HISTORY OF ELECTROCARDIOLOGY

Introductory Note to a Classic Article by Dr. Fred M. Smith

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This issue of *Annals* includes a special article by Dr. Antonio Bayes de Luna entitled "Evolving Myocardial Infarction with ST Elevation" and an Editorial on the renaissance in electrocardiography. Dr. Bayes de Luna provides precise correlations between the site of coronary occlusion and injured segments in the heart. It is always interesting to go back to the first descriptions of electrocardiographic changes in acute myocardial infarction.

Following the report of the electrocardiogram by Einthoven et al. in 1903, numerous publications appeared describing various ECG findings in normal subjects and the association of specific ECG patterns with altered physiology in animals and with clinical events in patients with cardiac disorders. One of the very early studies reported in 1909 involved a description of the ECG findings following the injection of silver nitrate into the ventricular muscle of a dog.¹ The ECG changes associated with acute chemical injury to the myocardium (called myocardial degeneration) included hyperacute prominent T waves followed by marked ST elevation. In 1918, Dr. Fred M. Smith described in considerable detail the ECG changes that occur following ligation of branches of the coronary arteries in 66 dogs.² Smith highlighted the marked ST elevation and prominent upright T waves that occurred within minutes after the coronary occlusion, with subsequent normalization of the ST segment and deep T-wave inversion in the same leads. Although the ECG findings were the focus of the article by Smith, he also reported the ventricular arrhythmias and pathological changes in the myocardium that developed following coronary ligation.

This classic animal study by Smith was important clinically in many regards. As pointed out in the concluding paragraph of the accompany-

ing reproduced article, Smith mentions that one case was observed in human in which the clinical diagnosis of coronary thrombosis with similar ECG ST and T-wave changes was made by Dr. John B. Herrick—the same Dr. Herrick who had reported the clinical (nonECG) and pathological features of sudden obstruction of the coronary arteries in 1912.³ In 1920, 2 years after Smith's animal studies, Dr. Harold Pardee described similar electrocardiographic ST and T-wave findings in a 38-year-old male with symptoms typical of occlusion of a coronary artery,^{4,5} and these changes became known as the "Pardee sign."⁶ Thus, between 1912 and 1920, the clinical syndrome of acute myocardial infarction with chest pain, evolving diagnostic ECG changes, ventricular arrhythmias, and myocardial "degeneration" due to coronary occlusion became appreciated.

Dr. Smith contributed basic insight into the acute and subacute ECG changes that occur after coronary occlusion. These early studies in the second decade of the 20th century were the foundation for modern-day clinical electrocardiography. A renaissance in clinical electrocardiography is now taking place, and this is exemplified by the studies of Dr. Bayes de Luna and his associates who report in this issue of *Annals* on the electrocardiographic location of acute myocardial infarction using sophisticated imaging techniques.⁷

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