Atrial fibrillation in the pediatric age group

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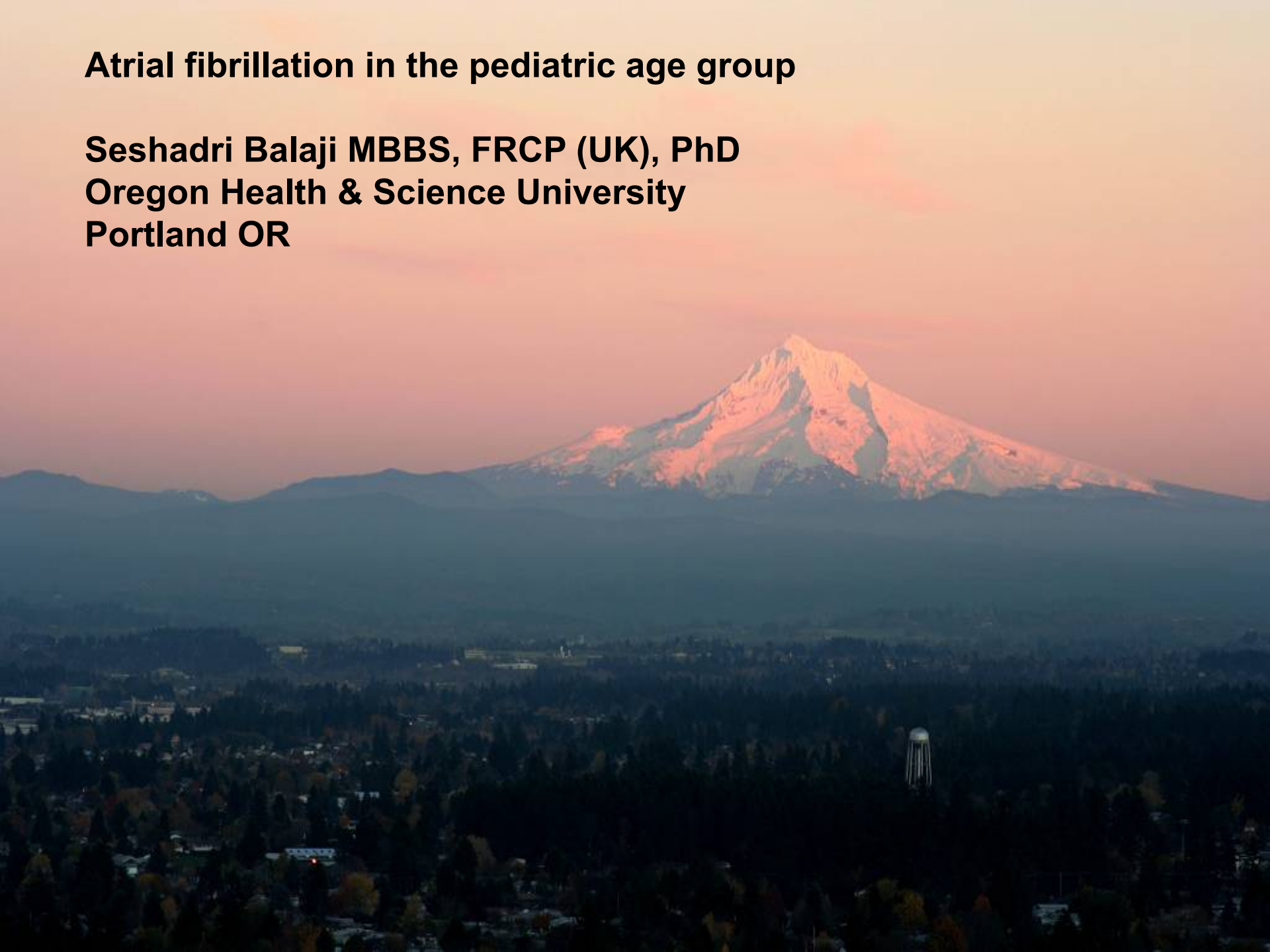

Catheter Ablation of Recurrent Lone Atrial Fibrillation in Teenagers with a Structurally Normal Heart

SESHADRI BALAJI, M.B.B.S., PH.D.,* JACK KRON, M.D.,† and ERIC C. STECKER, M.D., M.P.H.†

From the *Division of Cardiology, Department of Pediatrics, Oregon Health & Science University, Portland, Oregon; and †Knight Cardiovascular Institute, Oregon Health & Science University, Portland, Oregon

Background: *Atrial fibrillation (AF) is rare in teenagers. There are few reports and no clear guidelines on the management of AF with catheter ablation in teenagers.*

Methods: *A case series of teenagers (<18 years) with paroxysmal AF and a structurally normal heart who underwent catheter ablation was undertaken.*

Results: *Four teenage boys aged 15–17 years underwent catheter ablation of AF. All but one had failed antiarrhythmic medical therapy. Two had focal triggers and underwent culprit vein isolation (one recurred and so underwent isolation of an additional vein), and two had no focal triggers identified and so underwent isolation of all four pulmonary veins (PVs). At follow-up ranging from 2–6 years, one patient who underwent isolation of all four veins had recurrence of paroxysmal AF. All others have had medium and long-term success with complete absence of AF. None are on long-term antiarrhythmic therapy. No patient had a procedural or postprocedure complication.*

Conclusions: *A cautious attempt at catheter ablation may be appropriate in teenagers with paroxysmal AF and a structurally normal heart who fail pharmacologic therapy. Culprit vein(s) isolation should be preferred if possible but if no focal triggers are identified, isolation of all PVs appears to be beneficial. (PACE 2016; 39:60–64)*

atrial fibrillation, ablation, child

4 teenage males with Afib

Afib in children

- Rare
- Rheumatic or left sided heart disease
- In association with WPW or focal AT
- Vagally mediated: cough, swallow
- Family history of early Afib
- Short QT

- Case reports and few small series.

