Exercise and the PR Interval

George Pieper, M.D.
Principal Mutual Life, Des Moines, IA

The significance of prolonged PR interval was reviewed by Ferrer in the Journal of Insurance Medicine.¹ In this review, Dr. Ferrer states "... it would seem valuable to enlarge our evaluation of first degree AV block. In considering a prolonged PR interval, it would be useful, for example, to include any evidence of change in the PR interval (i.e., if it is stable, becomes shorter or longer)."

Case: A treadmill stress test (TMST) was reviewed as part of an insurance application. The proposed insured was in the third decade and gave no history of heart disease. The TMST revealed rate-related increase in PR from .16s to .30s during exercise; the test was otherwise normal.

During exercise circulating catecholamines increase, and vagal tone diminishes. There is sinus response in the form of increased heart rate, perhaps tempered (and governed?) by innate inability of the conduction apparatus to function beyond a given rate, as a result of fatigue and its obligatory refractory period. Changes in vagal influence often lead to shortened PR interval, and first degree AV block often disappears.² Rare references to instances of first degree AV block developing in coronary artery disease have been noted, but Ellestad states "... this rare finding [prolonged PR with exercise] probably has little significance."

This subject was further reviewed in the Journal of the American Medical Association by Botvinick. This author notes that atrial pacing would increase AV conduction "with an almost linear relation between the duration of the PR interval and the paced rate."

Both Botvinick and Ellestad have expressed the opinion that prolonged PR interval with exercise has no clinical significance. It seems certain that from an underwriting standpoint changes in PR interval, either in terms of shortening or lengthening, can be ignored. In particular, these phenomena do not appear to suggest ischemic heart disease.

References
1. Ferrer MI. Journal of Insurance Medicine, July 1984; 15:3

Interesting Electrocardiogram

Intermittent Complete Right Bundle Branch Block

M. Irené Ferrer, M.D.
Consultant in Cardiology Metropolitan Life Insurance Company
Professor Emeritus of Clinical Medicine, College of Physicians and Surgeons, Columbia University
Consultant Electrocardiographer, Presbyterian Hospital, Columbia Presbyterian Medical Center, New York, N.Y.

This 41-year-old man applied for a large amount of life insurance.

The applicant gave a history of atypical chest pain for which he had had a diagnostic hospital admission. A cardiologist had stated he had a complete right bundle branch block (CRBBB) "which was not present before." His workup, designed to evaluate a pre-test impression of ischemic coronary artery disease, revealed completely normal coronaries by angiograms and mitral valve prolapse without regurgitation by echocardiogram. There was perfectly normal left ventricular function.

This man's application was handled as a new onset of CRBBB and chest pain, raising the spectre of a possible recent myocardial infarction. Had the electrocardiogram seen here (Figure 1) been evaluated in terms of rate-related CRBBB, the problem could have become easier to solve. Note that in this ECG when the heart rate was below 65/min, there was no BBB. When this rate of 65 occurred — during sinus arrhythmia which varies between 60 and 65/min. — CRBBB is seen (see first four beats in lead I). When rate slows the BBB is gone (see lead I, beats 5-8). Leads II and III show no BBB at rates of 58-60/min., while aVR again shows CRBBB at rate 65. The intermittency is also well seen in lead V2.

Intermittent CRBBB that is rate-related is an unimportant finding and usually carries no rating. On the other hand, the appearance of fixed (i.e., non-rate-related) CRBBB is treated as a possible recent myocardial infarction. Since the chest pain in this case is explained by the mitral prolapse and the coronaries and left ventricular function are normal, the problems are reduced to evaluating for mitral prolapse only. If ECGs in which the rates were lower than 65 had been available the solution would have been clear. With faster rates which would show CRBBB, a misconception, namely the possibility of a recent myocardial event, was inevitable. Actually this man has probably had a rate-related CRBBB all his life. Heart rates during the recording of ECGs are usually above 65/min. due to the mild anxiety associated with the test. Hence the chance of uncovering the rate-related nature of this CRBBB during routine electrocardiogram is small.