1

History and Physical Examination

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The history and physical exam provide the basis for all patient care. Without this information, the veterinarian cannot formulate a correct diagnosis and treatment plan. Veterinary technicians provide an invaluable service in deciphering a client's perception of the problem while determining their true concerns. These may not be the same as the patient's actual medical condition. For example, a client brings a pet in for behavioral problems of urinating in the house. The client thinks the cat is "mad" because it is left alone for many hours. The client's concern is for the cat to stop urinating in the house. Questions are asked about litter pan behavior, urine color, and the cat's attitude. The patient shows pain on abdominal palpation and distended bladder. After consultation with the surgeon, it is decided to perform abdominal radiographs on this patient. Radiographs show the cat has cystic calculi (Figure 1.1). After discussing medical versus surgical options with the client, it is decided to surgically remove the bladder stones.

History

Surgical patients may present with many or no other medical conditions other than the original complaint. A careful medical history contributes to the patient's diagnosis, prognosis, and treatment plan. A complete history includes:

- Vaccinations
- Heartworm testing/preventative
- Diet
- Allergies
- Current medication
- Patient's lifestyle
- Medical and surgical history
- Client expectations

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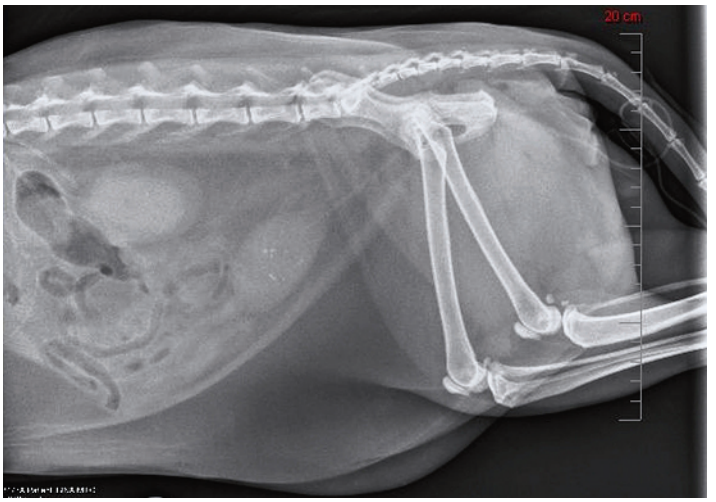


Figure 1.1 Lateral radiograph of a cat with cystic calculi. *Source:* Courtesy of Amy Lang.

Vaccinations

Hospitalized patients may be exposed to many communicable diseases. Suggested canine vaccinations include distemper, adenovirus, parainfluenza, parvovirus, leptospirosis, rabies, and possibly Bordetella and influenza. Feline vaccinations include viral rhinotracheitis, calicivirus, rabies, and panleukopenia. Care is taken to protect unvaccinated emergency patients with minimal interpatient contact. Hospital policy and local regulations dictate vaccination requirements. In an emergency setting, the vaccination records may not be attainable at intake and treatment will still be initiated carefully.

Parasites

Every state reports cases of heartworm disease. Preventative treatment promotes patients' good health. Patients with active or prior heartworm disease pose an anesthetic risk. The client is quizzed to determine the status of heartworm testing and preventative. Flea infestation is avoided in the veterinary hospital with appropriate prevention, therefore determining a client's use of flea and tick preventative is imperative. Many intestinal parasites can also be prevented with these medications. Some intestinal parasites can be zoonotic such as giardia.

Diet

Diet affects all aspects of a patient's health. Knowledge of a patient's dietary habits aids treatment plans. For example, young puppies fed a high-calcium diet can succumb to developmental orthopedic conditions. Obesity causes stress to most body systems including heart, lungs, and joints. Determining if a patient's feeding schedule is free choice or meal feeding aids in formulating weight management plans. Between-meal snacks contribute to obesity. Maintaining a patient's current diet while hospitalized avoids gastrointestinal upset from food change. However, clients providing raw food diets might create an in-hospital storage problem and hazard for hospital

personnel. Patients undergoing oral or facial surgery may need a softened diet postoperatively. Crushing a normal diet of dry kibble and soaking for a short time in water maintains the animal's normal diet. There are also many non-traditional diets such as grain free, raw, and home cooked. Nutritional balance may not be obtained with these diets and other health issues can arise from them. Dilated cardiomyopathy (DCM) can be the result of grain-free diets according to the FDA and a study by the University of California, Davis [1].

Allergies

Food allergies are prevalent in the veterinary patient population. Determining a patient's food allergies avoids gastrointestinal problems while hospitalized. Unidentified medication allergies can cause very serious complications during hospitalization, surgery, and recovery. Obtaining information on past sedation and anesthetic episodes provides guidelines for future needs. Patients with a history of a poor response to anesthesia must be more closely monitored during any surgical procedure and recovery. Anesthetic complications include vomiting, diarrhea, cardiac arrhythmias, breathing difficulties, blood pressure changes, and slow recovery. Other previous or ongoing allergic reactions to medications or environmental conditions must also be noted.

