

William Polk Longmire Jr. and the first 60 years of coronary artery bypass graft surgery

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ABSTRACT

According to published data, myocardial revascularization procedures to improve blood supply began in 1967, based on the procedures carried out by the Argentine René Gerónimo Favaloro at the Cleveland Clinic. Like many other aspects of cardiac surgery, this fact has also been overshadowed by historical inaccuracies, which have not been adequately clarified; so that the man who performed the first mammary-coronary anastomosis in humans has not been given the credit: Dr. William Polk Longmire Jr. Possibly, the coronary artery bypass began to spring from the seed in the expert hands of Longmire, in Los Angeles on a cold winter morning in 1958. A few years before Favaloro decided to continue watering it at the Cleveland Clinic. This article will hopefully serve as the first of the well-deserved tributes that the undisputed father of coronary surgery will receive this year.

Keywords: William Polk Longmire Jr., Surgery, Myocardial revascularization, History of Medicine

William Polk Longmire Jr. y los primeros 60 años de la cirugía de puentes aorto-coronarios

RESUMEN

Según datos publicados, en el año 1967 se iniciaron los procedimientos quirúrgicos de construcción de anastomosis para el aporte sanguíneo miocárdico, basados en las operaciones realizadas por el argentino René Gerónimo Favaloro en la Cleveland Clinic. Como muchos otros aspectos de la cirugía cardíaca, este hecho ha estado también ensombrecido por imprecisiones históricas, que no han sido adecuadamente dilucidadas; por lo que no se le ha dado el crédito que merece al hombre que realizó la primera anastomosis entre una arteria mamaria interna y un vaso coronario en humanos: el doctor William Polk Longmire Jr. El baipás coronario empezó a salir de su semilla en las expertas manos de Longmire, en Los Ángeles, quizás en una fría mañana del invierno de 1958; unos años antes de que Favaloro decidiera continuar regándola en la Cleveland Clinic. Sirva este artículo –quiza– como el primero de los merecidos homenajes que recibirá este año, sin dudas, el padre de la cirugía coronaria.

Palabras clave: William Polk Longmire Jr., Cirugía, Revascularización miocárdica, Historia de la Medicina

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FOREWORD

Last year, some journals presented articles celebrating the first half century of coronary surgery^{1,2}. The reason for taking 1967 as the beginning of surgical procedures for the construction of anastomosis for myocardial blood supply, was based in the surgeries performed by the Argentine René Gerónimo Favaloro at the Cleveland Clinic from May of that year².

Like many other aspects of cardiac surgery, apparently the birth of the preparation of grafts to the coronary arteries has also been overshadowed by historical inaccuracies, which have not been adequately clarified by some authors. Not all those who have contributed knowledge to the historical development of cardiac surgery, have given the credit that deserves the man who performed the first anastomosis between the internal mammary artery and a coronary vessel in humans, thus beginning the history of coronary artery bypass graft surgery: William Polk Longmire Jr.

For decades, names such as Robert H. Goetz, David C. Sabiston Jr., Vasilii I. Kolesov, Edward H. Garrett, Michael E. DeBakey, René G. Favaloro, George E. Green, among others³⁻⁹ have shared the recognition of being pioneers in the first options of surgical procedures aimed at revascularizing the heart through direct anastomoses. Until the last decade of the last century there seemed to be no doubt about it, but then something happened. By 1992 a pivotal historical compilation, *The Evolution of Cardiac Surgery*, by Harris B. Shumacker, precisely one of those who had also taken part in the original race to discover new ways to increase blood flow to the heart would be published^{10,11}. The author was privileged to have, for the preparation of his book, the testimony of many of the founding fathers of the specialty who were still alive. Thus, in 1990 when Shumacker asked Longmire for historical data for compilation, he informed him that at the beginning of 1958, when he was completely devoted to the execution of the first coronary endarterectomies, he had performed – perhaps for the first time in history – two artery anastomoses between the internal mammary artery and the vessels of the heart. The history of cardiac surgery had changed "in the twinkling of an eye". The birth of myocardial revascularization procedures, was now some years earlier than previously thought.

WHO WAS WILLIAM POLK LONGMIRE JR.?

The fourth son of Grace and William P. Longmire was born in Sapulpa, Oklahoma, on September 14, 1913^{12,13}. Since very young he was in contact with the practice of medicine while accompanying his father—who was the village doctor and surgeon—during home visits to his patients. His academic dedication allowed him to advance rapidly in his studies (he entered high school at the age of 13), and in 1934 he graduated from the University of Oklahoma. Encouraged by his teachers to broaden his horizons, he decided to continue his father's footsteps and soon he was accepted to the only medical school to which he had applied and the first in his country that required a previous university degree, the Johns Hopkins University.

His first interests were directed to anatomy and physiology. While still a student, he published his first article in *The American Journal of Physiology*, and his connection with neurosurgery led the head of that service at Hopkins to consider him as more advantaged than many specialists on his team. In 1938 he graduated as the best of his class and began his internship, and later his surgery residency which he interrupted in the autumn of 1940 when his father suffered a stroke and had to assume his father's practice.