Time Course of Atrial Fibrillation in Patients With Congenital Heart Defects

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Background—The incidence of atrial fibrillation (AF) is rising in the aging patients with congenital heart defects (CHD). However, studies reporting on AF in patients with CHD are scarce. The aim of this multicenter study was to examine in a large cohort of patients with a variety of CHD: (1) the age of onset and initial treatment of AF, coexistence of atrial tachyarrhythmia and (2) progression of paroxysmal to (long-standing) persistent/permanent AF during long-term follow-up.

Methods and Results—Patients (n=199) with 15 different CHD and documented AF episodes were studied. AF developed at 49±17 years. Regular atrial tachycardia (AT) coexisting with AF occurred in 65 (33%) patients; 65% initially presented with regular AT. At the end of a follow-up period of 5 (0–24) years, the ECG showed AF in 81 patients (41%). In a subgroup of 114 patients, deterioration from paroxysm of AF to (long-standing) persistent/permanent AF was observed in 29 patients (26%) after only 3 (0–18) years of the first AF episode. Cerebrovascular accidents/transient ischemic attacks occurred in 26 patients (13%), although a substantial number (n=16) occurred before the first documented AF episode.

Conclusions—Age at development of AF in patients with CHD is relatively young compared with the patients without CHD. Coexistence of episodes of AF and regular AT occurred in a considerable number of patients; most of them initially presented with regular AT. The fast and frequent progression from paroxysmal to (long-standing) persistent or permanent AF episodes justifies close follow-up and early, aggressive therapy of both AT and AF. (***Circ Arrhythm Electrophysiol.*** **2015;8:1065-1072. DOI: 10.1161/CIRCEP.115.003272.)**

Afib in CHD mean age 49 years.

Electrophysiological Findings in Adolescents With Atrial Fibrillation Who Have Structurally Normal Hearts

Kumaraswamy Nanthakumar, MD; Yung R. Lau, MD; Vance J. Plumb, MD; Andrew E. Epstein, MD; G. Neal Kay, MD

Background—Atrial fibrillation (AF) is uncommon in children, and its mechanisms are unknown. This study describes the electrophysiological findings in children and adolescents with AF and the outcome of catheter ablation.

Methods and Results—Nine adolescents with symptomatic, lone AF who failed antiarrhythmic drug therapy were evaluated. All patients had ECG-documented AF and underwent invasive electrophysiological testing. Intracardiac mapping was performed to determine the site of spontaneous onset of AF and rapidly firing atrial foci. Only the triggering focus was targeted for ablation or isolation. The patients' mean age was 15.9±3.3 (range, 8 to 19 years). The most common finding was rapid, irregular atrial tachycardias in the region of the pulmonary veins (n=5), left atrium (n=2), or crista terminalis (n=3). One patient had foci in both the pulmonary veins and crista terminalis. The cycle lengths ranged from 108 to 280 ms. Catheter ablation was acutely successful in 8 patients (88.9%), whereas 1 patient with multiple left atrium foci was treated with the surgical maze operation. Over a mean of 35±22 months, 7 patients (77.8%) were arrhythmia free on no medications, while AF recurred in 2 patients who are controlled on antiarrhythmic medications. Two patients with tachycardia-induced cardiomyopathy had resolution of their left ventricular dysfunction after ablation.

Conclusions—AF in adolescents with structurally normal hearts is usually due to foci in the pulmonary veins, crista terminalis, or left atrium. These foci usually induce irregular atrial tachycardias. Catheter ablation of the foci is effective in eliminating recurrent AF. (***Circulation.*** **2004;110:117-123.)**

Key Words: atrial fibrillation ■ catheter ablation ■ pediatrics

9 cases only targeting focal triggers.
Catheter ablation successful in 8.
1 surgical maze.

Catheter Ablation of Primary Supraventricular Tachycardia Substrate Presenting as Atrial Fibrillation in Adolescents

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ABSTRACT

Background. Atrial fibrillation is rarely encountered in children and adolescents, and these cases are usually secondary to myocardial diseases, electrical abnormalities, or scar related in postoperative congenital heart disease patients. Untreated sustained atrial fibrillation may lead to tachycardia-induced cardiomyopathy and/or systemic thromboembolization.

Objective. The objective here is to describe our findings in four adolescent patients presenting with recurrent atrial fibrillation.

Design. We report here the results of the findings in four patients who presented with recurrent clinical atrial fibrillation.

Results. Each of the four underwent electrophysiologic study that revealed a primary reentry or automatic supraventricular tachycardia (SVT) substrate, which was able to be treated with radiofrequency ablation. In three of the four cases, elimination of the primary substrate prevented subsequent recurrence of SVT symptoms or documented SVT and/or atrial fibrillation.

Conclusion. Children and adolescents presenting with atrial fibrillation warrant an exhaustive search for a treatable primary cause of myocardial or electrical disease. If present, a primary SVT substrate may be successfully ablated to prevent recurrence of atrial fibrillation and any associated complications. Pulmonary vein isolation is rarely indicated in adolescents and should be avoided.

Key Words. Pediatrics; Atrial Fibrillation; Catheter Ablation

Cong Heart Dis 2010
4 cases: all with focal triggers.

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Lone Atrial Fibrillation in the Young – Perhaps Not So "Lone"?

Scott R. Ceresnak, MD[1], Leonardo Liberman, MD[2], Eric S. Silver, MD[2], Steven B. Fishberger, MD[3], Gregory J. Gates, PhD[4], Lynn Nappo, RN[1], Joseph Mahgerefteh, MD[1], and Robert H. Pass, MD[1]

Objective To determine if pediatric patients with a history of lone atrial fibrillation (AF) have other forms of supraventricular tachycardia (SVT) that may potentially trigger AF.

