The Significance of a Prolonged PR Interval

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The PR interval represents the time from the beginning of the P wave (atrial excitation) to the beginning of the QRS complex (ventricular excitation). Taking an average PR interval of 0.16 sec., let us dissect it into its component parts. The impulse from the SA node spreads down the three atrial specialized tracts and through the atrial myocardium to reach the AV node. The atrial myocardial excitation generates the P wave and this lasts 0.08 sec. There is a delay in the AV node itself, taking another 0.04 sec., and then the excitation enters the common bundle of His. Thus the P-H interval (P to His bundle) takes up 0.12 sec. The procession down the intraventricular pathways is divided further; from His bundle to the right or left bundle branch takes 0.02 sec., and from each of these bundles to the right and left ventricles takes another 0.02 sec. before the QRS complex begins to form. Thus the H-QRS, or second part of the PR interval, comprises 0.04 sec. The P-H plus H-QRS embrace the full PR interval of 0.16 sec.

Despite the complexity of the components of the PR interval, simple prolongation of the PR interval is almost invariably due to a block in the AV node and is, of course, accompanied by no symptoms. Its importance as an insurance impairment depends on whether: 1) it signals underlying heart disease; 2) it represents the beginning of an ongoing process which ends up with third degree or complete AV block; 3) it is benign.

It had been the custom in the past to assign importance to the actual value of the PR interval (i.e., rating higher for longer intervals). After careful search of the literature, it appears quite clear that a precise value for prolongation of the PR interval which is definitive, or which separates subjects with longer and shorter intervals into prognostic groups, or which separates vagal etiology from organic disease, does not exist.

It is important to emphasize, in this regard, that markedly prolonged PR intervals can exist in subjects who are otherwise normal — as shown in the two Air Force reports done ten years apart (1940-1950) on the same 1,000 individuals. The longest PR interval in these "normal" men was 0.28 sec. Followup studies made ten years later showed no evidence of disease. Another survey done on 67,375 asymptomatic subjects showed that 350 cases of prolonged PR interval were found among these 67,375 healthy males. The age range was 17 to 54 years. Of these 350 cases, 337 had PR intervals between 0.21 sec. and 0.29 sec., and 13 subjects had PR intervals of 0.30 sec. or greater (range 0.30 to 0.39 sec.). The authors could not select a value for the prolonged PR interval above which organic abnormality could be expected.

A recent study on the natural course of prolonged PR intervals provides a 7-year followup on 1,585 selected normal males. The prevalence of a prolonged PR (≥ 0.22 sec.) was approximately 5%. This is higher than other surveys where the figures were 0.60-0.76% (5,6) Also, a recent study done at Metropolitan Life Insurance Company on 19,734 insurance applicants revealed a prevalence of 0.45%, with one 5-year death in 88 cases. The 7-year study revealed some interesting clinical information, namely, that of the initial group with a prolonged PR, there were only 60% who still had an abnormally long PR interval on the repeat study at 7 years. In other words, the prolonged PR interval was not a permanent abnormality. This suggests that it was not due to organic disease. In support of this conclusion is the fact that neither the development of coronary artery disease nor arrhythmia was correlated with a prolonged PR (4).

Furthermore, higher degrees of AV block were not documented during the followup, there was an absence of detectable heart disease, and the PR shortened during exercise in all cases. Thus the authors concluded that a prolonged PR interval is an innocuous finding and in asymptomatic men with no signs of heart disease carries an excellent prognosis. This opinion concerning solitary first degree AV block is shared by others.

In considering whether or not a prolonged PR interval can act as a marker of disease when coupled to another electrocardiogram abnormality, the finding of intra-atrial block (P width of 0.12 secs. or more) is very important. Obviously, if a prolonged PR is associated with intraventricular conduction defects, such as left anterior fascicular block (left hemi block) or bundle branch block, the situation becomes more serious and risk exists. In a large hospital population, fixed or constant intra-atrial block (I.A.B.), where the wide P wave is seen on every sinus beat, was found in 13.5% of the electrocardiograms taken in the electrocardiograph department, while intermittent intra-atrial block (a wide P wave seen on some but not all sinus beats)
was seen in 1.2%.\(^9\) In this survey, which included pediatric patients, no children were found to have intermittent intra-atrial block. A study of the pathology of 10 patients with fixed I.A.B. described an abnormal right atrial myocardial ultrastructure in these individuals and suggests that those with P waves measuring .12 and .13 sec. in duration have a disturbance primarily in their specialized intra-atrial conduction pathways.\(^\text{10°}\) Those patients with P waves of 0.14 sec. or longer probably have more generalized and wide-spread cellular damage, probably largely at the level of the ordinary working cells of atria.\(^\text{10°}\)

In contrast to this hospital population, a survey of 67,375 healthy, asymptomatic subjects has shown that intra-atrial block was present in 33% of the 350 persons who had a prolonged PR interval.\(^5\) In a recent evaluation of 19,734 electrocardiograms at Metropolitan Life Insurance Company\(^\text{7}\) a prolonged PR interval was found in 88 of 19,734 cases reviewed (0.45% prevalence) and there was no instance of I.A.B.

In view of these facts 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 a change in the PR interval (i.e., if it is stable, becomes shorter or becomes longer). If it becomes shorter (under any stimulus such as exercise or atropine), a vagal origin is suggested and a lower rating or no rating would be appropriate. The presence or absence of intra-atrial block deserves attention.

At present, based only on the skimpy information at hand, it is difficult to arrive at a reasonable rating for a prolonged PR interval and considerable injustice may be done. For example, evidence points to the fact that intervals above 0.24 sec. and even above 0.30 sec. may occur in the absence of disease. The association of a prolonged PR interval with other conduction defects such as fascicular or bundle branch blocks obviously is a different problem and the PR prolongation should effect a higher rate in such cases.

Thus isolated first degree AV block in most instances in an insurance population is a benign finding and probably a "normal variant" resulting from vagotonia\(^\text{4}\) It does not imply risk and, indeed, probably need not be rated.

References