

Arterial Thromboembolism in 250 Cats in General Practice: 2004–2012

K. Borgeat, J. Wright, O. Garrod, J.R. Payne, and V.L. Fuentes

Background: Population characteristics and outcome of cats with arterial thromboembolism (ATE) managed in general practice (GP) have been poorly described.

Hypothesis: Cats with ATE presenting to GP are usually euthanized at presentation, but survival times >1 year are possible.

Animals: Cats with ATE managed by 3 GP clinics in the United Kingdom.

Methods: Records of cases presenting to GP over a 98-month period (2004–2012) were reviewed. Cats with an ante-mortem diagnosis of limb ATE were included. Outcome information was obtained.

Results: Over 98 months, 250 cats were identified with ATE. Prevalence was approximately 0.3%. At presentation, 153 cats (61.2%) were euthanized, with 68/97 (70.1%) of the remaining cats (27.2% of the total population) surviving >24 hours after presentation. Of these, 30/68 (44.1%) survived for at least 7 days. Hypothermia (HR, 1.44; 95% CI, 1.002–2.07; $P = .049$) and management by Clinic 2 (HR, 5.53; 95% CI, 1.23–24.8; $P = .026$) were independent predictors of 24-hour euthanasia or death. For cats surviving >24 hours, hypothermia (HR, 2.25; 95% CI, 1.12–4.48; $P = .021$) and failure to receive aspirin, clopidogrel, or both (HR, 8.26; 95% CI, 1.39–50; $P = .001$) were independent predictors of euthanasia or death within 7 days. For cats that survived ≥ 7 days, median survival time was 94 (95% CI, 42–164) days, with 6 cats alive 1 year after presentation.

Conclusions: Although 153/250 cats were euthanized at presentation, 6 cats survived >12 months. No factors were identified that predicted euthanasia on presentation.

Key words: Cardiology; Cardiovascular; Clinical Epidemiology; Feline.

Arterial thromboembolism (ATE) is a condition associated with high morbidity and mortality in cats, most commonly with an acute and distressing presentation. For clinical purposes, it is often defined as thromboembolism to ≥ 1 limb. In most cases, the thrombus originates in the left side of the heart. Although pulmonary thromboembolism also involves arterial occlusion, it is usually classified as a separate syndrome.¹ Presenting signs of limb ATE are easily recognized. Loss of peripheral pulses, tissue pallor, lower motor neuron signs, and cool extremities in the presence of neuromuscular pain provide a highly suggestive clinical picture.^{2,3} Smith et al reported that 1/175 (0.006%) of their hospital feline population presented with ATE,⁴ a similar prevalence to 1/142 cats (0.007%) reported by Buchanan et al from a different center, almost 40 years earlier.⁵ These data were obtained from cats treated in referral practice and do not necessarily represent the general feline population. Feline ATE is most commonly associated with cardiomyopathy, although cardiac disease is not present in all affected cats.^{4–13}

Abbreviations:

ATE	arterial thromboembolism
GP	general practice
UK	United Kingdom
HR	hazard ratio
95% CI	95% confidence intervals
CHF	congestive heart failure
MST	median survival time

It is widely acknowledged that ATE has a poor prognosis, although, to the authors' knowledge, no prospective studies have reported the outcome of cats presenting with acute clinical signs. Several retrospective studies suggest that euthanasia at presentation is common and <50% patients survive to discharge.^{4,6–8,14} Smith et al reported that hypothermia, ≥ 2 affected limbs, absence of motor function, hyperphosphatemia, and bradycardia were associated with a decreased rate of survival to discharge.⁴ Moore et al also reported that hypothermia and ≥ 2 affected limbs were associated with death or euthanasia before discharge.⁸ It has been suggested that cats in congestive heart failure (CHF) have a shorter survival time after discharge.⁴ Among cats discharged from the clinic, recurrence of ATE is common.^{4–6,8}

Cats with ATE presented to general practice (GP) veterinary clinics have been under-represented in the literature.⁷ We aimed to analyze the patient characteristics and outcome in a population of cats managed in GP and to estimate the prevalence of ATE in cats in the United Kingdom (UK) GP. We hypothesized that cats with ATE presenting to GP were likely to be euthanized at presentation without any attempt to treat the disease, but that survival times >1 year were possible for some cats.

