Left ventricular lead implantation guided by sensor-based electromagnetic navigation in a patient with L-transposition of the great arteries

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A 31-year-old male with congenitally corrected (L-) transposition of the great arteries was admitted after successful resuscitation from out-of-hospital cardiac arrest. The patient had received a dual-chamber pacemaker for an advanced atrioventricular block at the age of 17. He was doing clinically well during the subsequent years despite worsening of the mechanical function of the systemic, morphologically right ventricle (RV) on permanent ventricular pacing. Transthoracic echocardiography revealed dilatation of the systemic RV, reduced RV ejection fraction (45%), moderate tricuspid regurgitation, and signs of ventricular dyssynchrony. Invasive examination could not identify haemodynamically relevant abnormalities. A decision was taken to upgrade the system to an implantable cardioverter-defibrillator with biventricular pacing. Left ventricular (LV) lead implantation was guided by a novel sensor-based electromagnetic tracking system [MediGuide Technology (MGT), St Jude Medical]. Non-fluoroscopic tracking of a sensor-equipped coronary sinus (CS)-guiding catheter [Panels A–C, yellow icon (asterisks)] and guidewire [Panels B and C, yellow arrow-like icon (red arrows)] was performed in a pseudo-biplane mode on pre-recorded ECG-gated cine-loops in left anterior oblique and anterior-posterior projection. The MGT system allowed us for non-fluoroscopic intubation of the CS and subselection of the target vein (Panel B). The cine-loop recorded during CS venography revealed a complex CS venous anatomy with a suitable posterolateral target branch (Panel A). Final LV lead positioning, however, was guided by a short sequence of live fluoroscopy since the currently available electrodes are not equipped with a sensor (Panel C). Predischarge echocardiography-guided optimization achieved a satisfactory mechanical resynchronization. The patient reported on good exercise capacity without dyspnoea at 8-week follow-up.

Non-fluoroscopic electromagnetic tracking of sensor-equipped LV lead delivery tools can help to reduce fluoroscopy exposure and increase spatial anatomic orientation during CRT device implantation, particularly in patients with congenital heart disease and complex cardiac and CS venous anatomy.

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