

CARDIAC RESYNCHRONIZATION THERAPY(CRT) IN HEART FAILURE PATIENTS ON MAXIMAL AND SUB-MAXIMAL DOSES OF β -BLOCKERS

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Introduction

Heart failure affects more than 500,000 Canadians and 50,000 new cases are diagnosed each year.⁴

Cardiac Resynchronization Therapy (CRT) and β -blockers are used as treatment options for patients with heart failure. β -blockers are used early on in therapy to counteract the body's abnormal activation of the sympathetic nervous system.³ β -blockers will reduce heart rate which allows the left ventricle to fill more completely and thereby allow the heart to pump more blood to the body. CRT is currently used as therapy in more severe cases of heart failure that are refractive to optimal pharmacological therapy. With CRT, the ventricles of the heart are simultaneously paced which resynchronizes the timing of global left ventricular depolarization and enhances mechanical contractility.⁵ CRT ultimately improves symptoms of heart failure, exercise capacity, quality of life, hospitalization, and left ventricular function.⁶

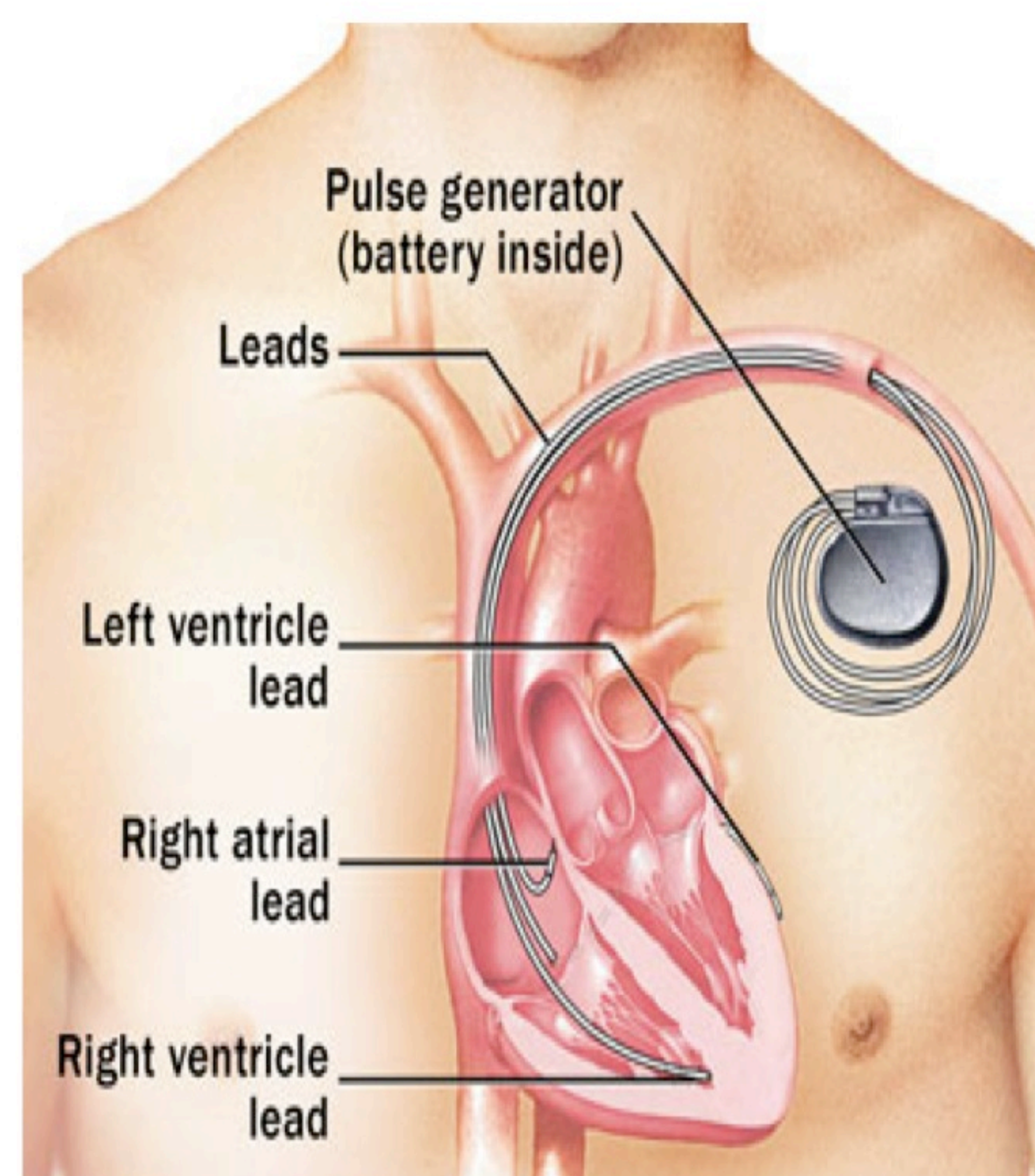


Illustration of a patient with CRT

Methods

