

SECTION 1

ANATOMY

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Chapter 1 Directional Terms

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Clinical case: Fluffy

A veterinary technician comes in for work in the morning to discover that Fluffy has come in overnight after having been hit by a car. The chart note indicates that there is “a cut on the back leg.” This, of course, gives very little information.

The study of anatomy is, put simply, the study of the structure of organisms. It involves looking at architecture, at the different positions, shapes, and sizes of various living tissues. As one might imagine, the anatomy of different species has some things in common and some things that are quite diverse. The structure of the heart is very similar in dogs and cats; it is quite different in equines and reptiles. The kidneys of the dolphin look very different from those of the dog, although they function in the same way. By understanding the differences in anatomy among animals, we can have a greater appreciation for how their body systems function. This understanding is the basis of recognizing states of health and disease.

There are a number of different ways to organize how one looks at anatomy. Gross anatomy refers to features that can be seen with the naked eye. Developmental anatomy is the study of

how anatomy changes as the fetus becomes a puppy or a kitten. Topographic anatomy refers to the relation to the parts to the whole (e.g., how the different parts of the kidneys and the connecting conduits make up the urinary system). Regional anatomy refers to the structures of a given area of the body; if one looks at the head, for example, as one unit, it would involve the study of all the muscles, blood vessels, bones, and other tissues that are present. Imaging anatomy refers to the anatomical features as they are seen on a good radiograph. Applied anatomy refers to the anatomy that is most important surgically or for medical treatment. In planning orthopedic surgery, for instance, it is necessary to know not only the structure of the bones but also the local muscles and blood vessels. Most of us use a systems approach. We study all of the bones, then all of the muscles, then all of the digestive organs, without regard to where they are placed.

One of the most important issues in studying anatomy is the understanding of directional terms. If one is asked to find a particular spot on the animal, having someone say “It’s on the leg” is not terribly precise. Saying that a spot is “just proximal to the right stifle” (just above the right knee) is much clearer. While the acquisition of vocabulary can be tedious, it is the way to communicate clearly with our clients, veterinarians, and other members of the patient-care team. In other words, good anatomic vocabulary contributes to excellent patient care.

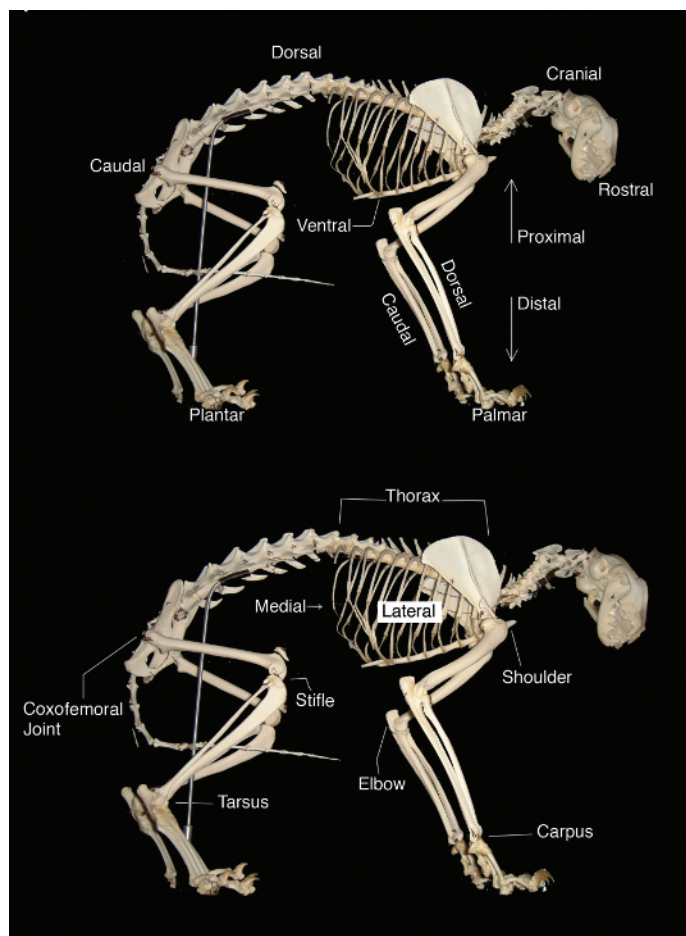


Figure 1.1 Directional terms as they pertain to the feline/canine skeleton. Also noted are some of the major joints.

