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Case Report

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Selective His Bundle Pacing in Patient with Large Ostium Secundum Atrial Septal Defect and Mitral Valve Dysplasia Post Surgical Correction

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Abstract

We described a case of 61 years -old patients with congenital heart disease underwent to implantation of His bundle pacing for post surgical atrio-ventricular block.

Keyworks: Adult with congenital heart disease, Atrioventricular block, His-bundle pacing.

Introduction

Permanent His bundle pacing (HBP) represents a promising technique to deliver a physiological pattern of ventricular pacing and has the potential to mitigate the adverse chronic right ventricular pacing avoiding ventricular dyssynchrony [1]. To date, evidence on routine use of HBP in adult with congenital heart diseases (ACHD) population are lacking [2].

Case Report

A 61-year-old patient with diagnosis of large ostium secundum atrial septal defect (ASD) with hyperafflux syndrome and mitral valve dysplasia with severe regurgitation was admitted to our institution.

A 12-lead electrocardiogram (ECG) documented atrial fibrillation with mean heart rate (HR) of 50 bpm, right bundle branch block (QRS duration 120 ms). 2D echo color Doppler cardiography and magnetic resonance imaging showed a large ostium secundum ASD with a hemodynamically significant left-to-right shunt (Qp/Qs > 2), severe right atrial enlargement (41 cm^2/m^2), right ventricular dilatation (319 ml/m^2), severe biventricular dysfunction without late gadolinium enhancement, pulmonary valve dysplasia without significant stenosis, mitral valve dysplasia with severe regurgitation.

Coronary artery disease was excluded by invasive angiography. Hemodynamic evaluation showed Qp/Qs of 2.7, pulmonary artery pressure at the upper normal limits and normal vascular resistance.

The patient underwent corrective cardiac surgery with closure of the large ASD with autologous fenestrated pericardial patch, and mitral valve surgery with a biological prosthesis.

Temporary pacing by epicardial lead was needed in the post-operative phase for the occurrence of advanced atrioventricular block (AVB). In the late post-operative stage temporary pacing was discontinued for the resolution of AVB. Bradycardic atrial fibrillation (mean HR of 35-40 bpm) and severe reduction of chronotropic reserve leading congestive heart failure were observed, despite progressive recovery of left ventricular systolic function (LVEF 45%). Therefor permanent pacemaker implantation was planned.

His bundle pacing with RV backup was chosen in order to avoid left ventricular function worsening due to dyssynchrony as a consequence of right ventricular pacing. Cardiac resynchronization therapy was deemed at risk of no-response due to the baseline QRS, right atrial and ventricular dilatation and a likely difficult coronary venous anatomy.

Double venous access was obtained by echo-guided punctures of the left axillary vein (7-Fr sheaths). Two active fixation leads were inserted: His lead (Solia, Biotronik) implanted on the His bundle via electrophysiological mapping using a specific delivery (Selectra 3D-40-42, Biotronik), and a backup right ventricular lead (Solia, Biotronik) at RV apex.

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Selective His capture, evidenced by no difference between native and paced QRS and equal HV and S-QRS intervals [Figure 2 A: H–QRS interval 57 ms, S-QRS interval 56 msec.] was obtained with acceptable outputs (threshold 1.0 V at 1ms, impedance 448-ohm, sensed amplitude was 2,4 mV) with RV pacing below 1.0 V at 0,4 ms. Pacing leads were connected to a biventricular pulse generator device (Biotronik Enitra 8 HF-T, His lead in LV port, RV lead in RV port, and a plug in RA port) which was programmed to obtain His pacing only (an attempt to narrow QRS with fusion pacing was ineffective). (Figure 2 B).

Conclusion

His bundle pacing can be a feasible pacing strategy in patients with ACHD and LV systolic dysfunction, accessible conduction system from the systemic venous circulation who require long-term cardiac pacing. The technical improvement and clinical availability of dedicated delivery tools with different bending designs allow high implantation success rate in patients with adverse anatomy (enlarged right atrium and displaced annular region).

