The Herptile Cloaca: Anatomy, Function and Disease

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Abstract: Reptiles and amphibians possess a cloaca as the common outflow for the gastrointestinal, reproductive, and urinary tract. Many disorders of the aforementioned systems can manifest themselves as cloacal abnormalities. It is important that veterinarians practicing herpetological medicine be familiar with basic cloacal structure, species differences, and potential disease processes. The following is a general review of herptile cloacal anatomy, function, and disease states.

Anatomy and Physiology
The cloaca is divided into three chambers and immediately follows the rectum. From cranial to caudal these chambers are the coprodeum, urodeum, and proctodeum. The cloaca terminates at the vent. Muscular folds or sphincters often separate the regions. The level of separation and ability to distinguish between these different chambers is variable according to species.

The coprodeum is the largest chamber in most bladderless herptiles. It, along with the rectum, is thought to be the major site of post-renal urine modification in these species. Following the coprodeum is the urodeum. The urodeum is the chamber where the reproductive and urinary tract terminate. If a bladder is present, the short urethra opens onto the ventral floor of the urodeum. The copulatory organ of some species arises from the ventral urodeal wall. The last chamber is the proctodeum. Glandular tissues and the copulatory organ are found in the proctodeum of some species. The vent is the outflow tract of the cloacal. Hemipenes, if present, evert from the base of the tail through the vent.

Snakes: Cloacal structure in snakes is simple with no separation between the chambers. No bladder is present. Hemipenes are found in the base of the tail and evert from the vent. Snakes also have "musk" sacs that open on the caudal aspect of the vent.

Lizards: Lizard cloacal anatomy is quite variable. Post-renal modification of urine occurs in the urinary bladder if present. Lizards also have hemipenes.

Chelonians: All chelonians possess urinary bladders, an erectile copulatory organ that originates from the floor of the urodeum, and distinct separation of the cloacal chambers. Aquatic turtles often have outpouchings from the lateral urodeal wall referred to as accessory bladders or bursae. The function of these structures may involve water and electrolyte regulation, respiration, and absorption of various solutes (Jeffree and Jones, 1992). Terrestrial chelonians have urinary bladders capable of holding very large volumes.
quantities of urine. The urinary bladder is the site of post-renal modification of urine and is important in water storage (Jorgensen, 1998).

Crocodilians: Crocodilians possess cloacas with distinct separation between chambers. The erectile copulatory organ in males arises from the wall of the proctodeum (Kuchel and Franklin, 2000). No urinary bladder is present and post-renal modification of urine occurs in either the urodeum or proctodeum/rectum. Glandular tissue is present in the walls of the proctodeum (Dunn, et. al, 1993).

Amphibians: Separation of the different cloacal chambers is indistinct. Bladders are present in all orders. Most species lack an intromittent organ. Spermatotheca can be found in the female cloaca of certain salamander species (Sever, 1992).

Disorders
The anatomy and function of the cloaca can be complex, as many organ systems terminate there. Many disorders manifest as abnormalities of the cloaca.

Prolapses: Prolapse of tissues from the vent is a relatively common occurrence in herptile species. It is extremely important to identify the tissue involved in order to effectively intervene. Tissue documented to be involved with prolapses in herptiles include the cloaca, bladder, rectum, colon, intestine, oviduct, copulatory organ or hemipenes. The goal of intervention is to identify and correct the inciting cause, and to replace the prolapsed tissue. Work-up should include a minimum database of a CBC and biochemistry panel, touch prep cytology from the tissue, fecal parasite examination (including acid fast cytology), and possibly radiographs, endoscopy, and biopsy. “Stuff and suture” methods of prolapse reduction are often associated with treatment failure. Surgical therapy may be necessary in some cases and methods for cloacopexy and amputation of various structures have been described (Bennett, 1994; Bodri, 1991; De Voe, 2001)

Cloacitis: Cloacitis is seen most often in chelonians (Frye, 1991). Non-infectious causes can include mechanical irritation from substrates or iatrogenic injury inflicted during sexing. Various organisms can cause infectious cloacitis. Investigations into the cause of cloacitis can include habitat evaluation, cultures, wet mounts and/or cytology of cloacal swabs, and biopsy.

Reproductive disorders: Prolapses of reproductive structures occur with relative frequency in both male and female herptiles. Impaction of eggs in the cloaca or egg deposition into the urinary bladder has been documented, most commonly in chelonians. In many cases of reproductive organ prolapse, where preservation of the animal's reproductive capabilities is not an issue, amputation or ovariosalpingectomy is an option. Egg impaction or deposition within the bladder can be addressed by manual extraction, endoscope assisted removal, or surgery.

Neoplasia: Neoplasia involving the cloaca has been reported in reptiles (Funk, 2000; Latimer, 1998; Ramsay, 1996). A diagnosis can usually be made via biopsy. Many
lesions appear to be amenable to resection, though long-term survival of affected animals is unknown.

Mechanical dysfunction: Traumatic injury, metabolic derangements, toxins and infectious disease can all cause mechanical dysfunction of the cloaca. Dysfunction can be due to structural damage, neurologic impairment, or decreased muscle contractility induced by electrolyte disturbances (Wright, 2001). These disorders can lead to ascending infections involving multiple organ systems as well as impactions.

Impactions and cloacoliths: Diagnosis of impactions or cloacoliths can be via palpation, radiography, and/or endoscopy. An effort should be made to determine the cause of the disorder. Therapy can be as simple as hydration, lubrication and manual expulsion of the impacted material, or as complicated as a cloacotomy.

Cystic calculi: Green iguanas, various species of tortoises, and certain tree frogs are commonly affected. Chronic dehydration with infrequent voiding of the bladder is implicated. Stones can predispose animals for bladder infections as well as disrupt cloacal function. Diagnosis is made by palpation, radiographs and/or endoscopy. Therapy is usually via cystotomy, but endoscopic removal may be an option.

Keywords: reptile, amphibian, cloaca, prolapse, cloacitis, coprodeum, urodeum, proctodeum

References


