



Mauricio B. Rosenbaum and the Argentinian School of Electrocardiography

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The name of Mauricio Bernardo Rosenbaum and of his school have always been associated with advances in the knowledge of cardiology because of his vast contribution to electrocardiography, cardiac electrophysiology, pathophysiology and treatment of the arrhythmias, epidemiology and treatment of Chagasic myocardopathy, studies of the pathogenesis of cardiomyopathies and the etiopathogenesis of the Brugada syndrome.

Rosenbaum was a bred-in-the bone researcher of an outstanding personality, not only because of his extraordinary scientific knowledge, intelligence, clinical sagacity, creativity, teaching capacity but also because of his moral integrity and humanitarian attitude in his private and professional life. He had a particularly fertile and strong mind, always one step ahead in the field of cardiac electrocardiology, a condition that turned him into a genuine leader in the specialty in Argentina and abroad. Not only all these virtues but also his serene and affable character made him be surrounded by a group of enthusiast young people to set up the prestigious Argentinian School of Electrocardiography (ASE), which has been acknowledged, praised and admired in the international academic world. Rosenbaum never really retired: he never stopped leading his beloved school until shortly before his death [1].

Rosenbaum headed this school focusing on many important topics in cardiac electrocardiography and electrophysiology: the electrocardiogram and the arrhythmias in Chagasic cardiomyopathy; the description of the trifascicular distribution of the intraventricular conduction system and the hemiblocks; the relationship between automaticity and conduction, the concept of phase 3 and phase 4 block, the interpretation of paroxysmal atrioventricular blocks; the definition of the electrotonic modulation of the T wave and cardiac memory; the introduction of amiodarone as an antiarrhythmic drug; the inter-relationship between immunoregulatory disturbances and cardiac arrhythmias; the identification of a new variety of atrial tachycardia and the etiopathogenesis and diagnosis of the Brugada syndrome. The findings of ASE's dazzled clinical and basic researchers as well as electrocardiologists all over the world and received the recognition of the international scientific community. The essence of the style of the ASE was the originality and deepness of the ideas as well as the meticulousness of its research, always respecting the ethical principles in all the investigations. All of this supported the significant impact of all the contributions of the ASE to contemporary cardiology aiming to clear the unknown and change or break paradigms.

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Scientific contributions of the Argentinian School of Electrocardiology

The Hemiblocks and the revelation of the trifascicular distribution of the intraventricular conduction system

From the early to the mid 50's Rosenbaum saw a patient with coronary artery disease who had at that time an incomprehensible electrocardiogram showing right bundle branch block and left axis deviation at -75° (Fig. 1A). Surprisingly, a few weeks later the QRS axis had shifted to the right at $+110^\circ$ (Fig. 1B) and in another tracing the left and right axis alternated with each other (Fig. 1C). For many years afterwards, Rosenbaum continued trying to decipher and interpret these electrograms. When he went to Vermont, USA for a year, he took the tracings with him to show them to Eugene Lepschkin. However, he came back to Argentina without a satisfactory answer. After considering different possibilities, he came to reason that since that right bundle branch block was constant, the changes in the axis occurred because the impulse could follow two different pathways within the left ventricle. This was the starting point of the concept of the trifascicular intraventricular conduction system and the description of the hemiblocks.

The results of a series of anatomical, experimental and clinical investigations performed during the 60's were published in "The Hemiblocks". This book had a marked impact in Latin American cardiology that was extended to the international scientific community after the publication of an English version in 1970 and later, of the Italian translation [2-4]. More than 30 articles followed between 1969 and 1973 helping this breakthrough be known, some of which are cited here [5-12].

From 1910 it was accepted unanimously that the conduction system of the heart had only two terminals: one in the left ventricle (left bundle branch) and the other in the right one (right bundle branch). As a consequence of this anatomic concept, both, the physiology and the pathology of the system were interpreted as bifascicular and this dogma was maintained for more than six decades. The anatomical, physiological, experimental, clinical and pathological studies carried out by the ASE showed there were three and not two terminals: one in the right ventricle and two in the left one [2-4]. From then on, the world of cardiology became familiar with a new doctrine and even with a new language: a conduction system that was essentially trifascicular and a whole family of conduction disturbances. As in other fields of science, the change in the paradigm had practical consequences.

Particularly noticeable in the concept of intraventricular trifascicular conduction system was the simultaneity of the new doctrine with its transfer to clinical practice, a fact that was due to the integrated way in which the ASE carried out the studies. While the theoreticians were not even in agreement on the essence of the new theory and the nomenclature to which it gave origin, cardiologists and clinicians all over the world could recognize in their patients the new signs of disease of the conduction system following the diagnostic criteria established by the ASE. These signs became object of daily discussion in coronary care units, clinical and cardiology wards, center for the placement of cardiac pacemakers, invasive electrophysiology and departments of public health and epidemiology.

The discovery and dissemination of The Hemiblocks concurred with two outstanding cardiologic advances: the recording of the His bundle electrogram in humans and the development of artificial cardiac pacemakers. The three

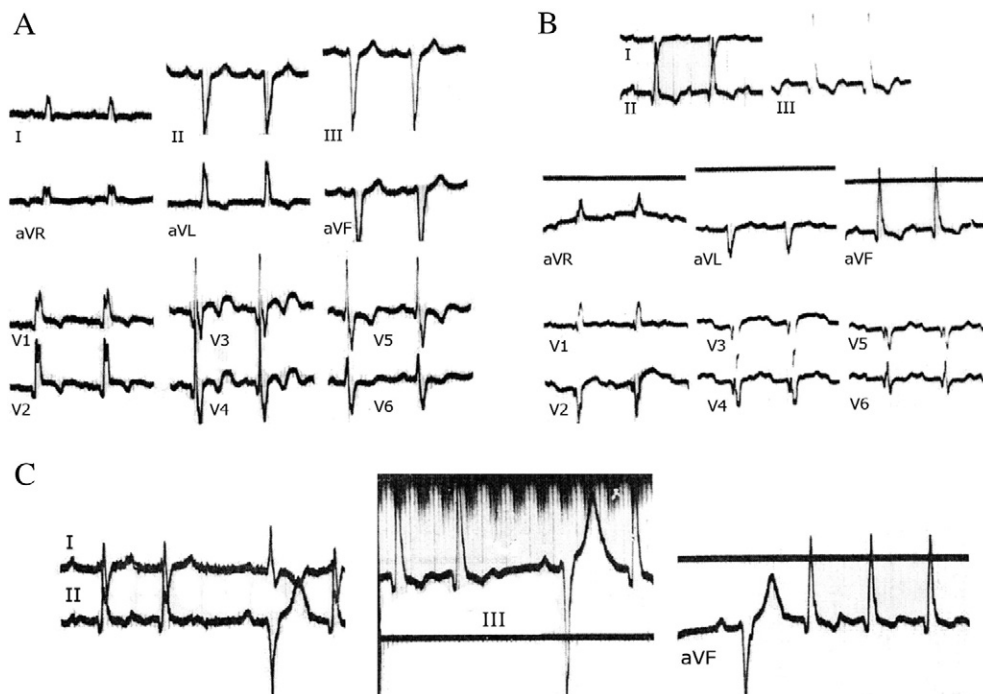


Fig. 1. Electrocardiogram of a patient with intraventricular trifascicular block. See text for description.

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