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Upgrade of a DF-1 Implantable Cardioverter Defibrillator Electrode with a Fractured Sensing-Pacing Cable for Left Bundle Branch Optimized Cardiac Resynchronization Therapy: A Practical Solution Without Lead Extraction

Kırık Algılama-Uyarım Kablosuna Sahip bir DF-1 İmplante Edilebilir Kardiyoverter Defibrilatör Elektrodunun Sol Dal Demeti Optimize Edilmiş Kardiyak Resenkronizasyon Tedavisine Yükseltilmesi: Elektrot Çıkarılmasına Gerek Kalmadan Pratik Çözüm

A 70-year-old male patient with a known history of hypertension, diabetes mellitus, and ischemic cardiomyopathy was admitted to another center after the alarm of an implantable cardioverter defibrillator (ICD) sounded. He had undergone right-sided ventricular demand pacing implantable cardioverter-defibrillator (VVI-ICD, DF-1) implantation five years earlier for primary prophylaxis, due to a skin lesion in the left pectoral region. On evaluation, there was high ventricular lead impedance, no ventricular capture during the threshold test, and a macrofracture of the electrode noted at the pacemaker pocket, as shown on chest X-ray (Figure 1). The patient was therefore referred to our institution. On admission, a 12-lead electrocardiogram (ECG) showed sinus rhythm with first-degree atrioventricular (AV) block (PR interval 360 ms) and intraventricular conduction delay (QRS duration 160 ms) (Figure 2). Transthoracic echocardiography revealed a left ventricular ejection fraction (LVEF) of 20%, akinesia of the septum and anterior wall, and moderate mitral and tricuspid regurgitation. ICD interrogation demonstrated that the DF-1 ICD electrode IS-1 cable impedance was greater than 3000 ohms, the shock impedance was normal, and no ventricular capture was observed with the IS-1 cable of the ICD lead. The arrhythmia logbook documented six non-sustained ventricular tachycardia episodes during the five-year follow-up. Thus, we planned a cardiac resynchronization therapy (CRT-D) upgrade procedure via left bundle branch area pacing (LBBaP) without extracting the existing DF-1 ICD lead. Venography revealed stenosis in the right subclavian vein, and venoplasty was performed using a 4.0 × 40 mm peripheral balloon. Despite left bundle branch (LBB) capture with an LBBaP lead (Solia S60, Biotronik) in the septum (R-wave sense amplitude: 10.2 mV), the V6 R-wave peak time was greater than 100 ms, so we switched to implanting an LBB-

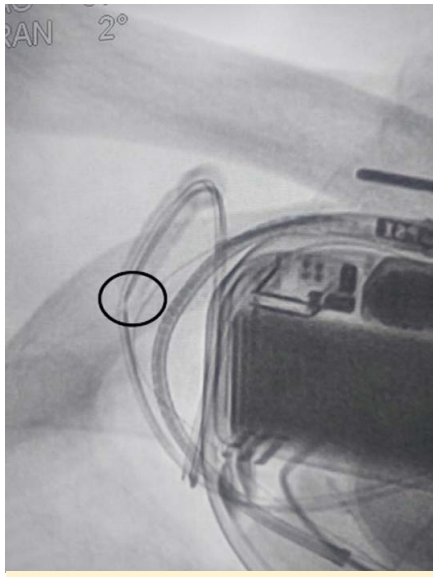

Figure 1. Macrofracture observed in the international standard-1 (IS-1) cable of the DF-1 connector implantable cardioverter-defibrillator (ICD) electrode.