A retrospective analysis was conducted at the University of Ottawa Heart Institute for patients with CRT who had a 6 and 12 month follow up after the procedure. Patients who were on the maximum recommended dose of β -blockers (MBB) at baseline were placed into one group in the study, and the remaining participants who were not on the maximum dose (NMBB) were placed into another group. Improvement was defined by an increase in ejection fraction (EF) as documented by MUGA scan or by an echocardiogram. Relevant baseline data was collected including baseline EF, heart rate, medical co-morbidities, and laboratory results. A t-test was conducted for all the continuous variables in the study as seen in Table 1. Table 2 lists the results from the chi square analysis for the various categorical variables.

Table 1: Multivariate Analysis – Continuous Variables

Numerical Variables	NMBB	MBB	Significance
Age	67.9 +/- 8.59	65.9 +/- 11.5	0.314
EF Baseline(%)	23.2 +/- 5.89 %	23.7 +/- 6.70 %	0.73
EF 6 mo.(%)	28.6 +/- 11.8 %	28.9 +/- 9.17 %	0.939
EF 12 mo.(%)	32.8 +/- 12.9 %	30.7 +/- 11.7 %	0.528
Heart Rate	67.7 +/-10.7	70 +/- 8.10	0.312
eGFR	55.9 +/-20.1	61.3 +/-24.9	0.3
Na+	138 +/- 3.38	139 +/- 2.34	0.31

