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Case Report

Pacemaker Implantation via the Coronary Sinus in a Patient with Triple Mechanical Valve Replacement

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Abstract...

In patients with both tricuspid and mitral mechanical valve replacement needing permanent pacing, there is no consensus about the best therapeutic option. Indeed, a trans-tricuspid pacemaker lead for Right Ventricle (RV) stimulation is contraindicated because of the high risk of damage of both the electrolead and the valve; moreover, Left Ventricle (LV) access via interventricular septal puncture is a not a practicable option. LV stimulation can be achieved with Coronary Sinus (CS) stimulation and, even if limited by sporadic lead dislodgment and suboptimal pacing threshold, in not-dependent pacemaker patients could be a successful and safe option.

Case presentation

A 56 years-old Caucasian man, with an history of rheumatic fever complicated by aortic, mitral, and tricuspidal insufficiency treated with mechanical valves replacements, was admitted to Emergency Department (ED) for epigastralgia and left arm pain. He also had an ascending aorta dilatation (43 mm) and suffered from hypertension, Obstructive Sleep Apnea Syndrome (OSAS) on C-PAP therapy and nonalcoholic fatty liver disease. The 12-lead ECG on admission showed an atrial flutter with a mean ventricular response of 65 beats/minute, inferior and anterior q waves, right bundle branch block, left anterior fascicular block, and a specific ST-T repolarization abnormalities (Figure 1). The patient was awake, with no cognitive disorders; his hemodynamic parameters were stable: blood pressure was 120/85 mmHg; oxygen saturation was 97% (ambient air). His admission laboratory results showed: haemoglobin 14.8 g/dL, white blood cells 5.480/uL creatinine 0.88 mg/dL, c-reactive protein 0.47 mg/dL, sodium 138 mmol/L, potassium 4.2 mmol/L, INR 4.94, high-sensitivity troponin 13 pg/mL. His daily therapy consisted of ramipril 2.5 mg/die, furosemide 25 mg/bid; atenolol 25 mg/bid and canreonoate 50 mg/die. The transthoracic echocardiography showed a dilated cardiomyopathy with ejection fraction of 40%, in absence of dysfunctions of the implanted valves. Several months before, due to lipothymia and synco-

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pal episodes, a 24-hour ECG Holter monitoring was done and showed atrial flutter with variable conduction, mean ventricular response of66 beats/minute, several phases of 1:1 conduction resulting in 240 beats/minute with tachycardia-dependent left bundle branch block. During the hospital stay, a chest X-ray (Figure 2) and a Transesophageal Echocardiography (TEE) were performed showing normal positioned and normally functioning mechanical bileaflet mitral, aortic and tricuspid valves, without leaks or plus images, in absence of thrombosis in left atria and/or appendage; the left ventricle appeared mildly dilated, with diffuse hypokinesia and coronary, regular caliber and course of the CS at the level of the posterior AV sulcus (Figure 3). Therefore, the patient underwent pacemaker implantation via left subclavian vein and selective cannulation of the CS by quadripolar 4 Fr electrophysiologic Josephson fixed-curve catheter and retrograde venography with Swan-Ganz catheter, then a bipolar electro-lead Easytrak 2® Model 4542 (Boston Scientific, Marlborough, MA, USA) was advanced in a branch for the anterior interventricular vein and connected to a Boston Scientific Essentio SR model L101 (Boston Scientific, Marlborough, MA, USA) single-chamber pacemaker generator, allocated in the left pre-pectoral fascia. As an outpatient, a 3-D TEE post-implantation was performed and showed normal electro lead position and no new valvular defects (Figure 4).

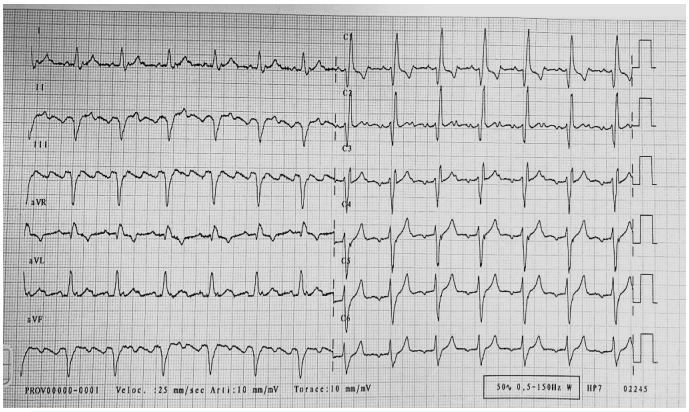

Figure 1: ECG at ED admission.

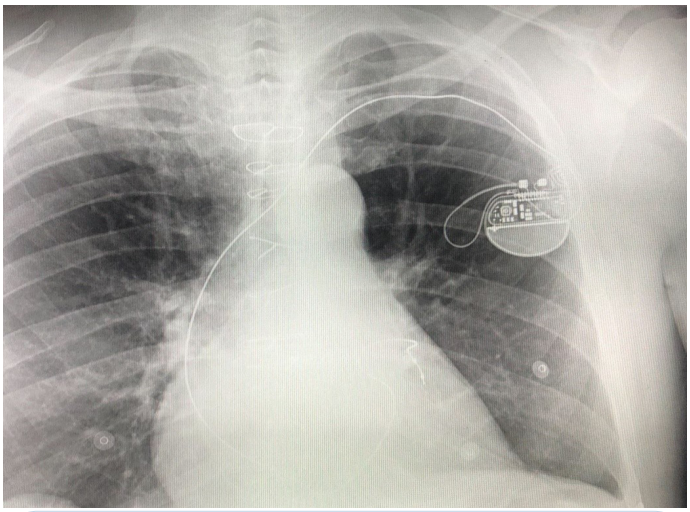

Figure 2: Chest RX post-implantation. It shows normo-positionatedelectroleads, without procedural complication.