CASE IMAGE
OLGU GÖRÜNTÜSÜ

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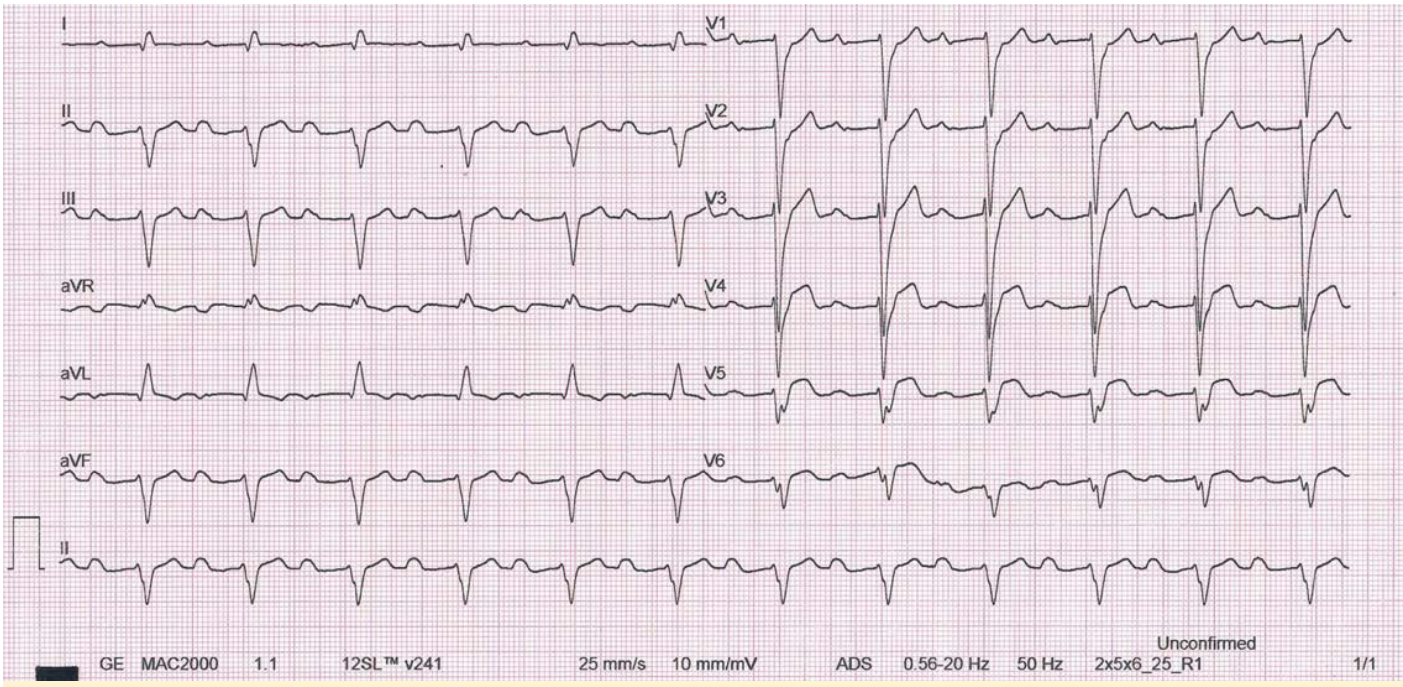

Figure 2. The 12-lead electrocardiogram (ECG) on admission.