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Materials and Methods

Two large practices and 1 emergency only, out-of-hours, clinic took part in the study. Both the 2 nonemergency practices consisted of a central hospital providing 24-hour care with 4 (Clinic 1) and 6 (Clinic 3) smaller branches. This is a common model of private practice in the United Kingdom. Across the 3 clinics, no more than 8 of 40 veterinarians at any time were known to have held a postgraduate Royal College of Veterinary Surgeons (RCVS) Certificate, with only 3 Certificate-holders in either Cardiology or Internal Medicine. One practice (Clinic 1) listed a total of 7 visiting RCVS or European Diploma holders during the inclusion period, with only 1 Cardiology and no Internal Medicine Specialists. Computerized records were maintained in each clinic and stored on a centralized database in each practice, from which the record text could be searched and records retrieved for manual review. Electronic patient records from each of the 3 centers were retrospectively reviewed and searched for terms relating to ATE in cats presented from January 1, 2004 to March 1, 2012 inclusive. The search terms used were as follows: "arterial thromboembolism", "aortic thromboembolism", "ATE", "FATE", "arterial thrombus", "aortic thrombus", "arterial clot", "aortic clot", "saddle clot", "hind limb paralysis", "off back legs", "aspirin", "clopidogrel", and "heparin". Individual records were manually reviewed by a single operator (KB). Cats were included if they presented with typical clinical signs of limb ATE. Cases were excluded if they had atypical signs, were dead on arrival, had clinical signs suggestive of nonlimb ATE, or had a diagnosis made postmortem. Cats that were referred from Clinics 1–3 to another specialist referral center for treatment of their ATE were excluded.

Medical records of cats with ATE were reviewed for date and age at presentation, sex, breed, and the time between the onset of clinical signs and presentation. The time of presentation to the clinic was defined as out-of-hours (yes/no), referring to a consultation outside of clinic working hours as an emergency patient. Physical examination findings were recorded, including number of limbs and which limbs were affected. Wherever laboratory results were available, the serum concentrations of urea, creatinine, phosphate, and potassium also were recorded. Details of previously auscultated abnormalities or any pre-existing diseases were recorded. CHF was defined as any one of the following: presence of radiographic evidence of pulmonary edema, ultrasonographic evidence of pleural effusion with concurrent cardiomegaly or left atrial dilatation, presence of pulmonary crackles in a dyspneic patient that subsequently responded to furosemide therapy, or fluid reported from the nose or mouth after euthanasia. Tachypnea, dyspnea, pulmonary crackles, or left atrial dilatation alone was not a sufficient criterion for the presence of CHF. Mortality was defined as either spontaneous death or euthanasia and analyzed at different time points: within 24 hours of presentation, after 24 hours of presentation but before 7 days after presentation, and after 7 days of presentation. For cats surviving ≥ 7 days, length of hospitalization (days) was recorded. Circumstances of death or euthanasia were classified as ATE-related (encompassing cases where attending clinicians suspected reperfusion injury and acute kidney injury, where limb necrosis prompted euthanasia, or where death occurred spontaneously with no identifiable cause), or related to acute or refractory dyspnea, or non-ATE and nondyspnea related. Recurrence of ATE, survival time after presentation, and circumstances of death were obtained by contacting owners of cats whenever this information was not available from electronic records. For cats still alive at the time of analysis, survival was based on the time of owner contact or last veterinary examination.

Statistical analysis was performed by commercially available software^a and values are reported as median (range) for all data.

Univariable analyses were performed using a chi-square or Fisher's Exact test for categorical variables. Continuous variables were analyzed using a Student's *t*-test for normally distributed data and a Mann-Whitney *U*-test for non-normally distributed data. Normality was assessed graphically and confirmed using a Kolmogorov-Smirnov test. Factors evaluated in univariable analysis were year of presentation, clinic, breed, sex, age, out-of-hours presentation (yes/no), time to presentation (<2 hours after onset, 2–6 hours after onset, 6–12 hours after onset, >12 hours after onset), rectal temperature, heart rate, respiratory rate, dyspnea (yes/no), number of limbs affected, murmur (yes/no), gallop (yes/no), arrhythmia (yes/no), CHF (yes/no), serum urea, creatinine, phosphate and potassium concentrations, and treatment given (aspirin, clopidogrel, or both, heparin, furosemide: yes/no). To evaluate independent effects on survival, multivariable analysis was performed using binary logistic regression in a backwards stepwise manner on variables with $P < .1$ at the univariable level, and hazard ratios (HRs) with 95% confidence intervals (95% CI) were calculated. Kaplan–Meier survival curves were generated and analyzed using a Log-Rank test. A value of $P < .05$ was considered significant.

