



CASE REPORT

Successful cardiac resynchronization therapy in a patient with heart failure and ischemic mitral regurgitation: Importance of septal flash[☆]

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Abstract We describe the case of a 76-year-old man with a history of ischemic heart disease and functional mitral regurgitation, who over the previous six months had experienced worsening of functional class (NYHA III/IV) under optimal medical therapy, without ischemic symptoms and with negative ischemic tests. Mitral valve annuloplasty was considered. As the patient presented left bundle branch block on the surface ECG, cardiac resynchronization therapy (CRT) was also considered. There was, however, severe biventricular dysfunction and moderate to severe pulmonary hypertension, which are considered predictors of non-response to CRT. On echocardiographic evaluation of mechanical dyssynchrony by two-dimensional strain (2DS), spectral Doppler and color tissue Doppler imaging (TDI)/tissue synchronization imaging (TSI), we observed absence of atrioventricular dyssynchrony and presence of interventricular dyssynchrony, with inconclusive intraventricular longitudinal dyssynchrony, but with marked intraventricular radial dyssynchrony.

The latter, immediately observed on the two-dimensional image, and termed multiphasic septal motion or septal flash, was characterized and quantified with 2DS. In our experience, the presence of such septal motion, for which the substrate is predominantly radial dyssynchrony, is a predictor of CRT response. Weighing the risks and benefits of mitral valve annuloplasty without associated revascularization versus CRT, we opted for the latter. Marked improvement in clinical and echocardiographic parameters was observed, compatible with the current criteria for “responder”. The improvement began one month after implantation and continued throughout 2-year follow-up. In this case, detailed echocardiographic study of mechanical synchrony enabled the most appropriate and effective therapeutic strategy to be chosen.

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PALAVRAS-CHAVE

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Sucesso da terapêutica de resincronização cardíaca num doente com insuficiência cardíaca e regurgitação mitral secundária a doença isquémica: Importância do *Septal flash*

Resumo Descreve-se o caso clínico de um doente de 76 anos, com antecedentes de cardiopatia isquémica e regurgitação mitral grave funcional, que nos últimos 6 meses se encontrava em classe funcional NYHA III/IV, sob terapêutica médica otimizada, na ausência de sintomas isquémicos e com testes de isquémia negativos. Foi considerada a hipótese de cirúrgica de anuloplastia mitral de redução, mas como o doente apresentava no ECG de superfície padrão de bloqueio completo do ramo esquerdo (BCRE), optou-se por terapêutica de resincronização (CRT), apesar de existir disfunção biventricular grave e hipertensão pulmonar (HTP) moderada a grave, factores considerados preditores de não-resposta a CRT. Na avaliação ecocardiográfica de dessincronia mecânica por *Strain* Bidimensional (2DS), *Doppler* espectral e *Doppler* tecidual cor sincronizado para a sístole (TDI/TSI) verificou-se a ausência de dessincronia aurículo-ventricular, a presença de dessincronia interventricular, sendo a análise da dessincronia intraventricular longitudinal ambígua, mas com evidente dessincronia intraventricular radial. Esta última era desde logo evidente na apreciação visual da imagem bidimensional e modo M, podendo ser descrita como movimento septal multifásico, ou *septal flash*, tendo sido caracterizada e quantificada por 2DS. Na nossa experiência, a presença deste movimento septal que tem como substrato dessincronia intraventricular de domínio radial, parece ser um marcador de resposta a CRT, pelo que, ponderados os riscos/benefícios da terapêutica cirúrgica mitral sem revascularização associada, versus CRT, optou-se por esta última, tendo sido observado comportamento de resposta clínica e ecocardiográfica compatível com a actual designação de "responder", registada ao primeiro mês e mantida no seguimento de dois anos. Neste caso o estudo ecocardiográfico detalhado do sincronismo mecânico, permitiu a escolha da estratégia terapêutica mais adequada e eficaz.

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Introduction

Cardiac resynchronization therapy (CRT) has been shown to improve quality of life and survival in a significant number of patients with heart failure (HF) in randomized multicenter clinical trials.¹⁻³ The inclusion criteria of these trials – New York Heart Association (NYHA) class III/IV, QRS ≥ 120 ms and ejection fraction (EF) $\leq 35\%$ – were subsequently incorporated into current guidelines.⁴ Many non-randomized single-center studies in three continents have shown additional benefit when there is evidence of mechanical dyssynchrony on imaging studies.⁵⁻⁷ We report the case of a patient with ischemic dilated cardiomyopathy who met the criteria for CRT but had severe functional mitral regurgitation, moderate to severe pulmonary hypertension (PH) and associated right ventricular dysfunction, in whom a biventricular pacemaker with cardioverter-defibrillator (CRT-ICD) was implanted.

Case report

A 76-year-old man with a history of paroxysmal atrial fibrillation and anteroseptal myocardial infarction in 1996 underwent coronary artery bypass grafting (CABG) in 1997 (left internal mammary artery to left anterior descending artery, saphenous vein to first obtuse marginal branch, and saphenous vein to posterior descending artery). In the previous six months he had been hospitalized twice for worsening

HF, once with acute pulmonary edema. He was in NYHA functional class III/IV under optimal medical therapy (maximum tolerated doses of angiotensin-converting enzyme inhibitors, beta-blockers, diuretics and statins). During this hospitalization he was without angina, but had symptoms of low cardiac output, which was treated with intravenous levosimendan, without success. No arrhythmias were observed and his heart rate remained stable at under 70 bpm. Cardiac auscultation revealed a third sound with a I-II/VI systolic murmur at the apex, while bibasal rales compatible with pulmonary congestion were heard on pulmonary auscultation. There was also jugular distension (jugular venous pressure of 3 cm at 30°) and malleolar edema. Laboratory tests showed hemoglobin 13.2 g/dL, NT-proBNP 2275 pg/mL, urea 59 mg/dL and creatinine 1.4 mg/mL; liver tests were normal, with SGOT and SGPT of 27 and 42 U/L respectively. The electrocardiogram showed a pattern of anterolateral scarring and left bundle branch block, with QRS of 130 ms. The echocardiogram revealed a moderately dilated left ventricle (end-diastolic and end-systolic dimensions of 75 mm and 61 mm, respectively, and end-diastolic and end-systolic volumes of 186 mL and 133 mL, respectively), moderate to severe global systolic dysfunction (EF by Simpson's biplane method: 34%) due to akinesia of the anterior septum, inferior wall and apical segments, and moderate posterior hypokinesia. The mitral valve showed no morphological alterations, but tenting (9 cm² in area and 26 mm in height) and symmetrical stretching of the subvalvular apparatus were observed, leading to severe functional mitral

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