Current Medication

A patient's current and prior medication and supplement history influences future treatment plans. For example, patients receiving anti-inflammatory medications need a "wash-out" period (three to seven days) prior to starting a different anti-inflammatory drug to avoid gastrointestinal problems including stomach ulceration. Medications for many medical conditions influence the choice of perioperative drugs. Dietary supplements, such as glucosamine chondroitin, calcium, and vitamins, affect patients' health and food needs.

Patient's Lifestyle

Clients have different expectations for patients leading a sedentary life versus working or service animals. If a dog's main job is to sit on the couch most of the day, recovery from a ruptured cranial cruciate ligament and its attending arthritis is much different from a search and rescue animal. If a patient lives in a city-dwelling apartment, it will have different experiences during recovery than a dog living in the country, with acres of freedom. If the patient is a working animal, an extensive rehabilitation regimen may be recommended to regain/maintain strength, flexibility, and endurance [2]. The same holds true for an indoor cat versus an outdoor cat. Will the client be able to medicate a mostly outdoor cat postoperatively? Do they have the ability to keep them inside for a short time?

Medical History

A complete medical history begins with confirming the signalment with the owner: age, breed, sex (intact or neutered), and presenting complaint. A preconceived diagnosis may affect physical exam findings; therefore, it is important to ask open-ended questions. (For example, a patient presented with hip dysplasia may actually have a cranial cruciate rupture causing more lameness than poor

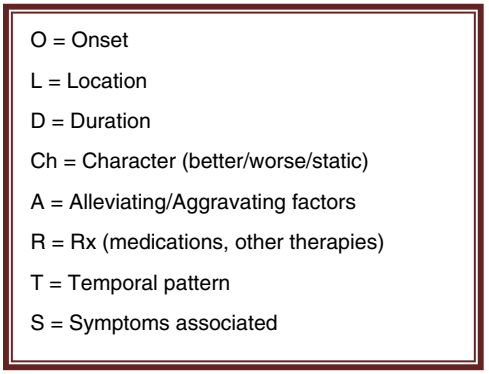


Figure 1.2 Old charts: a mnemonic device to remember important aspects of a patient's history.

hip conformation.) Carefully interviewing the client provides the much-needed information to aid in the diagnosis. In addition to the presenting complaint, e.g. lameness, the entire patient is taken into consideration with inquiries into coughing (C), sneezing (S), vomiting (V), diarrhea (D), increase in thirst or urination, polyuria/polydipsia (PU/PD), and appetite (A). These parameters are easily recorded in the medical record as C, S, V, D, PU/PD, and A with notations made accordingly. Note all current and previous medical problems as they may influence the surgical experience. Form questions to prevent leading a client into a specific "yes or no" answer. For instance, asking a client "Is Lily more lame today?" provides a yes or no answer as opposed to asking, "When do you see Lily's lameness increase?" Another example, asking a client "Is Sam vomiting more today?" versus "Did you see Sam eat anything unusual prior to the vomiting?" With the second questions, the client needs to give a more detailed answer providing the clinician with better historical information. Record all prior surgical procedures and outcomes. A patient may present for a second opinion of a recurrent problem. Historical knowledge influences the treatment plan.

The current exercise regimen may determine the client and patient's ability or lack of ability to provide appropriate postoperative rehabilitation. This may influence the surgical plan. A mnemonic for obtaining a history is using the old charts method (Figure 1.2).

Client Expectation

Although delicate to obtain, a client's personal situation and expectations (time, financial commitment, lifestyle, recovery, and other obligations) also influence the surgical plan. A client with many commitments may not have the time required for extensive post-op rehabilitation. For this person, a more conservative plan or an inpatient program may better fit the client's lifestyle. In addition, if the patient requires multiple procedures and/or treatments based on the current plan, alternative treatment plans may be more desirable. An example may be an open, traumatic, fracture with bone destruction that the client would like to repair. However, repairing the fracture requires a lengthy recovery with multiple surgeries and the likelihood of many different types of complications. Their financial and time commitment would be substantial so amputation may be elected.

Another example would be a mass removal, and for the best outcome, chemotherapy is recommended postoperatively. However, the client is not interested in pursuing additional treatments. These realities may need to be considered prior to moving forward with any surgery.

Physical Exam

A complete physical exam covers the patient from the tip of the nose to the tip of the tail. Failure to recognize patients' underlying medical problems can lead to devastating consequences. (The extent of the exam performed by a veterinary technician varies with individual veterinary practices.) A complete physical exam includes all parameters:

- Temperature, pulse, respiration, and weight
- Body condition score
- General appearance
- Attitude
- Locomotion
- Head and face
- Oral pharynx
- Lymph nodes
- Integument
- Musculoskeletal
- Perineum
- Abdominal cavity
- Respiratory
- Cardiovascular
- Nervous system

Use of a paper or electronic physical exam form serves as a reminder to examine all body systems. Many products exist for record keeping and they continue to evolve. Clinics generally search for a system that works best for them.