Results

Presentation

Over the 98-month period from January 1, 2004 to March 1, 2012, 250 cats were diagnosed with ATE in 3 clinics (74, 84, 92, respectively, in Clinics 1, 2, and 3). The prevalence was calculated from the total number of unique cats visiting Clinics 1 and 3. This information was not available for Clinic 2. In these 2 clinics, 166 cats were diagnosed with a first episode of ATE over the 98-month studied. During the same period, 62,856 individual cats visited the 2 clinics. This equated to a prevalence of 0.26% over the 98-month period studied. There was no apparent seasonality to presentation of cats with ATE: 58 presented in the Winter, 60 in Spring, 65 in Summer, and 67 in the Fall. Whenever the time to presentation could be determined, 95/220 cats (43.2%) were presented within 2 hours of the onset of clinical signs and 184/220 cats (83.6%) were presented within 12 hours.

Signalment and History

Most cats were nonpedigree, comprising 230/250 (92%) cases. Pedigree breeds represented were Siamese (4), British Shorthair (3), Burmese (3), Persian (3), Maine Coon (2), Ragdoll (2), Bombay (1), Havana (1), and Russian Blue (1). Males were affected in 144/250 (57.4%) cases. The median age at presentation was 12 years (range 1–21 years). The onset of clinical signs was reported to be associated with vomiting in 27/250 (10.8%) cats. Of 221 cats without previously diagnosed cardiomyopathy, an auscultatable abnormality (eg, murmur, gallop, arrhythmia) was detected in 59 cats (26.7%) before presentation with ATE (murmur, 20.8%; gallop, 2.8%; arrhythmia, 2.8%). Cardiomyopathy had been previously diagnosed in 29/250 (11.6%) cats and 17/250 (6.8%) had been previously confirmed as hyperthyroid on the basis of increased serum total thyroxine concentration.

Table 1. Limbs affected by clinical signs of ATE (RH, right pelvic limb; LH, left pelvic limb; RF, right thoracic limb; LF, left thoracic limb).

Limbs Affected by ATE	Number of Cats	Percent
Only RH	15	6
Only LH	15	6
RH and LH	194	77.6
Only RF	12	4.8
Only LF	10	4
RH, LH, and LF	2	0.8
RH, LH, RF, and LF	1	0.4
Missing data	1	0.4

Of these hyperthyroid cats, 4 were not receiving treatment for their disease.

Physical Examination and Diagnostic Findings

One limb was affected by ATE in 52/250 (20.8%) cats, 2 limbs in 194/250 (77.6%), 3 limbs in 2/250 (0.8%), and 4 limbs in 1/250 (0.4%). One cat (0.4%) did not have the number of affected limbs recorded (Table 1). At the time of presentation, 112/250 (44.8%) cats were reported as dyspneic and 131/192 (68.2%) cats had an auscultated abnormality when clinical data regarding cardiac auscultation were recorded. These were an isolated heart murmur in 50 cats, isolated arrhythmia in 27 cats, isolated gallop in 27 cats, murmur and gallop in 17 cats, murmur and arrhythmia in 8 cats, and a murmur, gallop, and arrhythmia in 2 cats. No auscultated abnormality was present in 61 cats and no clinical data regarding an auscultated abnormality were recorded in 58 cats. Temperature, heart rate, respiratory rate, and serum urea, creatinine, potassium, and inorganic phosphate concentration at presentation for all cats in which data were available are shown in Table 2. Hyperthyroidism was newly diagnosed in 4/233 (1.7%) cats not previously known to be hyperthyroid.

