RESTRAINT AND PHYSICAL EXAMINATION OF CHELONIANS

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Physical examination of chelonia should be conducted systematically, ensuring that each major organ system is assessed. Excellent accounts of chelonian medical evaluation have recently been published.

Small turtles should be weighed with an accurate gram scale. Larger turtles may be weighed using kilogram scales. Turtles should feel dense when picked up, similar to a rock of equal size. They should be reactive. They should protect themselves by withdrawal into the shell, or demonstrate a bright, alert, active posture. Underweight turtles may feel “empty” when picked up.

The head and limbs may be difficult to extract for examination. Experience, patience, and/or sedation may be required to perform a thorough examination. The limbs are palpated for muscle mass, strength, joint swelling, and bone structure. The nails are examined for overgrowth, hyperkeratosis, and so forth. The skin is examined routinely, specifically assessing the neck, axilla, and prefemoral regions for ticks, leeches, and fly larvae. The skin may show signs of hyperkeratosis, or flaking in long-term captive turtles kept on suboptimal diets. The cloaca is examined for evidence of inflammation or diarrhea. Some species can emit a foul odor when disturbed. In some cases the odor is produced by glands along the bridge of the shell. Turtles and tortoises will often defecate and urinate during examination. Use appropriate care, and save these diagnostic specimens for analysis.

Sexual dimorphism is usually apparent in sexually mature chelonians. Males generally have a longer tail with a more distal cloacal opening than females. The cloacal opening in males is often at or beyond the caudal carapace margin when the tail is pulled caudally and viewed ventrally. Males of many species also have a plastral concavity to facilitate mounting the carapace of the female for copulation. These rules do not hold true for all species, especially for plastral concavity, and other species-specific traits may be noted. For example, sexual dimorphism may be seen in the eye or skin color, adult size, or toenail length of some species. Common examples include the red iris of male eastern box turtles (Terrapene carolina carolina), elongated toenails on the forelimbs of male slider turtles (Pseudemys spp., Trachemys scripta), painted turtles (Chrysemys picta), and map turtles (Graptemys spp.), dramatically larger female versus male body size in map turtles and diamondback terrapins (Malaclemys terrapin), and more prominent mental glands, gular scutes, and body size, in male desert tortoises (Gopherus agassizii). In general males are more brightly colored than females. While sexual dimorphism is generally apparent in adult chelonians, it is much less apparent prior to puberty, and it can be difficult to ascertain the sex of juveniles. If desired, gender determination of juvenile turtles may be accomplished by coelioscopic examination of the gonad.

Respiratory exam includes assessment of respiratory rate, effort, and quality. Respiratory movements in most turtles are generated by slight to moderate rotational movement of the forelimbs and, or extension of the hind limbs. Pharyngeal pumping in most species has olfactory rather than respiratory function. Respiration should be silent or slightly audible and the mouth should be closed. Gaping or loud whistling is abnormal and may be a sign of rhinosinusitis or pneumonia. While some practitioners report that respiratory auscultation is useful in chelonia, the author has found this to be generally unrewarding.

The shell is examined for shape, symmetry, color, and density. The shell of mature specimens of most species should have strong bone density. Several species, including soft-shell turtles (several genera) and pancake tortoises (Malacochersus tornieri) have flexible shells. Several genera have normal plastron or carapace hinges that allow shell mobility. It is useful to palpate each scute, or keratin plate, of the shell, assessing for loose scutes, sensitivity, fluid, and so on. Ecchymoses or petechiae of the shell may be indicative of osteomyelitis, sepsis, or spirochord tremetate infection. Soft areas of the shell may be due to infection or secondary hyperparathyroidism. Long-term captive box turtles on suboptimal diets seem to develop a rounded, ball-shaped shell, rather the normal flat plastron and domed carapace. In these turtles, the limbs and head often seem disproportionately large in comparison the shell. This results in the soft tissues of the limbs, pelvis, and neck being exposed more than in a normal specimen.

Neurologic examination is conducted using standard principles. Observe the turtle walking around the exam room if cooperative. If possible, aquatic turtles should be observed while swimming. Abnormal buoyancy is common, and often indicates pulmonary, gastrointestinal, coelomic, neurologic, or metabolic abnormalities. Proprioception, withdrawal reflexes, and cranial nerve examination should be performed. Cardiac auscultation is difficult, but the heart rate, rhythm, and quality may be assessed with a Doppler monitor placed over the carotid artery or heart base. Use of Doppler monitor in the examination room is impressive to the client, and demonstrates a thorough examination. Coelomic palpation may detect eggs, bladder stones, masses, and organ enlargement. Palpation is accomplished via the prefemoral space. Depending on the size of the turtle, a single finger, multiple fingers, or the entire hand may be able to fit into the prefemoral space. The hind limb will need to be positioned in extension. Use caution in strong chelonians that may be able to crush one’s fingers by withdrawing the hind limbs. In most cases, palpation will reveal only soft tissue.

