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Introduction to the Necropsy

1.1 What is a Necropsy?

A necropsy is a postmortem examination. By convention, this term is typically used to denote a postmortem examination of a non-human animal, and the term "autopsy" is used for a postmortem examination of a human; however, the terms are essentially interchangeable, and some veterinary pathologists have argued for the use of a common term to increase communication in the age of "one medicine," Both terms are derived from Greek words: autopsy is from the word *autopsia*, meaning the act of seeing for one's self; necropsy is from the words *nekros* meaning dead and the suffix *-opsis* meaning sight. The word autopsy was used in the 1600s, and the word necropsy did not appear until about 200 years later, most likely to replace the two-word term *autopsia cadavaria*, or to look for oneself at a dead body. We chose the term *necropsy* for this book because it is the term we use at Cornell, where the word is deeply rooted in the long-standing tradition of veterinary pathology.

The term necropsy can be used broadly to encompass the entire set of diagnostic procedures that occur after an animal dies; however, in this book we will use the term to denote the macroscopic or gross examination of the carcass and the process of collecting tissues for histopathology and other ancillary tests. At Cornell and most diagnostic laboratories, the fee for a necropsy includes both gross examination and microscopic evaluation of the tissues collected during the necropsy; however, for a reduced fee, the formalin fixed tissues collected by a referring veterinarian or scientist can be processed and examined histologically (we call this type of case a "necropsy in a bottle"). If the clinician is willing to do the necropsy and collect the tissues, the necropsy in a bottle option is often an economically attractive alternative to shipping the carcass to a diagnostic lab.

In this text, the term *prosector* will be used for the person performing the necropsy.

1.2 Why do a Necropsy?

Necropsies are performed to determine or confirm the cause of death or reason for a condition necessitating euthanasia. A necropsy may be requested by an owner, a veterinarian, a drug or vaccine company, a biomedical researcher, or a law enforcement or other government agency. The common reasons for necropsy requests at Cornell are shown in Table 1.1.

1.3 What Information Can and Cannot Be Gained from a Necropsy

A necropsy can result in a definitive diagnosis, a presumptive diagnosis or, if there are no gross lesions, will at least rule out some possible diagnoses.

Necropsy Guide for Dogs, Cats, and Small Mammals, First Edition. Edited by Sean P. McDonough and Teresa Southard.

Companion Website: www.wiley.com/go/mcdonough/necropsy

Table 1.1 Reasons necropsies are requested.

Owner	Gain peace of mind, especially about a decision to euthanize Rule in or out infectious/toxic cause when other animals are at risk Suspicion of malicious action by another party (usually the neighbor) Suspicion of veterinary malpractice Concern about zoonotic disease (rabies) Insurance reasons (most common in horses)
Veterinarian	Find answers in a confusing or atypical case Confirm a suspected diagnosis Examine surgical sites or retrieve implanted devices Collect data about a condition of interest
Drug or Vaccine Company	Determine if drug or vaccine caused illness or death
Biomedical Researcher	Investigate cause of unexpected death in animal on a study Compare control and experimental animals at end of study
Law Enforcement or Government Agency	Animal harmed or killed during police activity Suspicion of criminal cruelty or neglect Suspicion of a pet-food related toxicity

Necropsies are particularly rewarding when they reveal pathognomonic gross lesions. These gross changes are specific for a particular disease entity and can often allow the prosector to make a definitive diagnosis with no need for additional testing. Some of these conditions are illustrated in Figures 1.1–1.6. Unfortunately, these cases make up only about 10% of our caseload at Cornell.

In another small portion of cases, again roughly 10%, the necropsy reveals no lesions to suggest a cause of death, either because all organs are grossly normal or because the body is decomposed to the point that lesions cannot be distinguished from the processes of decay. Abortions and neonatal deaths are our lowest yield necropsies, and often these cases go unresolved even with complete ancillary testing. Causes of death that typically have minimal or no gross lesions include metabolic derangements, many toxicities (especially neurotoxins), and cardiac arrhythmias.

For the vast majority of cases, the necropsy provides some clues as to the disease process, allows for a presumptive diagnosis, and directs sampling for additional tests that, in many cases, will yield a definitive diagnosis.

1.4 When to Refer a Necropsy

Anyone who has a good grasp of normal veterinary anatomy can perform a necropsy (especially if they read this book!) No advanced training is required; however, before beginning, a practitioner should make a realistic assessment of their ability to perform a particular necropsy. There are certain types of necropsies that are best handled by specialists in facilities specifically designed for postmortem examinations. Necropsies should be referred to a diagnostic laboratory with board certified pathologists in the following circumstances:

1) Cases where a client expresses concerns about your veterinary care of the patient
2) Cases which are part of a legal dispute (forensic necropsy)
3) Cases with strong suspicion of a zoonotic agent, such as rabies or tularemia
4) Cases involving unfamiliar species, such as non-human primates, reptiles, and birds.