Study design A multicenter review of patients with lone AF who underwent electrophysiology (EP) study from 2006-2011 was performed. Inclusion criteria: age ≤21 years, normal ventricular function, structurally normal heart, history of AF, and EP study and/or ablation performed. Exclusion criteria: congenital heart disease or cardiomyopathy. Patient demographics, findings at EP study and follow-up data were recorded.

Results Eighteen patients met inclusion criteria. The mean age was 17.9 ± 2.2 years, weight was 82 ± 21 kg, body mass index was 27 ± 6, and 15 (83%) were males. Eleven (61%) were overweight or obese. Seven (39%) had inducible SVT during EP study: 5 atrioventricular nodal re-entry tachycardia (71%) and 2 concealed accessory pathways with inducible atrioventricular re-entry tachycardia (29%). All 7 patients with inducible SVT underwent radiofrequency ablation. There were no complications during EP study and/or ablation for all 18 patients. The mean follow-up was 1.7 ± 1.5 years and there were no recurrences in the 7 patients who underwent ablation. There were 2 recurrences of AF in patients with no other form of SVT during EP study.

Conclusions Inducible SVT was found in 39% of pediatric patients undergoing EP study for lone AF. EP study should be considered for pediatric patients presenting with lone AF. *(J Pediatr 2013;162:827-31).*

J Peds 2013. 18 pts. 7 inducible SVT (5 AVNRT, 2 cAP).
So, in children with Afib, do an EP study and ablate SVT if present.

Canadian Journal of Cardiology 29 (2013) 1227–1233

Clinical Research

Lone Atrial Fibrillation in the Pediatric Population

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ABSTRACT

Background: There are few reports of pediatric studies of atrial fibrillation (AF). We sought to describe the clinical characteristics, management strategies, and recurrence rates and to identify predictors of AF recurrence in a contemporary pediatric population.

Methods: A retrospective review was performed of patients ≤ 18 years with lone AF who were seen at 4 pediatric institutions from 1996-2011. Patients with AF in the setting of thyroid disease, ventricular pre-excitation, coexisting congenital heart disease, or a history of cardiac surgery were excluded. Demographics, clinical

RÉSUMÉ

Introduction : Peu d'études pédiatriques sur la fibrillation auriculaire (FA) sont rapportées. Nous avons cherché à décrire les caractéristiques cliniques, les stratégies de prise en charge et les taux de récidive, et à déterminer les prédicteurs de récidive de la FA dans la population pédiatrique actuelle.

Méthodes : Une revue rétrospective a été réalisée chez des patients de ≤ 18 ans ayant une FA idiopathique qui ont été observés dans 4 établissements pédiatriques de 1996 à 2011. Les patients ayant une FA dans le cadre d'une maladie de la thyroïde, d'une préexcitation

Canadian multi-center study
42 children < 18 with Afib.
High incidence of recurrence (39%)
12 EPS; 6 ablation. 4 had non Afib substrates (1 AP, 1 AVNRT, 2 AFL) ablated.
2 had PVI.
The 2 who had AFL ablation had recurrence, others did not.

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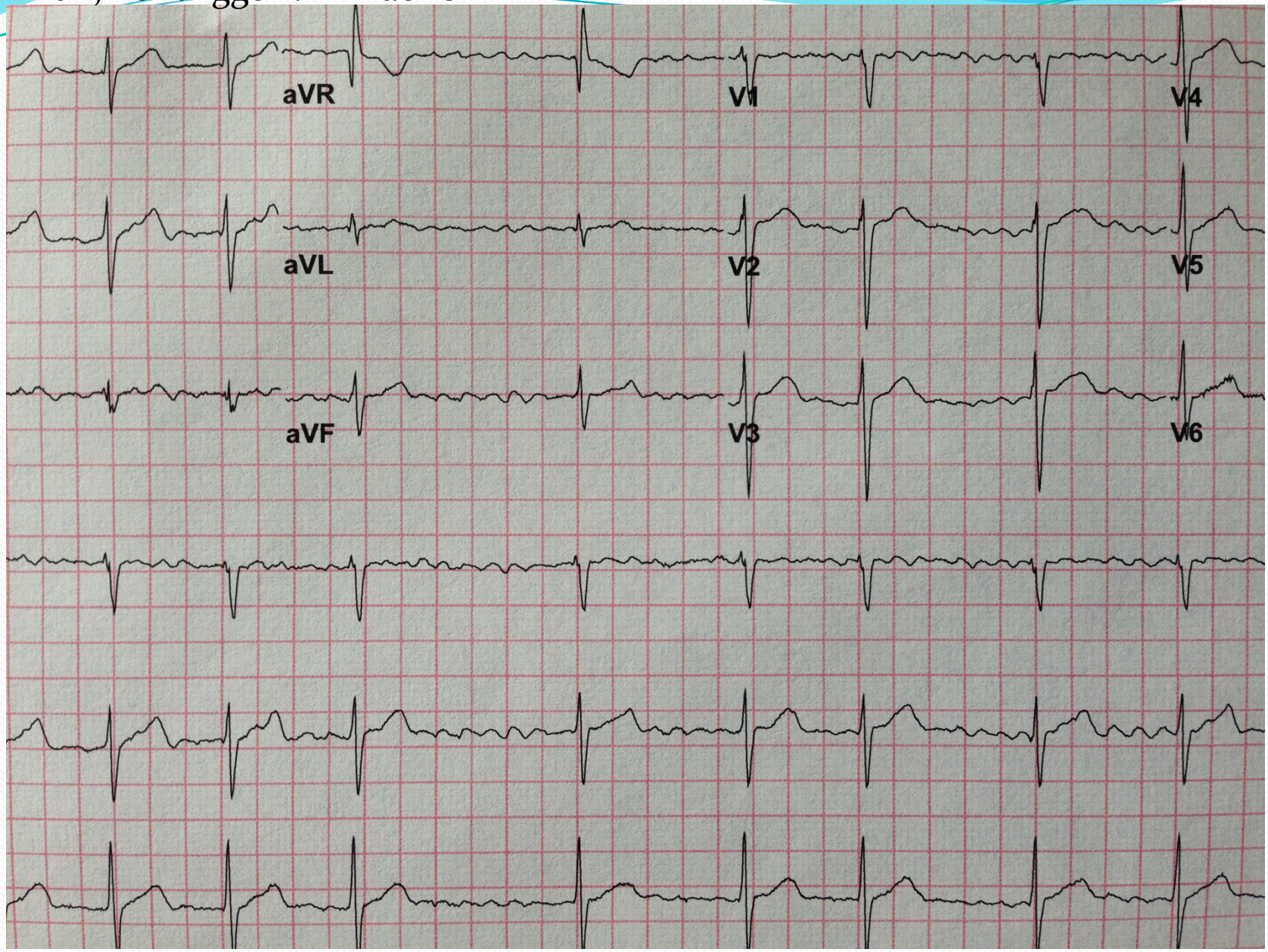
(PACE 2016; 39:60–64)

