

SPECIAL ARTICLE

The History of Cardiovascular Surgery in Puerto Rico

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Although isolated efforts to perform cardiac surgery in Puerto Rico (PR) were undertaken as far back as 1916, a concerted one did not take place until the decade of 1950.

In the year 1916, Dr. Rafael López Nussa, a general surgeon who practiced in the city of Ponce, sutured a stab wound of the left ventricle at Hospital Tricoche. The patient died 24 hours later. In 1930, he operated on a second case and had similar results. We know this through an article published in the *Boletín de la Asociación Médica de Puerto Rico* in 1931 by Dr. Francisco R. de Jesús, another general surgeon who also practiced in Ponce at that time. (1) In this article, Dr. de Jesús described his own case (stab wound at the cardiac apex). Since he had serious difficulty suturing the wound, he dissected a piece of the pectoralis major muscle and sutured it over the wound. This case survived for 35 days. The autopsy showed a healed cardiac wound and a large abscess in the left pleural cavity. The patient had died from empyema.

Other isolated individual efforts that have been properly documented, occurred as follows:

1940 Dr. Richard Slagle, during a visit to PR, performed the first pericardiectomy here. It took place at the Presbyterian Hospital and was assisted by our Dr. Jaime Pou, who later became a thoracic surgeon. The patient died.

1946 Dr. David Rodríguez Pérez was the first to ligate a patent ductus arteriosus in PR. He did so at the Bayamón Charity District Hospital. He presented the case during the Annual Meeting of the PR Medical Association (PRMA) on November of that year. (2) I witnessed the presentation.

1948 Dr. Isaac Bigger, a guest surgeon at the PRMA

Annual Session, graciously acceded to operate a case of adhesive pericarditis. The pericardiectomy was carried out successfully at the Hospital of the School of Tropical Medicine. Dr. Frederick González, our first certified anesthesiologist, was in charge of the anesthesia. (3)

1950 Dr. José Noya Benítez, then recently appointed Head of the Department of Surgery of the Medical School (University of Puerto Rico), performed the first portocaval shunt done in PR (cirrhosis of the liver). The operation took place at the Professional Hospital in Santurce and he was assisted by Drs. José S. Licha and Alberto Adam who later became a cardiovascular surgeon.

But let's go back to Dr. Rodríguez Pérez. In the year 1950, he went to Johns Hopkins University in Baltimore to learn the surgical techniques of Dr. Alfred Blalock. During his stay, he observed the Blalock-Taussing operation and was the first to perform it in PR on a case of tetralogy of Fallot. In 1953, he was the first to perform a mitral commissurotomy (closed method) on a case of rheumatic mitral stenosis. Dr. Ernesto Marchand was the attending cardiologist. During the years 1955-1956, Dr. Rodríguez Pérez, assisted by Drs. Gumersindo Blanco and Alberto Adam, successfully accomplished the first cardiopulmonary transplant carried out in dogs in PR. One dog had the longest survival of any done in the world at that time, including the Russian program. In 1962, he resected a tuberculous stenosing lesion in the aorta and replaced it with a Teflon graft, with a favorable outcome, a rarity even in today's experience.

Dr. Rodríguez Pérez operated mainly as a thoracic surgeon but also did cardiac surgery, mostly during the 70's and 80's, at the Veterans Administration Hospital (VAH). He is considered one of the pillars in cardiovascular (CV) surgery in PR and he is a co-founder of the Association of Thoracic Surgeons at the national level.

Dr. Jaime Costas Durieux, a pioneer in the Ponce area, was the first Puerto Rican surgeon to receive formal training in CV Surgery. This happened during the years 1951-1952 at Hahnemann Hospital in Philadelphia, under the tutelage of the renowned Charles P. Bailey. Three

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months after the one performed by Dr. Rodríguez Pérez at Bayamón, he accomplished the first mitral commissurotomy at Ponce on July 13, 1953. Three days later, he was the first to divide a patent ductus arteriosus in PR. In that year, he was the first to perform an aorto-pulmonary anastomosis (Pott's) in a patient with tetralogy of Fallot and the first to dilate a stenosed pulmonary artery in a similar case. He participated in an anecdotal and humorous incident in the year 1955. While the urologist Dr. José Gelabert was doing prostatic surgery in a given case, the patient developed an acute episode of ventricular flutter-fibrillation. Dr. Costas, who was operating in an adjoining room, was informed of the emergency. He immediately obtained two electrodes, connected them to an electric outlet with electric wires and applied to the patient the first shock therapy recorded in our island. I was told that the patient "bounced" a foot on the operating table but the procedure saved his life as the arrhythmia converted to regular sinus rhythm. Just in passing, may I say, that it took eight years for the hospital owners to buy a Lown Cardioverter....

