Left atrial tachycardia in a patient with calcified coronary aneurysms due to Kawasaki disease

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Kawasaki disease (KD) is an acute vasculitis involving all blood vessels with frequent cardiovascular complications. We describe a 28-year-old patient with childhood KD having coronary complications at the age of 17 now presenting with sustained atrial tachycardia. Electrophysiological study and catheter ablation were performed. Electrophysiological study revealed a left atrial (LA) tachycardia (230 ms cycle length) with 2:1 atrioventricular node conduction. The mechanism for the arrhythmia was re-entry around the mitral annulus associated with the low-voltage scar area anterolateral to the annulus and juxtaproximal to the coronary artery calcification seen in fluoroscopy. We describe a patient with childhood KD presenting with LA re-entrant tachycardia associated with the atrial scar. The arrhythmia was successfully treated using radiofrequency catheter ablation.

Introduction

Cardiovascular manifestations of Kawasaki disease (KD) include inflammatory changes in the pericardium, myocardium, endocardium, valves, and the coronary arteries. Formation of coronary artery aneurysms may lead to myocardial infarction and ischaemic heart disease with significant long-term morbidity and mortality.1 One-third of patients with coronary artery disease due to KD present with ventricular arrhythmia or sudden death.2 Patients with KD also have high incidence of abnormal sinus and atrioventricular node function.3 To our knowledge, there is only one previous case report on an association between KD and supraventricular tachycardia (SVT).4 In the present paper, we report a case of atrial tachycardia in a patient with childhood KD and consequent coronary complications now presenting with sustained palpitations and collapse.

![Figure 1](https://academic.oup.com/europace/article-abstract/12/10/1498/419182)

**Figure 1** Twelve-lead ECG during temporary slowing of atrioventricular conduction (A), intracardiac electrograms during termination of tachycardia during ablation (B).
A now 28-year-old man had his first presentation with fever, loose stools, rashes, and cardiac failure at the age of 4 months. Subsequently, he was thriving normally until the age of 17 when he had a cardiac arrest due to an anterior myocardial infarction. Coronary angiography showed severe three-vessel disease with aneurysmal dilatation of the proximal segments of all coronary arteries. The ejection fraction was 42% and he later underwent prophylactic coronary artery bypass grafting.

Eleven years after resuscitation, he presented with a collapse and his electrocardiogram (ECG) showed an atrial tachycardia at 130 b.p.m. (Figure 1A). An electrophysiological (EP) study was performed under general anaesthesia using three-dimensional (3D) electroanatomical mapping (CARTO XP, Biosense-Webster Inc., Diamond Bar, CA, USA). Multipolar catheters were introduced into right atrium (RA) and coronary sinus (CS) via the femoral veins. Endocardial activation along the catheters demonstrated an atrial tachycardia with a cycle length of 230 ms (Figure 1B). Entrainment in the cavo-tricuspid isthmus revealed a long post-pacing cycle interval. Electroanatomical mapping and ablation were performed using a 4 mm irrigated-tip electrode (NaviStar ThermoCool™, Biosense-Webster Ltd). An initial 3D map of the RA showed bystander activation with the earliest activation at the CS. Transseptal puncture was performed followed by 3D mapping of the left atrium (LA). Bipolar voltage map of the LA showed a low-voltage area suggesting scar antero-superior to the mitral annulus (Figure 2A). The localization of the scar area corresponded to the calcification seen in fluoroscopy (Figure 3). Local activation mapping during tachycardia demonstrated a re-entry circuit around the mitral annulus with a mid-diastolic isthmus located between the scar area and the annulus (Figure 2B). Pacing at the isthmus site showed a post-pacing cycle length corresponding to the tachycardia cycle length and identical P-wave morphology. Interestingly, the site of the low-voltage area
corresponded to the location of a coronary calcification seen in fluoroscopy. A line from the scar area to the mitral annulus (max. 40 W, temperature limit of 43°C, flow rate 17 mL/min) was created which terminated the tachycardia (Figure 1B). Mapping during sinus rhythm demonstrated double potentials along the anterior wall along the ablation line and the pre-existing scar (Figure 2C). The tachycardia was no longer inducible during 30 min waiting time, despite aggressive burst pacing and isoprenaline infusion.

**Discussion**

To our knowledge, there is only one previous report on the association between SVT and KD; an 11-year-old girl presenting with a narrow complex tachycardia that responded to adenosine.4 The authors did not perform an EP study but found it reasonable to suggest that the aetiology of the SVT was related to pathology in her conducting system. They speculated that this was AV nodal re-entrant tachycardia.

Our patient had a sustained atrial tachycardia due to re-entry around the mitral annulus as shown by the 3D mapping of the LA. The critical site of the re-entry circuit was identified between a low-voltage area and the mitral annulus. The fact that the only site of the low-voltage area in the atria corresponded to the location of a coronary calcification suggests that KD is the aetiology for the scar area and hence the arrhythmia. The scar could be a result of prior inflammatory process or a consequence of coronary ischaemia. An interesting finding was that the earliest activation on the RA map was at the CS ostium (and not as usually at the Bachmann’s bundle area). This can be explained by a faster conduction across LA to CS connections and may be a consequence of the scar formation.

In conclusion, we report a patient with childhood KD with late-onset sustained atrial tachycardia. We describe a ‘novel’ arrhythmia in KD of LA re-entry associated with an atrial scar adjacent to the calcifications of the left circumflex artery.

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**References**