Cardiovascular Drugs in Avian, Small Mammal, and Reptile Medicine

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KEYWORDS

• Cardiovascular • Avian • Exotic mammal • Reptile • Heart failure
• Pericardial effusion • Atherosclerosis • Treatment

KEY POINTS

- Cardiovascular disease, including congestive heart failure (CHF), pericardial disease and effusion, and atherosclerosis, is becoming increasingly better recognized in companion birds, small mammals, and reptiles.
- Animals with cardiac disease often present with signs of CHF. The mainstays for treatment of CHF in small animal medicine, namely diuretics, vasodilators, and positive inotropes, can also be applied to treatment of the condition in birds, reptiles, and small mammals. Negative inotropic drugs and lifestyle changes can also have merit.
- CHF may be accompanied by disease processes, such as hypertrophic cardiomyopathy, systemic and/or pulmonary hypertension, and arrhythmias, which need to be addressed accordingly.
- Treatment of pericardial effusion and cardiac tamponade should initially focus on fluid removal, followed by treatment of the underlying cause.
- Atherosclerosis is a disease that predominantly affects psittacine birds; treatment of this condition involves both controlling risk factors and managing sequelae, including peripheral hypoperfusion, ischemic stroke, and CHF.

INTRODUCTION

Cardiovascular disease has traditionally been thought to be a rare occurrence in companion birds, but a growing body of evidence collected over the last few decades indicates otherwise. It is frequently encountered in practice, predominantly in psittacine

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birds, and poses a serious threat to the quality of life and longevity of these and many other avian species. Similarly, in small mammals, cardiac diseases seem to be seen with increasing frequency and are no longer limited to the "predisposed" species, such as the ferret and hedgehog. In reptiles, cardiovascular disease still appears a relatively uncommon condition, predominantly occurring secondary to other abnormalities. Nevertheless, several case reports on reptiles with cardiac disease can be found in the literature. Improved acuity of available diagnostic methods, along with growing owner interest in more sophisticated veterinary care, enables the clinician to better recognize and pursue treatment of cardiovascular disease. Successful intervention requires a foundational understanding of relevant anatomy and physiology, heightened awareness of risk factors and clinical disease states, accurate and timely diagnosis, and innovative treatment approaches.

At the present time, therapeutic interventions for cardiovascular disease in birds and other exotic animals are largely empirical and extrapolated, where possible, from small animal and human medicine. Case reports of cardiovascular disease in which treatment was attempted are relatively few, but include cases of endocardial (eg, endocarditis), myocardial (eg, myocarditis), pericardial (eg, pericardial effusion), and vascular disease (eg, atherosclerosis and associated abnormalities, such as stroke and intermittent claudication syndrome in birds; heartworm disease in ferrets), cardiac arrhythmias (eg, second-degree atrioventricular [AV] block), and end-stage cardiac disease (ie, congestive heart failure [CHF]).[1–20] There is a paucity of pharmacokinetic and pharmacodynamic data and no clinical trials in exotic species for cardiovascular therapeutic agents. At present, the wide array of causative conditions, affected species, therapeutic interventions proposed or attempted, and outcomes precludes any conclusive association between therapeutic protocols and survival time.

Regardless of the species, long-term prognosis for most cardiovascular diseases is considered guarded to poor, given that treatment is limited to management, rather than resolution of disease in most cases. In addition, prognosis is partly contingent on timely diagnosis, which proves challenging given the absence or subtlety of clinical signs and the limited sensitivity of available diagnostic modalities before disease has become advanced. Primary goals are to identify and control risk factors, where possible, and following diagnosis of cardiovascular disease, to maintain quality of life and extend survival time. The following sections review treatment options that show promise for management of recognized disease states, including CHF and related conditions, pericardial disease/effusion, and clinical atherosclerotic disease in birds, reptiles, and small mammals. Medications that have been used empirically, and those for which pharmacokinetic and pharmacodynamic data are available, are presented in **Table 1**.

CONGESTIVE HEART FAILURE AND RELATED CONDITIONS

CHF occurs when the heart is unable to empty the venous reservoirs, manifested by vascular congestion and transudation of fluid within tissues and body cavities (congestive signs).[21,88–91] In the case of right-sided CHF, peripheral venous congestion, hepatic congestion, ascites, and pericardial (or pleural, in case of small mammals) effusion are often present. Pulmonary edema and congestion of the pulmonary veins occur with left-sided CHF, and a combination of signs may be seen with biventricular failure.[17,18,21,22,29,88,91,92] Heart failure can further be characterized as systolic (inadequate ventricular ejection), diastolic (inadequate ventricular filling), or a combination of the 2. In either scenario, stroke volume and cardiac output decrease.[89,90]