

SECOND-DEGREE HEART BLOCK (SECOND-DEGREE ATRIOVENTRICULAR BLOCK, MOBITZ TYPE II)

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 to 180 beats per minute (with smaller dogs have faster normal heart rates)
- The general range for normal heart rate in cats is 120 to 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 look 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
- “Second-degree heart block” or “second-degree atrioventricular block” refers to failure of one or more P waves (but not all P waves) to be conducted—Mobitz type II second-degree heart block occurs when one or more P waves are blocked, without a preceding progressive delay in atrioventricular transmission

ECG Features

- One or more P waves not followed by a QRS complex, and time between the P wave and the R wave (known as the “PR interval”) of conducted beats is consistent
- Ventricular rate—usually slow
- QRS complexes may appear normal or may be wide or have an abnormal appearance
- Abnormally wide QRS complexes may indicate serious, extensive heart disease

GENETICS

- May be inherited in pugs

SIGNALMENT/DESCRIPTION of ANIMAL

Species

- Dogs and cats

Breed Predispositions

- American cocker spaniels
- Pugs
- Dachshunds

Mean Age and Range

- Generally occurs in older animals

SIGNS/OBSERVED CHANGES in the ANIMAL

- Animal may have no clinical signs
- Fainting (known as “syncope”), collapse, weakness, or sluggishness (lethargy)
- May have signs of underlying disease
- Slow heart rate (known as “bradycardia”) is common
- May be intermittent pauses in the heart rhythm
- May have a change in heart sounds heard when listening to the heart with a stethoscope (known as “auscultation”)
- If associated with digoxin toxicity, may see vomiting, lack of appetite (known as “anorexia”), and diarrhea; “digoxin” is a heart medication

CAUSES

- May be inherited in pugs

- 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
- Deterioration of the electrical impulse conduction system (known as “degenerative conduction system disease”)
- Medications (such as digoxin, β -adrenergic antagonists, calcium channel-blocking agents, propafenone, amiodarone, α_2 -adrenergic agonists, muscarinic cholinergic agonists, or severe procainamide or quinidine toxicity)
- 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)
- Inflammation of the lining of the heart (known as “endocarditis”), particularly involving the aortic valve
- Infection/inflammation of the heart muscle (known as “myocarditis”)—viral, bacterial and parasitic causes; unknown causes (so called “idiopathic myocarditis”)
- Disease of the heart muscle (known as “cardiomyopathy”), especially in cats
- Trauma
- Atropine administered intravenously may cause a brief period of first- or second-degree heart block before increasing the heart rate; atropine is used as a preanesthetic medication, as an antidote, and to treat some forms of slow heart rate (bradycardia)

RISK FACTORS

- Any condition or procedure that raises vagal tone; “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, it has various functions, including slowing the heart

TREATMENT

HEALTH CARE

- Treatment—may be unnecessary, if heart rate maintains adequate blood volume being pumped by the heart (known as “cardiac output”)
- Medication to improve electrical impulse conduction or implantation of a pacemaker is indicated for pets having clinical signs
- Treat or remove underlying cause(s)

ACTIVITY

- Cage rest advised for pets having clinical signs

DIET

- Modifications or restrictions only to manage an underlying condition

SURGERY

- Permanent pacemaker may be required for long-term management of pets having clinical signs

MEDICATIONS

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive.

- Atropine or glycopyrrolate may be used short term, if animal has positive atropine response; atropine is used as a preanesthetic medication, as an antidote, and to treat some forms of slow heart rate (bradycardia); glycopyrrolate is a drug with similar effects and uses as atropine
- Long-term (chronic) anticholinergic therapy (drugs such as propantheline or hyoscyamine)—indicated for pets having clinical signs, if they had improved atrioventricular (AV) conduction with atropine response test
- [Isoproterenol \(drug used to control some types of irregular heart beats\)](#) or dopamine (drug used to increase contraction of heart muscle) may be administered in sudden (acute), life-threatening situations to enhance atrioventricular (AV) conduction

FOLLOW-UP CARE

PATIENT MONITORING

- Frequent electrocardiograms (“ECGs,” recordings of the electrical activity of the heart) because second-degree heart block (Mobitz type II) often progresses to complete (third-degree) heart block

POSSIBLE COMPLICATIONS

- Prolonged slow heart rate (bradycardia) may cause secondary congestive heart failure or inadequate blood flow to the kidneys; “congestive heart failure” is a condition in which the heart cannot pump an adequate volume of blood to meet the body’s needs

EXPECTED COURSE AND PROGNOSIS

- Variable—depends on underlying cause
- If animal has deterioration of the electrical impulse conduction system, second-degree heart block (Mobitz type II) often progresses to complete (third-degree) heart block

KEY POINTS

- Identify and specifically treat underlying cause
- Medications may not be effective long-term
- If animal has deterioration of the electrical impulse conduction system, second-degree heart block (Mobitz type II) often progresses to complete (third-degree) heart block
- Prolonged slow heart rate (bradycardia) may cause secondary congestive heart failure or inadequate blood flow to the kidneys; “congestive heart failure” is a condition in which the heart cannot pump an adequate volume of blood to meet the body’s needs

