

Assessment of morphological left ventricular function in congenitally corrected transposition of great arteries – Can we use conventional tools for an unconventional assessment?

Sir,

Congenitally corrected transposition of great arteries (ccTGA) or hearts with discordant atrioventricular and ventriculoarterial connections are among the most challenging congenital heart diseases managed by pediatric cardiac units with no clear guidelines on appropriate management strategy.^[1] Data are emerging that the short- and medium-term outcomes of anatomical repair are superior to those of patients in whom the mRV remains the systemic ventricle.^[2] Enthusiasm about the anatomical repair is tempered by concerns raised about the possibility of morphologically left ventricle (mLV) dysfunction in a small subset of patients undergoing anatomical repair on follow-up.^[3] Most of the available tools for the assessment of left ventricle (LV) function have been devised for the systemic LV in the setting of right-handed ventricular topology.^[4] We hence attempted to utilize the conventional LV function assessment tools by two-dimensional (2D) echocardiography and speckle-tracking echocardiography (STE) in three patients with ccTGA as a proof of concept. Our initial experience suggests that these have potential utility in the objective assessment of mLV function in ccTGA.

We performed a literature search and did not identify any published literature on the echocardiographic evaluation of mLV function in ccTGA. We hence attempted to obtain loops equivalent to those described for conventional LV assessment in hearts with right-handed ventricular topology in the children described. We initially obtained an LV-focused apical four-chamber (A4C) loop. After obtaining the LV-focused A4C, the probe was rotated superiorly and to the right till the LV outflow tract was imaged and the loop recorded in this view was used for apical three-chamber (A3C) evaluation. We noted that

this was typically obtained after 90–120° rotation from the A4C view. We then obtained an additional loop in an intermediate position between the A4C and A3C views for the apical two-chamber (A2C) evaluation. The images of an adequate quality suitable for STE were obtained in all three children. Ejection fraction (EF) was measured using the biplane Simpson's method of disk summation on the A4C and A2C views.

A 3-year-old boy with ccTGA and a small subpulmonic ventricular septal defect (VSD) underwent an anatomical repair. His preoperative LV EF was 54.6% with a GLS of -24.2% [Figure 1a]. He required mechanical circulatory support for 72 h postoperatively due to LV dysfunction which slowly recovered. On the predischarge evaluation, his LVEF was 60.2% with a GLS of -21.4% [Figure 1b]. Subsequently, we also performed a preoperative LV function on an infant with ccTGA and a large VSD as well as a postoperative assessment on a 3-year-old girl who had underwent a bidirectional Glenn shunt with hemi-Mustard and Rastelli-type operations using a similar method.

Our preliminary experience suggests that conventional tools for LV function assessment by 2D echocardiography can be utilized for the serial assessment of LV function. STE has the potential to assess LV function on a global (GLS) as well as regional level (utilizing the bull's eye) and could be a promising tool for the serial assessment of LV function objectively.

We acknowledge some very important limitations of this study. The views obtained were unconventional and have not been reported previously. The software utilized for STE was developed for LV in the setting of right-handed ventricular topology. Hence, the segments described

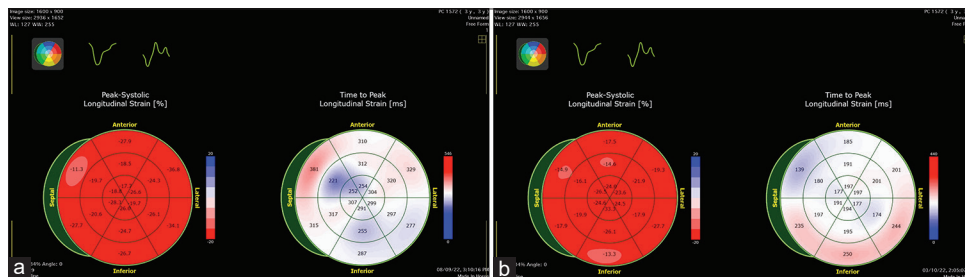


Figure 1: (a and b) Bull's eye depicting the relative motility of the different left ventricular segments as assessed by speckle-tracking echocardiography in patient 1 during the preoperative echocardiographic assessment (a) and the postoperative echocardiographic assessment (b)

in Bull's eye are inaccurate. We also did not obtain alternative assessment tools for LV function assessment such as CMR for comparison. As ccTGA is a rare anomaly, tools to evaluate mLV function would likely involve years of research and validation. In the interim, utilizing currently available tools for LV function assessment may provide a practical solution to the problem and allow for a serial and potentially "objective" assessment.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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