Atrial Fibrillation
Current Therapies

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KEYWORDS

• Arrhythmia • Tachycardia • Canine • Cardioversion • Antiarrhythmic

KEY POINTS

- Atrial fibrillation can be managed with a rate control or a rhythm control strategy.
- A rate control approach is preferred when atrial fibrillation is long-standing and underlying structural cardiac disease is present.
- A rate control approach is based on a combination of drugs, including calcium channel blockers, β-blockers, and digoxin.
- The success of a rhythm control strategy is higher when the onset of atrial fibrillation is recent, the arrhythmia triggers can be eliminated, and atrial size is normal.
- Transthoracic synchronized electrical cardioversion is the preferred method to terminate atrial fibrillation.

INTRODUCTION

A rate control or a rhythm control strategy can be applied to the management of atrial fibrillation. The rate control approach is aimed at slowing the ventricular rate in response to rapid fibrillatory impulses from the atria by increasing the filtering function of the atrioventricular node. A slower ventricular response rate alleviates clinical signs and limits the deterioration of ventricular function. The goal of rhythm control is to terminate the arrhythmia and restore sinus rhythm. Although there is a theoretic benefit in the rhythm control approach by restoring a regular ventricular rhythm and the contribution of atrial contraction to cardiac output, long-term maintenance of sinus rhythm after suppression of atrial fibrillation remains difficult in most cases. Moreover, clinical trials comparing treatment strategies in people with atrial fibrillation have not concluded that one is superior to the other.[1] Thromboembolic complications of atrial fibrillation are frequent in people but unusual in dogs. Only a few cases of dogs with a suspicion of intra-atrial thrombus on echocardiogram or with acute and painful limb paralysis secondary to an embolus have been reported in the veterinary literature.[2,3]

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This risk is likely higher in cats, but they rarely develop atrial fibrillation. In a retrospective study that included data from 5 institutions over a period of 23 years, only 50 cats with a diagnosis of atrial fibrillation were identified. Six of them presented with signs of arterial thromboembolism.[4] This review focuses on the treatment of atrial fibrillation in dogs.

RATE CONTROL VERSUS RHYTHM CONTROL TREATMENT STRATEGY

Several factors need to be taken into account when making a decision to treat atrial fibrillation and selecting a rate versus rhythm control approach, including

- The presence or absence of structural heart disease
- The presence or absence of another identifiable cause
- The duration of atrial fibrillation to distinguish recent onset from long-standing atrial fibrillation
- The heart rate distribution throughout the day and at various levels of activity
- The animal's lifestyle, because the impact of atrial fibrillation is more obvious on the performance of working dogs

Treatment Strategy for Atrial Fibrillation with Structural Heart Disease

A majority of cases of atrial fibrillation are diagnosed in dogs with structural heart disease, and many of them present with congestive heart failure.[5] Atrial dilatation, interstitial and replacement fibrosis, elevated adrenergic tone, and renin-angiotensin-aldosterone system activation are irreversible pathophysiologic changes that promote the occurrence, maintenance, and recurrence of atrial fibrillation. Once initiated, atrial fibrillation contributes to further deteriorate cardiac function, in part because of the loss of atrial contraction, but more importantly because of the rapid and irregular ventricular response rate (so-called tachycardiomyopathy) that is the result of high adrenergic tone and the decreased ability of the atrioventricular node to block atrial impulses.[6] In these cases, a rate control approach, which increases atrioventricular node filtering by prolonging the refractory period of the calcium-dependent nodal cells, is largely preferred, because arrhythmia triggers cannot be eliminated. Structural cardiac disease is present in nearly all cats with atrial fibrillation, and therefore it is managed with a rate control strategy if the ventricular response rate is too high.[4] Restoration of sinus rhythm via electrical cardioversion has been retrospectively studied in a small number of dogs with atrial fibrillation and heart disease; the results suggest that atrial fibrillation reoccurs in 50% of dogs within approximately 2 months and in most dogs within 5 months after cardioversion.[7,8] The need for general anesthesia, even of short duration, is another limitation of this treatment approach in dogs with severe cardiac dysfunction.

Treatment Strategy for Lone Atrial Fibrillation

Less frequently atrial fibrillation occurs in the absence of another identifiable cardiac disease in giant and large breed dogs.[5] It is commonly referred to as *lone atrial fibrillation* and it rarely causes clinical signs.[8] In these dogs, normal autonomic influence (ie, dominant vagal tone outside periods of excitement and stress) on the atrioventricular node usually prevents rapid ventricular response rates during rest and periods of mild to moderate activity, although the heart rhythm can become erratic during periods of strenuous exercise. After careful evaluation of the temporal variations of heart rate during the day, a decision is made to withhold treatment or in some cases administer low dosages of rate control drugs. Alternatively, a pharmacologic or