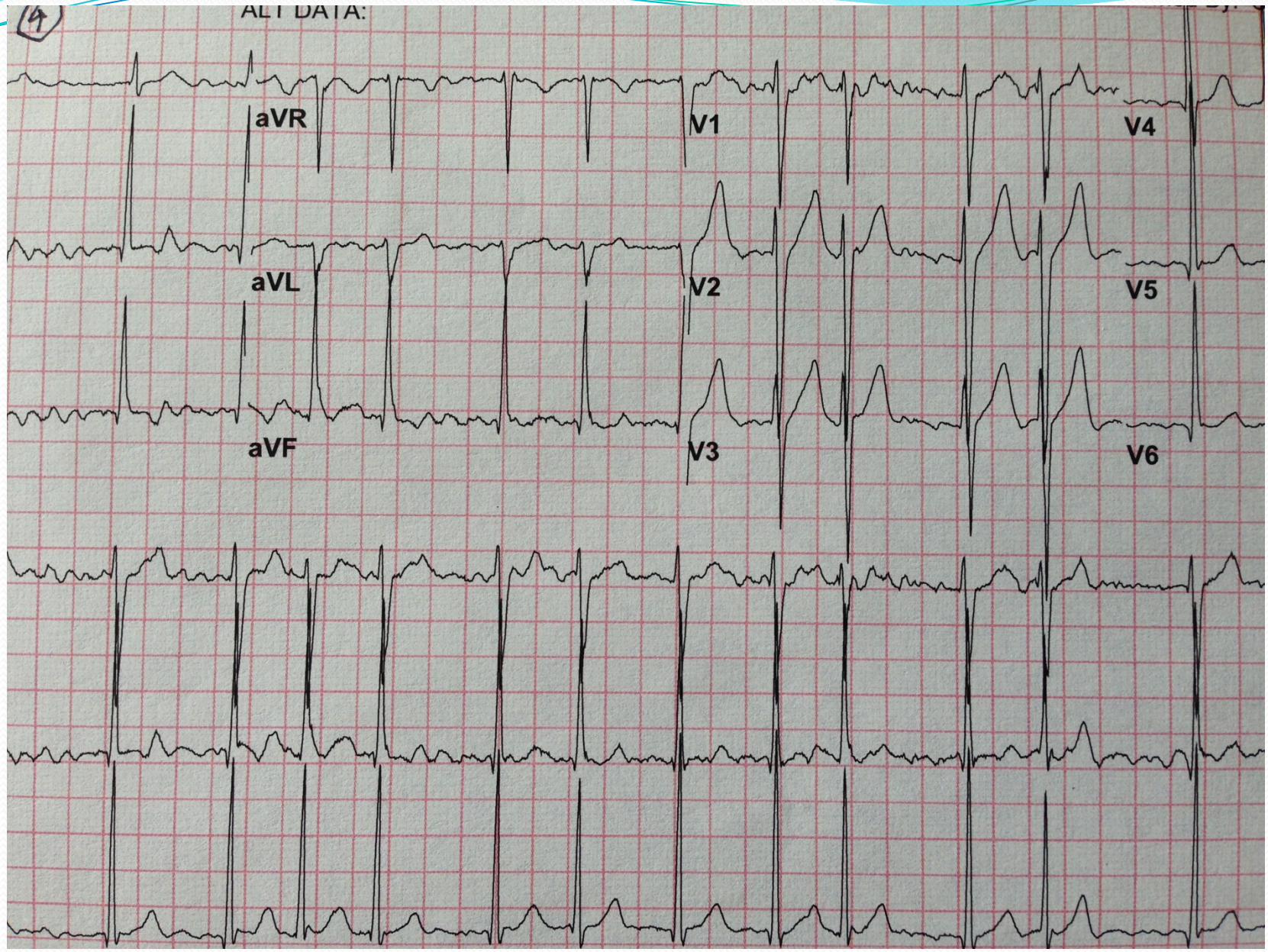
atrial fibrillation, ablation, child

4 teenage males with Afib, 2 focal triggers, 2 PVI.
1 recurred (swallow Afib with cold liquids)

Pt 2, no “trigger”. PVI done



Pt 4, Trigger +, only LLPV isolated.