Veterinarians sometimes open up the body to look for obvious gross lesions and, if none are detected, pack up the opened carcass and send it to us for a "second look necropsy."

Figure 1.1 Segmental hemorrhagic enteritis in this 8-week-old kitten is virtually diagnostic for panleukopenia caused by feline parvovirus. The lesion in puppies with canine parvovirus infection is similar.

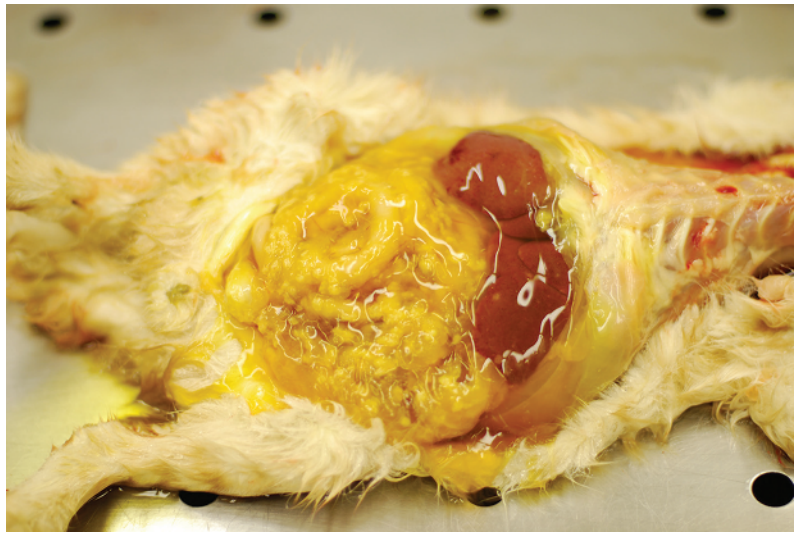

Figure 1.2 The wet form of feline infectious peritonitis often causes bright yellow, thick peritoneal effusion and multifocal tan to white plaques on the serosal surfaces.

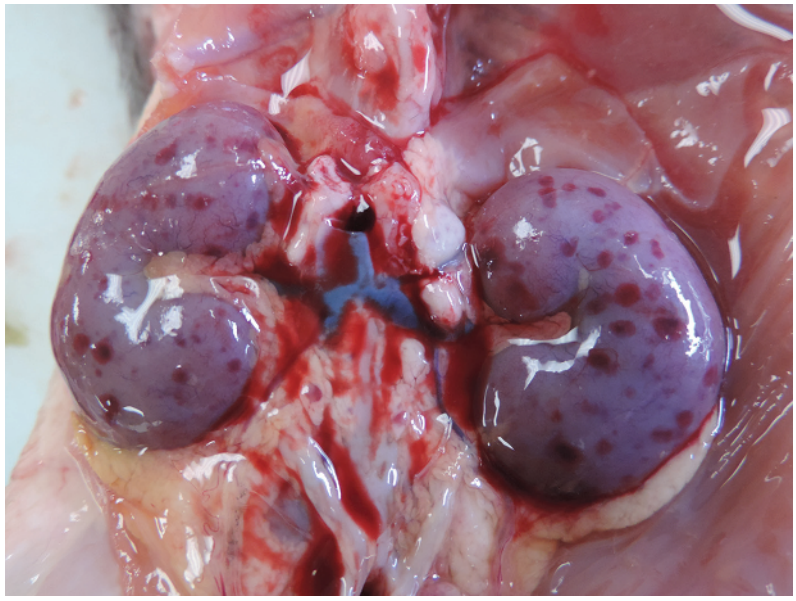

Figure 1.3 Dark red foci on the capsular surface of the kidneys in a newborn puppy usually indicates infection with canine herpesvirus.