Temperature, Pulse, Respiration, and Weight

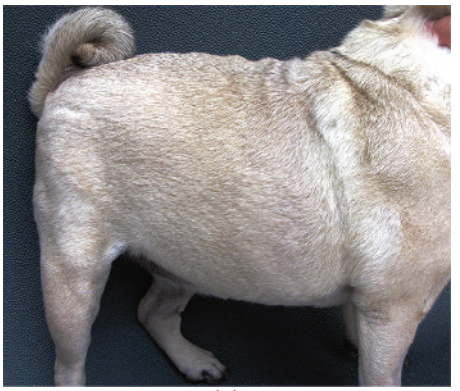
Obtain a temperature, pulse, and respiration (TPR) and weight at every visit. Clients appreciate knowing if their pet's TPR is in the normal range (Table 1.1). Knowledge of a patient's presurgical TPR influences the anesthetic protocol. Changes in TPR affect intra-operative and postoperative care. Accurate weight provides proper medication dosing including preanesthetic medication. If the patient is obese, calculating medications from an ideal weight should be considered. Monitoring obese patients, at each visit, aids in weight management.

Body Condition Score

Many charts help determine a patient's body condition score (BCS). Determining a patient's level of obesity or thinness influences treatment plans. Body condition scores (BCS) vary with the source, one style of chart uses a scale of 1 to 9, with 1 being emaciated and 9 being extremely obese.

Table 1.1 Normal feline and canine TPR.

Parameter	Feline	Canine
Temperature	101–102.5 °F	101–102.5 °F
Pulse	160–240 beats/min	70–160 beats/min
Respiration	20–30 breaths/min	10–39 breaths/min



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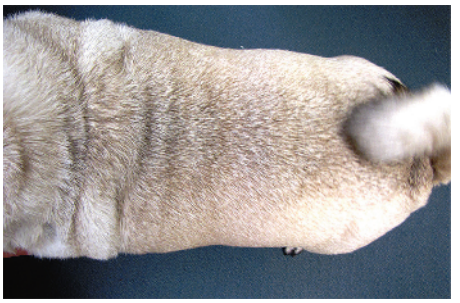

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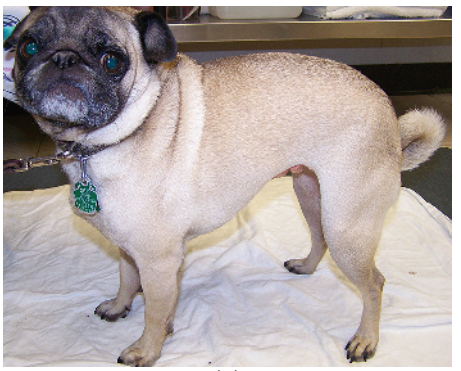
Figure 1.3 (a) An obese pug (BCS 7) shown in lateral view, (b) an obese pug (BCS 7) shown in dorsal view.



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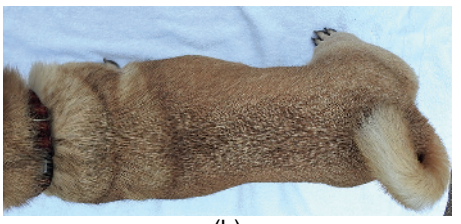


(b)

Figure 1.4 (a) A thin pug (BCS 4) shown in lateral view, (b) a thin pug (BCS 4) shown in dorsal view.

Describing a pet's BCS score to a client helps in understanding the nutritional needs of the animal. Dogs and cats within a breed can vary greatly (Figures 1.3a,b and 1.4a,b). Printing copies of the BCS images and providing them to clients allow for a visual reminder of a healthy state. See Chapter 8, *Aftercare and Home Care,* for examples of BCS charts.

General Appearance

A patient's general appearance may be a sign of their overall health. Unwell patients often have an unkempt appearance, poor hair coat, etc. They generally do not groom themselves as normal or maybe overgroom a painful or irritating area. Obese or hypothyroid patients may be sluggish. Emergent patients may be obtunded, comatose, painful, etc. Alternatively, a patient may be in perfect condition except for its presenting complaint.

Attitude

Patients come with all personalities. They may be bright, alert, and responsive (BAR) or quiet, alert, and responsive (QAR). Unusual environments and pain can produce fear and concern or may cause aggression. Careful reading of a patient's attitude prevents misunderstandings and provides a safe working environment. Dogs, by nature, hide their pain. Cats are often over-aroused in an unfamiliar environment.

Maintaining a calm, quiet environment alleviates patients' fears and client concerns. Keeping cats in crates helps them to feel safe. Often time, much of the initial exam can be carried out with a cat within the crate. Providing a mat or blanket on the floor for a dog may help it to relax. Dogs, unlike cats, prefer to be at ground level. Performing a physical exam on the floor alleviates dogs' fears of being off the ground. Patients can also "get away" if too stressed instead of leaping from an exam table and possibly sustaining an injury. Performing physical exams on the floor also helps to maintain a healthy working environment by avoiding back injuries from lifting heavy dogs, and providing an easy way to back away from aggressive patients. Small dogs, however, are more used to lifting and carrying by their owners. Physical exams on tables are useful for these patients provided they are safe and the client or an assistant can aid in restraint. Providing a mat on the floor or table provides sturdy footing for the patient. A mat or blanket also adds comfort and cushioning for the patient and staff (Figure 1.5).

Medications prior to arrival at the clinic can help with fear, aggression, and anxiety. Feline patients can benefit from gabapentin prior to appointments if they are prone to anxiety on

Figure 1.5 A physical exam on a comfortable floor mat provides patient and staff stability and comfort.

Table 1.2 Dosing and timeline of administration of sedative agents [4].