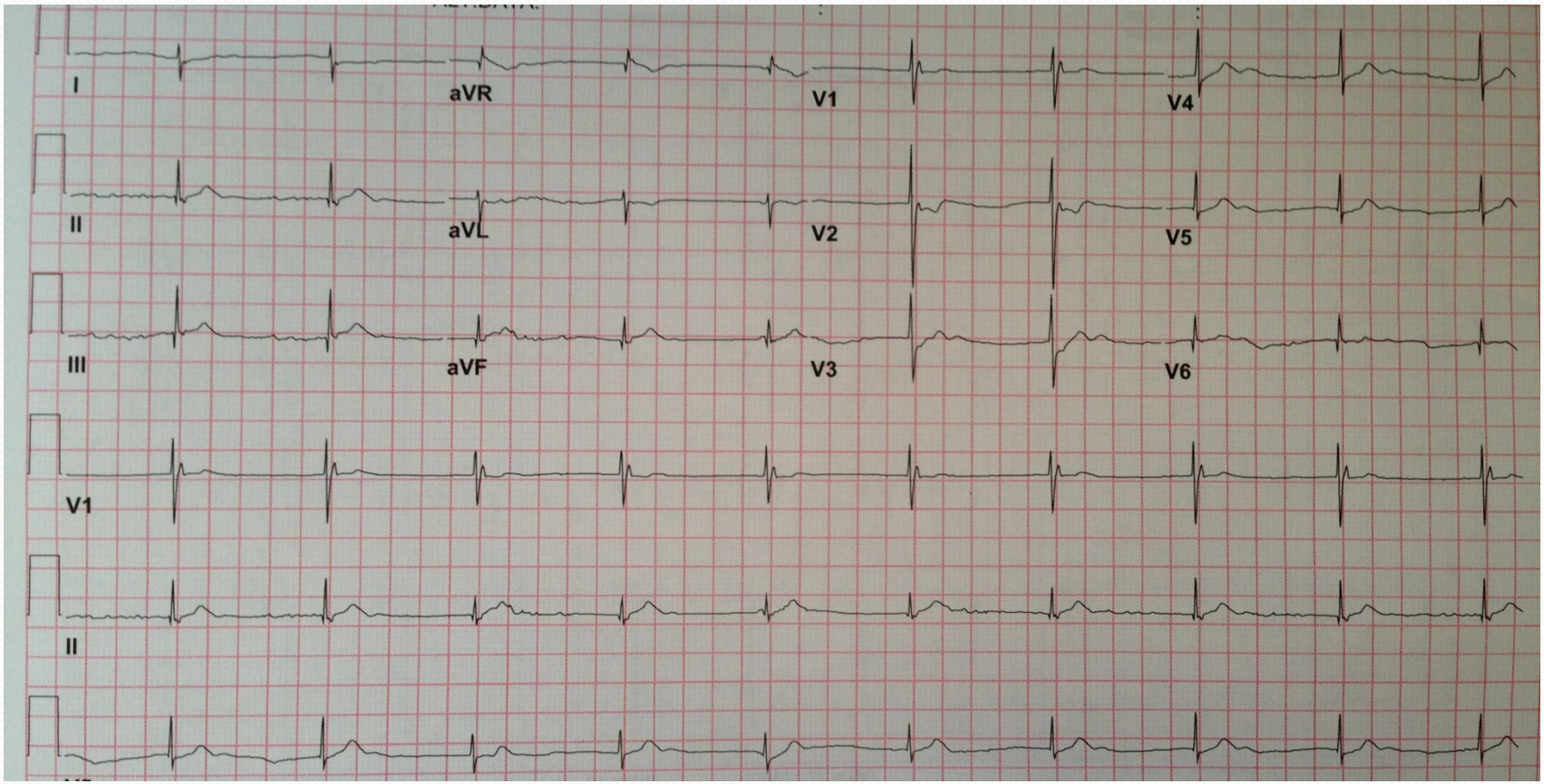


8 yr old with Afib

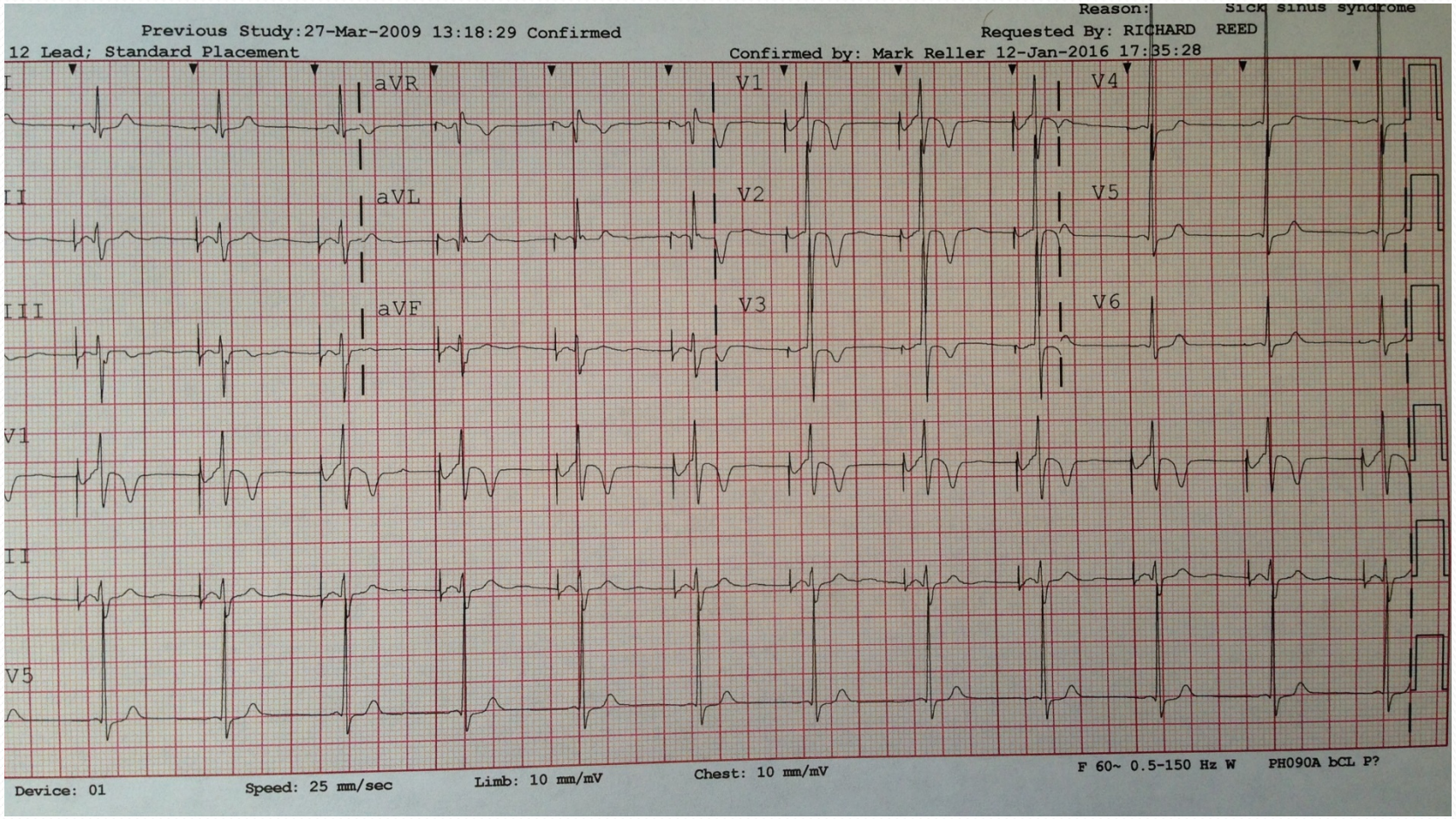
KC; now 8 yrs old

- Fetal bradycardia.
- Post-natal JR with rates 50s-60s.
- AAI epicardial pacemaker.
- Age 1 yr: non conducted beats: upgraded to epicardial DDD pacemaker.
- Aged 7 years: exit block ventricular lead; PG change to atrial pacemaker.
- FU: non capture? > ECG

