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REVIEW

Management of asymptomatic (occult) feline cardiomyopathy: Challenges and realities

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Abstract *Background:* Cardiomyopathy distinguishes a heterogeneous group of myocardial disorders that represent the most prevalent cause of feline heart disease. Etiology is uncertain and the natural history is presently unresolved. Hypertrophic cardiomyopathy is the most common of these conditions, and while the majority of affected cats are asymptomatic, a proportion is at risk to develop serious morbidities — the most devastating of which include congestive heart failure, arterial thromboembolism, and cardiac death. Predicting when or whether an asymptomatic cat might develop morbidity is hindered by lack of evidence-based clinical trials. Superimposed, these issues create an irresolvable predicament that presently confounds medical decision-making.
Methods: Review of current perspectives for managing asymptomatic (occult) feline cardiomyopathy.
Results: Complex pathophysiology and (likely) sarcomeric mutations give rise to heterogeneous cardiac phenotypes and variable clinical findings. Echocardiography remains the gold standard to clarify cardiac morphology. Frequently, however, detection of echocardiographic alterations — though often of unproven clinical significance — extrapolates by inference or implication a specter of disease, and with this, leads to a path of long-term treatment and testing. Presently, there is no proof that any particular therapy reduces morbidity or prolongs survival of cats affected with occult cardiomyopathy. Recently, however, evidence has accumulated to support the belief that certain prognostic indicators suggest risk for poor outcome. Accordingly, and in absence of evidence-based clinical trials, current practice has shifted to view therapy with the intent to target pathophysiology underlying

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documented or perceived clinical markers, whose presence portends high risk in certain patients. Affected animals and potentially siblings should be monitored using clinical testing that also takes into account age-related comorbidities.
Conclusions: Asymptomatic (occult) feline cardiomyopathy includes complex and heterogeneous diseases whose outcomes are challenging to predict. Review of available evidence-based treatment data leaves no uncertainties regarding drugs with established efficacy. There presently are none. Current management focuses upon identification of documented risk factors, individualized and tailored therapy, and cogent monitoring. Drugs most commonly considered in this paradigm include those that might reduce thromboembolic risk in cases with substantial left atrial enlargement or dysfunction, agents to counteract left ventricular remodeling, or medications that ameliorate systolic or diastolic dysfunction. Discovering reliable prognostic indicators may further improve stratification to identify patients at highest risk, or detect subsets that respond favorably. These issues shape the challenge to identify sensible preventative management and cost-effective, long-term monitoring strategies.

Abbreviations

ARVC	arrhythmogenic right ventricular cardiomyopathy
CHF	congestive heart failure
DCM	dilated cardiomyopathy
HCM	hypertrophic cardiomyopathy
HOCM	hypertrophic obstructive cardiomyopathy
RCM	restrictive cardiomyopathy
SAM	systolic anterior motion of the septal mitral valve leaflet

Although medical therapy for congestive heart failure (CHF) is plainly indicated to restore normal breathing and promote survival, the benefit of treating cats with asymptomatic (occult) cardiomyopathy remains unsubstantiated and controversial. The natural history of occult disease is variable and difficult to predict with certainty. Whereas the majority of affected cats appear to remain asymptomatic throughout life, cardiomyopathy can produce considerable morbidity in others, leading to CHF, arterial thromboembolism, and death.

Feline myocardial disease (cardiomyopathy) constitutes the leading cause of cardiac morbidity and mortality,[1–5] and hypertrophic cardiomyopathy (HCM) is the most prevalent of these disorders.[1–10] The cat is also affected less commonly by other forms of primary myocardial disease including restrictive cardiomyopathy (RCM),[11] endomyocardial fibrosis,[12] arrhythmogenic right ventricular cardiomyopathy (also termed arrhythmogenic right ventricular dysplasia, or arrhythmic cardiomyopathy) (ARVC),[13] and dilated cardiomyopathy (DCM). Some cats have myocardial disease whose echocardiographic, radiographic, and clinical characteristics do not closely conform to contemporary classification. Taxing, such cases have been referred to as 'unclassified' forms of cardiomyopathy, a generally equivocal and elusive descriptor.

Several obstacles have hampered the development of cost-effective and clinically successful management strategies. By and large, occult cardiomyopathy is challenging to diagnose and characterize. Physical examination, electrocardiography, and thoracic radiography have limited sensitivity and specificity.[14,15] Cardiac biomarkers such as NT-proBNP offer additional information when measured in populations at risk for heart disease,[7] but are less reliable when applied by themselves for purposes of generic screening and monitoring.[16] Echocardiography, the gold standard for cardiac diagnosis, is expensive, has a steep learning curve, and is unavailable in many locals.[7] Furthermore, myocardial diseases are complex and heterogeneous disorders and the natural history and mechanisms responsible for disease progression are poorly understood. Structural features can remain static, change over time, or take on characteristics that resemble morphologies or mimic dysfunction that characterize other disease forms. Frequently, some hearts will display more than one phenotype. Additionally, comorbidities including anemia, systemic hypertension, and thyrotoxicosis that are often detected during advanced age can affect the heart. These issues, coupled with limitations inherent in diagnostic classification schemes, may make it difficult to accurately characterize underlying