that same decade of the 1920s the new chest surgery of the lungs, the pleura, and the pericardium developed with pioneers overseas like Sauerbruch

in Germany who trained some of our chest surgeons like E. D. (Pete) Churchill of Boston who, by a spectacular pericardial resection at the Massachusetts General Hospital, cured a patient of mine, Catherine Southworth (later O'Neil) a girl of eighteen, of an extreme degree of chronic constrictive pericarditis. She lived after that a full and happy life for the next forty years until she fell victim to lymphoma from which she died in 1969. A young Irish surgeon, O'Shaughnessy, a more recent pupil of Sauerbruch, translated his book into English and was one of the first to suggest a supplementary blood supply to the myocardium, depleted of blood by serious coronary atherosclerosis, by implanting the omentum brought up to be attached to the heart. He attended our small group meeting at my home in Chestnut Hill a few months before he was killed in the Battle of Dunkirk, in June, 1940.

Although a more complete history of the development of the field of cardiovascular surgery will be presented by Dr. Litwak, I would add one more early personal experience which has been a red-letter one. In 1938 I was consulted by some of the staff of the Children's Hospital in Boston about a seven and a half year old girl seriously, yes mortally, ill with a large patency of the ductus arteriosus exhausting the heart. A few of us persuaded the senior staff of the hospital to allow Robert Gross to treat this youngster surgically. She (Lorraine Sweeney, now Nicoli) recovered quickly and completely and is perfectly well today more than three decades later. In 1963 she was named "heart mother of the year" by the American Heart Association, having raised a happy family.

I mention these very early personal experiences because they have strongly influenced my attitude to this specialty ever since. I must add one more influence as the result of my acquaintanceship in 1946 with Professor René Leriche of Paris who was pioneering in endarterectomy at a time when we in the U.S.A. did not adequately appreciate the importance of his work.

The last twenty-five years have been fascinating for several reasons and not only because of the rapid progress in the field technically with new suturing devices, artificial valves and arteries, pump oxygenators, internal and external pump assists, removal of aneurysms not only of the blood vessels but of the heart itself, repair of dissection of the aortic wall, pulmonary as well as systemic embolectomies, artificial hearts for total replacement of the human heart, and finally of heart transplants themselves, much of all this still in the experimental stage. Also the surgeons themselves have not only better educated themselves medically and learned how to use the stethoscope, but they have become involved personally in cardiac catheterization and angiocardiography, including the coronary angiogram, and have even become acquainted with the newest cardiac pacemakers. Thus they are no longer at the complete mercy of their greatest critics, their medical cardiologic colleagues, as was manifest in the exciting coronary-surgical debate at the Sixth World Congress of Cardiology in London in September, 1970.

Which brings me to my final comment, namely the happy and equal partnership of medical men and women on the one hand and surgeons on the other, which I have so much enjoyed myself and profited by during my own professional lifetime and which other physicians like myself have also enjoyed. To

name a few such medical partners of the surgeons whom I have known well there have been Laurence Ellis (with Dwight Harken), Helen Taussig (with Alfred Blalock), John Hubbard (with Robert Gross), Sam Levine (with Eliot Cutler and others), and Maurice Campbell of London (with his surgical colleagues), and of course there have been many others both at home in the U.S.A. and abroad. Such a team and partnership are invaluable. The medical partner can, as needed, either stimulate or restrain his surgical partner, while the surgeon by his skill and audacity fascinates his colleague.

I now find a further development of this team idea rapidly and usefully evolving with multiple membership, with subspecialties on both sides, all to the great advantage of the patient as well as of scientific advance; but they must all be personal friends with each other and with their patients in order to reach and to maintain their optimal service to humanity.

If I may add one final word, it is this. When, as I frequently do, I stress *first* the ultimate need and the highest priority of preventive cardiology and *second* the possible recovery by nature and by medical therapy of many very sick patients without surgical intervention, I do not do so at the expense of the marvelous achievements that my friends are accomplishing in the many specialties now included under the title of cardiovascular surgery.

The Growth of Cardiac Surgery: Historical Notes

Robert S. Litwak, M.D.

Evolution of cardiac surgery as a major specialty is the story, in microcosm, of the growth and development of medicine itself. Just as Harvey's discovery took place when the time was ripe, so cardiac surgery has become a reality because the critical mass of information from diverse sources was available for synthesis and use at this ripe time. History, like beauty, is viewed from the eye of the beholder and is certain to be limited in both accuracy and perspective. Indeed, history has been depicted by Herbert Spencer as "masses of worthless gossip furnished us by historians." While some would quarrel with this view, it is clear that the tree of science has branched many times since its faltering birth in antiquity and the expanse of its leaves often distorts or obliterates our view of the solid boughs underneath. Claude Bernard wrote of this: "The names of the prime movers of science disappear gradually in a general fusion, and the more science advances, the more impersonal and detached it becomes."