At presentation, data were insufficient to determine the presence or absence of CHF in 140/250 (56%) cats. Of cats not euthanized at presentation, sufficient information was available to identify the presence or absence of CHF in 63/97 (64.9%) cats, with CHF present in 42 (66.7%) cats. Although echocardiography was not performed in all cases, echocardiographic

evidence of cardiac disease was reported in 52/97 (53.6%) cats not euthanized at presentation.

Treatment

Analgesia was administered to all cats not euthanized at presentation (97/250). Diuretic treatment was administered to 57/97 (58.8%) cats. Specific medical treatment of ATE, other than analgesia, was administered in 68/97 cats (70.1%). Heparin (unfractionated or low molecular weight) was administered alone to 21 cats and in combination with aspirin in 8 cats, with clopidogrel in 1 cat, and with aspirin and clopidogrel in 1 cat. Aspirin was administered alone to 25 cats and in combination with clopidogrel in 10 cats. Clopidogrel was used as the sole ATE-specific agent in 2 cats.

Mortality <7 Days after Presentation

Euthanasia was performed at presentation in 153/250 (61.2%) cats. Of those cats for which treatment other than euthanasia was attempted, an additional 22/97 (22.7%) cats were euthanized and 7/97 (7.2%) cats died before 24 hours after presentation. In all, 68/250 (27.2%) cats survived for 24 hours after presentation. Cats were more likely to be euthanized or die in the first 24 hours after presentation if presented out-of-hours, to Clinic 2, with ≥ 2 limbs affected, or with CHF (Table 3). Mean rectal temperature was lower in nonsurvivors (36°C [32.0–39.2] versus 37.8°C [33.1–41.5], $P < .001$, Fig 1). Factors carried forward to multivariable analysis were temperature, number of limbs affected, CHF, clinic, and out-of-hours presentation. Independent predictors of 24-hour mortality (euthanasia/death), identified using multivariable analysis, were lower rectal temperature (HR, 1.44; 95% CI, 1.002–2.071) and presentation to Clinic 2 (HR, 5.53; 95% CI, 1.23–24.8). If Clinic 2 was excluded from the analysis, no significant independent predictors of 24-hour mortality could be identified.

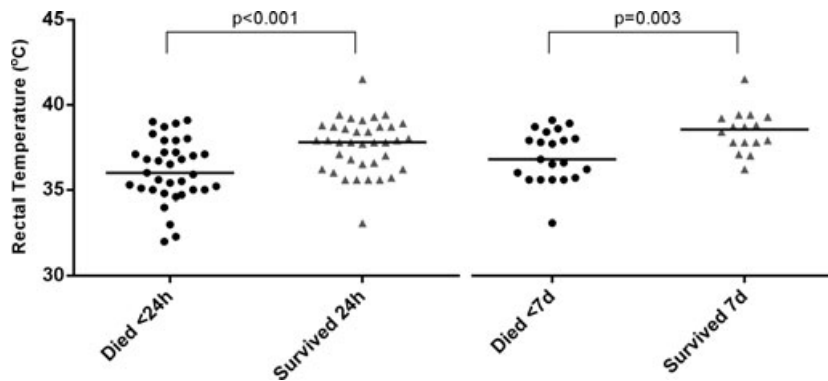
Of cats that survived 24 hours after presentation: 38/68 (55.9%) were dead <7 days after presentation, 32/38 were euthanized (47% of 24-hour survivors), and 6/38 died (8.8% of 24-hour survivors). Of all cats presenting with ATE, 30/250 (12%) survived for at least 7 days after presentation. Of cats surviving the initial 24 hours, those with ≥ 2 limbs affected, dyspnea, CHF, treated with heparin, or not treated with aspirin,

Table 2. Physical and laboratory findings of cats at presentation.

