



Permanent junctional reciprocating tachycardia in a dog

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Abstract A 5-year-old male English Bulldog was presented with a 1-year history of paroxysmal supraventricular tachycardia (SVT) partially responsive to amiodarone. At admission the surface ECG showed sustained runs of a narrow QRS complex tachycardia, with a ventricular cycle length (R–R interval) of 260 ms, alternating with periods of sinus rhythm. Endocardial mapping identified the electrogenic mechanism of the SVT as a circus movement tachycardia with retrograde and decremental conduction along a concealed postero-septal atrioventricular pathway (AP) and anterograde conduction along the atrioventricular node. These characteristics were indicative of a permanent junctional reciprocating tachycardia (PJRT). Radio-frequency catheter ablation of the AP successfully terminated the PJRT, with no recurrence of tachycardia on Holter monitoring at 12 months follow-up.

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A 5-year-old male English Bulldog was presented to our institution with a history of episodic weakness caused by a supraventricular tachycardia (SVT) treated with amiodarone (7.5 mg/kg once a day orally) for 1 year. Despite therapy, the dog experienced several episodes of the same tachyarrhythmia lasting up to 13 h that were

documented by Holter monitor recordings. The dose of amiodarone could not be increased due to occurrence of severe gastrointestinal side effects. Upon admission the dog was bright and alert with normal body condition score and no signs of congestive heart failure. Thoracic radiographs and echocardiography were within normal limits. A 12-lead ECG showed runs of a narrow QRS complex (60 ms) tachycardia with a ventricular cycle length (R–R interval) of 260 ms, negative P' waves in the inferior leads (II, III and aVF) with a mean

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Abbreviations

AP	accessory pathway
AV	atrio-ventricular
AVRNT	atrioventricular reentrant nodal tachycardia
CS	coronary sinus
FAT	focal atrial tachycardia
HV	his-ventricular
PJRT	permanent junctional reciprocating tachycardia
RV	right ventricle
SVT	supraventricular tachycardia
VA	ventriculo-atrial

electrical axis in the frontal plane of -45° , a long RP' (140 ms) and an RP'/P'R of 1.16 (Fig. 1A). The arrhythmia alternated with periods of normal sinus rhythm with PQ duration in the lower limit of the reference range (75 ms) and a normal QRS configuration (Fig. 1B). According to the electrocardiographic characteristics of the SVT, four possible diagnoses were considered: focal atrial tachycardia (FAT) originating from the coronary sinus (CS), atypical (fast-slow or slow-slow variant) atrio-ventricular reentrant nodal tachycardia (AVRNT), permanent junctional reciprocating tachycardia (PJRT) and orthodromic atrioventricular reciprocating tachycardia (OAVRT) with prolonged ventriculo-atrial (VA) conduction time secondary to the effects of amiodarone on the accessory pathway (AP) conduction and refractoriness. Given the potential for ablation of the arrhythmic substrate in all these different types of SVT, an electrophysiologic study (EPS) was scheduled 4 days after discontinuation of amiodarone.

The EPS was performed under general anesthesia, and the dog prepared as previously described.¹ Using a modified Seldinger technique, three venous accesses were obtained: one in the left external jugular vein and two in the right femoral vein. From the jugular vein a decapolar electrode catheter^c was positioned in the coronary sinus; a quadripolar electrode catheter^d was inserted through the right femoral vein and positioned at the atrioventricular (AV) node region to record His bundle potentials; finally, a 7-Fr catheter^e was placed alternatively in the right atrium, right ventricle and tricuspid valve annulus for mapping and programmed stimulation. Surface and intracardiac

ECG signals were displayed on a recorder^f at a paper speed of 150 or 300 mm/s. Intracardiac ECGs were recorded at filter settings of 50–500 Hz. Pacing was performed with stimuli that were twice the diastolic threshold and 2 ms in duration.

During the basal study, a sinus rhythm with normal antegrade conduction times characterized by an AH interval of 64 ms (normal values 54–116 ms)² and a HV interval of 12 ms (normal values 30–44 ms)² was recorded. The HV interval was shorter than reported because the His catheter was placed just beyond the actual hisian area. During programmed ventricular pacing an eccentric VA activation along a concealed right postero-septal AP with decremental conduction properties was recorded. Ventriculo-atrial conduction times ranged from 140 to 185 ms (Fig. 2). Ventricular refractoriness was attained before the AP retrograde effective refractory period was reached, which was estimated to be less than 150 ms. Programmed atrial stimulation induced an AV reciprocating tachycardia with the earliest site of retrograde atrial activation at the proximal coronary sinus. To distinguish AVRT from AVNRT and FAT, during tachycardia, a timed ventricular extrastimulus was introduced during the His refractory period.¹ The QRS complex of the ventricular paced beat was anticipated with respect to the tachycardia cycle length, and interrupted the tachycardia without atrial retro-activation (Fig. 3).

According to endocardial mapping and response to electrophysiologic tests, a diagnosis of PJRT with antegrade conduction along the AV node and retrograde conduction along a concealed postero-septal AP was made. Mapping of the annular postero-septal region of the tricuspid valve was performed during tachycardia, and once the earliest site of atrial activation with simultaneous sharp and negative unipolar recording was established (Fig. 4), radiofrequency energy was delivered with a temperature control system.[§] Maximal catheter tip temperature and power were set respectively at 65 °C and 75 W. Radiofrequency energy was delivered for 60 s and successfully interrupted the tachycardia after 1.5 s, with median values of 18 W, 64 °C and 111 Ohms for power, temperature and impedance, respectively. The presence of VA dissociation during incremental ventricular pacing, 45 min post-ablation, verified the interruption of conduction along the postero-septal accessory pathway. After 12 months of serial follow-up Holter monitor recordings no recurrence of tachycardia could be documented.

^c Polaris X, 7F, Boston Scientific Corp., Genova, Italy.

^d Explorer ST, 5F, Boston Scientific Corp., Genova, Italy.

^e Std CrV Blazer II HTD, 4 mm, 7F; Boston Scientific Corp., Genova, Italy.

^f EMS, 16 channels, MennenMedical, Manta, Genova, Italy.

[§] EPT 1000 XP, Boston Scientific Corp., Genova, Italy.

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