In conclusion, HBP represents a promising strategy in ACHD patients with reduced systolic LV function, candidates to permanent pacing, in whom cardiac resynchronization therapy could be challenging for high probability of LV lead implant failure.

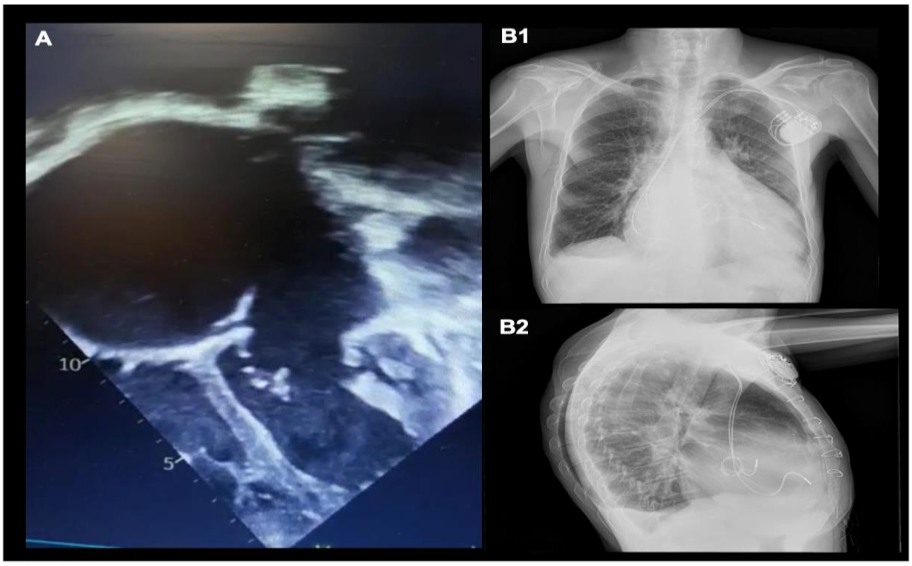

Figure 1.
A: first basal echocardiogram. B1-B2: chest radiography after permanent pacemaker implantation.

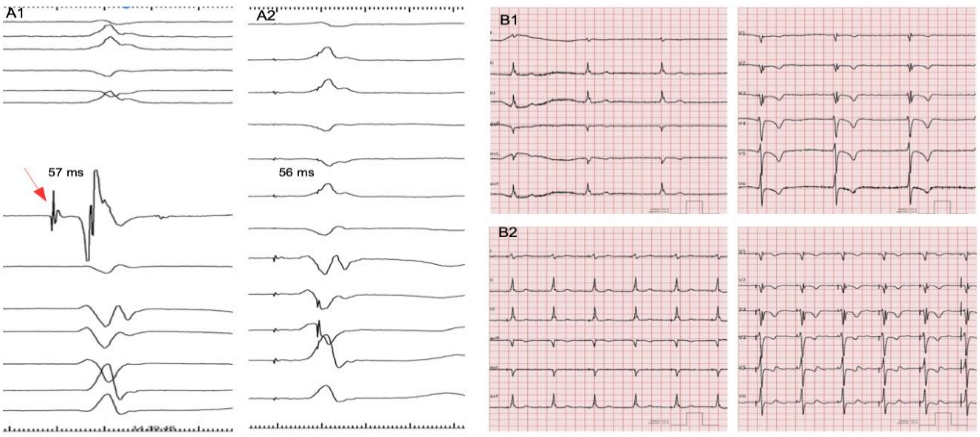

Figure 2.

A1-2 His electrogram (red arrow) previous implantation with H-QRS 57 ms and His bundle pacing (HBP) after lead positioning with S-QRS 56 ms.
B1-2:12-lead electocardiogram before and after HBP.

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