Gender Specific Response to Cardiac Resynchronization Therapy

Manish Ganwani\textsuperscript{1}, Narayanan Namboodiri\textsuperscript{1}, Krishna Kumar Mohanan Nair\textsuperscript{1}, SP Abhilash\textsuperscript{1}, Mukund Prabhu\textsuperscript{1}, Debashish Das\textsuperscript{1}, Niraj Varma\textsuperscript{2}, Ajit kumar Valaparambil K.\textsuperscript{1}

Department of Cardiology, Sree Chitra Tirunal Institute for Medical Sciences and Technology, India\textsuperscript{1}

Heart and Vascular Institute, Cleveland Clinic, Cleveland, Ohio\textsuperscript{2}

\textbf{Background:} Over the last few decades, cardiac resynchronization therapy (CRT) has emerged as a valuable treatment, substantially reducing morbidity and mortality in selected patients with heart failure. Intriguingly, sex differences have been noted in response rates. This study was designed with the hypothesis that gender-specific cardiac resynchronization therapy response rate represents primarily the body and heart size.

\textbf{Aims and objectives:} We aimed to assess CRT response rates between genders and the influence of BSA and LV mass on response between genders.

\textbf{Methods:} Fifty-seven patients (41 males; mean age 55.11±9.36 years) who underwent CRT implantation and cardiac MRI prior to it, were prospectively followed up. All patients underwent clinical evaluation, ECG, echocardiography, before and after the intervention.

\textbf{Results:} Amongst the study population, 14 (24.56\%) patients had ischemic cardiomyopathy while 43 (75.40\%) had non-ischemic DCM. BSA was significantly higher in males as compared to females (1.72±0.206 vs 1.55±0.188 m\textsuperscript{2}; p-value = 0.007). CRT-D devices were implanted more frequently in males as compared to females (60.90\% vs 6.25\%; p-value=0.01). At baseline, the mean QRS duration was significantly higher in males as compared to females (173ms vs 158ms; p-value-0.02). Males had larger LV end-systolic (57.56±11.44 vs 48.50±4.70mm; p-0.003) and LV end-diastolic dimensions (67.20±10.61 vs. 59.38±5.58 mm; p-value-0.007) as compared to females. LVEF was significantly different between the sexes, with males having a lower LVEF as compared to females (28.54±7.61 \% vs 34.25±4.25 \%; p-value-0.007). All patients were treated according to guideline-directed medical therapy. On MRI evaluation, males had higher LV end-systolic (182.56±108.86ml vs 106.96±41.23ml; p-value-0.009) and LV end-diastolic volumes (234.44±113.5 ml vs 152±47 ml; p-value-0.007) as compared to females. Late gadolinium enhancement (LGE) was seen in 23 (40.35\%) of the patients, while no LGE was noted in 34 (59.64\%) of the patients. LGE was more commonly seen in males (48.78\%) as compared to females (18.75\%) which was statistically significant (p-value-0.038). Overall response rate was 75\% which was comparable between sexes (Males-74.28\%, females-78.57\%; p-value-0.75). Significant improvement in QRSd, LVEF, LVIDD, LV Mass, LVIDS, LVEDV, and LVESV was seen post CRT implantation in both sexes. Among responders, females had a narrower QRS as compared to males (156.73±8.73 vs 170.92±23.32; p-value-0.05). Amongst factors assessed only baseline QRS duration correlated with a poorer response (p-value 0.004). There was no significant effect of BSA and LV mass on response rates.
Conclusion: Overall, wider QRS duration at baseline was associated with poor CRT outcomes. However, response rates were comparable between the genders. We also noted that the average QRS duration among female responders was lower as compared to their male counterparts. This gender difference was independent of lower body surface area and LV mass noted in females.