He confidently returned to his hometown with the promise of Dr. Warfield Firor, Head of Surgery at Hopkins, that he could complete his residency once his family affairs were back in order and he could return to Baltimore. That same year Firor was replaced by Alfred Blalock who was not willing to fulfill the offer of his predecessor, and informed Longmire –there are historical inaccuracies in relation to whether it was in a letter or personally– that he could not continue his residence because he needed to decrease the number of personnel in training.

This situation forced him to continue helping his father in Sapulpa as in 1941 was denied the possibility of joining the US Army in World War II due to recurrent hernias. This circumstance could change his life forever. The following year, during a visit to Baltimore, he returned to Hopkins to greet his former colleagues and, as the staff was very reduced due to the conflagration, the Chief Resident of Surgery Mark Ravitch barely managed to convince Blalock to accept him again in his team, but not before clarifying that under no circumstances would that be the "back door" to complete his residence in

the prestigious institution. However, that was all Longmire needed, a chance to prove his greatness: a man accustomed, perhaps like no other, of making good use of every opportunity that life gave him, demonstrated his exceptional capabilities and soon became in one of the brightest young stars of the Hopkins constellation and, eventually, in the trusted resident and principal assistant of Alfred Blalock.

Over the years, Bill Longmire would be the first Chief of Surgery at the University Hospital of Los Angeles. He would develop a long and spectacular career that would make him one of the most successful surgeons in history, undertaking fields as diverse as aesthetic, cardiovascular and general surgery, (important and still widely used procedures on the bile ducts, stomach and esophagus bear his name), transplantation and grafts, among others¹⁴⁻¹⁸.

His professional expertise is summarized in a single anecdote. In the late 1940s the famous British Surgeon Sir Henege Ogilvie, on a visit to the Hopkins, could not help but be astonished to see the young doctor (he was only 27 years old!) Performing his novel operation of biliodigestive bypass, despite to act as Head of the Aesthetic Surgery Service. Intrigued, he asked Blalock, what was really his specialty. He replied: "Bill Longmire is a professor of difficult surgery".

PROTAGONIST OF THE FIRST CORONARY ARTERY BYPASS GRAFT SURGERY?

By 1958, Longmire had been involved in cardiovascular surgery for more than a decade. It became a permanent part of the history of the specialty on November 29, 1944. His position in Hopkins as Head of Residents led him to be the main assistant of the first successful subclavian artery-pulmonary artery anastomoses surgery, which allowed to surgically alleviate the conditions causing insufficient blood flow to the lungs and to start a true revolution in the field of treatment of many congenital heart diseases^{19,20}. History knows this milestone as the procedure (or Blalock-Taussig shunt), but it was Longmire who assisted his professor that historic morning.

During 1949 he boldly ventured into adult cardiac surgery, and almost on par with Madden he operated and reported three of the first five patients whose left atrium was resected in a bold effort to prevent the formation –and future embolism– of thrombi originating in the cardiac cavities²¹. In 1951 he practiced experimental surgery on the pulmonary valve

by developing a superior valvulotomy technique under direct vision, by occlusion of the arterial circulation at that level²². Similarly, in the middle of this decade, he traveled to Europe, to support the development of German post-war surgery as part of the Marshall plan. Many of his articles published in those years (written in German) account for its great influence on the progress of the Teutonic cardiac surgery during this period. By the end of the 1950s the most brilliant surgeons of the time were trying, without much success, to find ways for the surgical treatment of coronary artery insufficiency. However, since the clinical introduction of the Vineberg technique on April 28, 1950²³, this was practically the only operative approach that had shown some encouraging results in this regard, but awaiting the birth of coronary angiography –which would demonstrate the effectiveness of what was proposed by the Canadian– many were skeptical to adopt the procedure²⁴. The direct connection to the coronary arteries was apparently still out of all consideration, however, that was about to change.

In 1956, Charles Bailey performed the first closed endarterectomy, using a blind technique by repeatedly sliding a cupped silver curette back into the diseased coronary artery, thereby removing tubular segments from the atheromatous plaque. It is logical to assume that Longmire, one of the physicians most prone to scientific research and practical innovation in surgery, would enter the worldwide effort to try to give surgical solution to the most important cause of death in Western society. Thus, the following year, he also began to develop thrombo-endarterectomies in the right coronary and anterior descending systems, and very soon published the first technique for the direct approach with the use of extracorporeal circulation, consisting of the longitudinal incision of the vessel, directly on its diseased segment and beyond the limits of the stenosis, to remove the plate under direct vision^{3,25}.

According to the confession that 32 years later he would make to Shumacker, it was precisely during one of these procedures, that without previous planning or intention, the first anastomosis between the internal mammary artery and a coronary vessel in human beings would be constructed. It turns out that, presumably, at the beginning of 1958, the intense calcification in the coronary arteries of two patients caused the almost total destruction of the atheromatous fragment of the vessel. Desperate in front of the fateful end that undoubtedly would have the surgery if blood flow was not reestablished, Wil-

William Longmire and Jack Cannon decided to ligate the proximal segment of the right coronary artery and anastomosed the ipsilateral mammary to its distal portion, decision that made them agree with the result of the surgery. Possibly at that time they were not aware of the great leap that, in their hands, had given cardiovascular medicine, but in a casual and unexpected way coronary artery bypass graft surgery was born.