There is merit in considering what moves men and women of science and particularly those whose contributions have been lasting. Perhaps Lawrence J. Henderson's remarks about Claude Bernard are appropriate for they represent the insight of one distinguished scientist as he looks at another:

> It is possible not only to see [Bernard] at work, but even to discover his purposes and his feelings. The desire to relieve suffering and a sense of duty are clearly apparent, and one may read between the lines the enduring satisfaction that he felt in the society of younger men who owed to him more than they could ever repay. But weightier still are the contentment which comes from work well done, the sense of the value of science for its own sake, insatiable curiosity and, above all, the pleasure of masterly performance and of the chase. These are the effective forces which move the scientist. The first condition for the progress of science is to bring them into play.[1]

Where should these historical notes start? Perhaps one sentence of gratitude is owed to the countless now nameless men of the past whose contributions were made, recorded once, and ultimately consigned to the public domain of accumulated general knowledge. And we would be remiss not to acknowledge those who tried and failed for we often do not know what monuments of success have been built on the rubble of failure. "It is not in the nature of things for any one man to make a sudden, violent discovery," said Sir Ernest Rutherford, "science goes step by step, and every man depends on the work of his predecessors."

"It is clear that Harvey started something," remarks Chauncey D. Leake.[2] With all his insight, the irascible Englishman could not have foreseen what future ramifications his Lumleian lecture (1616) and his *De Motu Cordis* (1628) would have. One wonders whether even that man of genius could have conceived that the ideas he expressed would one day lead to methods whereby precise open intracardiac operations would become standard hospital procedures. It had taken the better part of 2000 years—from Alcmeon, Empedocles, Praxagoras, Herophylos, through the durable dialectics of Galen to Harvey—until a rational conception of the circulation had begun to take shape. Leake comments of Harvey's achievement that it "established the central principle of modern physiology and indeed of medicine, but it also demonstrated the most

effective method of procedure in the natural sciences: a) careful and accurate observation and description of a phenomenon; b) a tentative explanation of how the phenomenon occurs; c) a controlled testing of the hypothesis, and d) conclusions based on the results of the experiments. In addition, he introduced the method of quantitative reasoning which forced validity of the conclusions."

There are those who have expressed surprise that exploitation of Harvey's work was so slow in coming. Why not? In the first place, anatomical demonstration of capillaries was required before Harvey's concept of the circulation could be effectively completed and this awaited Malpighi's description in 1661. Moreover, the idea that altered cardiovascular function could be caused by pathologic changes in heart muscle, valves, and blood vessels was only in its embryonic stage a half-century after Harvey's publication. Finally, that something might be done when the cardiovascular system malfunctioned had undoubtedly occurred to many but rational therapy did not begin until William Withering's careful account of the effect of Foxglove on dropsy and other conditions in 1785.

Although the contemporary cardiovascular surgeon finds no difficulty in agreeing with Gollan that ". . . the secret weapon is . . . reverence for the anoxic tolerance of living tissue,"[3] it is well to recall that long after Harvey's discovery, the exchange of substances between blood and air was but a speculative notion. A group of Oxford physiologists, Boyle, Hooke, Mayow, and Lower, in the decade beginning with 1660 described a series of experiments which were to be fundamental to our knowledge of respiratory physiology, but it was not until 175 years after Harvey's lecture that Lavoisier was led "irresistibly by the consequence of my experiments" to the conclusion that respiration was analogous to combustion and its products were carbon dioxide and water.

"For countless generations the prophets and kings of humanity have desired to see the things which men have seen, and to hear the things which men have heard in the course of the wonderful nineteenth century. . . . The spirit of Science was brooding on the waters," wrote Sir William Osler. He continued, "The most distinguishing feature of the scientific medicine of the century has been the phenomenal results which have followed *experimental* investigations."[4] Cardiac surgery's debt to the mathematicians, physicists, chemists, and physiologists of that century and the early twentieth century needs little amplification but it has become almost customary to give them a respectful nod *en passant* while paying much more attention to those whose contributions had more obvious clinical implications. Thus, much has been written about the work of the early experimental physiologists such as Le Gallois (1813) who had the extraordinary notion that perfusion of any portion of an organism could sustain life; Stenon, Bichat, and other physiologists who observed that brain and neuromuscular function could be temporarily restored after apparent death if blood were passed through the organs; Ludwig and Schmidt who devised an apparatus for pressure infusion of blood into an isolated organ (1868); von Schroeder who oxygenated venous blood by bubbling air through it (1882); and von Frey and Gruber who constructed the first artificial heart-lung machine