

First-Degree Heart Block

(First-Degree Atrioventricular Block)

Basics

OVERVIEW

- The heart of the dog or cat is composed of four chambers; the top two chambers are the right and left atria and the bottom two chambers are the right and left ventricles
- In order to pump blood to the lungs and body, the heart must work in a coordinated fashion; the normal control or “pacemaker” of the heart is the sinoatrial (SA) node, which starts the electrical impulse to begin the coordinated contraction of the heart muscles—the electrical impulse causes the atria to contract, pumping blood into the ventricles; the electrical impulse moves through the atrioventricular (AV) node and into the ventricles, causing the ventricles to contract and to pump blood to the lungs (right ventricle) and the body (left ventricle)
- The normal heart rate for dogs varies based on the size of the dog; however, the general range is 60–120 beats per minute (with smaller dogs having faster normal heart rates)
- The general range for normal heart rates in cats is 120–240 beats per minute
- An electrocardiogram (ECG) is a recording of the electrical impulse activity of the heart; the normal ECG is a tracing with P, QRS, and T waves; the P waves are the first upward deflection of the ECG tracing that looks like a “bump” in the tracing; the P waves are a measure of the electrical activity of the atria; the QRS looks like an exaggerated “W” with the Q wave being a short, downward deflection, the R wave being a tall, spiked upward deflection, and the S wave being another short, downward deflection; the QRS is a measure of the electrical activity of the ventricles; finally the T wave may be an upward or downward deflection of the ECG tracing; the T wave is a measure of ventricular recovery prior to the next contraction
 - “First-degree heart block” or “first-degree atrioventricular block” refers to a delay in conduction that occurs between atrial and ventricular activation

ECG Features

- Heart rate and rhythm—usually are normal
- Usually see regularly occurring normal P waves and QRS complexes
- Prolonged, consistent time between the P wave and the R wave (known as the “PR interval”)—dogs, greater



than 0.13 seconds; cats, greater than 0.09 seconds

SIGNALMENT/DESCRIPTION OF PET

Species

- Dogs
- Cats

Breed Predilections

- Dogs—American cocker spaniels, dachshunds, and short-nosed, flat-faced (known as “brachycephalic”) breeds
- Cats—Persian

Mean Age and Range

- May occur in young, otherwise healthy dogs as a manifestation of high vagal tone; “high vagal tone” refers to the vagus nerve—the vagus nerve provides nervous stimulation to the heart, lungs, throat, voice box, windpipe, and gastrointestinal tract; when it is stimulated (known as “vagal tone”), it has various functions, including slowing the heart
- Intra-atrial conduction delay involving the right atrium may be seen with congenital (present at birth) heart defects or disease
- May be noted in aged pets with deterioration of the electrical impulse conduction system (known as “degenerative conduction system disease”), particularly cocker spaniels and dachshunds
- Persian cats of any age with high vagal tone and in cats of any age with hypertrophic cardiomyopathy (disease characterized by inappropriate enlargement or thickening of the heart muscle of the left ventricle)

SIGNS/OBSERVED CHANGES IN THE PET

- Most affected pets do not have clinical signs
- Physical examination will be normal unless there is underlying drug toxicity, general heart muscle disease or non-heart diseases
- If drug-induced first-degree heart block, may have a history of clinical signs related to drug toxicity—lack of appetite (known as “anorexia”), vomiting, and diarrhea with digoxin; weakness with calcium channel blockers or β -adrenergic antagonists
- May have signs of more generalized heart muscle disease, drug toxicity, or other non-heart disease

CAUSES

- May occur in normal pets
- Increased stimulation of the vagus nerve resulting from non-heart diseases; the “vagus nerve” provides nervous stimulation to the heart, lungs, throat, voice box, windpipe, and gastrointestinal tract; when it is stimulated, it has various functions, including slowing the heart; usually accompanied by sinus arrhythmia (rhythm change) or other arrhythmias
- Medications (such as digoxin, β -adrenergic antagonists, calcium channel blocking agents, propafenone, amiodarone, α_2 -adrenergic agonists, or severe procainamide or quinidine toxicity)
- Deterioration or degenerative disease of the conduction system
- Hypertrophic cardiomyopathy (disease characterized by inappropriate enlargement or thickening of the heart muscle of the left ventricle)
- Inflammation of the heart muscle (known as “myocarditis”), especially caused by infectious agents (*Trypanosoma cruzi* [Chagas’ disease], *Borrelia burgdorferi* [Lyme disease], *Rickettsia rickettsii* [Rocky Mountain spotted fever])
- Heart-muscle disease caused by infiltration with abnormal substance or cancer (known as “infiltrative cardiomyopathy”); example of disease with infiltration by an abnormal substance is amyloidosis (condition in which insoluble proteins [amyloid] are deposited outside the cells in the heart and various organs, compromising their normal function)
- Atropine administered intravenously may briefly prolong the PR interval; atropine is used as a preanesthetic medication, as an antidote, and to treat some forms of slow heart rate (known as “bradycardia”)

RISK FACTORS

- Any condition or procedure that raises vagal tone;; when the vagus nerve is stimulated, it has various

functions, including slowing the heart

Treatment

HEALTH CARE

- Remove or treat underlying cause(s)
- Hospitalization may be necessary to manage the underlying cause (such as heart muscle disease [known as “cardiomyopathy”], gastrointestinal disease, airway disease)

ACTIVITY

- Unrestricted; unless restriction required for an underlying condition

DIET

- No modifications or restrictions unless required to manage an underlying condition

SURGERY

- None, unless necessary to manage an underlying condition

Medications

- Medications used only if needed to manage an underlying condition

Follow-Up Care

PATIENT MONITORING

- Except in healthy young pets, monitor electrocardiogram (a recording of the electrical activity of the heart) to detect any progression in electrical impulse conduction disturbance of the heart

EXPECTED COURSE AND PROGNOSIS

- Depends on underlying cause
- Prognosis usually excellent, if no significant underlying disease is present

Key Points

- “First-degree heart block” or “first-degree atrioventricular block” refers to a delay in conduction that occurs between atrial and ventricular activation
- May be a normal finding or may be related to medications, heart disease, or other non-heart diseases stimulating the vagus nerve; the “vagus nerve” provides nervous stimulation to the heart, lungs, throat, voice box, windpipe, and gastrointestinal tract; when it is stimulated, it has various functions, including slowing the heart
- Except in healthy young pets, monitor electrocardiogram (a recording of the electrical activity of the heart) to detect any progression in electrical impulse conduction disturbance of the heart