

# Standing on the Shoulders of the Giants: Stories of 3 Pioneers

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## ABSTRACT

The history of medicine and surgery is a rich source of interesting stories of genius and brave people who paved the way ahead of mankind towards the current status of medical and surgical practice. One has to admire the enthusiasms and courage of such people to whom millions of patients ought to be grateful. This paper reports the inspiring stories of 3 heart surgeons (Werner Forssmann, Dr. Lillehei and Dr. Michael E. DeBakey) and highlights their outstanding contributions to the modern cardiac surgery. It reminds the people to remember these three pioneers forever and encourages people working in this field to seek innovation.

## KEYWORDS

Medical; Surgical; Stories

## 1. Introduction

The history of medicine and surgery is a rich source of interesting stories of genius and brave people who paved the way ahead of mankind towards the current status of medical and surgical practice. One has to admire the enthusiasms and courage of such people to whom millions of patients ought to be grateful. In this monograph, we present a few such inspiring stories. The purpose is to motivate and stimulate all working in this field.

## 2. Story 1

In 1929, in a small hospital in Eberswalde Germany Werner Forssmann (**Figure 1**), a young surgical resident, anesthetized his own elbow, inserted a catheter in his antecubital vein and, catheter dangling from his arm, proceeded to a basement x-ray room where he documented the catheter's position in his right atrium—proving that a catheter could be inserted safely into a human heart [1].

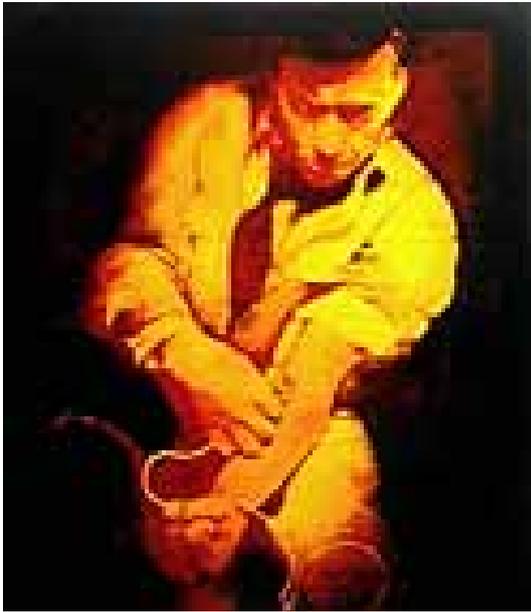
His biographic sketch [1] adds “Forssmann’s goal was to find a safe way to inject drugs for cardiac resuscitation. He was determined that catheterization was the key, but it was believed at the time that any entry into the heart would be fatal. Forssmann was immediately fired for his self-experimentation, despite the significance of his discovery. The popular press acclaimed his work, but the medical establishment branded him as crazy, scorning him and ignoring his work for over a decade [1].

He continued to experiment with catheterization in dogs and it is alleged he stopped self-experimentation only when he had used all of his veins with 17 cut downs. Discouraged by his lack of acceptance in cardiology he switched to urology and eventually became a country doctor. He never returned to cardiology research but was awarded a Nobel Prize in 1956 (along with cardiology innovators Cournand and Richards) for his pioneering efforts” [1].

## 3. Story 2

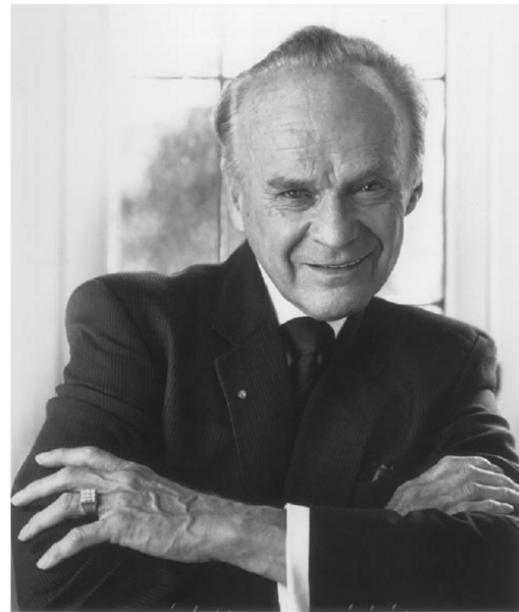
The history of open heart surgery is fascinating. At one