The decade of 1950 was an explosive one in relation to the development of cardiovascular surgery in PR. Here are what I consider the ten most important events responsible for its evolution:

- 1950 The establishment of specialized cardiac clinics.
- 1950 Founding of the PR Heart Association.
- 1950 Initiation of Pediatric Cardiology as a sub-specialty.
- 1952 Birth of Cardio-Vascular Radiology.
- 1954 Creation of the Animal Laboratory for Experimental Surgery.
- 1955 Institution of the Cardiac Board.
- 1955 Establishment of the Cardio-Pulmonary Laboratory (CP Lab)
- 1956 Use of cardiac catheterization.
- 1957 Initiation of open heart surgery under hypothermia.
- 1959 Initiation of open heart surgery under extra-corporeal circulation.

The CP Laboratory, an essential feature for the appropriate practice of cardiac surgery, was founded, organized and directed by Dr. José M. Torres-Gómez in 1955. It was the first one established in PR and was attached to the Department of Medicine of the School of Medicine of the University of PR. The Department was headed by Dr. Rurico E. Díaz-Rivera and the laboratory was located in the historical Santa Rosa Building of the San Juan City Hospital, Stop 22, Calle De Diego.

Since the first patients to be operated were congenitals, a precise diagnosis was a necessity. The Cardiac Board

was instituted in the same year and the first cardiac catheterization was performed on February 15, 1956. It revealed the presence of an atrial septal defect (ASD). However, the first ASD operated upon was catheterized on October 3, 1956. The facilities for open heart surgery under hypothermia were available only at this time and Dr. Frank Raffucci was the successful surgeon.

Five months earlier, Dr. Raffucci had consulted with Dr. Torres-Gómez over the case of an 8 year old girl (Alicia Calderón). The diagnosis of tetralogy of Fallot had been made but Dr. Torres-Gómez was intrigued by the appearance of a marked left electrical axis deviation on the electrocardiogram. In short, a diagnosis of tricuspid atresia was made instead, which was confirmed at Minnesota where a Blalock-Taussing anastomosis was performed with notable improvement. This was the first case of tricuspid atresia clinically diagnosed in PR. About 5 years later, the anastomosis closed spontaneously and a cavo-pulmonary one was accomplished at the Rio Piedras Medical Center by Drs. Enrique Márquez and Francisco E. Oliveras. Years later, this shunt also closed spontaneously and a right atrio-pulmonary communication was achieved with complete success. The patient is still alive and works as a secretary at the time of this writing.

Another "first" was the one contributed by Dr. Mario R. García-Palmieri. He had taken care of a 40 year old female (Hortensia Rivera de Rexach) who had suffered an acute myocardial infarction. Not content with the patient's convalescence, he consulted Dr. Torres-Gómez on the indication of a cardiac catheterization. The consultant found it justified, it was carried out and an ASD was discovered. The patient became the first case of open heart surgery under hypothermia performed in a private hospital (Doctor's Hospital) in PR. On October 27, 1957, Dr. Raffucci, assisted by Drs. Luis Díaz Bonet and José F. Bernal, performed the successful operation. Dr. Ariel Méndez was the anesthesiologist. A 41 year follow-up reveals that the patient is still doing well.

Dr. Alfred Axtmayer, another pioneer in CV surgery, trained under Dr. Hufnagel in Georgetown University. On his return to PR, he practiced at the San Juan Veterans Administration Hospital (VAH). At that institution, he performed its first pericardiectomy (1953), its first mitral commissurotomy (closed method; 1955) and the first resection of a ruptured abdominal aortic aneurysm with graft replacement and survival (1959). In 1963, he implanted the first permanent pacemaker with epicardial electrodes at a private hospital (San Jorge Hospital).

At about this time, the Puerto Rican community had not completely welcomed open heart surgery; was still afraid of its risks. A stimulus was needed to make the people accept its benefits. The donations at the PR Heart

Association had also fallen and a message was needed to spur our people to give. It was then when Mr. Edgardo Urrutia, pharmacist-member of the Board of Directors, came up with a very attractive suggestion. "Why not invite Dr. Christian Barnard to come to PR as a guest of the Heart Association? He has recently performed a notorious cardiac transplant in South Africa." The Board approved the proposal and Dr. Barnard came to PR.

