Electrovectrocardiographic Diagnosis of Left Septal Fascicular Block

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"Everything should be made as simple as possible, but no simpler." —Einstein

We read with interest the recent review by Pérez Riera et al.¹ In Tawara's original monograph describing the left bundle branch, septal fibers interposing between anterior and posterior

divisions may be clearly seen (Fig. 1, Plate VI).² Demoulin and Kulbertus's pathological studies reinforced this finding.³ Yet, as the authors state, Rosenbaum's model of trifascicular ventricular conduction prevails (RBB–right bundle branch, LAF–left anterior fascicle, LPF–left posterior fascicle).

Figure 1. Surface ECG (A) recorded while pacing (S) from the ablation catheter (Abl 1,2) resting in the right coronary sinus. The first three sinus beats show a typical pattern of LAF block and QRS duration of 110 ms; each QRS is preceded by a fascicular signal (F). The final three beats (*) result from capture of the fascicle—note reduction in QRS duration to 98 ms, loss of left axis and prominence of anterior forces across the precordial leads. The suggested mechanism is shown in (B)—see text for details. (LPF—left posterior fascicle; LSF—left septal fascicle; LAF—left anterior fascicle; RBB—right bundle branch; AV node—atrioventricular node; X denotes hypothesized site of fascicular capture).

We were recently reminded that not all patterns of ventricular conduction are captured by Rosenbaum's conception.

A man of 43 years underwent an electrophysiology study for premature ventricular contractions (PVC) associated with LV dysfunction. Baseline ECG showed intermittent LAF block and absent septal Q waves (Fig. 1A). With the catheter nestled in the right aortic sinus facing the left/right commissure a fascicular signal was recorded, presumed LBB/LAF-onset 28 ms pre-His and 35 ms pre-QRS. Pacing captured the fascicle without local myocardial capture (Fig. 1A). The resultant QRS was narrow (98 ms) with a normal frontal axis but prominent anterior forces. We reasoned that activation in the fascicle traveled both anterograde to the Purkinje network subtended by the LAF, and retrograde to the bifurcation of RBB and LBB and thence (anterograde) to the LPF and RBB (Fig. 1B). This hypothesis explains the narrow QRS (activation of the RBB) and normal frontal axis (activation of LAF and LPF), but not the appearance of prominent anterior forces. We suspect, in addition, that

the patient had delay or block in his LSF accompanying delay in his LAF at baseline. Pacing the LAF proximate to its termination "compensated" for its slow conduction, but the LSF could only be activated by the signal passing retrograde in the LAF and then anterograde along the length of the LSF (where it was blocked, or met significant delay) (Fig. 1B).

Prominent anterior forces may have many causes including LSF block.¹ We share the authors' desire that a quadrifascicular conception of intraventricular conduction should ultimately prevail. The trifascicular model is simple, but simpler than true.

REFERENCES

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