Rev Port Cardiol. 2014;33(5):309.e1–309.e7

Revista Portuguesa de Cardiologia
Portuguese Journal of Cardiology
www.revportcardiol.org

CASE REPORT

The proarrhythmic effect of cardiac resynchronization therapy: An issue that should be borne in mind☆

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Received 14 December 2012; accepted 20 January 2014
Available online 18 June 2014

KEYWORDS
Cardiac resynchronization;
Epicardial pacing;
Repolarization heterogeneity

Abstract The demonstrated benefits of cardiac resynchronization therapy (CRT) in reducing mortality and hospitalizations for heart failure, improving NYHA functional class and inducing reverse remodeling have led to its increasing use in clinical practice. However, its potential contribution to complex ventricular arrhythmias is controversial.

We present the case of a female patient with valvular heart failure and severe systolic dysfunction, in NYHA class III and under optimal medical therapy, without previous documented ventricular arrhythmias. After implantation of a CRT defibrillator, she suffered an arrhythmic storm with multiple episodes of monomorphic ventricular tachycardia (VT), requiring 12 shocks. Subsequently, a pattern of ventricular bigeminy was observed, as well as reproducible VT runs induced by biventricular pacing.

Since no other vein of the coronary sinus system was accessible, it was decided to implant an epicardial lead to stimulate the left ventricle, positioned in the left ventricular mid-lateral wall. No arrhythmias were detected in the following six months.

This case highlights the possible proarrhythmic effect of biventricular pacing with a left ventricular lead positioned in the coronary sinus venous system.

PALAVRAS-CHAVE
Ressincronização cardíaca;
Pacing epicárdico;

Terapêutica de ressincronização cardíaca e efeito pró-arrítmico: um problema que deve ser lembrado

Resumo Os benefícios demonstrados com a terapêutica de ressincronização cardíaca (TRC) na redução da mortalidade e hospitalização por ICC, melhoria da classe funcional e obtenção

☆ Please cite this article as: Cabanelas N, Oliveira M, Nogueira da Silva M, et al. Terapêutica de ressincronização cardíaca e efeito pró-arrítmico: um problema que deve ser lembrado. Rev Port Cardiol. 2014;33:309.e1–309.e7.

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Heterogeneidade da repolarização

de remodelagem inversa em doentes selecionados com insuficiência cardíaca (ICC), têm contribuído para a crescente utilização destes dispositivos na prática clínica.

No entanto, permanece controverso o impacto da TRC como fator causador de arritmias ventriculares complexas. Apresentamos o caso duma doente com cardiopatia valvular operada, disfunção sistólica grave e ICC classe III da NYHA, com terapêutica médica otimizada, sem documentação prévia de arritmias ventriculares significativas. Após implantação do sistema de TRC com cardioversor-desfibrilhador, desenvolveu quadro de tempestade arrítmica com múltiplos episódios de taquicardia ventricular monomórfica (TV) e necessidade de 12 choques, mantendo padrão de bigeminismo ventricular reprodutível e indução de salvas de TV pelo *pacing* biventricular. Dada a inacessibilidade a outra veia tributária do seio coronário foi decidido implantar elétrodo epicárdico em localização diferente (de veia póstero-lateral para posição lateral-mediana), sem registo de recorrência de arritmias num *follow-up* de seis meses. Este caso sugere que a TRC pode contribuir para um efeito pró-arrítmico com consequências clínicas potencialmente graves.

Introduction

The benefits of cardiac resynchronization therapy (CRT) in reducing mortality and hospitalizations for heart failure (HF), improving NYHA functional class and inducing reverse remodeling have been amply demonstrated in various multicenter trials in the last 10 years, leading to a considerable expansion of indications for biventricular (BiV) pacing.[1–8]

CRT can have adverse effects, most of which are related to procedural complications, infection and system malfunction. In recent years there has also been debate concerning the possible contribution of BiV pacing to the occurrence of complex ventricular arrhythmias.

Case report

A 58-year-old female patient with controlled mild hypertension, type 2 diabetes and dyslipidemia was being followed in the cardiology outpatient clinic for valvular HF and permanent atrial fibrillation (AF). She had previously undergone mitral valve replacement with a mechanical valve due to severe mitral stenosis.

During follow-up, progressive clinical deterioration was seen to NYHA class III under optimal medical therapy (OMT). The ECG showed QRS interval of 150 ms and complete left bundle branch block. She had no history of ventricular arrhythmias during follow-up. Serial echocardiograms showed steadily worsening global systolic function, ejection fraction (EF) falling from 24% to 13%. Six years after valve replacement surgery, she had severely impaired global systolic function, with left ventricular (LV) end-diastolic diameter of 82 mm, EF estimated at 13% by the modified Simpson's rule, and echocardiographic criteria of intraventricular dyssynchrony, with tissue synchronization imaging showing septal-lateral delay of 100 ms, two-dimensional strain imaging showing radial strain of 448 ms with inferior-anteroseptal delay but no ventricular dyssynchrony (pulmonary and aortic pre-ejection times of 78 ms and 105 ms, respectively). Right ventricular (RV) function was also impaired, with tricuspid annular plane systolic excursion of 5 mm.

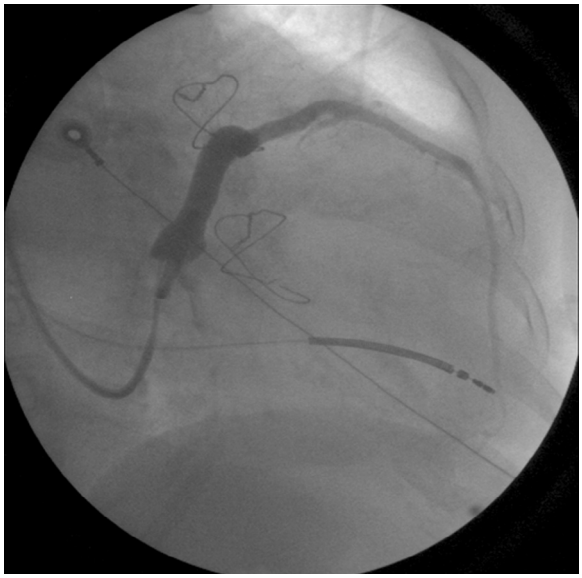

Figure 1 Angiogram of the coronary sinus, showing sparse venous system.

A VVIR mode CRT defibrillator (CRT-D) was implanted with the LV lead positioned in a posterolateral vein (Figure 1) with a different ostium from that of the coronary sinus, the venous system of which was sparse, consisting of small and markedly angulated vessels (Figure 2). In our center, the posterolateral vein is often used when the branches of the coronary sinus are technically difficult to access, although it is generally difficult to characterize. However, this vein is only used as an alternative, since the distance between it and the RV apex gives insufficient time for myocardial activation. Furthermore, the fact that both leads activating the ventricular mass are relatively close could trigger new dyssynchrony by the late activation of more distant areas of the myocardium.