Variable	Number of Cats	Result (Median, Range)	Reference Interval (from Clinics 1 and 3)	Abnormal Result (%)
Rectal temperature (°C)	69	37.0 (32.0–41.5)	37.8–39.2	62.3
Heart rate (beats/minute)	125	200 (80–300)	160–240	16.0
Respiratory rate (breaths/minute)	72	50 (24–200)	16–30	90.3
Urea concentration (mg/dL)	35	36.1 (18.2–196.1)	7.84–30.8	68.6
Creatinine concentration (mg/dL)	30	1.96 (0.96–3.65)	0.45–2.26	26.7
Phosphate concentration (mg/dL)	19	5.05 (3.31–15.5)	2.79–8.05	5.3
Potassium concentration (mEq/L)	22	4.1 (2.7–6.1)	3.5–5.8	27.3

Table 3. Categorical variables significantly associated with mortality in the initial 24 hours after presentation and the period from 24 hours to 7 days after presentation, identified by univariable analysis (*data from Clinics 1 and 3 only).

Factor	Mortality: <24 h	<i>P</i> Value	Mortality: ≥24 h but <7 days	<i>P</i> Value
Time of presentation*				
Out-of-hours	61/84 (72.6%)	.003	19/34 (55.9%)	1.0
In normal hours	48/82 (58.5%)		19/34 (55.9%)	
Clinic				
Clinic 2	73/84 (86.9%)	<.001	8/11 (72.7%)	.43
Clinics 1 and 3	109/166 (65.7%)		30/57 (52.6%)	
Number of limbs affected				
≥2	158/196 (80.6%)	<.001	28/38 (73.6%)	.001
1	22/52 (42.3%)		10/30 (33.3%)	
Respiratory status				
Dyspneic	85/112 (75.9%)	.058	19/27 (70.3%)	.045
Nondyspneic	74/113 (65.5%)		17/39 (43.6%)	
Heart failure status				
CHF	64/87 (73.6%)	<.001	15/23 (65.2%)	.002
No CHF	4/23 (17.4%)		3/19 (15.8%)	
Heparin				
Received	n/a	n/a	18/24 (75%)	.023
Did not receive	n/a		20/44 (45.5%)	
Aspirin, clopidogrel, or both				
Did not receive	n/a	n/a	26/35 (74.3%)	.001
Received	n/a		9/33 (27.3%)	

**Fig 1.** Scatter plot to show the difference in rectal temperature at presentation between 24-hour survivors and nonsurvivors (left) and 7-day survivors and nonsurvivors (right).

clopidogrel, or both were more likely to be euthanized or die before 7 days (Table 3). Rectal temperature was lower in nonsurvivors (36.8°C [33.1–39.1] versus 38.6°C [36.2–41.4], $P = .003$, Fig 1), as was age (11 years [2–19] versus 13 years [1–21], $P = .028$). Factors carried forward to multivariable analysis were rectal temperature at presentation, age, CHF, number of limbs affected, treatment with heparin, and treatment with aspirin, clopidogrel, or both. Independent predictors of <7-day mortality were lower rectal temperature (HR, 2.25; 95% CI, 1.12–4.48; $P = .021$) and not receiving treatment with aspirin, clopidogrel, or both (HR, 8.26; 95% CI, 1.39–50; $P = .001$).

Mortality ≥7 Days after Presentation

Median hospitalization time for the 30 cats alive ≥7 days was 2 days (range 0–7 days). At least 1

episode of ATE recurrence was reported in 14/30 (46.7%) cats surviving for at least 7 days. Median time from presentation to recurrence was 118 days (range 7–2,614 days). Euthanasia was performed at the first episode in 11/14 (78.6%) cats, at the second episode in 2/14 (14.3%) cats, and 1 cat was euthanized because of a third recurrence. Euthanasia caused by clinical signs of CHF was the cause of death in 15/30 (50%) cats surviving ≥7 days. Clinical signs of ATE-related disease, excluding recurrence, were the inciting factor for euthanasia in 1 cat alive at 7 days; this cat suffered substantial limb necrosis. No cats in this population were euthanized or died in association with noncardiac or non-ATE disease.

By 1 year after presentation, 6/30 (20%) cats alive at ≥7 days were still alive. For these cats, median survival time (MST) was 94 days (95% CI, 42–164 days; range 7–2,614; Fig 2) versus a MST of zero days

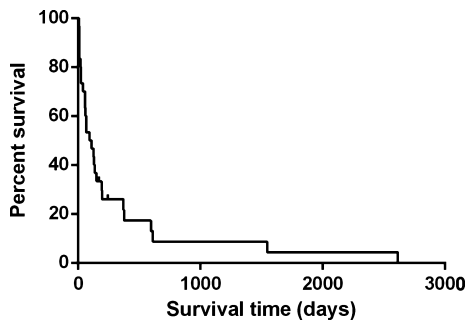


Fig 2. Kaplan-Meier curve to show survival in cats alive at 7 days after presentation with ATE (median survival 94 days; 95% CI, 42–164 days; range 7–2,614 days).

