

The mechanisms of ventricular tachycardia, Leo Schamroth and Guy Fontaine 30 years ago

It was the third specific international meeting for cardiac arrhythmias to which I had been brought to make a statement regarding our original work concerning the results of surgery for the treatment of ventricular tachycardia. It was organized by Eric Sandoe (Denmark) and Desmond Julian (England) at the University Hospital of Copenhagen in May 1978. My talk was scheduled for the following day when an important conference of Prof. Schamroth was to take place. To better understand what occurred, it is necessary to introduce the exceptional personality of Leo Schamroth, established in South Africa where he completed his medical studies in the company of Dr. Dennis Krikler and Dr. David Friedberg. The former was established secondarily in London's Hammersmith Hospital as a member of the group of Dr. J.F. Goodwin. His thesis on the syndrome of Wolff-Parkinson-White (WPW) was a milestone. David Friedberg settled in Milwaukee (Wisconsin). He played a specific role in my life by introducing me to Manuel Villafana, who enabled me to use the first lithium cell pacemakers in France.

To return to Leo Schamroth, he was the archetype of a brilliant, intellectual Jew of the cardiologic world at the top international level. He had established his celebrity by publishing several books, in particular on the interpretation of the disorders of cardiac rhythm starting from the electrocardiogram, in the tradition of Alfred Pick, Richard Langendorf and Charles Fisch. I learned much later that Leo Schamroth had very little interest in the patients but much more in the ECGs coming from the whole world. He scrupulously examined them with callipers. From these measurements, he was able to build quantified diagrams resulting in an understanding of the mechanisms of rhythm disorders, with an admirable rigor.

Leo Schamroth, was tall, thin, well spoken and spoke elegant, perfectly articulated English. He was known for the brilliance of his conferences. He had thus been invited by Sandoe and Julian, to speak on the "Mechanism of Ventricular Tachycardia". The conference did not form part of the ordinary program of the congress which took place in the buildings of the University of Copenhagen. Being

given the rank of the lecturer, the organizers had hired the vast ballroom of the Hilton hotel with candelabra, gilded chairs and red velvet. From the start, all this gave a solemn feel and a particularly social event.

It did not leave a doubt in anybody's mind that this conference was going to be the "highlight" of the symposium, and everyone was there. Moreover, the front rows were occupied by many academics and cardiologist friends of Eric Sandoe, many of them accompanied by their wives. All of these ladies were adorned in long black evening dresses, some of which floated around them like a light naphthalene perfume. Some wore low necklines, which had been cut at one distant time a number of years ago, that I would have concealed through discretion. Important cardiologists from the Danish high society were also invited, friends of Prof. Sandoe, and their wives. All of this formed an impressive company which occupied all of the seats up to the 5th or 6th row. The seats intended for the invited speakers were next. It is thus in this position that I sat, beside important people such as John Gallagher, Philippe Coumel and many others... All were eager to hear the great conference of Prof. Léo Schamroth. He entered the stage as a star, introduced by Sandoe, accompanied by a long salvo of applause.

In a few minutes I understood that Schamroth was going to perform a high level demonstration on the mechanisms of ventricular tachycardia, drawn from his own electrocardiographic experience. The quoted references were not among the most recent... His talk was also illustrated by many quotations extracted from the non-medical literature. As envisaged by those who knew Schamroth, he decorated his speech with quotations extracted from the Bible and Conan Doyle for which he gained great admiration. The audience already understood that he was interested in the rigor of the logic of the human spirit, and, on the other hand, the failures of thought. Thus, while presenting his electrocardiograms, he underlined the fact that in the spirit of the common people, it was Eve who had tempted Adam with the apple, and it was well-known that Sherlock Holmes, addressing his usual partner, had

said to him, “Elementarily, dear Dr. Watson, with what do we start?”.

The slides followed one another and everything indicated that the mechanism of ventricular tachycardia was due to the phenomenon of “ectopic focus”, even if there existed some extremely rare cases suggesting the phenomenon of “re-entry”, which were regarded as “debatable”. The arguments culminated at a point, repeated for the second time, that some cases were “debatable” and could have been interpreted as phenomena of re-entry. There was no doubt in his mind, nor in the minds of his admirers in the first 6 rows, as well as their wives — entranced by his eloquence, that the ectopic theory of “heart rhythm disorder” was by far the concept which it was most necessary to bear in mind concerning the mechanism of ventricular tachycardia. He finished the conference while implying that if one suggested other mechanisms such as those of re-entry, they had been elements built artificially in the minds of those who had listened to them. They did not correspond in fact to anything very significant, as was the case in the history of paradise on earth... Contrary to all that one might think, even if one read the Bible from the first to the last line, there was never the question of an apple between Eve and Adam, and in the same way, one could read the work of Conan Doyle from beginning to end, and see that there never existed a passage in which Sherlock Holmes turned to his collaborator and said to him “Elementarily, dear Dr. Watson, with what do we start?”. It was thus clear that if one were to preserve something in one’s mind, it was that the mechanism of ventricular tachycardia was due to the “ectopic focus”...

This last formula was managed with liveliness and a plume which caught the admiration of the listeners and of course started a thunder of prolonged applause...