Drug	Dose	When to administer	Contraindications
Acepromazine	Tablets: 1–2 mg/kg Recommended: Injectable (administered via oral transmucosal [OTM]): 0.01–0.05 mg/kg Note: Small volumes can be diluted with 0.9% saline for easier administration	Time of onset is about 20–30 min, so it is best given orally 30–60 min prior to the hospital visit.	Patients with significant cardiovascular or kidney disease, liver failure, trauma, critically ill, pediatrics, and geriatrics
Gabapentin	10–20 mg/kg Use the upper end of the dose in very hard-to-handle dogs and the lower end of the dose in geriatric patients	Give orally the night prior to the hospital visit and repeat the same dose in the morning of hospital visit, at least two hours prior to arrival.	Patients with liver failure, critically ill, and pediatric.
Melatonin	By patient's body weight, total dose (not per kg): • <5 kg, give 1 mg • 5–15 kg, give 1.5 mg • 15–50 kg, give 3 mg • >50 kg, give 5 mg	Give orally on the morning of the hospital visit, two hours prior to arrival.	None
Trazodone	5 mg/kg	Give orally the night prior to hospital visit, then repeat same dose the morning of hospital visit at least two hours prior to arrival.	Patients with pre-existing arrhythmias, taking monoamine oxidase inhibitors (MOAIs), and patients with seizure history/epilepsy.

Timing recommendations are based on morning appointments. If appointment falls in the afternoon or evening, morning-administered medications are likely to have little effect. Timing regimen must be adjusted based on patient's appointment time.

transport and in the clinic setting at 100 mg/cat 2 hours prior to transport [3]. Table 1.2 provides guidelines for canine dosage and timing [5]. These can aid in providing a more comfortable patient experience (Table 1.2).

Locomotion

Allowing a patient to roam the exam room during history taking provides an assessment of a patient's uncontrolled movement. (Assure that all doors are closed.) Note any lameness or gait abnormalities. If a hallway or outside area is available, ask the client to walk the dog on a leash. Try to minimize distractions by eliminating unnecessary personnel and closing hallway doors. Request a variety of speeds, as lameness may be more prevalent at faster or slower speeds. For example, a patient with hip dysplasia may walk relatively normally but "bunny hops," with both rear feet moving as one, when at a rapid gait. Some lameness may only be observed after working the patient. If this is the case, having them worked prior to the appointment will aid in diagnosis. Observe the patient sitting in the exam room. Patients with cranial cruciate rupture may sit with one leg slightly extended due to pain induced when flexing the stifle (Figure 1.6) [6].

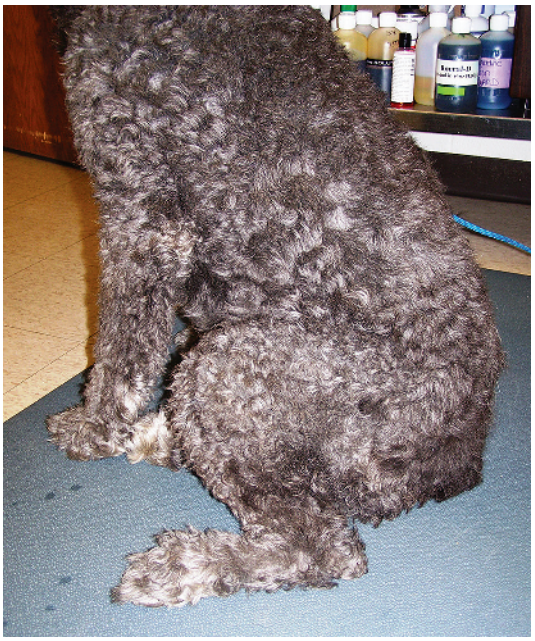


Figure 1.6 The "sit test" often indicates a ruptured cranial cruciate ligament as the patient does not want to flex the stifle fully.

Most cats do not walk on a leash which provide a challenge in locomotion assessment. Placing a crate or box at one end of a closed exam room and the cat at the other end provides the cat with a destination. It may run or slink to the crate or box allowing for gait evaluation. Keep all people away from the crate to aid in letting the cat think it is "getting away." Having the client provide a video of the abnormality at home can also be a helpful tool with cats or intermittent lameness in any species.

Always ask the client if, and when, they note any lameness at home. Patients in an unfamiliar setting or on slippery hospital tiled floors may walk differently than at home. Doing a gait analysis on different surfaces may be helpful such as concrete or a rug runner. Ask clients which leg they believe is causing the problem but do not assume they are correct, confirm the leg of concern by pointing it out in the exam room. Patients with front leg lameness drop their head when putting weight on the unaffected limb [7]. The degree of lameness is graded on a scale of 0–5 as follows [8]

- *Grade 0/5*: No lameness, stands normally
- *Grade 1/5*: Stands with abnormal posture, no lameness
- *Grade 2/5*: Mild lameness
- *Grade 3/5*: Moderate lameness
- *Grade 4/5*: Severe lameness
- *Grade 5/5*: Consistent non-weight-bearing lame

Head and Face

Assess all parts of the head and neck. Palpate the bone and musculature of the head for asymmetry and/or muscle wasting. Neuromuscular diseases may cause muscle atrophy on one or both sides of the face. Trauma of the head may cause fractures. Young patients may have an open fontanel at the top of the skull. Monitor the patient for any pain or discomfort when moving the head and neck from side to side and up and down.