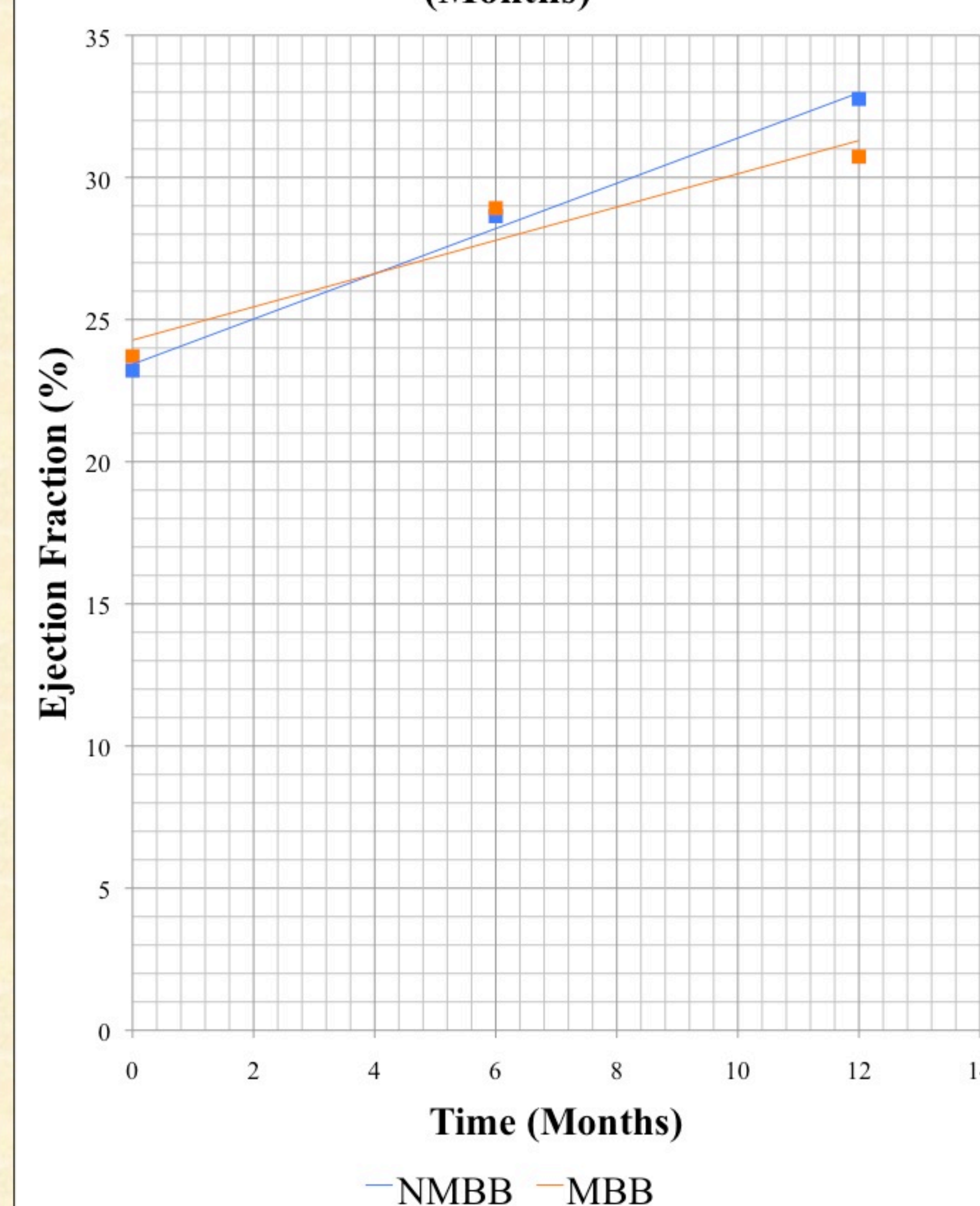
Table 2: Multivariate Analysis - Categorical Variables

Categorical Variables	NMBB	MBB	Total	Significance
Female	6	6	12	0.687
Male	42	25	67	
Ischemic	30	18	48	0.693
Non-ischemic	18	13	31	
Diabetic	17	13	30	0.339
Non-diabetic	31	18	49	
HT	12	7	19	0.806
NT	36	24	60	