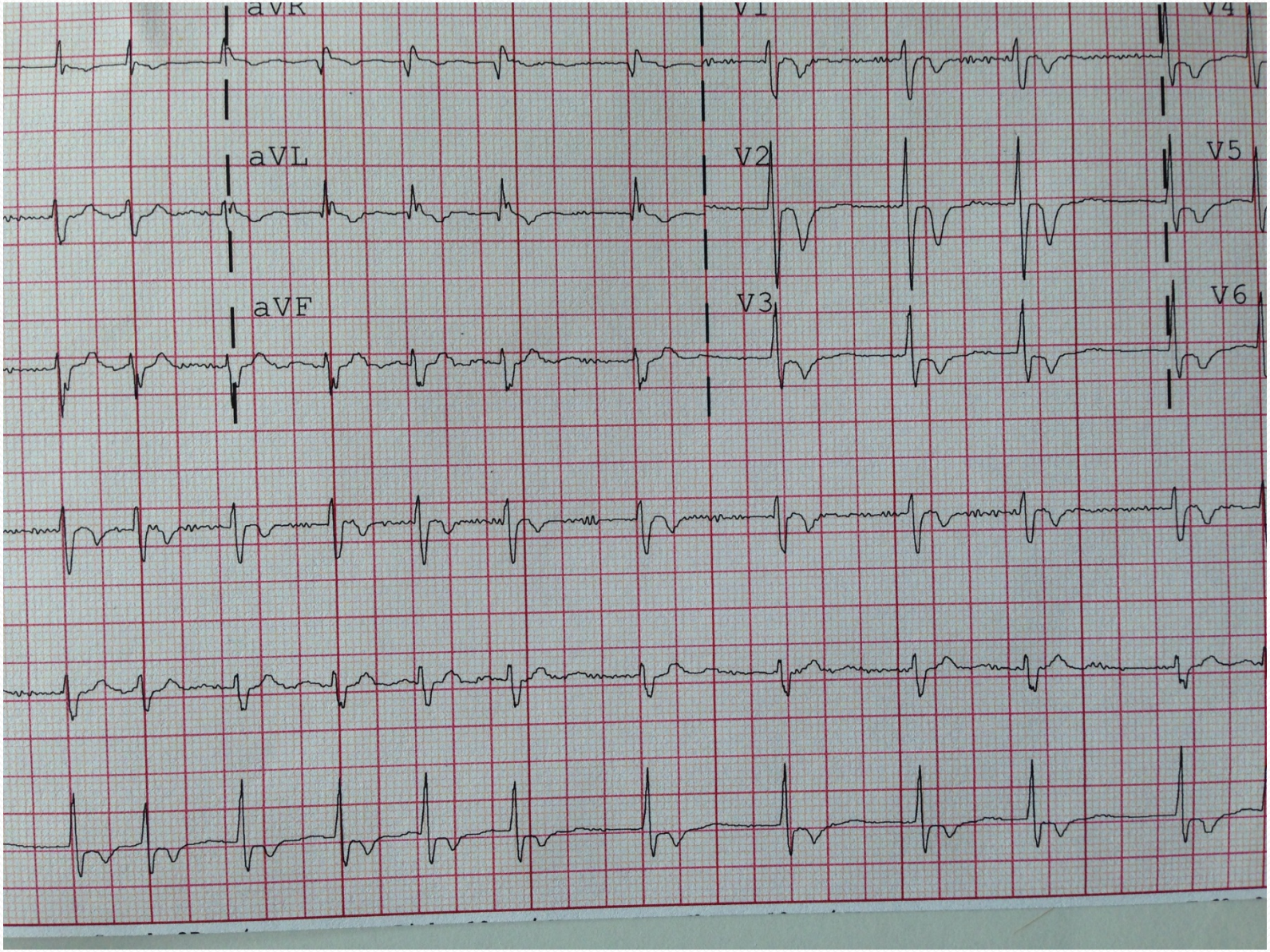
Initial ECG



Atrial pacing

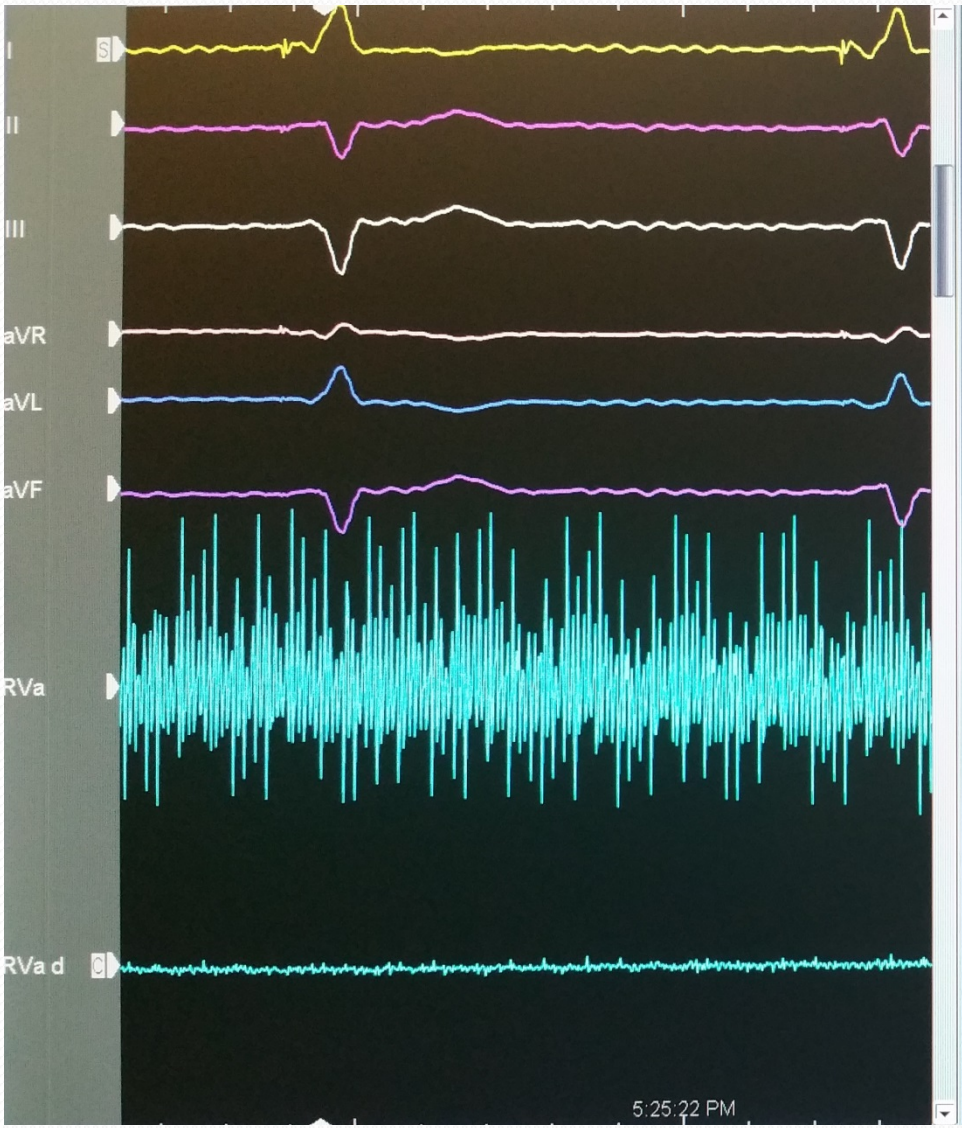


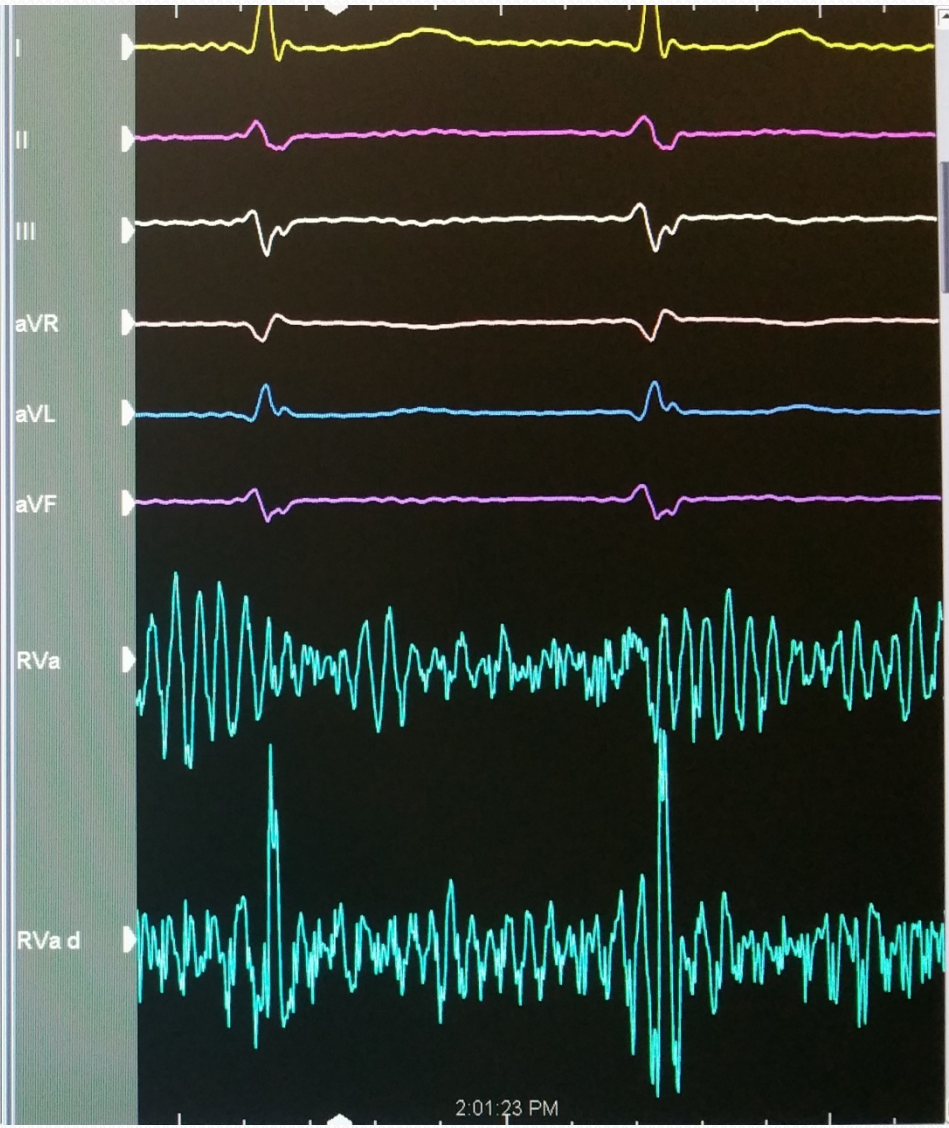
ECG aged 7. no pacing seen.



60 cycle noise

Atrial torsades in a child with short QT



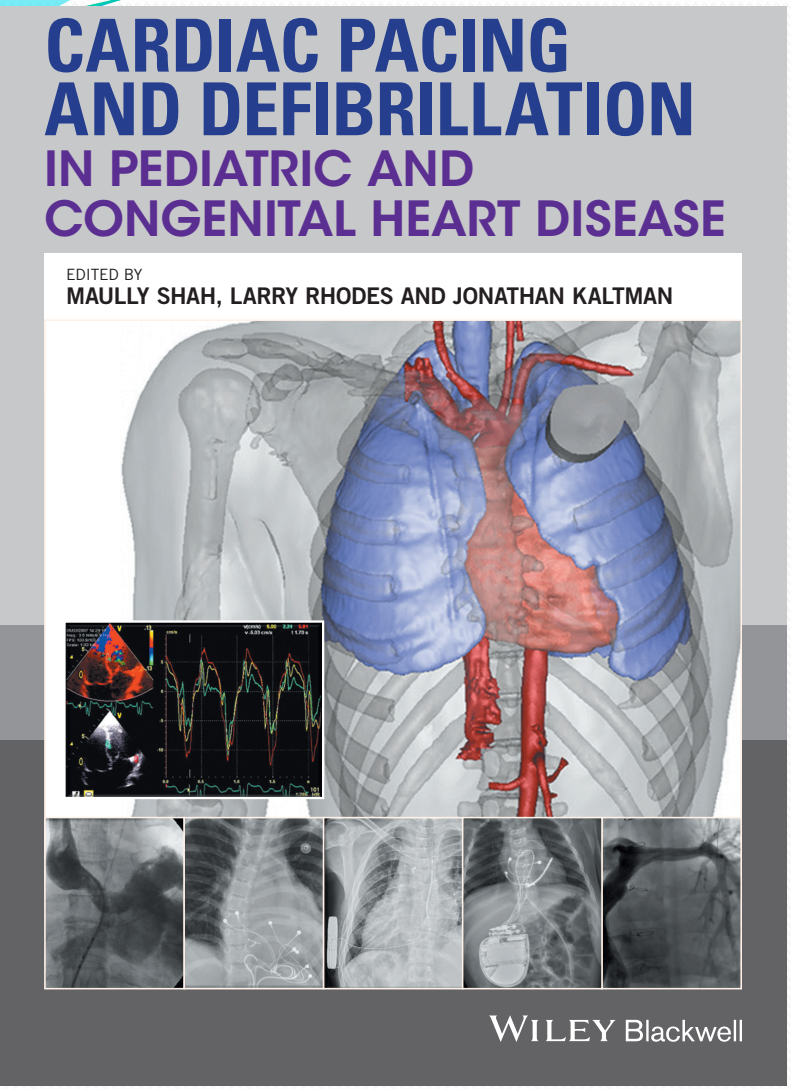


Atrial torsades

- Unable to cardiovert.
- Endocardial VVI device placed.
- Likely short QT.
- Gene testing:
  - KCNQ1 mutation (reported by Hong K 2005; Villafane 2013; Harrell 2015; Sarquella-Brugada 2015). Known gain of function mutation associated with short QT and early onset Afib.
  - CACNB2: VUS
  - RYR2: VUS

Afib in children: Management

- Avoid stimulants
- Look for triggers eg. Cold liquids
- Drug therapy: class 1c vs class 3. limited experience
- Catheter ablation: few small reports but mostly encouraging.
  - Regular EPS. Ablate associated substrates.
  - Focal triggers. Ablate. If inside PV, isolate culprit vein.
  - No focal triggers: Isolation of all PVs.



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