There is no question that his visit was a complete success. His lectures, appearances and publicity did wonders in the Puerto Rican community. Now a native surgeon was needed to promote the surgical sub-specialty. Yet, this was already occurring in the person of Dr. Raffucci. An able, talented and aggressive surgeon, he is considered, without doubt, the foremost pioneer in Cardiac Surgery in PR. Around him, this sub-specialty really blossomed.

In 1954, Dr. Raffucci created and directed the first Laboratory of Experimental Surgery in PR on the grounds of the Institute of Tropical Medicine. I already made reference to the CP transplants in dogs achieved by Dr. Rodríguez Pérez and his co-workers in this work-place. It was here where Drs. Gumersindo Blanco and Alberto Adam demonstrated that open heart surgery could be performed during retrograde perfusion of the coronary sinus in the absence of the "pump" (1957). This was the most efficient way to maintain the myocardium oxygenated when CP bypass was not available. It was here where Dr. Raffucci devised the best approach for aortic valve repair known at that time. It was here where he produced interventricular and interatrial septal defects in dogs for Dr. Torres-Gómez to diagnose as unknowns through catheterizations. And so on.....

Dr. Raffucci also developed a school of surgeons via a residency program. Eleven of them proceeded to become involved in cardiac surgery. Drs. Ricardo Arredondo, José F. Bernal, Juan Sanabria and Marino Blasini later assisted in CV operations. Drs. Efraín Defendini, Enrique Márquez, Leovigildo Cuello, Francisco E. Oliveras, Luis A. Fraguada, José Pérez Anzalota and Víctor Carlo became certified CV surgeons. In 1970, in an activity that took place at the Hotel La Concha (Condado), his residents honored him with a Silver Platter on which their names were inscribed. Their work could be considered an indirect contribution of Dr. Raffucci.

Here is what some of them have accomplished:

Dr. Efraín Defendini, a Thoracic and Cardiac Surgeon, later trained in the United States. In 1964, he was appointed Chief of the Cardio-Thoracic Section of the Department of Surgery of the San Juan City Hospital. The Pavía Heart Institute, now ably directed by Dr. Raúl García Rinaldi, evolved from the CV Center initiated by Dr.

Defendini. In 1967, he operated the first ASD under extracorporeal circulation at a private hospital (Pavía) with survival. He was assisted by Drs. Arredondo and Just-Viera. In 1969, he organized the first accredited residence in CV Surgery in PR. In 1971, he became the director of Cardiovascular Surgery at the University of PR School of Medicine and the University Hospital.

Another pupil of Dr. Raffucci was Dr. Enrique Márquez. In 1964, he became a Pediatric CV surgeon after training in the United States and Canadian institutions. In 1968, he was the first to replace the tricuspid valve in a 5 years old child with Ebstein's anomaly; he was assisted by Dr. Raffucci. In 1969, he was the first to achieve a double implantation of the mitral and aortic valves with survival (assisted by Dr. Defendini). In 1970, he was the first in PR to correct an anomalous pulmonary venous return in a 6 month old infant with survival. In summary, Dr. Márquez contributed substantially to the development of Pediatric CV surgery in PR. He was known as an innovator as he continuously modified his surgical techniques.

Dr. Francisco E. Oliveras was another CV surgeon who made history in this field. In 1968, together with Dr. Márquez, performed the cavo-pulmonary anastomosis in the already-mentioned case of tricuspid atresia. After the year 1970, up to the appointment of Dr. Defendini as Chief of the Service, and again with Dr. Márquez, he filled the gap left by the retirement of Dr. Raffucci.

In May 1971, Dr. José Pérez-Anzalota performed the first coronary artery bypass in PR. It took place at the Rio Piedras Medical Center and the catheterization was carried out by Dr. Luis Román Irizarry.

Dr. Víctor Carlo practiced mostly at Ponce. By 1972, he had to his credit over 30 operations under CP bypass.