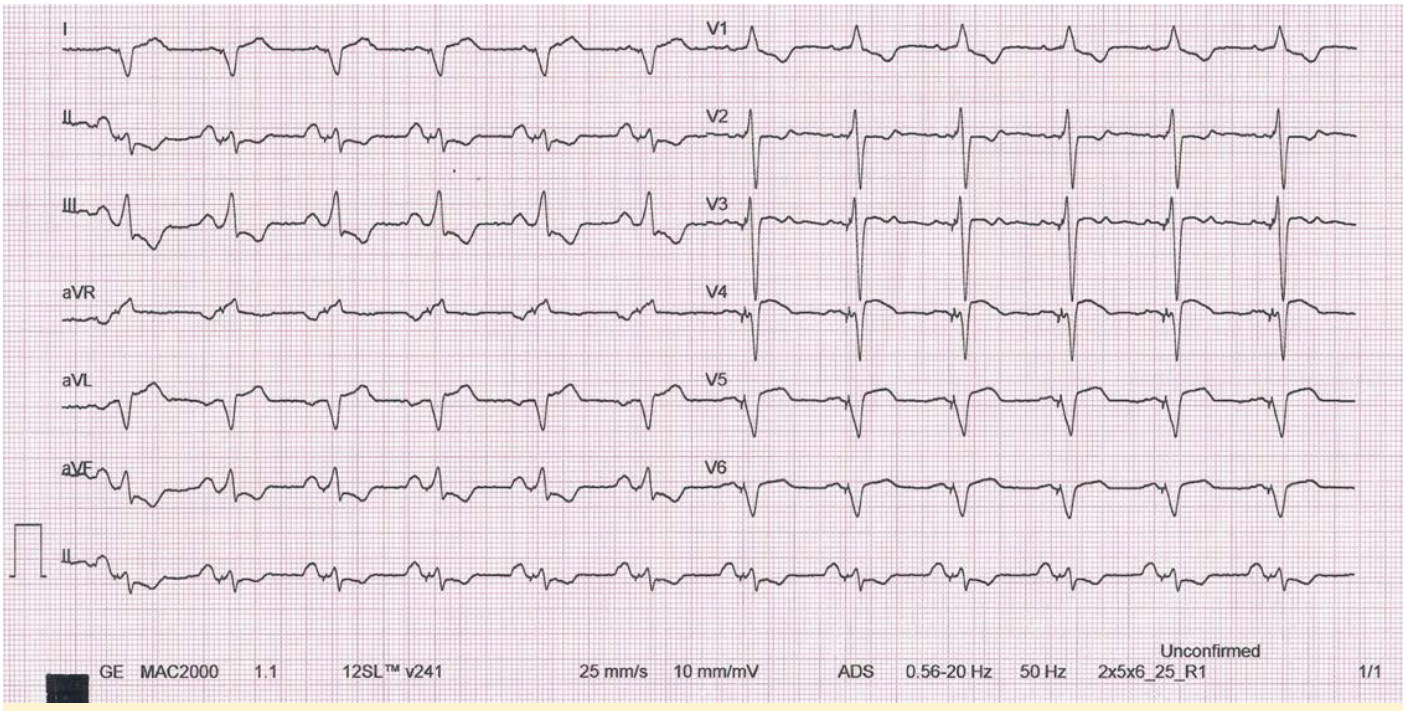

Figure 3. Final fluoroscopic image of the electrodes at the end of the left bundle branch-optimized cardiac resynchronization therapy defibrillator (LOT-CRT-D) upgrade procedure.

optimized CRT-D (LOT-CRT-D). An LV lead was placed into the lateral branch of the coronary sinus (qLV delay of 114 ms). The LBBaP lead was connected to the RV IS-1 port, and the coronary sinus lead was connected to the LV port of the DF-1 CRT-D battery (Figure 3). The fractured IS-1 cable of the DF-1 ICD lead was capped and placed in the pocket. The final ECG showed biventricular pacing with a QRS duration of 120 ms (Figure 4). For the safety of the abandoned ICD lead in the right pectoral region, a successful defibrillation test was performed. In addition, a skin biopsy for a malignant-looking lesion in the left pectoral region revealed basal cell carcinoma, and local excision with flap conversion by plastic surgery was performed one month later. The patient remained stable, and the electrical parameters were within normal limits at the 6- and 12-month follow-up visits.

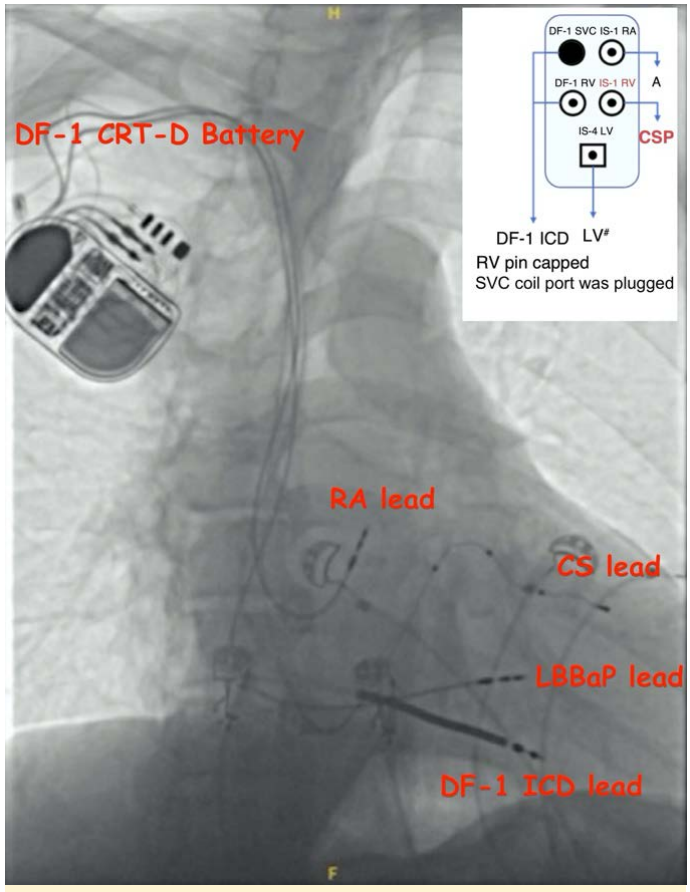

Figure 4. The 12-lead electrocardiogram (ECG) after the left bundle branch-optimized cardiac resynchronization therapy defibrillator (LOT-CRT-D) procedure.

With a DF-1 ICD connector, the addition of a separate pace-sense lead (a septal lead for LBBaP), along with abandonment of the IS-1 portion of the ICD lead, resolved the problem in this patient. This approach is an inexpensive, practical, and effective solution that avoids both extraction of the old ICD lead and the need for a second ICD lead.

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Informed Consent: Written and verbal informed consent was obtained from the patient.

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