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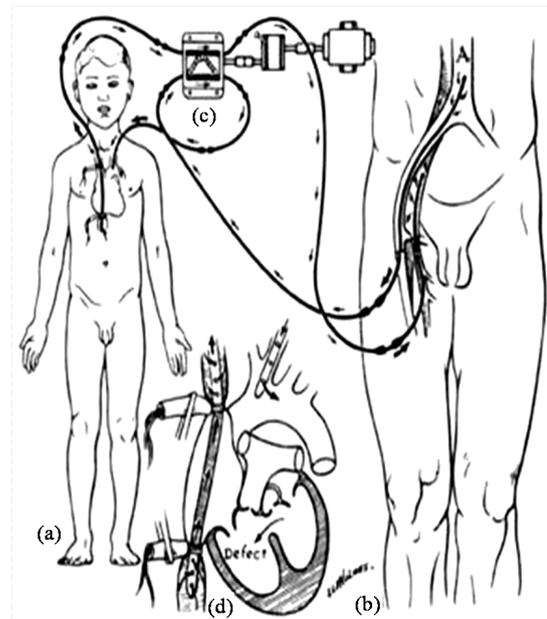


**Figure 1.** Werner Forssmann inserting a catheter into his antecubital vein [1].

time in the history it was strongly believed that surgery on the heart was impossible. Any surgeon dares to do so was considered foolish. The dream of operating on a motionless relaxed open heart awaited genius cardiac surgeons in the fifties of the last century to become a reality. In 1944, Alfred Blalock at Johns Hopkins University had begun successfully performing surgery on the great vessels around the heart to relieve the symptoms of tetralogy of Fallot, demonstrating that heart surgery could be possible [2]. Dr. Clarence Walton Lillehei (**Figure 2**), one of the world's leading cardiac surgeons, researchers, and educators, pioneered a direct, safe approach to open heart operations in the 1950s, named as (controlled cross-circulation) (**Figure 3**) for which he was known as the (father of open heart surgery) [3]. Lillehei participated in 1952, at the age of 35, in the world's first successful open-heart operation using hypothermia [2]. Hypothermia, however, only gave a brief window (up to 10 minutes) during which surgery could be performed and was therefore not suited for complex congenital defects within the heart [2]. This situation was changed in March 1954 when Dr. Lillehei and associates Morley Cohen, Herb Warden, and Richard Varco used controlled cross-circulation to correct a ventricular septal defect in an 11-year-old boy. The boy's anesthetized father served as the oxygenator. Blood flow was routed from the patient's caval system to the father's femoral vein and lungs, where it was oxygenated and then returned to the patient's carotid artery. The cardiac defect was repaired with a total pump time of 19 minutes. Over the following 15 months, Lillehei operated on 45 patients with otherwise irreparable complex interventricular de-



**Figure 2.** Dr. Clarence Walton Lillehei 1918-1999 (Father of open heart surgery) [3].



**Figure 3.** Controlled cross-circulation pioneered by Dr. Clarence Walton Lillehei in 1954. Source: [www.heartviews.org](http://www.heartviews.org).

fects; most of these patients were less than 2 years old. Although cross-circulation was a major advance, it was not adopted for widespread use because it posed a serious risk to the "donor". Nevertheless, this method paved the way for the open heart surgery era [3].

### Who Was Dr. Clarence Walton Lillehei?

Clarence Walton "Walt" Lillehei (23 October 1918-5

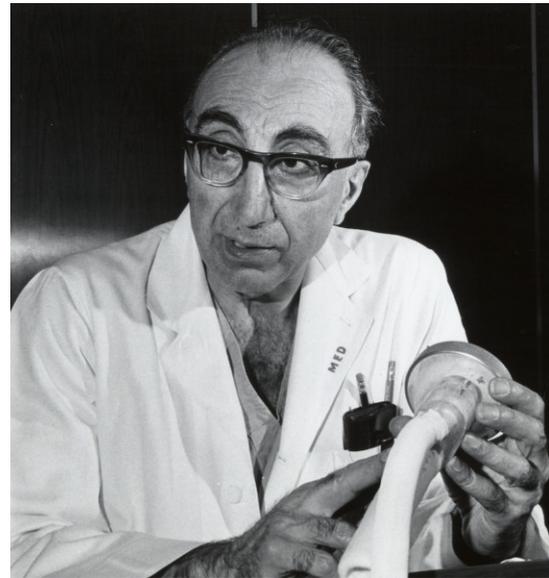
July, 1999) was an American surgeon, who pioneered open-heart surgery, as well as numerous techniques, equipment and prostheses for cardiothoracic surgery [2]. Indeed, hardly any other cardiac surgeon has introduced a greater number of innovative techniques and concepts [3]. In mid-1950, however, his career was interrupted by a devastating health crisis: at age 31, he was diagnosed with lymphosarcoma of the parotid gland and was given a 5% to 10% chance of surviving for 5 years. The day after he completed his senior residency, he underwent head and neck surgery and mediastinal exploration by Drs. Wangenstein and Richard Varco. After subsequent radiation therapy, Walt Lillehei recovered slowly but completely, exhibiting a remarkable degree of courage and insistence. Unfortunately, his neck remained slightly disfigured for the rest of his life [3]. Regrettably, because of deteriorating vision related to his 1950 cancer radiation treatment, he had to end his surgical career at age 55. Nevertheless, he remained active as a lecturer, writer, and consultant [3].