But let me go back to Dr. Raffucci. Between the years 1954-1956, he had accumulated the largest series in the world of porto-caval anastomoses in hepatic schistosomiasis. In 1956, he was the first to correct a coarctation of the aorta in an adult. In the following year, he was the first to correct an ASD under hypothermia. In 1958, he was the first to attempt the correction of aortic dissection but unsuccessfully (diagnosed clinically and confirmed at operation). In 1963, he was the first to implant an artificial mitral valve in PR but the patient died. He was assisted by Dr. Soltero-Harrington. In the same year, he was the first to implant a cardiac pacemaker. In the following year, he was the first to implant an artificial aortic valve (McGovern).

Like other pioneers, Dr. Raffucci had his failures, yet, if there is someone who opened the door to CV surgery in PR, it was he. In his favor it is fair to state that the patients referred to him for operation were far from being

in the best condition for intervention. During his term as Chief of the Department of Surgery of the University Hospital, more than 1,000 operations of the CV system were performed. Like Dr. Rodríguez-Pérez, he too was a co-founder of the Association of Thoracic Surgeons at the national level. In addition, he was elected to the exclusive Association of American Physicians. He died on October 14, 1971.

Dr. Luis Soltero Harrington was the first certified Pediatric Cardiac Surgeon to arrive at PR (1959). He trained under Dr. Denton Cooley at the Houston Medical Center. Soon after he arrived, he was named Chief of CV Surgery at both the San Juan City Hospital and the School of Medicine. Aside from his many surgical contributions which I will mention, he made another crucial one: he brought his wife Joyce Carpenter.

Mrs. Soltero-Harrington had acquired ample experience in the use of the "pump" in the United States. After she arrived in PR, she took charge of the program of extracorporeal circulation which had been discontinued for 9 months because of poor results. Under her guidance, the program was a success from the start and CV surgery was revived. In 1962, Víctor Pérez, a technician originally trained by Dr. Rafael Sorrentino and later by her, took charge. Dr. Soltero-Harrington (uncle of Dr. Ernesto R. Soltero, another Puerto Rican certified CV surgeon) was the first to perform cardiac surgery in infants in PR. On April 13, 1960, he corrected successfully a VSD under CP bypass. In the same year, he introduced the technique of pulmonary artery banding to alleviate cardiac failure so that infants could later be operated upon with less risk. In little over two years, he assembled the largest series known in the world at that time. The data was presented at the World Congress of Cardiology held in Mexico City in 1962.

Between the years 1960-1963, he performed the Hanlon-Blalock operation in patients with transposition of the great vessels, creating a common atrial mixing chamber. At that time it was considered a corrective procedure for such patients. He carried out numerous Pott's anastomosis, cardiorrhaphies, valvulotomies, corrections of aortic coarctation and many other operative procedures.

On March 1963, he was the first in PR to implant an artificial mitral valve in a 10 year old child, with survival. On August of the same year, he performed a similar operation on an adult with an equally favorable result. His assistants were Drs. Fraguada and Benmamán, who, by the way, had been residents under Dr. Raffucci. There is no doubt that Dr. Soltero's contribution was remarkable. His surgery was notorious by his very low mortality.

Dr. José S. Licha was a general surgeon who participated

in many CV cases. In 1957, he performed the first successful embolectomy at the abdominal aortic bifurcation with complete recovery of the circulation in both lower extremities.

Dr. José L. Iturrino, a thoracic surgeon, practiced in the area of Mayaguez. Among his work, he implanted pacemakers and did several mitral commissurotomies (closed method).

As we entered the decade of 1970, it was evident that coronary artery bypass surgery was to be the standard bearer of CV operations. Yet, for it to develop in PR, we needed the introduction to coronary angiography, just as we needed cardiac catheterization for cardiac surgery to develop in the 50's. Dr. Eduardo Medina de la Baume was already proficient in doing selective arteriography. But it was in 1969 when the first coronary angiogram was performed in PR. Dr. Efraín García, one of the graduates from our medical school (1955), had been invited by Dr. José E. López, another of our graduates, to deliver a series of lectures at the Medical School. Dr. Edwin Lugo, Chief of the CP Laboratory at that time, made use of this opportunity to ask Dr. García if he could give a demonstration of how to perform a coronary angiogram. He acceded and was responsible for the first procedure of this type to be performed in PR.

In December 1970, Dr. Luis Román-Irizarry was the first to repeat the procedure at the Rio Piedras Medical Center and Dr. José Pereyó initiated the program at the VAH (1972). Dr. Pérez-Anzalota performed the first coronary artery bypass at the Rio Piedras Medical Center on May 1971.

