

remaining 83 patients with a normal P-R interval, the H-V time was abnormal in 58%.

In conclusion, in a given patient with first degree block, the delay may be present in one or more of the four regions of the A-V conduction system, i.e., intra-atrial, A-V nodal, mainstem BH, and bundle branches. It is difficult to predict the site of delay from the surface ECG alone.

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### The authors reply:

To the Editor:

The normal values for P-H and H-Q in our laboratory were established using  $V_1$  as a reference lead.<sup>1</sup> Subsequent studies in over 40 patients, using a multiple simultaneous lead system (leads I, II, III, and  $V_1$ ) have confirmed these ranges.<sup>2</sup> Defining 45 msec as the upper limit of normal for H-Q, as proposed by Narula and Samet, greatly increases the incidence of H-Q prolongation in patients with and without conduction disease.

Narula and Samet seem to have misinterpreted the purpose of the study. We were primarily interested in determining the sites of delay

producing P-R prolongation in patients with first degree A-V block (AVB) and bundle-branch block. The incidence of conduction delays in patients with normal P-R and bundle-branch block, although of interest, was not essential to the purpose of the study. We have frequently found H-Q prolongation in patients with left bundle-branch block (LBBB), with both normal<sup>2</sup> and prolonged P-R intervals.<sup>3</sup> However, it should be stressed that H-Q was more markedly prolonged in the latter group. Nine of our 12 patients with first degree AVB and LBBB had H-Q intervals ranging from 75–125 msec, which contributed very significantly to P-R prolongation. This was in contrast to our patients with first degree AVB and RBBB, in whom H-Q ranged from only 35–65 msec, contributing much less to P-R prolongation. In both groups, P-H was both frequently and significantly prolonged. Narula and Samet appear to have corroborated the latter finding.

In regard to the sites of conduction delay proposed by Narula and Samet: (1) all of our patients with P-H prolongation had A-H prolongation (P-A [intra-atrial] prolongation is a rare cause of first degree A-V block, and did not contribute significantly to first degree A-V block in our series); and (2) the presence of mainstem BH lesions as well as all other lesions defined by the His bundle technique, cannot be considered "well documented" until there is pathological confirmation of such lesions utilizing serial section of the conduction system.

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