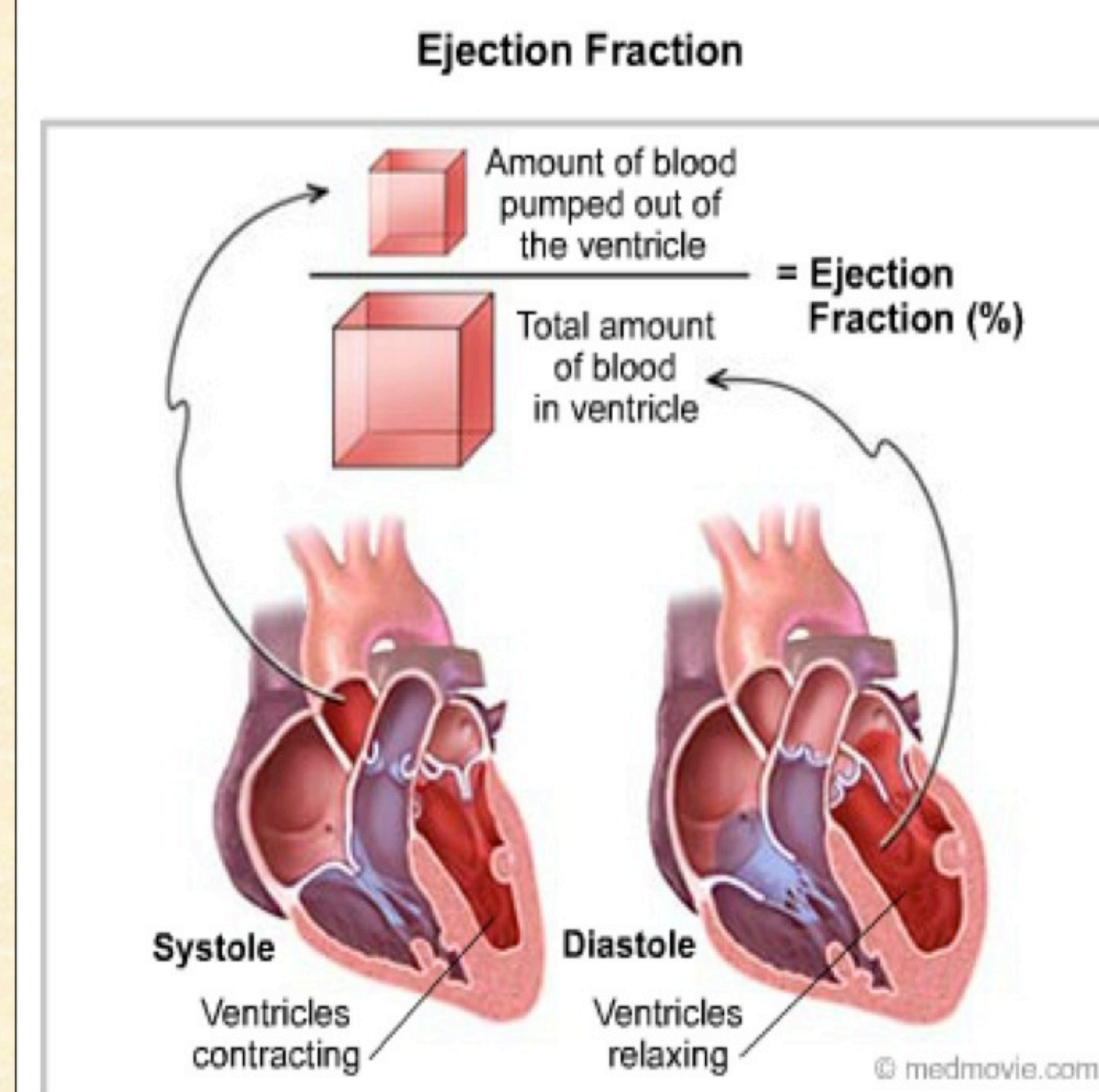
Results

There were a total of 79 participants in this study. The two groups were similar in terms of age, heart rate, ejection fraction and other baseline variables as evident by a p-value greater than 0.05. It is important to highlight the comparable improvement in ejection fraction in both groups. The p-value for EF at baseline, 6 months, and 12 months was not significant (>0.05).

Graph 1: Ejection Fraction(%) vs. Time (Months)



The graph above illustrates the comparable improvements in EF for both groups at 6 and 12 months after the CRT procedure.



Discussion & Conclusion

Discussion

This study has been able to demonstrate that CRT is capable of providing comparable dramatic improvements regardless of the β -blocker dosage at baseline. This suggests that clinicians may not have to wait until patients are on the maximum dose of β -blocker before they can consider CRT as an option. This would be particularly true for patients who cannot tolerate the maximum dose of β -blockers due to its associated side effects.

Conclusion

CRT is relatively new technology that is showing great promise in managing heart failure. CRT has demonstrated its ability in our study to remarkably increase ejection fraction regardless of the baseline β -blocker dose.

Acknowledgment

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