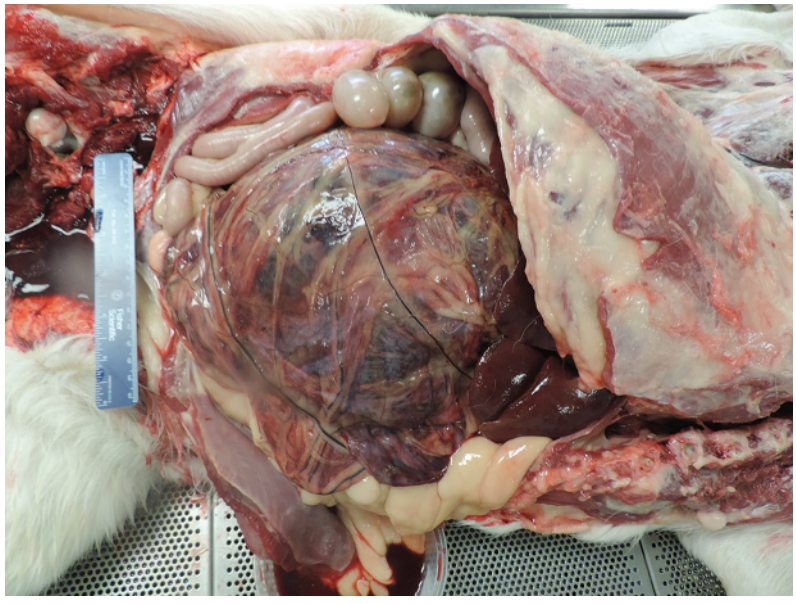

Figure 1.4 The gross finding of a distended, rotated, congested stomach is characteristic of gastric dilatation volvulus in a dog.

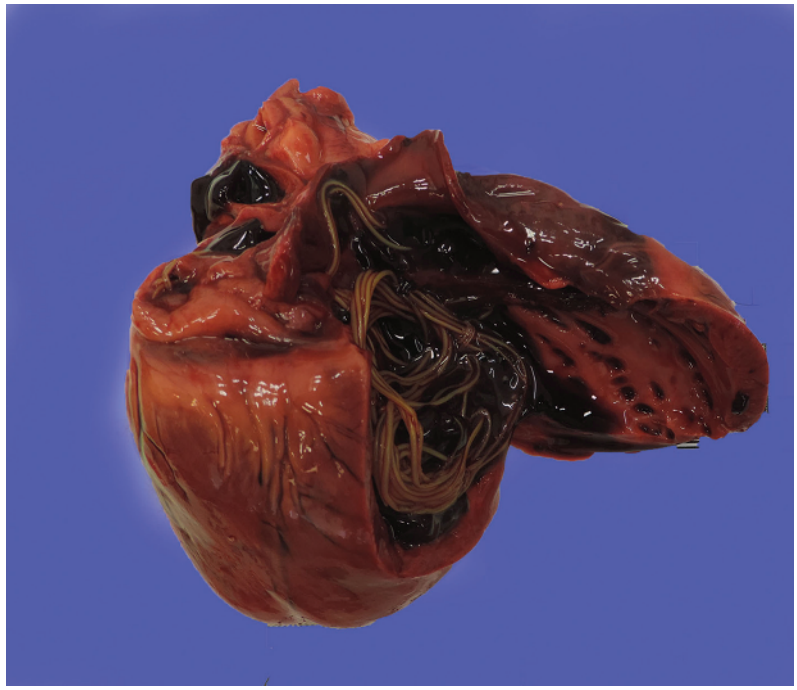

Figure 1.5 Long, slender tan nematode parasites in the right side of the heart and pulmonary artery are pathognomonic for heart worm infection (dirofilariasis).

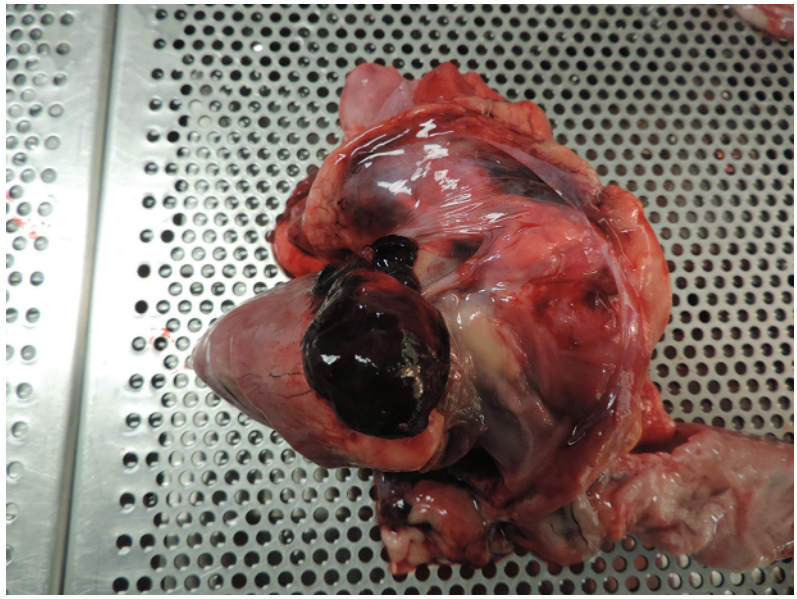

Figure 1.6 A dark red mass associated with the right atrium, with or without rupture and hemopericardium, in a dog strongly supports a diagnosis of hemangiosarcoma.

Opening the body cavities leads to significant artifactual changes in the color and consistency of the viscera and may interfere with both gross interpretation of lesions and the ability to collect optimal samples for additional testing. The preferred course of action at this point would be to continue with the necropsy, take digital photos, and send us the photos along with formalin-fixed (and fresh, if appropriate) samples.