Directional terms in veterinary medicine are very different from those used in human medicine. The human head is “up” from the hips, while it is “forward” in the dog. This is another reason that it is important to use the proper terms.

Going toward the head is considered to be cranial; going in the opposite direction is caudal. Going from the floor upward is traveling in a dorsal direction. From the top downward is moving in a ventral direction. On the limbs, we use special terms. Closer to the body is proximal; going away from it is moving in a distal direction (Figure 1.1).

Moving toward the center is going medially. Going out from the midline to the side of the animal is a lateral movement. On the head, there is a special term. When we discuss something that is cranial to another spot on the head, we describe it as rostral (from the Latin word for face).

We need to add some more vocabulary to refer to specific places. The part of the body that includes the chest and abdomen is referred to as the trunk. The proper name for the ventral part of the abdomen is the ventrum. The proper name for the top of the trunk is the dorsum. The lateral surface of the part of the trunk caudal to the chest is the flank.

There are specific names for other parts of the body. The part of the trunk from the neck to the caudal ribs is referred to as the

thorax. The areas around the ribs are referred to as costal areas. The abdomen refers both to the outer surface (the skin) of the ventrum and also to the space within it. The thoracic inlet is the area of the ventral thorax where the neck ends.

The space within the thorax is called the thoracic cavity, and the space within the abdomen is the abdominal cavity. Note, however, that some of the features of each of these are lined by a membrane. The pleural membrane, within the thorax, surrounds the lungs and lines the walls of the thoracic cavity. The area bordered by this membrane is considered to be within the pleural cavity. Similarly, the membrane surrounding some of the organs and lining the interior walls of the abdomen is the peritoneal membrane, or peritoneum, and that space is called the peritoneal cavity. Inflammation of that membrane is called peritonitis. There is a viral disease called feline infectious peritonitis that causes inflammation of the peritoneum (among other things). The localized inflammation is so severe that a condition called ascites (fluid in the abdomen) can result. This disease is incurable and can only be treated symptomatically.

Features of the limbs get special names. The front legs are referred to as the thoracic limbs, the rear legs as the pelvic limbs. The shoulder and elbow in dogs are, in medical terms, the scapulohumeral and humeroradioulnar joints, respectively. The next joint distal to the elbow is the carpus, the equivalent of the human wrist. The front of the leg from the shoulder going distally to the paw is the dorsal section, with the back of that area up to the carpus referred to as the caudal section of the limb. On the pelvic limb, the joint between the femur and the tibia is the femorotibial joint, commonly known as the stifle; it is equivalent to the human knee. The next joint going distally is the tarsus. The common name for the tarsus is the hock. The same terms, dorsal and caudal, apply to the pelvic limb.

The part of the thoracic limb from the shoulder to the elbow is referred to as the brachium; the area from the elbow to the carpus is the antebrachium. The area from the head of the femur (the proximal-most bone of the pelvic limb) to the stifle is called the femoral area. The area from the stifle to the tarsus technically is called the crus, although that term is not commonly used in a clinical setting; distal pelvic limb is less precise but often used in general practice.

There is one other directional label referring to the limbs. The area from the carpus distally, on the caudal surface, and around to and including the ventral surface of the paw, is known as the palmar surface. The analogous area from the tarsus to the bottom of the paw is the plantar surface.

The joints of equines have a number of common names that are distinct from those of small animals. For example, the carpus is called the knee, and the tarsus is called the hock.

There are different names for the bones themselves in large animals. The long bone distal to the carpus and tarsus is known as the cannon (equivalent to the third metacarpal/metatarsal bone of dogs and cats). The three bones of the digit, called proximal, middle, and distal phalangeal bones, have a different set of names. They are called, respectively, long pastern, short pastern, and coffin bone. We will discuss the specific names of bones in Chapter 3.

Clinical case resolution: Fluffy

In the example at the beginning of this chapter, a problem was noted with Fluffy's "back leg." The chart note is not terribly precise. We can record that Fluffy has a laceration proximal to the right stifle, on the medial surface of the limb, and it will be clear to any reader exactly where the problem is. This is the advantage of using correct anatomical terms.

Review questions

- 1 Define the terms medial, rostral, and dorsal.
- 2 Which is more cranial, the thoracic limb or the pelvic limb?
- 3 The caudal paw area on the thoracic limb is referred to as the _____ surface.
- 4 True or false: The stifle is caudal to the tail.
- 5 Define the term "topographic anatomy."