#### 4. Story 3: The Man on the Table Devised the Surgery

Lawrence K. Altman in a cover story published in The New York Times on December 25, 2006 wrote “In late afternoon December 31, 2005 Dr. Michael E. DeBakey (Figure 4), then 97, was alone at home in Houston in his study preparing a lecture when a sharp pain ripped through his upper chest and between his shoulder blades, then moved into his neck [4].

Dr. DeBakey, one of the most influential heart surgeons in history, assumed his heart would stop in a few seconds. The pain became so severe and intolerable that he assumed he had a cardiac attack. He was willing to get a cardiac arrest to get rid of the pain. But when his heart kept beating, Dr. DeBakey suspected that he was not having a heart attack. As he sat alone, he decided that an aneurysm had probably weakened the aorta, and that the inner lining of the artery had torn, known as a dissecting aortic aneurysm. No one in the world was more qualified to make that diagnosis than Dr. DeBakey because, as a younger man, he devised the operation (Figure 5) to repair such torn aortas, a condition virtually always fatal. The operation has been performed at least 10,000 times around the world and is among the most demanding for surgeons and patients” [4,5].

Over 70 years of his career, Dr. DeBakey has changed the way heart surgery is performed. He was one of the first to perform coronary bypass operations. He trained generations of surgeons at the Baylor College of Medicine; operated on more than 60,000 patients [4] including several heads of the state [6]; and in 1996 was summoned to Moscow by Boris Yeltsin, then the president of Russia, to aid in his quintuple heart bypass operation [4].



**Figure 4.** Dr. Michael E. DeBakey (1908-2008), surgeon and aortic dissection sufferer [6].

##### Surgery on a Surgeon

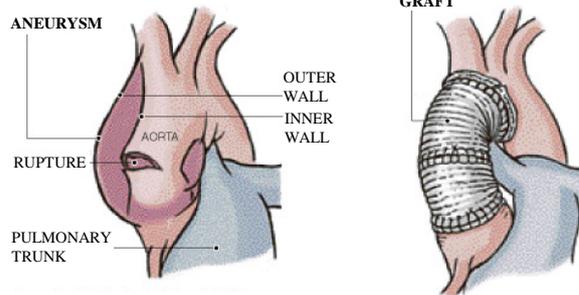
Surgeons operated in February on Dr. Michael E. DeBakey, repairing an aortic aneurysm using techniques that he had pioneered.

##### The Problem

An aneurysm, or a ballooning, developed in Dr. DeBakey’s aorta, the main artery leading from the heart. The wall of the aorta weakened and tore, allowing blood to seep into the inside layers of the artery, a problem that can lead to sudden death.

##### The Repair

A Dacron graft, 6 to 8 inches long, was used to replace the damaged section of the aorta.