FULL RECOGNITION?

Unfortunately, William Longmire passed away on May 3, 2003, and perhaps he took to the grave the secret of why he waited so many years to publicize the procedure performed on his two patients in 1958. The truth is that since 1990 they have written a number of texts that address the history of cardiac surgery and many are unaware of the merit of this father of modern surgery, having been the creator of the construction of aorto-coronary bypasses. It is possible that skepticism is the culprit of this discredit, and the cause of the doubts about Bill's sincerity, based on the reasons that led him to keep his feat hidden for so long, despite being a milestone in the field of world cardiac surgery and whose paternity, for decades was conferred on other illustrious contemporaries. However, the study of the Professor's life, as it was respectfully called by all¹³, the admiration that those who knew him and worked with him (in 1965 the first 15 Resident chiefs formed by him) founded the Longmire Surgical Society, whose fundamental precepts are detachment, humility, meticulousness and method¹⁹), and the knowledge of the values that always ruled his ethical and professional behavior, hardly leave room for doubts about the veracity of their testimony.

There are some arguments whose simple analysis prevents discrediting his word.

The first and perhaps most important issue is medical and professional ethics. It should be remembered that Longmire was ahead of his time, and the anastomoses he performed, despite the apparent success achieved, were unplanned, risky and highly experimental procedures for the knowledge and the surgical practice of that moment. If the technique had been reported, it might have been rejected by the scientific community at that time; as happened to Robert Hans Goetz when two years later he performed this type of surgery for the first time, but previously planned and programmed⁵. It is almost

certain that patients were never informed of the final turn that their surgeries took, since their consent should not have included a procedure that they were not expecting. As Bill confessed to Shumacker, later (he did not specify when) he decided that it had been a "good surgery"²⁶ but perhaps by that time another colleague had reported the surgery and decided, honestly, not to steal his possibility to be part of history.

A second issue is that the aforementioned wide versatility of his surgical practice could have also influenced him in not lending it all the interest that its procedure deserved. Both before and immediately after his incursion in coronary surgery, Longmire reports can be found in subjects as diverse as surgery of the adrenal glands²⁷, gastric and esophageal reconstruction²⁹, pancreas affections¹², valvuloplasty treatment for aortic stenosis³⁰, and biliary diseases, at the end of the 20th century, being almost 80 years old³¹. It can then be assumed with total equanimity that such a fruitful and tireless mind could easily move from one project to another without taking the time to publish in detail the results of his multiple works, much less those that could generate a possible ethical conflict.

A third issue is that the Longmire of 1958 cannot be considered a beginner or improvised in the manipulation of the internal mammary. In 1946 (or earlier²⁹), when Vineberg in Canada announced the first results of the introduction of this artery in the myocardium of his dogs, the American already anastomosed mesenteric vessels of a jejunum segment to keep the intestine viable during his aforementioned esophageal reconstruction¹¹. A review of the literature of 1934 showed gangrene of the intestinal loop in 22% of the reconstructions with the Roux pedicled technique. Bill then assumed that inadequate blood supply was the main cause, and through microvascular anastomosis techniques (using magnifiers) devised a procedure –still used today– to feed the jejunal segment from the internal thoracic artery³².

To our knowledge, no author has reported it, but it is possible that by this operation Longmire was the first surgeon to use the benefits of the flow and anatomical situation of the mammary artery for the revascularization of other organs in human beings, and being familiar with this type of procedure, perhaps did not perceived the gigantic step he took in 1958, by directly creating a supplementary blood source for the coronary artery system, at a time when everything that was done about it in the world, was precisely the eponymous procedure of Vineberg³³. His

experience in the performance of surgeries without extracorporeal circulation gained during endarterectomies cannot be forgotten either, since presumably he was also the first cardiac surgeon to go without this technology during the coronary approach^{34,35}; which, obviously, prepared him from the technical point of view to subsequently undertake his anastomosis.

The last and perhaps the most important question is that the version told by Longmire in 1990 is backed by a universal and unquestionable truth: the history of mankind has demonstrated that the greatest inventions of man, have arisen from necessity, chance and setbacks.

EPILOGUE

The current meanings of the word birth, according to the Dictionary of the Royal Spanish Academy, include concepts such as “start to be” and “get out of the seed”. If both definitions are unified, it can be affirmed that the coronary artery bypass began to spring from the seed in the expert hands of Longmire, in Los Angeles on a cold winter morning in 1958; a few years before Favaloro decided to continue watering it at the Cleveland Clinic. The fact that Bill has never specified the exact date of his operations, will allow the world of cardiac surgery to celebrate the first 6 decades of aorto-coronary grafts any day of the year that has just begun. This will be a good reason and moment to finally recognize in all its greatness the figure of William P. Longmire and the feat with which he opened a new era in the cardio-surgical procedures. This article will hopefully serve as the first of the well-deserved tributes that the undisputed father of coronary surgery will receive this year.

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