Observe the eyes for nystagmus, symmetry, pupil dilation and constriction, light response, eyelid masses, tear production, scleral color, ectropion, and entropion. Examine the ears for debris, odor, masses, aural hematoma, intact tympanic membrane, discharge, and color change. Palpate and observe the nose for changes including masses, deviated septum, stenotic nares, and discharge. Check for a cough while palpating the trachea. Palpate the thyroid gland for size abnormalities.

Oral Pharynx

Begin the oral exam by lifting the lip, if the patient does not protest, continue the exam with caution to avoid personal injury. Assess the teeth for correct number (42 teeth in the adult dog and 30 in the adult cat), retained deciduous teeth, calculus and plaque, mobility, and color. Observe the gingiva and oral mucosa for color (red, pink, or various shades of black), moisture, gingivitis, periodontal disease, alignment, masses, and bleeding. The gingivae should be pink and moist. (Pigment may be dark in some breeds making assessment difficult.) If the gingiva is tacky, it may indicate dehydration, and if dark red/blueish, it can indicate cyanosis. Check capillary refill time by pushing on the mucosa to blanch the color. Normal color should return in one to two seconds. Assure the tongue is normal color and does not contain any masses. The tongue may be dark pigmented in addition to the normal pink color. If possible, look at the tongue for abnormalities and check the gag reflex. Check the tonsils for inflammation and location within their crypts. Check the palate for elongation, redness, and ulceration.

Lymph Nodes

Palpate lymph nodes for enlargement. Feel all lymph nodes to assess size differences. The most accessible nodes are submandibular (not to be confused with the submandibular salivary glands), prescapular, axillary, inguinal, and popliteal. Lymph node enlargement may be an indication of inflammation or neoplasia.

Integument

The skin can indicate underlying conditions. Allergic patients may bite or lick any part of the body; however, feet and legs are especially vulnerable. Check for alopecia, redness, or irritation from self-trauma. Check the skin for erythema, rashes, excess moisture, dryness, or flakiness. These may indicate conditions ranging from allergies to fleas to Lyme disease. Observe any parasites such as fleas and ticks. If present, treat and provide the client with prevention and control information.

Discern any indication of pyoderma. It may be indicated by the presence of pustules, rash, or skin odor. Skin infections present at the time of surgery can lead to surgical site infections. Pyoderma must be treated appropriately. If possible, delaying the procedure until after the skin has healed may be indicated, especially on elective procedures. Alternatively providing antibiotic therapy at the time of surgery may prevent bacterial infection of the surgery site.

Musculoskeletal

Patients presenting for lameness receive a complete orthopedic exam. This includes all legs not just the injured area. If an exam begins with a painful leg, the patient anticipates discomfort and may react to minimal stimulus of other legs creating false exam findings. Beginning the exam with the unaffected side provides for a more comfortable patient. Ideally, a musculoskeletal exam is

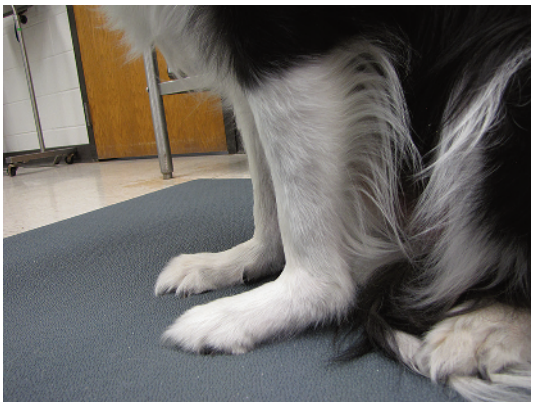


Figure 1.7 A Border Collie with carpal hyperextension.

performed with the patient in lateral recumbency to provide a non-weight-bearing exam. However, uncooperative patients may be examined while standing or may need sedation to complete manipulation of all limbs.

The orthopedic exam begins with the toes, feeling for any swelling, tenderness, or pain. Look between the toes for foreign materials, redness, or injuries. Each toe is moved, checking for normal range of motion (ROM). Examine the toenails for abnormal or asymmetric wear indicating an unusual gait or dragging the foot. Observe the bottom and between the pads for injuries or foreign objects such as glass shards, sticks, grass awns, or thorns.

Examine the carpus for swelling and pain. Discern the range of motion. (See *Table 8.1 Normal Rang of Motion*, in Chapter 8, *Aftercare and Home Care*.) Normally a dog or cat can flex its carpus until the toes touch the caudal side of the ulna. The normal degree of extension is 10–12° [7]. Extending beyond this range indicates damage to the palmar fibrocartilage (Figure 1.7).

Deviation from standard is a cause for concern and may indicate an acute or chronic condition. Carpal valgus is present when the carpus deviates laterally. Carpal varus indicates medial deviation of the carpus. Both conditions may result from trauma or genetics. They often occur with bowing of the radius due to premature closure of the distal ulna growth plate [7]. Some breeds of dogs have naturally occurring carpal valgus such as the Shih Tzu, Lhasa Apso, and English Bulldog. Other conditions to monitor in the carpus are fractures and luxations. (Note: if the forelimb is the area of concern, begin the exam on the rear limb.)