The author prefers to examine the structures of the head as the last part of the examination, as the turtle is often significantly upset after head restraint, and may not allow further examination. Examination of the head is very important since many pathologic conditions affect
the ears, eyes, nasal cavity, tongue, and oral mucosa. Restraining the head and opening the mouth requires some practice. Restraint of the head should not be done without sedation in dangerous species such as snapping turtles. In some cases, many of the structures of the head can be partially examined prior to restraint of the head (eg, eyes, nares). Ideally, the examiner patiently waits for the turtle to extend its neck, and then the examiner’s thumb and index finger are swiftly moved to grasp the turtle’s neck behind the jaw. The examiner’s hand should come from behind the head to prevent the turtle from noticing the imminent restraint. It may take significant strength to maintain control of the head, and it may be helpful to brace the remaining fingers of the restraining hand against the anterior margin of the carapace. An alternate method of initial head restraint is to grasp the head with thumb and index finger on top of the head and between the rami of the mandible. This grip does not allow examination of the mouth, but can be used as a transitional hold prior to restraining the turtle behind the head. If head restraint is not possible because the turtle refuses to extend its neck, several options are available. In some cases, “tickling” the hind feet or tail of the turtle may cause it to extend the neck. Alternatively, placing the turtle on a flat surface for several minutes, or placing the turtle in shallow water may be helpful. Rocking the turtle side to side or front to back, while held in ventral recumbency may also help. If none of these techniques work, a curved-tip dental hand-scaler may be placed under the tip of the upper beak and carefully used to slowly and smoothly extract the head. In sea turtles, the head cannot be withdrawn and is easily accessible. After failing all of these methods, sedation may be considered.

Once the head is restrained, the eyes should be assessed for signs of inflammation, discharge, and corneal ulcers. Vitamin A deficiency, viral infection, and bacterial infection are common causes of inflammation of the eyes. Saline eye-wash solution may be useful to flush debris. Enophthalmia may be indicative of dehydration or cachexia. There is no external ear canal in turtles. The tympanum is just deep to the skin, and should be located by palpating for a soft spot on the side of the head. Asymmetry of the tympanum may be noted with otitis media. The nares should be examined for asymmetry and discharge because rhinosinusitis is common in chelonia. The conformation of the beak should be assessed. The keratin of the beak can become overgrown, and conditions such as prognathism may be seen. Turtles do not have teeth. Oral examination is performed in most cases with the head restrained. However, oral examination can sometimes be performed without head restraint. Some turtles will open their mouth as a defensive display (particularly if carefully coaxed). If the mouth must be manually opened, several techniques are useful. This, too, takes practice. In small sea turtles, some smaller species, or weak individuals, the mouth can often be opened by putting gentle ventral traction on the mandible, or by gently pulling the pharyngeal skin ventrally. If this is not successful, a tool is inserted along the edge of the mouth. As the turtle begins to open the mouth, the tool is quickly and smoothly repositioned transversely across the mouth. A number of tools will work well for this technique, but the author prefers a flat, stainless-steel dental spatula. Pen caps, blunted needles, or dental scalers may also be used. In the author’s opinion, tongue depressors do not work well for opening turtle mouths.

Once open, the oral cavity is examined for mucous membrane color, mucosal plaques, glossitis, and stomatitis. Oral plaques have been reported in association with herpes virus and iridovirus infection of chelonia, and warrant biopsy for histopathology and molecular diagnostics. The glottis is located at the base of the tongue and should be examined for discharge. The paired choanae are located along the palate and should be evaluated for symmetry and discharge. Occasionally, discharge from the eustachian tubes may be visible in the caudal pharynx in cases of otitis media.

In some cases, chemical immobilization may be required for thorough physical examination of chelonia. Dissociative agents are useful for many procedures. Ketamine (20–100 mg/kg IM) and tiletamine/zolazepam (3–10 mg/kg IM) have both been used safely and effectively for many years. Chelonians often require treatment with the high end of the above doses. If sedation is inadequate, incremental doses up to the maximum dose may be given. Prolonged recovery may be seen with high doses of these drugs, but generally recovery occurs within two to twelve hours. Although spontaneous respiration often persists under the effect of these drugs, the patient should be monitored closely and ventilated if apneic.

Propofol (5–15 mg/kg IV or IO) has become a popular reptile anesthetic. Benefits of propofol include its rapid onset of action, relatively short residual effect, and cardiovascular-sparing effect. Drawbacks to the use of propofol include the necessity of IV or IO injection, relatively high cost, short shelf-life, and respiratory depressant effects. Medetomidine may be useful as an adjunct to other injectable anesthetics. Several studies in tortoises have found that medetomidine (25–100 µg/kg IM or IV) is a useful adjunct to ketamine (5–10 mg/kg IM or IV). By using medetomidine, a low dose of ketamine may be used, thus allowing for a more rapid recovery after reversal with atipamezole. The author has also used medetomidine (50 µg/kg IM) as an adjunct to tiletamine/zolazepam in several chelonian species, when standard doses of tiletamine/zolazepam provided inadequate restraint.

Neuromuscular blocking agents have been used for restraint of reptiles for nonpainful procedures. While these agents have not gained widespread acceptance, succinylcholine and gallamine have been used for procedures such as transport of crocodilians and intubation of chelonians. Rocuronium (0.4 mg/kg IM), has been studied in North American box turtles (Terrapene carolina ssp.). Initial clinical trials of this drug by the author indicate the drug to be useful in Mediterranean tortoises (Testudo sp.), but less effective at the proposed dose for tortoises of the genus.
Geochelone. The effect of rocuronium is reversed by neostigmine and glycopyrrolate.

REFERENCES