(range 0–2,614 days) for the entire cohort ($n = 250$). Log-rank survival analysis failed to identify any significant association with survival ≥ 7 days.

Overall, the most common cause of death was euthanasia, performed in 229/250 (91.6%) cats. Spontaneous death occurred in 16/97 (16.5%) cats that were not euthanized at presentation.

Discussion

This retrospective study provides new information on the prevalence of ATE in cats in a GP population. According to these data, the prevalence was approximately 0.3% over the 98-month period studied. Our background GP population included cats presented for a variety of routine consultations, which may explain the lower frequency with which ATE is reported in GP compared with previous reports from referral practice.^{4,5} It is also possible that search terms used to interrogate electronic databases, although thorough, did not detect every case presented to the 3 clinics during the inclusion period. The prevalence calculated from our data is likely to be representative of the wider GP population, because the clinics participating provided a large number of cases and represented hospitals with on-site hospitalization and diagnostic facilities and smaller branch practices with more limited staffing and resources. However, only Southern England was represented. The prevalence of feline ATE may be different in other geographic regions.

As we hypothesized, euthanasia at presentation with no attempt to treat was the most common outcome for cats with ATE presented to GP. Nevertheless, 70.1% of cats in which treatment was attempted survived for at least 24 hours after presentation. The ability to evaluate factors associated with spontaneous death was compromised by the large proportion of cats euthanized in this study, particularly at presentation. In cats surviving 24 hours in which treatment was attempted, lower rectal temperature at presentation was significantly associated with mortality between 24 hours and 7 days after presentation. This finding remained significant after multivariable analysis that accounted for the effect of other measured variables, with an increased hazard of death of 2.25 for every 1°C lower rectal temperature.

After the initial 24-hour period, mortality within 7 days was also significantly associated with not receiving treatment with aspirin, clopidogrel, or both. Our retrospective evidence of a treatment benefit should be interpreted with caution. Although we did identify a significantly positive effect on outcome for cats receiving treatment with aspirin, clopidogrel, or both in a multivariable analysis, it is possible that this was a spurious result. The effect on outcome of early antiplatelet treatment in cats presenting acutely with ATE has not been evaluated and merits further prospective study. Recently, clopidogrel was reported to increase time to ATE recurrence or cardiac death compared with aspirin in a prospective, randomized, multicenter, clinical trial of cats with a prior history of ATE.^b

In the univariable analysis, cats with ≥ 2 limbs affected by ATE were less likely to survive to ≥ 7 days. This is similar to a decreased rate of survival to discharge from the hospital reported by other authors,^{4,8} but was not an independent predictor of mortality in our population. Although the degree of motor function has previously been associated with outcome,⁴ we did not evaluate this variable because data from multiple practitioners in multiple centers were considered insufficiently reliable.

We could not identify any significant predictors of mortality after 7 days in this population. In a previous publication, the presence of CHF at presentation with ATE was associated with a significantly shorter median survival time.⁴ In our population, only 8 cats with CHF were included in the survival analysis. Such a low number of subjects will have decreased the likelihood of detecting a significant difference, should it have existed. MST of all 30 cats surviving 7 days after presentation was 94 days after they were presented. Previous authors have reported the survival times of cats discharged from the hospital,^{4,6–8} but we performed survival analysis based on cats surviving 7 days after presentation. This is likely to be a more objective classification of patients than the point of discharge, which may be subject to owner, veterinarian, and clinic factors.

One-year survival of cats alive at ≥ 7 days after initial presentation was 20% in this cohort. Similar numbers of patients were euthanized after discharge as a result of CHF and ATE recurrence. The devastating nature of ATE and CHF in cats is illustrated by the observation that all cats alive at 7 days after presentation died or were euthanized because of cardiac disease or factors relating to ATE.

