

Poster presentation

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Restrictive physiology in repaired Tetralogy of Fallot: Prevalence, significance and pathophysiology

Lee Whal*¹, Susan L Roche², Shi-Joon Yoo² and Las Grosse-Wortmann²

Address: ¹Seoul National University Hospital, Seoul, Republic of Korea and ²The Hospital for Sick Children, Toronto, ON, Canada

* Corresponding author

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Introduction

Restrictive physiology of the right ventricle(RV) has been associated with a better long-term prognosis in patients after Tetralogy of Fallot(TOF) repair presumably because the decreased compliance prevents dilation of RV. However, there is another report that restrictive physiology is related to poor exercise tolerance. The presence of end diastolic forward flow(EDFF) in the pulmonary artery in patients with pulmonary regurgitation is commonly used to diagnose "restriction" of the RV.

Purpose

To investigate the cause, prevalence and clinical significance of EDFF to prognosis of the in patients with repaired TOF.

Methods

From Aug 2007 to Jan 2009, a total 93 magnetic resonance imaging (MRI) examinations were performed in patients with repaired TOF. Out of them 43 examinations were excluded for analysis in this retrospective study because of significant RV outflow obstruction or other causes. A total 50 patients (mean age = 13.0, M:F = 26:24) are divided into two group; Group 1 with EDFF and Group 2 without EDFF. We also analyzed the data from 12 normal subjects as controls. We evaluated the timing of flow patterns of the ascending aorta and pulmonary artery, mitral and tricuspid inflow, obtained by phase contrast MRI. We also collected the results of the volumetric assessment within the same MRI, the most recent exercise test, electrocardiogram. The date and type of repair was recorded.

Results

EDFF was present in 33 patients (group 1) out of 50 and not observed in the control groups. Group 1 reached 69% of the predicted maximum oxygen consumption while group 2 achieved 58% ($p = 0.01$). There was no significant difference in ejection fraction (49% vs. 46%, respectively, $p = 0.33$) and right ventricular end-diastolic volume (168 ml/m² vs. 166 ml/m², respectively, $p = 0.92$) between groups 1 and 2. Descriptors of the aortic, pulmonic, mitral and tricuspid inflow patterns were similar between the two groups. Group 1 showed a significant delay of onset of the tricuspid inflow and lower tricuspid inflow e/a ratio of 1.25 than 2.58, when compared to normal subjects ($p = < 0.001$) Figure 1.

Conclusion

The presence of EDFF is associated with with better exercise tolerance. Patients with EDFF express diastolic dysfunction, as evidenced by a delayed onset of tricuspid valve inflow and a lower the e/a ratio.

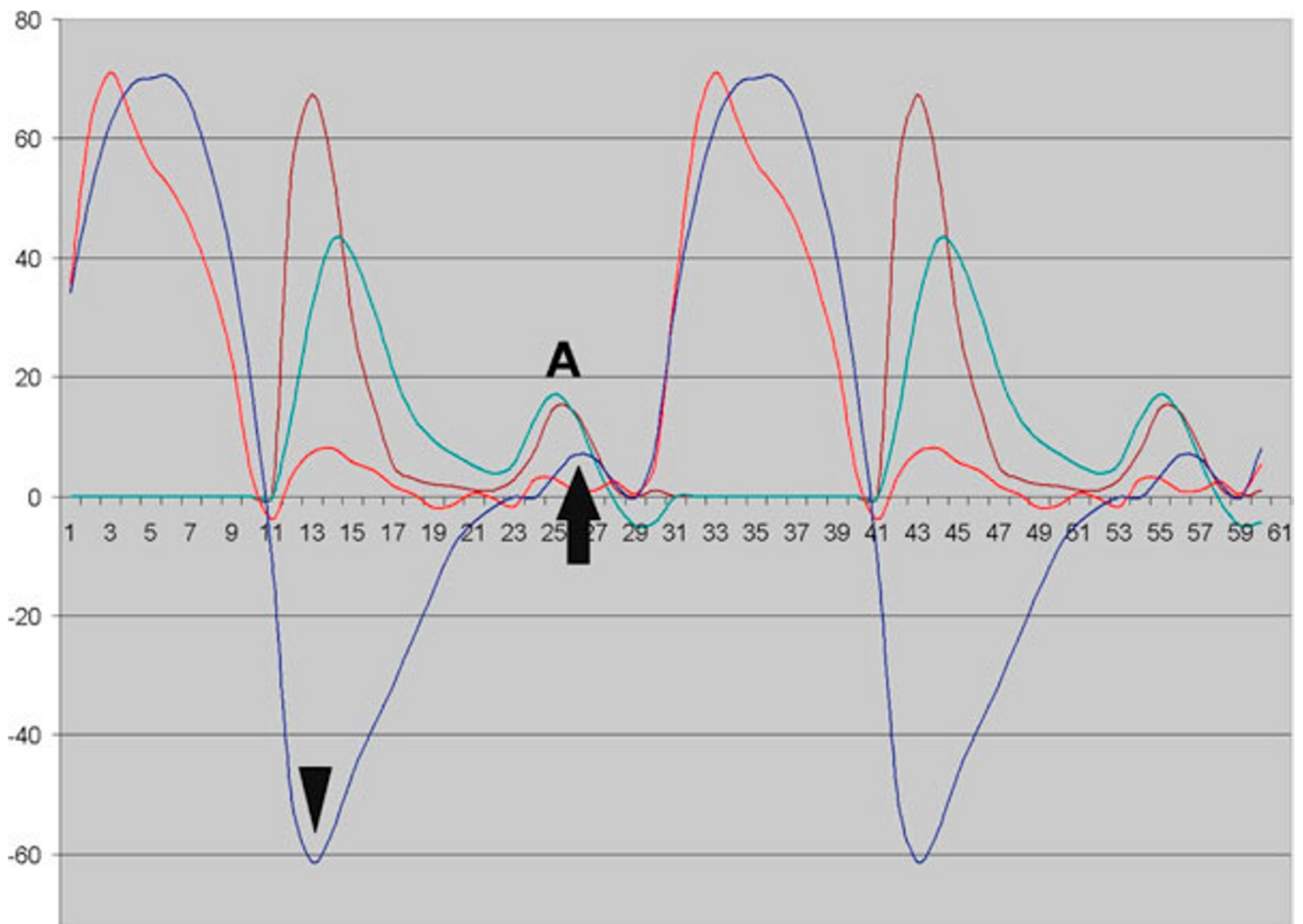


Figure 1
Typical flow pattern of aorta (red), pulmonary artery (blue), mitral (brown) and tricuspid valves (green) in repaired TOF. Note the pulmonary regurgitation (arrowhead) and end-diastolic forward flow (arrow) which is related with a wave of tricuspid inflow (A).

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