



Devices in Heart Failure

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Cardiac resynchronisation (CRT) by means of implantable devices has become an important strategy in the therapy of patients with congestive heart failure (CHF). After the recognition that patients with intraventricular conduction disturbances and heart failure could be improved by positioning an additional pacing lead on the epicardium on the left ventricle, transvenous systems were developed. Implantation technology is continually improving, but surgical implantation remains necessary in some cases.

WHAT HAS BECOME CLEAR?

The mechanisms by which it should work are multiple. CRT prolongs diastolic filling time and decreases presystolic and systolic regurgitation over the AV valves. It decreases asynchrony at several levels: atrioventricular, interventricular, and intraventricular. Further, relief of external constraint is provided.

From a clinical point of view, CRT improves quality of life, improves exercise time, and reduces hospitalization for heart failure.

WHAT ARE THE MAIN PROBLEMS?

Some important remarks have to be made. Complications are not infrequent. Coronary sinus dissection occurs in 2-3%, but usually is harmless. Perforation with pericardiac effusion happens in 0.6%. Phrenic nerve stimulation is more frequent, and its incidence depends on the site, the catheter type, but makes pacing impossible in 5 to 10%. There is general agreement that 30% is not responding to this technology. The reasons again are multiple. Sometimes, implantation fails; in another group, the pacing catheter dislodges, or pacing becomes impossible because of phrenic nerve stimulation. It is logical that non-ischemic patients have a better response than ischemic patients: e.g. pacing in slow conduction zones as an infarcted area can be ineffective.

FOLLOW-UP

Intra-operative guiding by ECG or echo is not standardised. Postoperatively, optimisation of the pacing mode is important,

but no general agreement exists how it should be done. Restoring AV synchrony is probably the most important step in the majority of patients. An option is that only non-responders are extensively tested to improve the other settings.

DO PATIENTS NEED A DEFIBRILLATOR, CRT OR BOTH?

Recent studies proved how standard ICDs with VVI back-up pacing play a role to improve survival in patients with CHF (SCD Heft). The COMPANION trial showed how CRT-D devices were superior compared to pacing devices, in respect to survival. In our analysis, prophylactic implantation of CRT-D is associated with ventricular arrhythmias in 10%/per year.

When this would be applied in guidelines, a first step (class IIa) would be that CRT is needed for NYHA class III-IV, having sinus rhythm, receiving optimal drug therapy, with LVEF < 35% and LVEDD > 55 mm. The QRS width criterion (> 120 ms) remains valid. If a patient then has a class I indication for ICD, the choice is easy. If a society accepts MADIT II, all fulfilling the criteria mentioned above have a class IIa indication for a CRT-D. If survival is taken into account, COMPANION and SCD Heft come in the picture, requiring more ICDs. NYHA class II was accepted in both trials, but only one used CRT in combination with the defibrillator.

PERSPECTIVES

It is sure that improvement of the implantation techniques has to go on. Patient selection has to improve as well, with appropriate echocardiography, that can be used at implantation and for follow up. Identification of those who need and probably do not need a defibrillator remains a challenge.