Indeed, hardly the last applause had died down when Prof. Sandoe seized the microphone and in a tone which was not without humour, declared quietly “I would like to know if there is anybody in the room who does not agree with what Prof. Schamroth has just said?”. This caused, as one would expect, general hilarity among the audience. It is easy to understand that even if I personally had a different opinion, I was among the first to appreciate the quality of Prof. Schamroth’s presentation; it was, in itself, part of a masterpiece in front of which one could only agree. Instead of concluding the meeting and letting us return to our hotels quietly, Prof. Sandoe took the microphone again and started to quote the names of some of the most

eminent electrophysiologists who were among his guests, starting with some unknown names, then my friend Dr. John Gallagher, the famous American expert in cardiac arrhythmias at the forefront of some exceptional work on the surgical treatment of WPW syndrome, Philippe Coumel, who also paid attention to WPW syndrome in France. Of course, they agreed completely with the opinion of the master...

At this point in time a phenomenon occurred which started my pulse racing. The third quoted name was obviously that which I had been dreading, the name of someone who, in terms of animal species, would have preferred to be a mouse in a hole rather than be confronted with such an uncomfortable situation.

What could I do? After a short pause to think about the end of my career, I was “scientifically” obliged to raise my hand and go to the microphone located in the middle of the central aisle. This started as one would imagine: the rotation of all the heads in the first 6 rows, including those of the ladies in large, black, low-neckline dresses. Moreover, the flabbergasted eyes of the back rows of academics and high-class cardiologists scanning the imprudent unknown who dared to oppose to the master, their glances expressing surprise, not to mention plain disapproval...

After starting by underlining the high standard of the conference, and by supporting myself with the fact that the speaker had said that certain cases were “debatable”, I proposed the existence of new electrophysiological concepts related to the induction and termination of ventricular tachycardias by the stimulation and presence of “late potentials”, about which I was going to speak the following day.

Prof. Schamroth indicated that he would be extremely interested to assist and criticize this talk, and the evening finished with a generalized hubbub, my pulse finally returning to within normal limits. Not for long, however, because my presentation took place the next morning, so I could not stop thinking about being re-examined and even re-re-examined, I selected and reselected all of the slides presenting the “late potentials” recorded during surgical operations, observed in sinus rhythm, their behavior during stimulations and their presence in the course of ventricular tachycardia. This had been written in three chapters of the book by Sandoe and Julian, illustrating what had been called for the first time the “syndrome of post-excitation”.

After this presentation, before which I had not failed to see that Prof. Schamroth was sitting at the front, he asked for a word immediately, and made

a long intervention indicating that the presence of "late potentials" and their particular dynamic behavior under stimulation and in the course of ventricular tachycardia were a phenomenon about which there was nothing to argue because it was an undeniable scientific fact. He repeated this concept three times; however, my interpretation of the electrogenesis of these potentials could lead to a discussion. Indeed, my assumption was based on the presence of surviving myocardial fibres within fat cells, forming small strands which one could feel intuitively were the place of slowed down conduction, while basing oneself on the known phenomenon of the cable theory about which I had already spoken.

Nevertheless, Prof. Schamroth quoted that he had telephoned the most brilliant electrophysiologists he knew. He quoted certain names from England and especially from the United States — his friend Gordon Moe, the famous cellular electrophysiologist from Utica (New York). He had also telephoned to Dr. Andy Wit of Columbia University, while insisting on the name of this famous university. Dr. Wit belonged at this time to the department of Prof. Brian Hoffman, one of the fathers of cellular electrophysiology, as well as those who had formulated different interpretations, calling upon the electrotonic potentials in particular, which would be shown experimentally a few years later, letting it be known that these researchers, surely informed of the discovery of late potentials, had built in their laboratories methods allowing them to measure the electric field located remotely from certain groups of cells surrounded by a non-activable conducting medium.

The discovery of "gap junctions" and the preliminary studies on connexin Cx43 implied that disorders of cell-cell conduction could be the result of a reduction in expression of this protein, which is definitely less rich in the right ventricle of

Naxos disease patients than in the left ventricle. These two situations being themselves weaker than those observed in a series of controls.

In the history of knowledge, the meeting with Leo Schamroth was remarkable. It stigmatized the major changes which were going to take place in the world of cardiac arrhythmias. On the one hand, the fine analysis of their mechanism and their classification based on the conventional electrocardiography, and on the other hand, the beginning of clinical electrophysiology, which "entered by the large door" with the electric stimulation of the human heart with percutaneous catheters, the first cardiac maps in sinus rhythm, then during ventricular tachycardia, and in our case the discovery of the "late potentials" which had not been seen on the ECG.

They will be reported later, but starting from the knowledge obtained through clinical electrophysiology.

It was clear that Prof. Schamroth quoted the American electrophysiologists abundantly, but, apart from rare exceptions, they were laboratory men who meticulously explored the behavior of the heart at an almost exclusively cellular level and provided the basis of what later will facilitate the work of clinical electrophysiologists. However, the phenomenon of "slow conduction" of the cellular electrophysiologists was based on the behaviour observed in cells insulated in a medium modified by physical or pharmacological agents far away from clinical reality. The concept of "slow conduction" introduced by clinical electrophysiology was quite different by nature since it related to anomalies concerning of whole pathological zones in close connection with known affections. It was going (not without sorrow) gradually to supplant that of the laboratory men whose contribution had, however, played a determining role in the comprehension of the electrical behavior of cardiac cells.

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