Journal of Veterinary Cardiology (2018) ■, ■–■

ELSEVIER

Journal of Veterinary Cardiology
ESVC

www.elsevier.com/locate/jvc

Case Report

Low-energy ablation of anteroseptal accessory pathways in two dogs

R.A. Santilli, DVM, PhD [a,c,*], D. Caivano, DVM, PhD [b], R. Pariaut, DVM [c], F. Birettoni, DVM, PhD [b], M. Perego, DVM [a], F. Porciello, DVM [b], N.S. Moïse, DVM, MS [c]

[a] *Clinica Veterinaria Malpensa, Viale Marconi 27, 21017 Samarate, Varese, Italy*
[b] *Department of Veterinary Medicine, University of Perugia, Via San Costanzo 4, 06126, Perugia, Italy*
[c] *Department of Clinical Sciences, Cornell University, Ithaca, NY 14853, USA*

Received 20 November 2017; received in revised form 25 April 2018; accepted 1 May 2018

KEYWORDS
Canine;
Bypass tract;
Atrioventricular reciprocating tachycardia;
Atrioventricular node

Abstract In humans, accessory pathways (APs) in an anteroseptal and midseptal position are often challenging to ablate because of their close proximity with the conduction pathways of the atrioventricular junction. The use of low-energy ablation techniques can be useful to reduce the risk of permanently damaging the atrioventricular node and the His bundle. This report describes the use of low-energy radiofrequency catheter ablation to successfully and permanently ablate anteroseptal APs in two dogs with orthodromic atrioventricular reciprocating tachycardia. In the first dog, a transient first degree atrioventricular block persisted for 30 s after radiofrequency energy delivery. In the second dog, transient paroxysmal atrioventricular conduction block was observed during the procedure but resolved within 3 days. First degree atrioventricular block was again identified 2 months later. In conclusion, anteroseptal APs can be effectively treated by low-energy radiofrequency catheter ablation with minimal and transient damage to the atrioventricular junction.
Published by Elsevier B.V.

* Corresponding author.
E-mail address: rs2259@cornell.edu (R.A. Santilli).

https://doi.org/10.1016/j.jvc.2018.05.001
1760-2734/Published by Elsevier B.V.

Abbreviations

AP	accessory pathway
AV	atrioventricular
OAVRT	orthodromic atrioventricular reciprocating tachycardia
RF	radiofrequency
SVT	supraventricular tachycardia

Case 1

A 2-year-old, 15-kg, male Brittany spaniel was presented to the Cardiology Service at Cornell University Hospital for Animals with a history of lethargy, decreased appetite, and severe tachycardia. Physical examination revealed pale mucous membranes with a capillary refill time <2 s, rapid and weak femoral pulses, and abdominal distention. Electrocardiography showed a sustained and regular narrow QRS complex (60 ms in duration) tachycardia with a rate of 300 bpm (ventricular cycle length of 200 ms). P′ waves with an inferior-to-superior axis (−30°) were inscribed within the ST segment. The RP′/P′R ratio was 0.42. The presence of a narrow QRS complex, short RP′ tachycardia with a positive atrial depolarization in lead aVR was most consistent with a supraventricular tachycardia (SVT) mediated by an accessory pathway (AP) [1]. The tachycardia could be terminated for short periods of time with chest thumps (Fig. 1A), which resulted in the return of sinus rhythm without ventricular pre-excitation. During sinus rhythm, P′ waves were still visible within the ST segment (blocked reciprocating beats).

Transthoracic echocardiography showed biatrial (left atrium to aorta ratio = 1.6) and biventricular enlargement with reduced left ventricle fractional shortening (10%) and ejection fraction (27%). Moderate mitral and mild tricuspid valve regurgitation was also present. Abdominal ultrasound confirmed the presence of a moderate volume of ascites and caudal vena cava distention consistent with right-sided congestive heart failure.

Initially, a bolus of procainamide[d] (90 mg IV) was administered but failed to stop the tachycardia. An initial oral dose of sotalol[e] (30 mg PO) was administered. Sinus rhythm (average rate of 60 bpm) returned within approximately 1 h. The dog was discharged and treated with sotalol (30 mg, PO, q12h), furosemide[f] (25 mg, PO, q12h), enalapril[g] (7.5 mg, PO, q24h), and pimobendan[h] (5 mg, PO, q12h). Seven days later, 24-h Holter monitoring showed that the SVT was present for 79% of the duration of the recording. Whenever the tachycardia stopped, it was abrupt and typically associated with a ventricular premature beat. Brief periods of sinus rhythm were present between two episodes of tachycardia. Electrocardiographic findings were highly suggestive of an orthodromic atrioventricular reciprocating tachycardia (OAVRT) mediated by a concealed AP. The sotalol dose was increased (40 mg, PO, q12h), and extended release diltiazem[i] (30 mg, PO, q12h) was added. One month later, Holter monitoring showed frequent and sustained SVT runs (58.6% of the duration of the recording). At that time, a decision to attempt ablation of the arrhythmia substrate was made. It was scheduled to occur 5 days after discontinuation of sotalol and diltiazem, and no recurrence of OAVRT was noted during this time period.

The dog was anesthetized, positioned in right lateral recumbency, and prepared as previously reported [2–5]. Briefly, three venous access points were obtained via the Seldinger technique: one 7-Fr introducer[j] was placed in the left external jugular vein and two 7-Fr introducers in the right femoral vein. Using fluoroscopic and intracardiac ECG guidance, a decapolar electrode catheter[k] was positioned in the coronary sinus, but owing to the great cardiac vein conformation, only the four more distal electrodes could be inserted inside the lumen of the vessel (Fig. 2A). A quadripolar electrode catheter[l] was positioned near the region of the atrioventricular (AV) node to record the His electrogram, and finally, a thermocouple-tipped steerable 7-Fr catheter[m] was used to perform programmed atrial

[d] Procainamide HCL Injection Solution, 100mg/mL, Hospira, Inc, Lake Forest, IL 60045, USA.

[e] Sotalol hydrochloride, 80 and 120 mg tablets, Teva Pharmaceuticals, USA.

[f] Furosemide, Salix 50 mg tablets, Merck Animal Health, Madison, NJ 07940, USA (Case 1); Diuren 20 mg tablets, Vetefarma Srl, Cuneo, Italy.

[g] Enalapril maleate, 5 mg tablets, Mylan Pharmaceuticals Inc, Canonsburg, PA 15317, USA.

[h] Pimobendan, Vetmedin 5 mg tablets, Boehringer Ingelheim Vetmedica, Inc, St Joseph, MO 64506, USA.

[i] Diltiazem hydrochloride (extended release), Dilzene 60 mg tablets, Sigma-Tau Industrie farmaceutiche Riunite Spa, Milano, Italy.

[j] 7 F introducer, Pinnacle Super Sheath, Boston Scientific, Marlborough, MA, USA; Prelude PRO, Merit Medical Srl, Assago, Milano, Italy.

[k] Polaris X, 7 F, 2/5/2, Boston Scientific Corp., Marlborough, MA, USA.

[l] Explorer 360, 5 F, 5/5/5, Boston Scientific Corp., Marlborough, MA, USA.

[m] Polaris C, 4 mm, 7 F; Boston Scientific Corp., Marlborough, MA, USA.

Please cite this article in press as: Santilli RA, et al., Low-energy ablation of anteroseptal accessory pathways in two dogs, Journal of Veterinary Cardiology (2018), https://doi.org/10.1016/j.jvc.2018.05.001