Three-dimensional bipolar voltage map demonstrating electrical activity of a single muscle bundle along the cavotricuspid isthmus

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Ablation of the cavotricuspid isthmus (CTI) for the prevention of Atrial flutter has traditionally been guided anatomically (1). Recently, an atrial electrogram (EGM) voltage-guided approach was described (2,3). It has been hypothesized that muscle bundles in the CTI are predominantly responsible for conduction through this area, and targeted ablation of those muscle bundles is an efficient and effective means to achieve bidirectional conduction block across the CTI. The muscle bundles can be identified by the highest-amplitude local atrial bipolar EGM recorded along any given 'line' between the tricuspid annulus and the inferior vena cava.

A voltage map of the CTI bipolar atrial EGM was generated with a 4 mm, steerable irrigated-tip ablation catheter (Cool Path; St Jude Medical Inc, USA) during CTI-dependent atrial flutter (cycle length 243 ms) using a three-dimensional mapping system (NavX; St Jude Medical Inc). Figure 1 shows a caudal left anterior oblique view of the three-dimensional bipolar voltage map. A discrete line of high voltages was seen, demonstrating electrical activity of a single muscle bundle along the CTI.

In voltage maps, the voltages corresponding to the colour codes are indicated on the colour bar. Voltages higher than 1.8 mV (set arbitrarily) are shown in purple. The lowest voltages are shown in red. In the present voltage map, the region of the His potential was indicated by red dots. A duodecapolar catheter was in the right atrium, the ablation catheter was in the inferior vena cava and a reference catheter was in the coronary sinus.

Visualization of the high-voltage area of the CTI with endocardial voltage mapping supports the muscle bundle hypothesis and helps with the understanding of the voltage-guided ablation approach for CTI-dependent atrial flutter.

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Figure 1 Three-dimensional bipolar voltage map (caudal left anterior oblique view). A discrete line of high voltages (purple colour, arrows) is seen, demonstrating electrical activity of a single muscle bundle along the cavotricuspid isthmus. The voltages corresponding to the colour codes are indicated on the colour bar. The region of the His potential (HIS) is indicated by red dots. A duodecapolar catheter (BDB) is seen in the right atrium in red. The ablation catheter is in the inferior vena cava (IVC). A reference catheter is in the coronary sinus (CS). CL Cycle length

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