Chapter 17 His Bundle Electrocardiography—Its Clinical Value

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General Considerations

Since the introduction by Scherlag and associates (23) of the catheter technique for recording His bundle activity in man, a voluminous amount of knowledge has been obtained about the physiology of normal and abnormal atrioventricular conduction and of arrhythmias. However, recent editorials consider His bundle electrocardiography of limited value in the clinical management of cardiac patients (3, 9, 10). Nevertheless, as these editorials point out, certain clinical situations exist when His bundle electrocardiography can be of considerable value in arriving at therapeutic decisions. In this paper, we will consider briefly the technique of His bundle recording and the physiologic importance of the measurements obtained. The major portion of our discussion will deal with the clinical findings of and indications for His bundle studies.

Technique of His Bundle Recording

His bundle electrocardiography may be performed on patients in a postabsorbtive, nonsedated state wherever fluoroscopic and recording equipment are available. Before the study is started, a reliable intravenous route is begun and a routine 12-

![Fig. 17-1. A single cardiac cycle illustrating the intervals measured during His bundle electrocardiography. In this and all subsequent figures, the following abbreviations are used: BAE = bipolar atrial electrogram representing high right atrial activity; BHE = bipolar His electrogram representing low right atrial activity (A), His bundle activity (H) and ventricular septal activity (V); BEE = bipolar esophageal electrogram representing primarily left atrial activity; I, lead 1; II, lead 2; III, lead 3; V₁, lead V₁; P-A, P-A interval representing intra-atrial conduction; A-H, A-H interval representing AV nodal conduction; H-V, H-V interval representing His-Purkinje conduction. All numbers are given in milliseconds. Paper speed 100 mm/sec unless otherwise stated. Interrupted lines demarcate atrial activity precedes low right atrial activity recorded in the BHE lead and this precedes left atrial activity recorded in the BEE lead.](image-url)
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lead electrocardiogram is recorded. Using local anesthesia, a multipolar (usually, a tripolar) catheter electrode is inserted percutaneously into a femoral vein and advanced under fluoroscopic guidance to the right atrium. A quadripolar catheter is also inserted into the right atrium through the femoral vein or an antecubital (basilic) vein. The proximal two electrodes of this catheter are used to record the atrial electrogram and the distal two electrodes are used for atrial pacing. After the catheter is connected to appropriate recording devices, the electrode portion of the His bundle catheter is then advanced across the atrioventricular ring while the electrogram is recorded simultaneously, until the position yielding the optimal His bundle deflection is found (Figure 17-1). In some instances, a right bundle branch deflection also may be recorded (Figure 17-2). The tip of the quadripolar catheter is advanced to the high lateral portion of the right atrium. Once the His and right atrial catheters have been introduced into the vein, it usually takes less than 5 minutes to position them. An esophageal lead may be swallowed, and yield information about left atrial events (30). Additional catheter electrodes may be inserted to record from the coronary sinus, stimulate the ventricle, and so forth, depending on the nature of the study. His bundle recording can also be obtained using an arm or neck vein, or from the aorta.

Complications from His bundle studies are uncommon if the usual precautions observed during cardiac catheterization are performed. One must remember that whenever catheters are introduced into the heart, thus bypassing the high skin resistance, great care must be taken to assure that all equipment is adequately grounded. This may require the help of an experienced electrician or bioengineer. Reported complications involving improperly grounded electrical equipment are not

Fig. 17-2. Example illustrating a right bundle branch deflection (RB). In the panel on the right, three His bundle leads recorded simultaneously indicate recordings of both His and right bundle spikes (BHE$_1$), recording of primarily right bundle spike (BHE$_2$), and recording primarily a His bundle spike (BHE$_3$).