Inspect the elbow for pain and swelling. Edema of the elbows is more easily palpated while the patient is standing to allow for comparison of left and right sides. Observe the elbow range of motion. Normal elbow flexion permits the carpus to almost touch the cranial area of the shoulder. Decreased flexion is indicative of osteoarthritis [9]. Pain on hyperextension of the elbow may indicate an ununited anconeal process while pain on rotation can be indicative of osteochondritis dissecans.

Evaluation of the shoulder is more difficult due to its extensive muscle mass. Begin by checking the range of motion and observing for any pain response. Examine for pain in the biceps tendon by fully flexing the shoulder and extending the elbow (Figure 1.8). Lameness caused by biceps injury exacerbates with this maneuver.

Moving to the rear legs, examine the toes and foot as with the front legs. The tarsus is palpated for pain and swelling. Observe range of motion. Hyperflexion of the tarsus can accompany an avulsion or laceration of the common calcaneal tendon (Achilles mechanism) (Figure 1.9). Palpate the full length of the tendon for swelling, pain, and laxity.

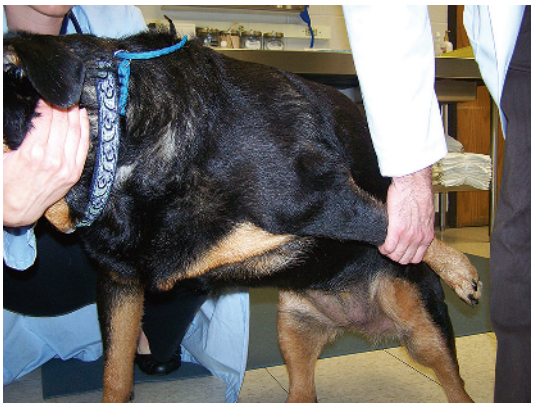


Figure 1.8 Patients with biceps tendon conditions become more lame after performing the biceps flexion test as shown. The shoulder is flexed for two minutes, leg is released, and patient is allowed to walk.

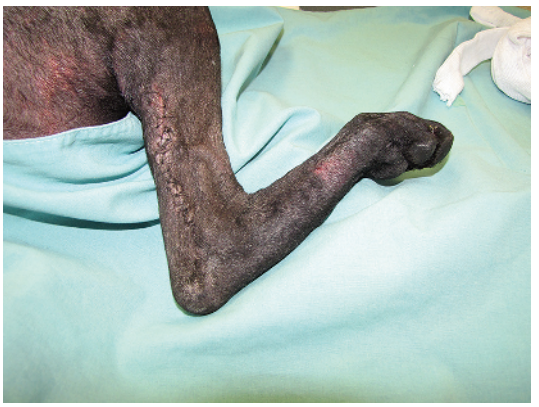
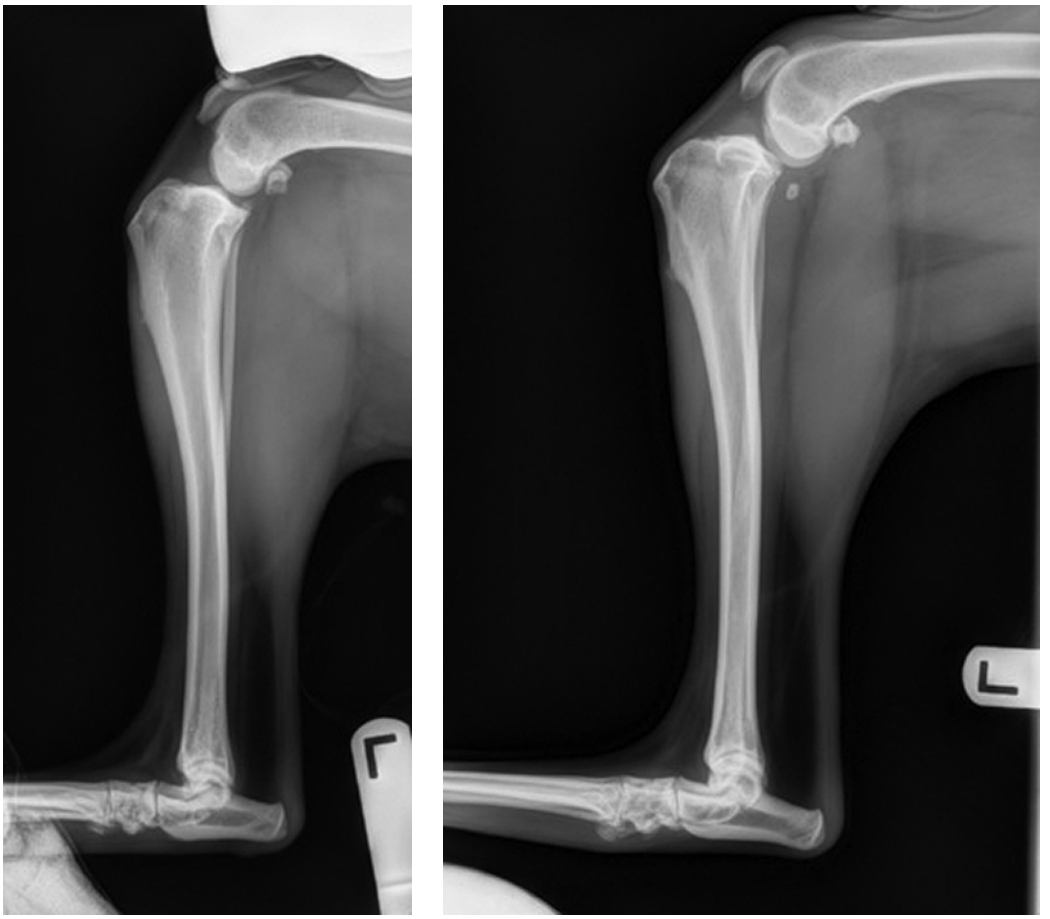


