

LEFT VENTRICULAR DYSFUNCTION IN INFANTS WITH COARCTATION OF AORTA

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Coarctation of the aorta (CoA) represents a congenital cardiac anomaly characterized by narrowing of the aortic lumen, often leading to significant hemodynamic alterations and subsequent cardiac complications. Among these complications, left ventricular (LV) dysfunction emerges as a critical concern, particularly in infants under one year of age. Understanding the trigger factors for LV dysfunction in this specific population is paramount for timely intervention and improved patient outcomes.

Aim: This abstract aims to elucidate the trigger factors associated with LV dysfunction in infants diagnosed with CoA.

Materials and methods: A retrospective cohort study was performed. Medical records and CT scans were analyzed retrospectively and all relevant information and CT scan measurements about 46 patients under the age of 1, who underwent surgical repair of coarctation of aorta between 2012-2022 was acquired to perform statistical analysis. All statistical analysis was performed using SPSS and Jamovi applications.

Results: 46 patients (31 males, 67.4%), with mean age of 4.11 ± 3.23 months, who diagnosed with isolated CoA. Patients were divided in to 2 groups: Group 1 comprised individuals with normal left ventricular (LV) function, characterized by an LV ejection fraction exceeding 56% (34 patients). Meanwhile, Group 2 comprised patients with impaired LV function, presenting with an LV ejection fraction lower than 55.9% (12 patients).

The statistical analyses showed that, patients with low LV function (Group 2) showed significantly higher pressure gradient on coarctation site, less number of patients with LV hypertrophy, more number of patients with LV dilation, lower ejection fraction of LV and higher end-diastolic volume of LV by echoCG, and smaller aortic arch and isthmus size, lower z-score for aortic arch and isthmus sizes by CT, compared to Group 1 (patients with normal LV function).

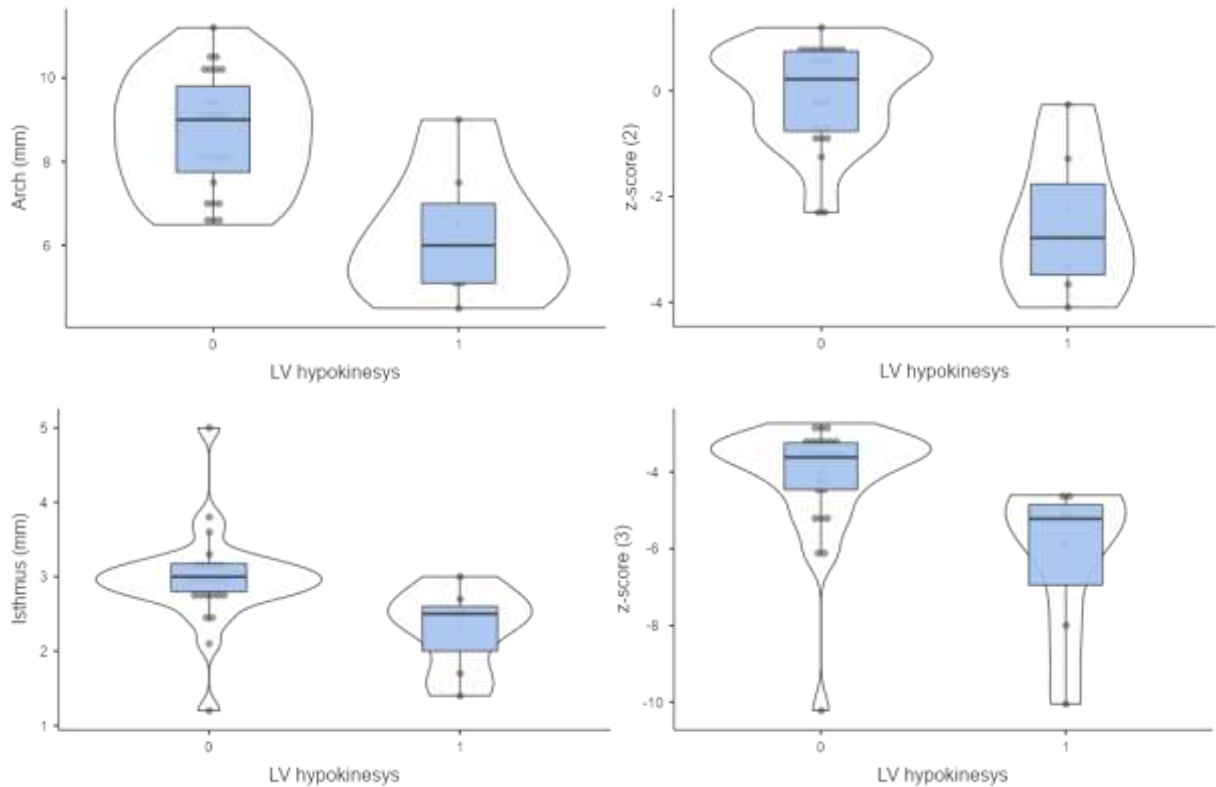


Figure 1. Comparison of CT scan results of aortic arch size and its z-score, and aortic isthmus size and its z-score between two groups. All four measurements were statistically significantly different ($p < 0.05$). (sizes of other parts of aorta were not statistically different.)

The correlation analysis indicates that the ejection fraction of the left ventricle (EF LV) exhibits a positive correlation with the size of the aortic arch ($r=0.462$, $p=0.006$) and the z-score of the aortic arch size ($r=0.500$, $p=0.003$). This implies that patients with a smaller aortic arch tend to have a lower EFLV. Conversely, EF LV shows a negative correlation with the pressure gradient on the coarctation site ($r=-0.393$, $p=0.008$), mitral regurgitation ($r=-0.817$, $p < 0.001$), and left ventricular end-diastolic volume (EDV LV) ($r=-0.492$, $p=0.006$). Hence, patients with a higher pressure gradient at the coarctation site, or those with more severe aortic coarctation, are likely to have a lower EFLV and a higher EDV LV.

Conclusion: These findings suggest that left ventricular (LV) dysfunction is primarily a consequence of LV pressure overload, with the severity of aortic coarctation directly influencing the manifestation of LV dysfunction. Aortic arch hypoplasia and mitral regurgitation further exacerbate the impairment of left ventricular function. Consequently, the objective of coarctation of the aorta (CoA) intervention is to alleviate LV pressure overload and prevent irreversible myocardial damage.