Does Cardiac Resynchronization Therapy Benefit Patients With Right Bundle Branch Block?

_CRT Has a Role in Patients With RBBB_
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**Agenda**

- Introduction & Magnitude of the Problem
- What Do the Guidelines Say?
- Evidence behind the Guidelines
- Special RBBB Subpopulations:
  - Electromechanical dyssynchrony
  - RBBB with long PR interval
  - Use of LV Lead Electrical Delay (LVLED)
- Conclusion
RBBB, although less common than narrow QRS or typical LBBB, is frequently encountered in the HF population, affecting between 10 and 15% of patients.
From: An individual patient meta-analysis of five randomized trials assessing the effects of cardiac resynchronization therapy on morbidity and mortality in patients with symptomatic heart failure.  

CRT has been established as a useful therapy for patients with heart failure with prolonged QRS duration and low ejection fraction.

CRT has been shown to reduce mortality and morbidity in these patients.

Recommendations for cardiac resynchronization therapy implantation in patients with heart failure.
QRS width was the inclusion criterion in all randomized trials

None of the landmark trials selected patients for inclusion according to QRS morphology

Intraventricular conduction delay in HF patients with QRS intervals > 120 ms
Meta-analysis of 5 CRT trials showed that QRS duration was the only predictor of magnitude of response to CRT.

The intersection of the 95% confidence interval and the line indicating a hazard ratio of 1.0 (no effect) indicates the QRS duration above which there is a high certainty of response.

From: An individual patient meta-analysis of five randomized trials assessing the effects of cardiac resynchronization therapy on morbidity and mortality in patients with symptomatic heart failure

Do RBBB patients represent a homogenous group?

- RBBB masking LBBB (associated LV electromechanical dyssynchrony)
- RBBB with long PR interval
- Use of intraprocedural LVLED
Electroanatomic mapping and surface 12-lead ECG in a patient with RBBB in a patient with LBBB

Angelo Auricchio et al. Circ Arrhythm Electrophysiol. 2014;7:532-542

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Electroanatomic mapping and surface 12-lead ECG in a patient with RBBB masking left LBBB

Two patient examples of different right RBBB morphology and long-term outcome after CRT
The Kaplan–Meier curves demonstrating the probability of freedom from death, transplant, or ventricular assist device after CRT comparing patients with LBBB, to those with RBBB with or without significant radial dyssynchrony.

From: The relationship of QRS morphology and mechanical dyssynchrony to long-term outcome following cardiac resynchronization therapy

RBBB associated with first degree HB
In a substudy of the MADIT CRT Non-LBBB patients with a long PR interval derive a significant clinical benefit from the implantation of CRT-D versus ICD-only.

**Effect of PR Interval on Outcomes Following Cardiac Resynchronization Therapy: A Secondary Analysis of the COMPANION Trial**

Predicted hazard ratios (estimates and 95% CIs) according to baseline PR intervals and QRS morphology. In patients with non-LBBB and LBBB, there was a statistically significant decrease in hazard ratio (favoring CRT-D treatment) for all-cause mortality with increasing PR intervals.

There was no significant difference in either endpoint between patients with non-LBBB and LBBB.
Use of left ventricular lead electrical delay

Event-free survival for (A) heart failure hospitalization and (B) composite outcome at 3 years comparing LVLED ≥50% and LVLED <50% in RBBB patients. LBBB patients are plotted to provide comparison.
Conclusion

• Heart failure patients with RBBB represent a sizeable subgroup in need of adjunct therapies on top of the best pharmacological therapy
• CRT provide some benefits to unselected patients with RBBB, albeit modest
• Some RBBB patient subpopulations seem to benefit more from CRT and they include:
  – Associated LAFB or LPFB (masked LBBB)
  – Associated LV electromechanical dyssynchrony
  – Long PR > 230 ms
  – Intraprocedural LVLED >50%

Thank You