Essential Diagnostics in the Exam Room

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History

Determine age, breed, and sex of the patient to help formulate a rule-out list and help to determine prognosis. Note current pre-existing diseases. Record current drugs and clinical response. Record presenting clinical signs and duration and progression of the illness.

Physical Examination

In addition to a complete physical examination, perform a thorough cardiovascular examination including all of the following:

1. Auscultation, noting:
    a. Heart rate
    b. Presence or absence of the following:
        i. Heart murmur (Point of maximum intensity, radiation, loudness, timing, character)
        ii. Gallop sound (rhythm)
        iii. Other abnormality heart sounds (e.g. splitting of S1 or S2, clicks, rubs)
        iv. Arrhythmias
        v. Abnormal lung sounds
2. Femoral Pulse palpation (character, rate, rhythm, pulse deficits)
3. Jugular vein observation for distention or pulsation
4. Precordial palpation for apical impulse, presence of thrills
5. Abdominal palpation to assess organomegaly and detect ascites

Electronic stethoscope

Electronic stethoscopes have improved dramatically in the past 10 years. This problem can be partially addressed by coupling the electronic stethoscope's chest piece to the chest wall with carefully applied ultrasound gel. In addition to electronic amplification of heart sounds and murmurs, most of the electronic stethoscopes currently allow the user to record and play back sounds at either normal or half speed, a useful feature for judging the timing and shape or quality of murmurs in tachycardic patients and for judging the timing of transient heart sounds such as clicks or gallops. Some models also provide the ability to record graphic representations of sounds in a digital file format (i.e., a phonocardiogram) that can be stored on a computer, possibly even becoming part of the patient's medical record. A new electronic stethoscope, the 3M Littmann model, features useful ambient noise reduction circuitry that appears to overcome most if not all of the problems of background noise amplification that plagued previous models. This stethoscope has the additional advantage of allowing wireless (infrared) digital file transfer to a computer, although this system currently has no provision for recording a timing ECG.

Electrocardiography

It is recommended that practitioners have two ECG machines: an oscilloscope and an electrocardiograph. The electrocardiograph linked with a strip recorder or printer provides a permanent record. A PC based system is highly recommended. The ECG is required for the accurate diagnosis of arrhythmias and conduction disorders. Just some of the indications include arrhythmias heard on auscultation, breathing problems, shock, fainting or seizures, cardiac murmurs, and systemic disease that affect the heart (tumors, kidney function, heartworm disease, etc.). The ECG is also useful as part of the preoperative work-up in older animals, for monitoring patients during and after surgery, and for evaluating the effects of cardiac drugs.

Assess the rate, rhythm and axis; evaluate to P-QRS-T complex morphology. The heart rate (beats/min) can be calculated easily by counting the number of beats (R-R interval intervals) between two sets of marks in the margin of the ECG paper (3 seconds at 25 mm/sec) and multiplying by 20. ECG rules are also available. This is all the measuring we need to do.

To recognize arrhythmias, you need to know two things

1. The site of origin of the abnormal beat.
2. Recognize deviations from the normal rate of automaticity for that site.

Three different arrhythmias can be identified on Lead II by the following features

- **Atrial origin** – these beats originate from somewhere in the atria other than the SA node. They look just like a normally conducted beat except that their timing is very early. A big hint is that the P-wave of the atrial beat touches the T-wave of the beat before it.
- **Junctional origin** – these beats originate near the AV node and have a negative deflection P-wave, or no P-wave, with a normally conducted, short-duration QRS complex.

- **Ventricular origin** – these beats originate somewhere in the ventricles. No P-waves are evident, QRS complexes are wide and bizarre appearing, and may be positive or negative polarity.

Blood pressure

Diseases associated with hypertension include systemic hypertension and renal disease, hyperadrenocorticism, hyperthyroidism, essential or primary hypertension, and pheochromocytoma. Of these, Cushing's disease (dogs) and renal disease are probably the most common. Cats diagnosed as hypertensive are presented to veterinarians for the evaluation of ocular abnormalities (such as dilated pupils, hyphema, or presumed blindness), neurological signs, anorexia, and lethargy. Many cats with renal disease or hyperthyroidism are hypertensive.

Diagnostic technique

Definitive diagnosis of hypertension requires documentation of high arterial blood pressure by indirect measurement. Indirect blood pressure measurements can be obtained using oscillometric or Doppler techniques. Technique requires an inflatable cuff (approximately 40% in width of the circumference of the limb at the site of placement) wrapped around a distal limb or tail.

The oscillometric technique detects pulse pressure oscillations beneath the cuff bladder resulting from changes in arterial diameter. Proper cuff size is critical for accurate measurement. The animal is placed in lateral recumbency in a calm environment. Hair coat at the carpus (radial artery) is matted with alcohol and pneumatic cuff applied in a snug position. Cuff is inflated and deflated automatically with blood pressure (systolic, diastolic, and mean) and heart rate automatically calculated and digitally displayed.

The Doppler technique uses ultrasound waves to detect and make audible blood flow in an artery distal to the blood pressure cuff. Hair coat between the carpus and elbow is matted with alcohol and pneumomatic cuff applied in snug position. Distal to cuff position, transducer probe crystal is placed over the skin, just proximal to the carpal pad (digital branch of the radial artery) using ultrasound gel and taped or held in place. Cuff bladder is inflated to suprasystemic pressure with cut-off of Doppler signal. Cuff is deflated slowly with systolic pressure determined with return of Doppler signal. Diastolic pressure is measured when Doppler signal pitch changes abruptly or disappears.

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