Figure 1.9 Labrador Retriever showing breakdown of surgical repair of lacerated Achilles tendon; note hyperflexion of the tarsus.

Palpate the stifle for pain and effusion. Swelling of the medial side of the stifle is often indicative of cranial cruciate ligament (CCL) rupture. Move the stifle through a full range of motion observing for discomfort. To assess joint stability, perform a cranial drawer test. Grasp the distal femur with one hand and the proximal tibia with the other, and attempt to move the tibia cranially. If movement is present, the cranial cruciate may be torn (Video 1.1). Another test for CCL problems is the tibial thrust. Place a hand over the stifle with the forefinger resting on the tibial crest, with the other hand flex the tarsus. If the CCL is torn, the tibia moves cranially (Video 1.2) (Figure 1.10a,b).

Assess the location of the patella. Determine if it lays within the patellar groove or if it lays medially or laterally to normal. If outside the normal location, ascertain the patella's ability or inability to return to a normal position and stay there. Patella luxation has four levels:

- *Grade 1*: Patella intermittently luxates but spends most of its time in the normal position
- *Grade 2*: Patella easily luxates but is readily put back into place, spends most of its time in normal position
- *Grade 3*: Patella often luxates but can be put back into place with effort, spends most of its time out of place
- *Grade 4*: Patella is always luxated and is unable to be moved back into a normal position (Figure 1.11a,b)



(a) (b)

Figure 1.10 (a) Lateral radiograph of a normal left stifle, (b) lateral radiograph of a left stifle demonstrating cranial tibial thrust.

As with the shoulder, the deep musculature of the hips prevents palpation of swelling. Evaluate the range of motion of the hips and determine if pain is present on flexion or extension. Place a hand over the hip while taking it through a ROM to help evaluate if a hip luxation is present. A sedated exam is indicated to evaluate a patient completely for hip dysplasia by performing the Ortolani maneuver to check for hip laxity, the angle of subluxation, and the angle of reduction [9].

Perineum

Evaluate the external urogenital system. Examine the prepuce for swelling and discharge. The scrotum in neutered animals should be flat. Intact dogs and cats' testes are symmetrical. Note any abnormalities. Altered animals normally display minimal to no drainage, however, record any vaginal swelling or secretions. Examine the rectum for irritation, masses, ulcerations, and swelling. Palpate the anal glands to determine fullness. Perform a digital rectal exam to check for masses or hernias.

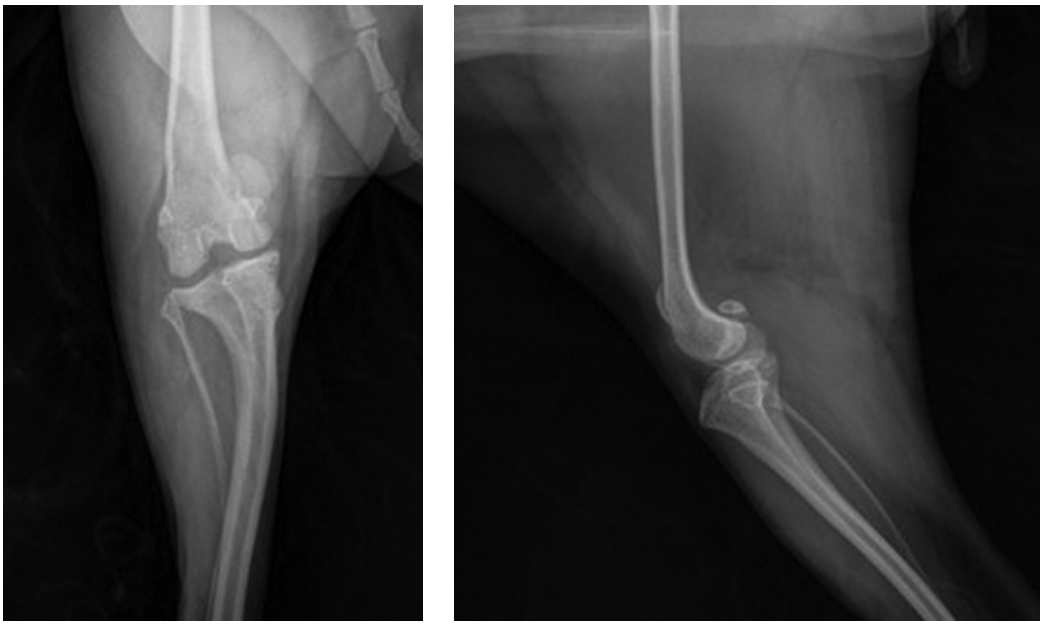


Figure 1.11 (a) Cranial radiograph of a right stifle showing Grade 4 medial patella luxation, (b) lateral radiograph of a right stifle showing Grade 4 medial patella luxation and cranial displacement.

