CASE REPORT

Biventricular pacing in a patient with ventilatory and inotropic dependant heart failure following coronary artery by-pass surgery

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Abstract Resynchronisation of intra- and interventricular conduction delay by biventricular pacing has become a proven therapy for selected heart failure patients. We present a case of biventricular pacing, used with great success, as a 'bail out' for a patient with refractory congestive heart failure following by-pass surgery.

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Introduction

Biventricular pacing (BVP) is a rapidly developing therapy for selected patients with congestive cardiac failure and significant QRS prolongation. Normal inclusion criteria in many large trial series included stable patients with New York Heart Association (NYHA) Class III—IV heart failure (moderate to severe heart failure). Although traditionally BVP has been used with promising results in this chronic stable group, evidence is starting to emerge for its use in patients with medically refractory acute heart failure. Isolated case reports have demonstrated its successful usage in refractory heart failure patients with idiopathic dilated cardiomyopathy [1], and in weaning patients from extracorporeal circulation post surgery [2]. There is also literature regarding its use in high risk patients undergoing cardiac surgery [3,4] which appears positive, although there are no large trials to corroborate this.

Case report

A 74-year-old woman with ischaemic dilated cardiomyopathy and severe left ventricular dysfunction (LVD) with an ejection fraction of 25% underwent coronary artery by-pass surgery (CABG)
for symptomatic angina. She had extensive coronary artery disease and received grafts to her left anterior descending, intermediate, diagonal and obtuse marginal coronary arteries.

Post operatively she made slow progress, remained ventilated and required an intra-aortic balloon pump (IABP) and inotropic support for 6 days before the IABP was successfully removed and she was extubated. Despite this she continued to remain dependant on both inotropic and continuous positive airways pressure ventilatory (CPAP) support. All attempts to wean off her ventilation led to florid pulmonary oedema and she had developed medically refractory heart failure.

Her ECG demonstrated sinus rhythm with a very broad QRS complex (170 ms) and left bundle branch block morphology indicating probable significant ventricular dyssynchrony. Formal tissue Doppler imaging was not performed given her adverse clinical predicament and lack of other medical/invasive treatment options. Therefore, due to her broad LBBB a transvenous biventricular pacing system (BVP) was implanted. The procedure was carried out under general anaesthetic. The right ventricular lead was positioned in the apex and the left ventricular lead in the anterolateral branch of the coronary sinus. The right atrial lead was deployed in the appendage. The generator used was a Medtronic In-Sync III 8040.

To provide reliable resynchronisation the generator was programmed in the DDD mode with a lower rate of 50 bpm and an echo optimised AV delay set at 90 ms with simultaneous LV and RV pacing. The AV delay was optimised in the immediate post implant setting (and checked prior to discharge).

Following active biventricular pacing ECG QRS width reduced from 170 to 148 ms with a rapid improvement in her haemodynamic status allowing reduction and then cessation of her inotropic support. Within 4 days removal of her ventilatory support was also achieved.

She went on to mobilise and was medically discharged from hospital 74 days after surgery but only 16 days following her BVP implant.

At 9 months follow up the patient was clinically in NYHA class II, echocardiography demonstrated a reduction in LV size (LV diastolic dimension) from 6.8 cm to 6.4 cm. Mitral regurgitation was reduced from severe to moderate and the ejection fraction had risen from <20% to 25%.

The patient has not been hospitalised for heart failure since discharge.

**Discussion**

It would appear that a potential new role for BVP is emerging in groups of patients with significant LV dysfunction who are undergoing cardiac surgery. Whilst small studies already exist in this patient group showing that BVP can be a successful additional therapy following cardiac surgery [4] the data are sparse, as pacing was only performed for up to 24 h post operatively via temporary epicardial pacing. The authors believe a potential role may exist for the use of BVP in those patients with significant LVD and dyssynchrony (detected by echocardiographic or ECG means) who are awaiting cardiac surgery. Perhaps the implantation and use of BVP may serve to improve LV function pre operatively, and also serve to assist the already failing LV peri and post operatively. This may reduce morbidity and mortality in the long term.

Further prospective studies are required to evaluate this potential new use of BVP.

To the author’s knowledge this is the first reported case of a patient post CABG surgery suffering from medically refractory heart failure who was successfully weaned from both ventilation and inotropic support with the aid of BVP.

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**References**