Potential complications of ATE,^{4,8} such as acute kidney injury and reperfusion injury, were difficult to identify from available records. Although severe azotemia or hyperkalemia was reported in some patients, it is likely that the frequency of acute metabolic abnormalities was underestimated, because of a relatively low intensity of monitoring for patients in GP. Because of this, we did not attempt to estimate the rate of reperfusion injury or acute kidney injury, but instead classified euthanasia or death in association with severe metabolic abnormalities as “ATE-related”.

However, it is a limitation of this study that we could not more accurately identify these complications of ATE within our population.

Despite a previous report suggesting seasonality in the presentation of cats with ATE to GP, we did not detect seasonality in our larger cohort.⁷ As reported by other authors, a male bias was evident in our population of cats with ATE.^{4,6–8} Hypertrophic cardiomyopathy also has a male sex predisposition,^{9–11,15,16} which may explain the male bias in cats with ATE. The pedigree breeds reported here are also over-represented in reported descriptions of cardiomyopathy in cats.^{10,11,15}

A notable difference in signalment between this population and those previously reported was a greater median age at presentation. Previous studies have reported an age at presentation between 6 and 9 years,^{4–7} whereas cats in our study had a median age of 12 years. Interestingly, univariable analysis of factors influencing mortality after 24 hours but within 7 days suggested that nonsurvivors were younger (11 years, 2–19 versus 13 years, 1–21). It is impossible to explain this finding from our data. Although cats were older, the proportion confirmed as hyperthyroid was comparable to that previously reported.^{4,7,8}

An interesting difference in the historical findings of this population was the high frequency of previously auscultated abnormalities. Smith et al documented previously auscultated abnormalities in only 4.7% of cases,⁴ compared to 23.6% cats in this study. This may reflect greater availability of complete clinical records in our population because cats were not referred outside of their primary practice.

The number of cats with CHF may be underestimated by this study, possibly because of limited diagnostic testing performed in some clinics or because of our relatively strict criteria for the diagnosis of CHF. Accurately determining the proportion of cats with CHF at presentation was not possible because of the high rate of euthanasia. Of patients in which the presence or absence of CHF could be determined, 42/63 (66.7%) cats had confirmed CHF. The fact that diuretics were administered to 57 cats may indicate that clinicians are more likely to administer treatment for CHF than perform diagnostic tests to confirm its presence or that our classification of CHF using strict criteria underestimated the true number of cats affected. The inability of our study to determine the presence or absence of CHF at presentation is a potential limitation.

Unfortunately, data contained in the clinical records from multiple GP centers over a long period, which is based on the experience and opinion of individuals, are likely to be highly variable among clinicians and over time. There is no way of standardizing the data in a retrospective study. There were a large number of missing data points attributable to minimal investigation in patients that were likely to be unstable and poorly tolerant because of stress and pain in a population in which financial restrictions were likely to be common. A prospective study to evaluate outcome in cats treated for ATE, performed in a standardized manner in ≥ 1 center,

should eliminate most of this variation and thus improve reliability and the strength of evidence.

In summary, the estimated prevalence of ATE in cats presented to GP over the 98-month period studied was 0.3%. As we hypothesized, cats with ATE presented to GP were likely to be euthanized with no attempt to treat. Approximately, half of cats surviving the initial 24 hours after presentation survived for 7 days. One-fifth of cats alive at ≥ 7 days survived for 1 year after presentation, confirming that long-term survival is possible in a small proportion of cases.

Corrections made after online publication November 15, 2013: errors in reported prevalence of ATE in general practice have been fixed. The article previously stated 0.003% (or 0.0026%); however, the correct figure is 0.3% (or 0.26%).

Footnotes

- ^a IBM SPSS Statistics 21.0 for Windows 7, IBM (UK) Ltd, Portsmouth, UK; GraphPad Prism 6, GraphPad Software Inc, San Diego, CA
- ^b Hogan D, Fox P, Jacob K, et al. Analysis of the Feline arterial thromboembolism: Clopidogrel vs. aspirin trial (Fat Cat). In: Proceedings of the ACVIM Forum; June 13–15, 2013; Seattle, WA (abstract)

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