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## Review article on cardiac resynchronization therapy in chronic heart failure

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### Abstract

Cardiac resynchronization therapy has recently emerged as an effective treatment for patients with moderate to severe systolic heart failure and ventricular dyssynchrony and wide QRS complex. It also coordinates timing between the left and right sides contraction of the heart. This device improves the heart's ability to pump oxygenated blood to your body. This cardiac device is actually a tiny computer, contained in a small titanium metal case that is about the size of a pocket watch & insulated wires called lead, this device implanted through small insertion below the collar bone and connected to the heart three lead (arterial lead, left ventricular lead and right ventricular lead) are implanted to carry signals from your heart to the heart device and carry electrical impulses to your heart.

**Keywords:** Heart failure, cardiac resynchronization therapy, QRS complex, ventricular dyssynchrony

### Introduction

Cardiac resynchronization therapy is one of the most effective and recent advancement in heart failure and it also reduces the risk for arrhythmia-related sudden death. Recent studies have shown that the use of CRT improves heart function in patients with mild and moderate heart failure and decrease mortality and morbidity rate of patients [1-3] with reduced left ventricular ejection fraction, Prolonged QRS duration, and abnormal QRS morphology. CRT-D also function as a defibrillator by delivering an electrical shock to the heart to restore an extremely rapid to irregular heart rate to normal rate. Most of the patient with dilated cardiomyopathy received implantable defibrillators with cardiac resynchronization therapy and also received congestive heart failure and an abnormal wide QRS patient

### CRT in heart failure

- LVEF <35%, sinus rhythm, LBBB with a QRS >119 ms, and NYHA class II, III, or ambulatory IV symptoms on GDMT (guideline-directed medical therapy) [3, 4]
- LVEF <35%, sinus rhythm, a non-LBBB pattern with a QRS duration >120 ms, and NYHA class III/ambulatory class IV symptoms on GDMT [4].
- Atrial fibrillation and LVEF <35% on GDMT if (i) the patient requires ventricular pacing or otherwise meets CRT criteria and ii) AV nodal ablation or pharmacologic rate control allows near 100% ventricular pacing with CRT [5, 6].  
LVEF <35%, on GDMT, with planned new or replacement device placement with anticipated requirement for (40%) ventricular pacing [7, 8]  
LVEF <30%, ischemic etiology of heart failure, sinus rhythm, LBBB with a QRS duration >150 ms, and NYHA class I symptoms on GDMT.
- LVEF <35%, sinus rhythm, a non-LBBB pattern with a QRS duration >150 ms, and NYHA class II.

### CRT in atrial fibrillation

- Persistent third-degree atrioventricular block, with or without symptoms
- In atrial fibrillation and while awake, pauses in heartbeat  $\geq 5$  seconds with or without symptoms [9, 10].
- In sinus rhythm and while awake, pauses in heartbeat  $\geq 3$  seconds or heart rates less than 40 beats per minute or an escape rhythm below the AV node, with or without symptoms [11].  
catheter ablation of the AV junction.
- cardiac surgery, if expected to be permanent.

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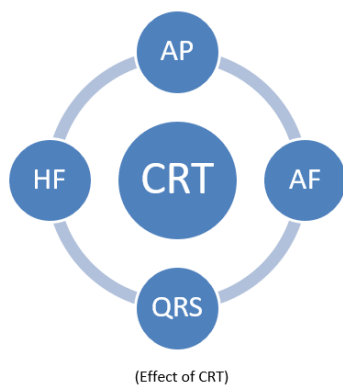
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- In neuromuscular diseases such as myotonic
- Exercise-induced heart block without myocardial fraction.

### Crt In Qrs Complex

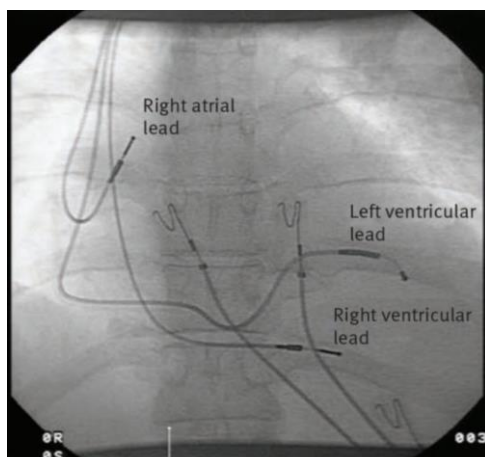
The finding of mechanical dyssynchrony in patients with a QRS duration <120ms. Several studies showed a benefit from CRT [12, 13] two most recent multicenter, randomized, controlled studies, LESSER-EARTH (Evaluation of Resynchronization Therapy for Heart Failure) trial [14] and Echo CRT (Echocardiography Guided Cardiac Resynchronization Therapy [15].

**Action potential:** The action potential duration in DHF is more prolonged in the lateral than in the anterior wall, and this effect is shortens by CRT, particularly in the lateral myocytes wall [16].



### Method

Cardiac resynchronization therapy is a form of cardiac pacing that aims to improve the heart ability and the coordination of the atria and both ventricles., this device implanted through small insertion below the collar bone and connected to the heart three lead and Pacing leads are placed into the right atrial appendage, at the right ventricular apex, which is also the anterior wall of the left ventricle, and, via a lateral tributary of the coronary sinus, into the leftventricular posterolateral wall (fig 1). Venous access is through the subclavian vein as for normal pacing, and the procedure is usually done under local anesthetics through an infraclavicular incision. The target vein on the lateral wall. Cardiac resynchronization therapy improves cardiac output, reduce mitral regurgitation during rest and exercise [17].



**Fig 1:** Image showing right ventricular, right atria, and left ventricular lead

### Conclusion

CRT benefit is thought to depend on mechanical resynchronization of cardiac electrical and mechanical activity. The modality of CRT has been clearly proven to enhance quality of life, reduce hospitalization for heart failure. CRT offers a more favorable response in heart failure and arterial fibrillation. Data from the CARE-HF study showed that cardiac resynchronization therapy is very effective and data showed Between 55% and 75% of patients with chronic heart failure who have left bundle branch block show an improvement in symptoms after biventricular pacing and after this appears improvements in cardiac function, left ventricular dimensions, mitral regurgitation [18].

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