pISSN 1975-4612 / eISSN 2005-9655

www.kse-jcu.org
https://doi.org/10.4250/jcu.2017.25.1.1
EDITORIAL COMMENT J Cardiovasc Ultrasound 2017;25(1):1-2

Progeria of the Heart in Type 1 Diabetic Children?

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Diabetes mellitus (DM) itself may induce subclinical myocardial dysfunction without significant coronary artery disease.[1)2)] Accordingly, adults with type 2 DM are susceptible for heart failure and a lot of experimental studies have shown significant changes in microvasculature and myocardial interstitial fibrosis in type 2 DM.[2-4)] Therefore, early recognition of subclinical myocardial dysfunction and therapeutic intervention such as renin-angiotensin-aldosterone system blockers may prevent the progression of heart failure in diabetic patients.[3)] Although there have been many studies regarding diabetic cardiomyopathy in adults with type 2 DM, adults subjects innately have confounding factors for subclinical myocardial dysfunction. Aging, coronary artery disease, hypertension and long-standing metabolic properties related to insulin resistance also influence on left ventricular (LV) mechanical function.

In this issue of the Journal, Abd-El Aziz et al.[5)] report the results of their study of forty patients with type 1 DM and forty-two healthy controls between 6 and 16 years. In this study, the interrogators demonstrated that diabetic children have evidence of LV and right ventricular dysfunction on tissue Doppler echocardiographic assessment. Children with type 1 DM usually have fewer confounders of myocardial dysfunction than adults with type 2 DM. In fact, only one patient in this study subjects had blood pressure above 95th percentile. We can simply accept that myocardial dysfunction in diabetic children is mainly caused by DM itself. This is one of the strengths of this study.

However, in the interpretation of the present study, main results should be cautiously understood. First, in terms of LV diastolic function, E' velocity and E/E' were not different between diabetic children and controls. The majority of differences regarding LV diastolic function between two groups were resulted from the mitral inflow Doppler parameters, which are dependent on LV preloads. Moreover, the investigators failed to demonstrate decreased E' velocity, an early indicator of LV relaxation, in type 1 diabetic children although decreased LV and right ventricular S' velocities and increased global myocardial performance index were clearly shown. All parameters that were significantly different between two groups don't exactly indicate LV diastolic dysfunction in type 1 diabetic children. Second, we need to consider the effects of normal growth in children on tissue Doppler imaging velocities. It has been well-known that tissue Doppler imaging velocities are variable and age-dependent in children. Choi et al.[6)] investigated myocardial tissue Doppler velocities in 144 healthy children (age range: 0 to 19 years) to assess the effect of age with cardiac growth on the various echocardiographic measurements. Interestingly, age was positively correlated with E' velocity and S' velocity.[6)] On the other hand, E/E' ratio was negatively correlated with age.[6)] Therefore, it needs a caution when we interpret whether a lower S' or E' velocity is actual myocardial longitudinal dysfunction or not.

About eighteen percentages of diabetic children in the present study presented with exercise intolerance. Although this study could not show significantly different diastolic parameters at rest, diabetic children might have impaired diastolic functional reserve during exercise.[7)] Recently, two-dimensional speckle tracking echocardiographic studies to demonstrate LV mechanical dysfunction more sensitively and a few studies have published in children with type 1 DM.[8)9)] Hensel et al.[10)] reported that asymptomatic type 1 DM children had signs of hyperdynamic LV contractility early in the course of the disease. And, poor glycemic control was associated with early subclinical LV systolic and diastolic impairment.

Finally, Abd-El Aziz et al.[5)] concluded that diabetic children have echocardiographic evidence of subtle LV and right ventricular dysfunction. From this study, we get a chance to think about premature myocardial aging, so-called "progeria of the heart", in children with type 1 DM.

• Editorials published in the Journal of Cardiovascular Ultrasound do not necessarily represent the views of JCU or the Korean Society of Echocardiography.
• Received: February 26, 2017 • Revised: February 27, 2017 • Accepted: February 27, 2017
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