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Radiofrequency catheter ablation of atypical atrial flutter in dogs

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Abstract Five dogs were presented to our institution for fatigue caused by an incessant supraventricular tachycardia. In all dogs, an ECG on admission showed a narrow QRS complex tachycardia with a median ventricular cycle length of 220 ms (range 180—360 ms), and a positive atrial depolarization identifiable in the ST segment following the previous QRS complex. There was a 1:1 atrioventricular conduction ratio in all but one dog, which presented with 2:1 atrioventricular block. Electrophysiologic studies identified the underlying arrhythmogenic mechanism as a right atrial macro-reentrant tachycardia with two distinct isthmic areas: right septal (RS) in three dogs and right atrial free wall (RAFW) in two dogs. Linear radiofrequency catheter ablation was performed during tachycardia in all dogs at the identified isthmic area, which acutely blocked the macroreentrant circuit. At 18-month follow-up, 3 dogs (1 with RAFW isthmus and 2 with RS isthmus) showed no recurrence of the arrhythmia on Holter monitoring. One dog with RS isthmus showed recurrence of the supraventricular tachycardia 15 days post-ablation, and 1 dog with RAFW isthmus presented with persistent atrial fibrillation 2 months post-ablation.

Five dogs (3 Bernese dogs, 1 dogue de Bordeaux and 1 Irish setter), 3 females and 2 males, with a median age of 90 months (range 9—132 months) and a median body weight of 48 kg (range 32—59 kg) (Table 1) were presented to our

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Abbreviations

AFL	atrial flutter
AV	atrioventricular
CS	coronary sinus
CTI	cavo-tricuspid isthmus
HRA	high right atrium
LRA	low right atrium
LLR	lower loop reentry
MRA	middle right atrium
MRT	macroreentrant tachycardia
RA	right atrium
RAFW	right atrial free wall
RS	right septal
SVT	supraventricular tachycardia
ULR	upper loop reentry

institution for incessant supraventricular tachycardia (SVT), profound weakness and dysorexia of 5—8-day duration. Three out of 5 dogs were treated with sotalol (2 mg/kg PO q12 h) with no response to medical treatment. At admission all dogs were depressed, showed mild weight loss, rapid heart rate and had pulse deficits. Thoracic radiographs displayed cardiomegaly in 2 out of 5 dogs with no signs of congestion. Echocardiography revealed reduced left ventricular volume with pseudohypertrophy and mildly depressed systolic function in 2 out of 3 Bernese dogs and left atrial and ventricular dilation with volume overload and severely depressed systolic function in the remaining dogs (Table 1).[1,2] In all dogs, 12-lead ECG showed a narrow QRS complex tachycardia (median QRS duration 40 ms, range 40—60 ms) with a median ventricular cycle length of 220 ms (range 180—360 ms). Atrial depolarization was visible in the preceding ST segment as a positive wave in the inferior leads (II, III, aVF) with a median voltage of 0.25 mV (range 0.15—0.4 mV), a median duration of 40 ms (range 35—60 ms) and a median axis on the frontal plane of 74° (range 63—90°) (Table 1). In all dogs an isoelectric line was present between consecutive atrial depolarizations. The atrioventricular (AV) conduction ratio was 1:1 in all but one dog in which it was 2:1 (Fig. 1). An electrophysiologic (EP) study was performed in all dogs to characterize the electrogenic mechanism and ablate the arrhythmic substrate.

Electrophysiology studies and ablation procedures

The electrophysiology studies were performed under general anesthesia with dogs prepared as

Table 1 Signalment, echocardiographic and electrocardiographic findings in 5 dogs with atypical atrial flutter.

	Dog A	Dog B	Dog C	Dog D	Dog E
Signalment					
Breed	Bernese	Bernese	Bernese	Dogue de Bordeaux	Irish setter
Gender	Female	Female	Female	Male	Male
Age (months)	60	90	96	9	132
Body weight (Kg)	48	59	51	46	32
Echocardiography					
LVEDD (mm)	36.88	42.75	34.09	54.56	46.63
LVESD (mm)	23.09	25.36	21.04	34.02	32.95
2D-EF (%)	45.66	38.52	51.82	30.72	25.94
LA/Ao	1.57	1.65	1.56	3.2	1.88
Surface ECG					
QRS duration (ms)	50	40	40	60	40
Atrial CL (ms)	220	200	180	180	220
Ventricular CL (ms)	220	200	180	360	220
F wave amplitude (mV)	0.2	0.25	0.4	0.15	0.25
F wave duration (ms)	40	60	60	35	40
F wave axis (degree)	63	74	90	84	72
AV conduction ratio	1:1	1:1	1:1	2:1	1:1
Intracardiac ECG					
Atrial CL (ms)	230	220	240	180	300
Ventricular CL (ms)	230	220	240	360	300
AV conduction ratio	1:1	1:1	1:1	2:1	1:1
AFL Isthmus	Right septal	Right septal	Right septal	RA free wall	RA free wall

LVEDD, left ventricular end-diastolic diameter; LVESD, left ventricular end-systolic diameter; EF, ejection fraction; LA, left atrium; Ao, aorta; CL, cycle lenght; AV, atrioventricular; AFL, atrial flutter; RA, right atrial.