It took 12 years for the next historical event to take place. In July 1984, Dr. Emilio del Toro performed the first coronary angioplasty at San Lucas Hospital in Ponce. At the same time, Dr. José Martínez-Toro did the same at the University Hospital in San Juan. By this time, 4 Centers became actively engaged in CV Surgery in PR: one in Ponce and 3 others in the San Juan metropolitan area. I do not include the Cardiology Unit at the VAH because their Cardiac Surgery Program has been discontinued for several years. However, I must point out that on June 7, 1972, Dr. José Marín Cancel was the first in PR to implant a Mobin-Uddin teflon umbrella in the inferior vena cava to prevent major pulmonary embolism in a patient with venous thrombosis in his lower extremities.

The Cardio-Renal Center at Ponce was created by Dr. Héctor Rodríguez Estapé, a cardiologist, in 1966, at the Ponce District Hospital. He later moved the Cardiac Unit to the San Lucas Hospital and brought Dr. Hugh Wilson from the States to start the Cardiac Surgery Program which included CP bypass cases. It was successful from the

beginning, Drs. Sergio López-Totti and Víctor Carlo followed him. In September 1966, Dr. López-Totti implanted the first permanent pacemaker that was achieved at Ponce.

Dr. Emilio del Toro, its present Chief of Cardiology, and Dr. Roberto Torres-Aguiar were the first to insert stents in the coronaries in 1994. Since then, Dr. del Toro has become the foremost proposer and defender of the stents. Their present CV Surgeons are Drs. Salvador Jiménez and Javier Pérez.

The CV Center at San Pablo Hospital (Bayamón) was inaugurated in 1987 with the implantation of a pacemaker by Dr. Jorge García Gregory, who graduated from our Medical School in 1973. On the following year (1988), he was the first to perform a percutaneous transluminal coronary angioplasty (PTCA) at this hospital. On July 17, 1989, Dr. Manuel Martínez Colón carried out its first cardiac surgery with assistance of Dr. Juan Ramón Vilaró. Dr. Martínez Colón is at present the Director of CV Surgery at this institution.

The Pavia Heart Institute is the offspring, as I have already stated, of the Cardiac Surgery Center initiated by Dr. Defendini in 1964. When the latter became full-time Professor of Surgery at the UPR School of Medicine, Dr. Raúl García Rinaldi, who had been practicing in the States, gradually entered into the scene. By 1991, he finally established himself in PR and took full charge of the center. Under his knowledgeable and aggressive leadership, the center has become the prestigious Pavia Heart Institute where a wide range of surgical services is offered.

The Centro Cardiovascular de PR y del Caribe is the youngest of all. This Public Hospital owned by the Government opened its doors in the year 1992 and is located on the grounds of the Rio Piedras Medical Center. The promoters of this CV Surgery Center were Drs. García-Palmieri and Defendini. The latter became Chief of the Department of Surgery until 1996 when Dr. Iván González Cancel took over. Dr. José Martínez Toro is the Director of the Invasive Laboratory. This physician is the

first to use the rotablator (1995), the first to perform a pulmonary valvotomy with the balloon technique (1996), and a similar operation on a coarctation of the aorta (1997) in PR. On this occasion, he was assisted by Dr. Angel Espinosa. Dr. Raúl Jiménez Castro has been a valuable addition to their staff. He is a clinical electrophysiologist in charge of catheter ablation therapy using radiofrequency current for the elimination of intractable and life-threatening arrhythmias associated with accessory pathways, pre-excitation syndromes, AV nodal reentries, etc. Dr. Germán Malaret is the Medical Director and Dr. José Eugenio López is the omnipresent cardiologist whom I consider to be the soul of the Center.

So, where do we stand today? In general, we can safely say that not much time elapsed between the occurrence of advances in the field of cardiac surgery anywhere in the world and their availability to the Puerto Rican patient. This is to the credit of our physicians, who have been at the vanguard more than once.

We can also safely say that, with the exception of Laser therapy, cardiac transplantation and transcatheter occlusion devices, practically every other type of cardiac surgery can be offered, at present, to our patients.

Let us hope that, in response to Seminars such as the one we are enjoying today thanks to the auspices of Dr. García-Rinaldi Foundation, we continue to progress in the field of cardiac surgery so that we may place at the disposal of our patients, the best cardiac surgery services that are available in the world today.

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