Abdominal Cavity

Systematically palpate the abdominal cavity using the flats of both hands to examine each organ. (It may be better to palpate small dogs and cats with one hand, cupping the abdomen between the thumb and fingers.) Begin just behind the ribs feeling for masses, distension, and abnormal positioning of the liver, stomach, spleen, kidneys, bladder, small intestine, and bowel. An irritated and enlarged gall bladder or pancreas may also be palpable. Observe the patient for a pain response. They may display tension, flinching, restlessness, biting, and/or vocalizing. Pain may also be associated with pupil dilation. Palpate the mammary chain for any masses. Pregnant and nursing animals may discharge milk upon examination. Normal milk is white or cream colored. Examine the abdomen for inguinal or umbilical hernias.

Respiratory System

Listen to all lung quadrants and the trachea for breath sounds. Cats normally have quieter lung sounds than dogs. Cat lung sounds are only heard during inspiration [10]. Abnormal breathing may express as wheezing, gasping, crackling, coughing, or lack of breath sounds. Note if breathing difficulty is on inspiration or expiration. If panting, close the animal's mouth to assess true lung noises.

Cardiovascular System

Auscultate the heart for murmurs, arrhythmias, and muffled heart sounds. All four quadrants should be assessed. Sinus arrhythmia is a common finding, where the heart rate changes during

breathing. While this is noted in the medical record, it is not a sign of cardiac pathology. Palpate the femoral pulse while listening to the heart. A pulse should be present for every heartbeat, if not, it indicates a pulse deficit. Areas of the heart to listen for murmurs are the aorta, mitral, and pulmonic valves on the left side and the tricuspid valve on the right side. Record murmurs in quality (Grade I–VI), location of intensity, timing, and radiation. Turbulent blood flow not only produces a heart murmur but also a thrill that is palpable on the chest wall with higher-intensity murmurs (V–VI) [11].

Nervous System

Along with examining locomotion for lameness, neurologic disorders are also noted. Observe the patient for scuffing or dragging the feet, inability to bear full weight (knuckling), and the inability to lift itself fully when rising. It is often difficult to determine if weakness or lameness is the result of an orthopedic or neurologic condition. Evaluate the patient's brain and mental status by observing its reaction to:

- Strong smells (e.g. alcohol)
- Menace, nystagmus, pupillary light response, and ability to follow the movement of a finger
- Corneal and palpebral reflexes
- Noise reaction
- Moving head normally by self and ability to "right" itself
- Gag and laryngeal reflexes
- Tongue retraction

Assessment of the spinal cord involves testing the spinal reflexes, postural reactions, and pain response. Use a reflex hammer to tap the appropriate tendon to check for a response. The triceps tendon behind the elbow, the patellar tendon of the stifle, and the gastrocnemius tendon of the hock are the most often tested reflexes. Note if the reflex is normal, hyper-reflexive, or not present. Check for conscious proprioception of the limbs by turning each of the feet under, thus forcing the patient to stand on the dorsal area of the foot. A patient with a normal postural reaction will immediately move the foot into a typical plantar/palmar position. This test is often repeated to confirm the response. Delayed response indicates a neurologic condition (Figure 1.12).

Other postural reactions include hopping – holding three legs in the air and walking the animal sideways toward one leg on the ground to allow the animal to move the leg laterally. Wheel barrowing is holding the rear legs in the air and allowing the patient to walk forward and maintain weight,

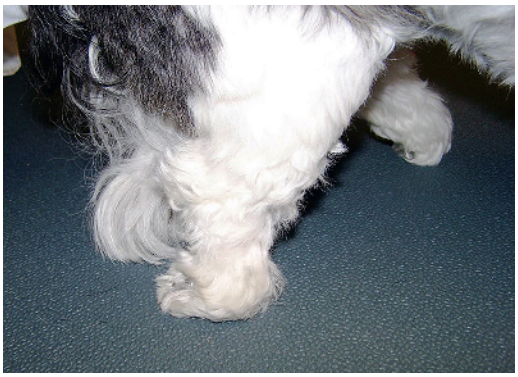


Figure 1.12 Patient with intervertebral disc disease demonstrating absent conscious proprioception or CP deficits.

and hemi-standing or hemi-walking is holding both legs of one side in the air while allowing the patient to walk with the other two legs. Any abnormality of the above may indicate a neurologic condition.

Evaluate pain response by pinching the toes. Gauge the response as a reflex (pulling the leg away) or a true pain response noted when the patient turns to look at the source of pain, vocalizes, and/or the pupils dilate. The panniculus aids in localizing the area of a spinal lesion. Pinch the skin of the back just off midline beginning at the tail and slowly moving forward to the head. Watch for contractions of the skin (Video 1.3). The spinal lesion is located in one vertebra caudal to the location of the first skin contraction [10].

Complete the neurologic exam by observing the anus for tone, it is normally closed and gap free. Evaluate the perineal reflex by stimulating the skin around the anus and watching for a contraction of the sphincter. The complete history and physical exam provide the veterinarian and client with much-needed information for creating a surgical plan.

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