The New York Times

**Figure 5.** Aortic dissection and its repair originally devised by Dr. Michael E DeBakey [4].

The New York Times reportage adds “Now Dr. DeBakey is making history in a different way—as a patient. He refused to be admitted to a hospital until late January. As his health deteriorated and he became unresponsive in the hospital in early February, his surgical partner of 40 years, Dr. George P. Noon, decided an operation was the only way to save his life. But the hospital’s anesthesiologists refused to give Dr. DeBakey anaesthesia because such an operation had never been performed on someone his age and in his condition. Also, they said Dr. DeBakey had signed a directive that forbade surgery. As the hospital’s ethics committee debated in a late-night emer-

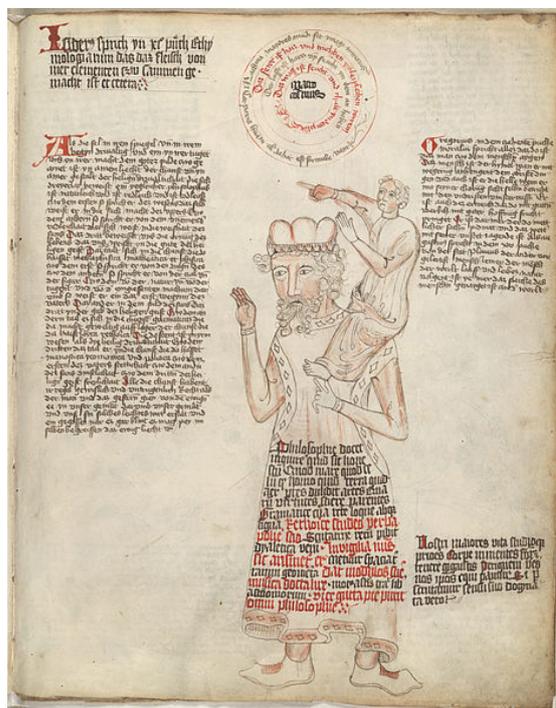
gency meeting on the 12th floor of Methodist Hospital, Dr. DeBakey’s wife, Katrin, barged in to demand that the operation begin immediately. In the end, the ethics committee approved the operation; an anesthesiology colleague of Dr. DeBakey’s, who then worked at a different hospital, agreed to put him to sleep and the seven-hour operation began shortly before midnight on February 9. ‘It is a miracle,’ Dr. DeBakey said as he sat eating dinner in a Houston restaurant recently. ‘I really should not be here.’ At 98, he was the oldest survivor of his own operation proving that a healthy man of his age could endure it” [4].

**5. Comment**

The three stories presented in this paper are just few examples of giant people who served the humanity by their extra-ordinary thinking, insistence and pioneering works. Werner Forssmann deserves to be named (the father of angiography). He had subjected himself to an invasive procedure, underwent 17 venous cut downs, fired from his job... etc. but eventually introduced people into a field with endless diagnostic and therapeutic applications and himself entered the medical history from its widest gates.

Dr. Lillehei solved the problems resulting from oxygenators at that time and provided near natural state by his genius technique of cross-circulation. He avoided using a complex heart-lung machine, yet achieved good results (32/45 survivors) [2] in an era of high mortality due to oxygenator-related problems [3] though he operated upon patients most of them were under the age of 2 years [3]. The story of his malignancy and his visual problem later is really exciting. Though he couldn’t continue his surgical career after 55, he remained active. Dr. Walt Lillehei is “one of the surgical immortals” [3]. Denton A. Cooley, a personal friend of C. W. Lillehei wrote (In Memoriam in Circulation 1999 issue) stating that “Approximately 1000 cardiothoracic surgeons, residing in numerous countries worldwide, can trace their preceptorial lineage to him. Many of these surgeons (including Christiaan Barnard and Norman Shumway) later headed well-known cardiothoracic programs of their own. First- and second-generation Lillehei trainees have developed important techniques in transplantation, perfusion, coronary artery bypass, prosthetic valves, and congenital heart surgery” [3].

When it comes to Dr. Michael E. DeBakey, it deserves to mention that at age 23, while still in the medical school at Tulane University, DeBakey developed the roller pump, the significance of which was not realized until 20 years later when it became an essential component of the heart lung machine [6]. His innovations in cardiovascular surgery are difficult to count. To the amazement of his colleagues and patients, DeBakey continued to practice medicine into an age well after most



**Figure 6. Standing on the Shoulders of the Giants (Latin: nanos gigantum humeris insidentes). The picture is derived from Greek mythology, where the blind giant Orion carried his servant Cedalion on his shoulders. It is a western metaphor first used in the 12<sup>th</sup> century by Bernard of Chartres [7].**

others have retired. DeBakey practiced medicine until the day he died, and nearly reached 100 years of age in 2008 [6].

**6. Conclusion**

Whatever we achieve in our career, we should feel humble and grateful to our predecessors and remember the letters of Isaac Newton “If I have seen further it is by standing on the shoulders of the giants” [7]. See **Figure 6**.

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