Validation of entrainment index to assess cavotricuspid isthmus block in clockwise atrial flutter

CLAUDIO HADID, MD, DARÍO DI TORO, MD and CARLOS LABADET, MD

Hospital General Cosme Argerich, Buenos Aires, Argentina

ABSTRACT. The recognition of cavotricuspid isthmus (CTI) block during atrial flutter (AFL) ablation is sometimes challenging. In the setting of typical counterclockwise AFL, conduction times from the coronary sinus (CS) to the inferolateral tricuspid annulus (ILTA) during entrainment and during pacing after ablation are expected to be similar if a complete CTI block was achieved. We applied the same concept in a patient with clockwise AFL. The conduction time from the ILTA to the CS during entrainment from the ILTA was 152 ms, the same as that during pacing from the same site and at the same cycle length after ablation, confirming that a CTI block was achieved. A maneuver originally developed for counterclockwise AFL was validated in the setting of clockwise AFL.

KEYWORDS. atrial flutter, catheter ablation, entrainment.

Achievement of complete cavotricuspid isthmus (CTI) block is essential at the time of ablation of typical atrial flutter (AFL). Recognition of this block is not always easy because significant conduction delay at CTI can mimic conduction block if an extensive evaluation is not performed. For this reason, several methods for assessing CTI block have been described.1–8 One of them compared the conduction time from the coronary sinus (CS) to the inferolateral tricuspid annulus (ILTA) during entrainment of typical counterclockwise AFL to that during pacing in sinus rhythm after CTI ablation.9 The authors found an excellent correlation between them if clockwise CTI block had been achieved. They used the term “entrainment index” to indicate the difference between both conduction times. A conduction time during entrainment that does not exceed that during pacing in sinus rhythm at the same cycle length by more than 18% (that is, entrainment index <18%) identified successful clockwise CTI blocks with high sensitivity and specificity.

We applied the same concept in a 67-year-old patient with history of hypertension who presented with clockwise AFL. As opposed to during counterclockwise AFL, impulse propagation from the ILTA to the CS during entrainment of clockwise AFL from the ILTA should use the same path as during pacing from the same site after ablation if CTI block has been achieved. Hence, the conduction times should be similar if pacing at the same cycle length. AFL cycle length was 269 ms. The diagnosis of clockwise typical AFL was confirmed by analyzing the postpacing intervals after entrainment from septal and lateral sites of the tricuspid annulus (TA), as well as from CTI. Figure 1 shows that conduction times during entrainment (Figure 1A) and during pacing from the ILTA at the same cycle length after CTI block (Figure 1B) were the same (entrainment index = 0). Although the atrial activation sequence after ablation suggested CTI block, electrophysiological tests can be performed to confirm a CTI block or to identify a conduction delay (if present). The implementation of this maneuver (entrainment index) in a patient with clockwise AFL validated a method for assessing CTI block that was originally developed for counterclockwise AFL.
Figure 1: Surface ECG leads from D1 to V1; intracardiac electrograms from proximal and distal CS and TA from 19–20 (septal) to 1–2 inferolateral. A: Atrial activation sequence compatible with clockwise AFL (cycle length 269 ms). During entrainment from the inferolateral TA (S1–S1 251 ms), the conduction time to CS is 152 ms. B: After CTI ablation, atrial pacing from the same site and at the same cycle length conduction time to the CS is also 152 ms, suggesting that the impulse propagation route is the same in both scenarios. Abbreviations: AFL: atrial flutter; CS: coronary sinus; CTI: cavitricuspid isthmus; ECG: electrocardiogram; TA = tricuspid annulus.
References