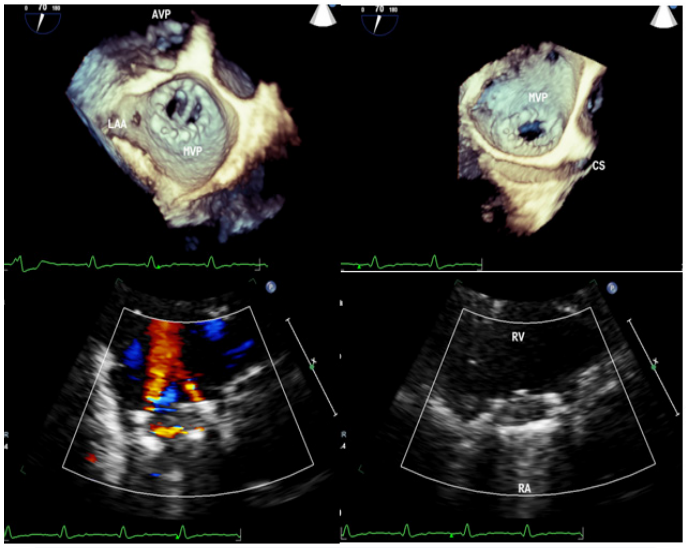

Figure 3: TEE before CS lead implantation. On the top left: this 3-D TEE Mid-esophageal (ME) short-axis view of mitral valve shows a normal size CS across atrio-ventricular groove. On the top right: mechanical bileaflet mitral valve normally located and left atrial appendage free from thrombus. On the bottom: 2D TEE with and without Color Doppler ME 4-chamber view focused on TV, illustrating a normally function mechanical valve with two signature jets.

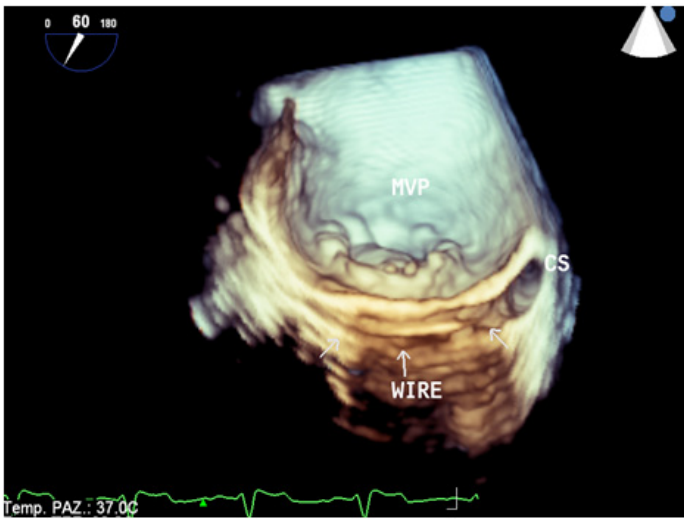

Figure 4: 3D TEE after PMK implantation. The 3-D TEE Mid-esophageal (ME) short-axis view of mitral valve shows the electro-lead inserted in the CS.

Discussion

We describe a case of LV stimulation via CS in a patient with atrial flutter with phases of rapid ventricular response, bi-fascicular block and previous syncopal episodes, with an history of Rheumatic Heart Disease (RHD) complicated by valves insufficiency treated with three mechanical valves implantation. Transtricuspidal RV endocardial stimulation is forbidden for the high risk of valve and electro-lead damage [1]; moreover, mechanical tricuspid valve does not allow access in LV endocardium via inter ventricular septum puncture, a relatively novel and promising technique [2]. Lastly, interatrial septum puncture is prohibited by mechanical valve. Many patients with RHD also have pericardium involvement [3,4], and the overall surgical risk was high because of the previous heart surgery for epicardial

lead placement via thoracotomy; moreover, long-term epicardial pacing tended to require higher pacing thresholds [5-6]. Consequently, we have opted for LV stimulation via CS, using a quadripolar electrophysiological catheter to identify the best stimulation area: LV stimulation via CS is a established technique, and, although limited by sporadic cases of catheter dislocation [7,8], our patient was not pacemaker dependent.

According to the recent European Society of Cardiology (ESC) Guidelines for the management on cardiac pacing [9], LV stimulation via CS lead is a safe and feasible option, although limited by paucity of data. Noheria et al. [10] published a retrospective analysis of 23 patients with CS stimulation, finding no significant difference with conventional RV stimulation in term of lead revision or abandonment. In addition, the last American College of Cardiology/American Heart Association/Herat Rhythm Society specific guidelines [11] agree to use either to implant a CS lead and to use the capped epicardial lead, if necessary.

In this patient, due to a relatively higher thrombotic risk associated with triple mechanical valve replacement, the oral anticoagulant therapy of warfarin was not interrupted and a bridging therapy with Low-Molecular-Weight Heparin (LMWH) was not initiated, as suggested by results of BRUISE CONTROL [12] study and ESC guidelines [9]; no pocket hematoma and thromboembolic an event was found in this patient.

Conclusion

CS pacemaker implantation for LV stimulation can provide an effective ventricular pacing in patients with contraindications to RV endocardial stimulation.

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