Title: An unusual cause of repolarization abnormality after congenital heart surgery: A case report

Background: We present a case of a young boy who developed persistent tachycardia despite fluid resuscitation, antipyretics, and analgesia after a Fontan procedure. Review of telemetry and electrocardiograms (ECGs) revealed a repolarization abnormality including the appearance of T-wave alternans for which an uncommon cause was ultimately identified.

Case Description: A 4-year-old male was admitted to the intensive care unit following Fontan surgery. Past medical history included hypoplastic left heart syndrome with prior Norwood-Sano and bidirectional Glenn surgeries. No significant arrhythmia had been noted previously. The post-operative course was complicated by need for interventional cardiac catheterization. Following catheterization, the patient had persistent tachycardia to around 140 beats per minute. Telemetry showed ST depression with associated T-wave inversion, initially concerning for a hemodynamic or ischemic abnormality given the clinical context. On further review, a pattern resembling T-wave alternans was observed, suggesting an electrical rather than hemodynamic cause.

Discussion: Ultimately, surface ECG alone is insufficient to differentiate among various types of accessory pathways. Given our patient’s comorbidities, the lack of clinical symptoms indicating a pathway supporting re-entrant tachycardia or supporting rapid antegrade conduction, and the presence of features suggesting a fasciculoventricular pathway (FVP), definitive testing has not been performed but will be considered in the future based on the patient’s clinical course.

Conclusion: It is important to consider accessory pathway variants and other depolarization abnormalities when evaluating repolarization abnormalities. In this instance, recognition of an FVP as the cause of the repolarization abnormality allowed for appropriate avoidance of unnecessary tests and concern.
Legend:

Figure 1: Telemetry. A) Sinus rhythm with 3 mm ST depression and upright T waves. B) Sinus rhythm with 4 mm ST depression and inverted T waves. C) Apparent T-wave alternans, with subtle associated change in QRS morphology (the beats with inverted T waves have a slightly longer QRS duration than those with upright T waves).
Figure 2: ECGs. A) Sinus rhythm with narrow QRS complex and a QRS duration of 73 ms with biphasic T waves in the lateral precordial leads. B) Sinus rhythm with a subtle delta wave, marked repolarization abnormality, and a QRS duration of 83 ms. T waves inverted throughout the precordium.
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Author Information:

Nicholas V. Barresi, MD
Resident, Yale University School of Medicine
333 Cedar St, New Haven, CT 06520, United States of America
nicholas.barresi@yale.edu

Brian S. Marcus, MD
Section of Pediatric Cardiology
Fellow, Yale University School of Medicine
333 Cedar St, New Haven, CT 06520, United States of America
brian.marcus@yale.edu

Cheyenne M. Beach, MD
Section of Pediatric Cardiology
Faculty / Mentor, Yale University School of Medicine
333 Cedar St, New Haven, CT 06520, United States of America
cheyenne.beach@yale.edu

Jeffrey M. Vinocur, MD
Section of Pediatric Cardiology
Faculty / Mentor, Yale University School of Medicine
333 Cedar St, New Haven, CT 06520, United States of America
jeffrey.vinocur@yale.edu