Right ventricular pacing for hypertrophic obstructive cardiomyopathy: a meta-analysis and meta-regression of clinical studies

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Background

Right ventricular (RV) pacing for left ventricular outflow tract (LVOT) gradient reduction in hypertrophic obstructive cardiomyopathy (HOCM) remains controversial.

Purpose

To perform a meta-analysis of the effect of RV pacing on echocardiographic and symptomatic outcomes in HOCM.

Methods

We conducted a literature search in MEDLINE using the following search terms (including MeSH) in title and abstracts:

Hypertrophic Cardiomyopathy
Left Ventricular Outflow Tract Obstruction
Left Ventricular Outflow Tract Gradient
Left Ventricular Hypertrophy
Right Ventricular pacing
Pacing
Pacemaker
Ventricular pacing

All randomized controlled trials (RCTs) and observational studies published were eligible as long as they consisted of a study of RV pacing in adults with HOCM and change in LVOT gradient reduction and New York Heart Association (NYHA) class.

Results

604 studies were identified from the search. 429 were excluded on the basis of the title and abstract alone. 141 studies were excluded after review of full publications. 34 studies comprising 1135 patients were included in the meta-analysis. Mean age was 55.5 years and mean baseline unpaced LVOT gradient was 78.9mmHg. AV delay selection method, and actual AV delay used for RV pacing, varied greatly between studies.

In the 4 blinded crossover RCTs, pacing reduced LVOT gradient by 35% (CI 23.2 – 46.9, p<0.0001, figure 1), but only showed a trend towards improved NYHA class (odds ratio [OR] 1.82, CI 0.96 – 3.44, p=0.066).
Abstract:

The unblinded observational studies, with similar follow up duration, reported a 54.3% (CI 44.1 to 64.6, p<0.0001) reduction in LVOT gradient, which was 18.6% greater reduction than the RCTs (p=0.0351 for difference between study designs). They reported an effect on unblinded NYHA class at an OR of 8.39 (CI 4.39 to 16.04, p<0.0001), 450% larger than the OR in RCTs (p=0.0042 for difference between study designs).

Figure 1 shows the forest plot for percentage change in LVOT gradient from baseline in RCTs.

The gradient progressively decreased at longer follow durations, by 5.2% per month (CI 2.5 to 7.9, p=0.0001) indicated that remodelling may be occurring over time.

Conclusions

Right ventricular pacing reduces LVOT gradient in blinded RCTs. There is a non-significant trend to improvement in NYHA class. The bias in NYHA class assessment in observational studies appears to be over twice as large as any genuine treatment effect.