REGURGITATION IN SNAKES

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Abstract: Regurgitation is a common problem in snakes that is due to pathologic conditions of the upper gastrointestinal tract. It is important to consider regurgitation as a symptom of an underlying problem. Obtaining an anemnesis and performing a thorough physical examination before proceeding with appropriate diagnostics is strongly recommended. The causes of regurgitation are divided into two categories. The first category includes noninfectious etiologies such as improper husbandry practices, foreign bodies and neoplasia. The second category is composed of infections causes such as parasitic, bacterial and viral agents. Examples of basic diagnostic testing are fecal analysis, hematology plasma biochemistries, radiology and gastric lavage for cytology/parasitology. Additional tests and procedures which may have to be performed are virology titers, ultrasonography, contrast radiology, endoscopy/biopsy and exploratory celiotomy.

Key words: regurgitation, snake(s), noninfectious etiologies, infectious etiologies

INTRODUCTION

The terms regurgitation and vomiting have been used interchangeably when describing this problem in snakes. By definition regurgitation means backward flowing and is used to describe the casting up of undigested food shortly after eating. Vomiting is defined as the forcible expulsion of stomach contents through the oral cavity. For the sake of discussion however, regurgitation shall henceforth include vomition.

Snakes possess a poorly developed cardiac sphincter thus permitting what can appear to be almost effortless regurgitation. Regurgitation is associated with pathology of the upper gastrointestinal tract which includes the oral cavity, pharynx, esophagus, stomach, and small intestine. It is important to consider regurgitation as a symptom of the underlying disease; consequently, therapeutics will be more efficacious when they are chosen based upon the identification of a specific etiology. While this goal is not always attainable in a clinical setting, disciplining oneself to follow this principle will significantly improve treatment success rates. Sometimes an etiology can be strongly suggested by the anemnesis and physical examination alone. Tests that are commonly included in the initial diagnostic workup are a fecal exam, hematology/plasma biochemstries, radiography and gastric/cloacal washes. Although normal hematological and biochemical parameters are still lacking for many ophidian taxons, blood work, when combined with a thorough work-up, can be a useful aid in assessing the alimentary tract. A decreased hematocrit may suggest hemorrhaging from an upper gastrointestinal tract lesion; leukocytosis can be associated with granuloma, neoplasia, or sepsis. increased hepatic and renal values, or electrolyte disturbances should not be overlooked as potential causes of

regurgitation. Additional diagnostics include contrast radiography, ultrasound, endoscopy, biopsy, bacteriology, virology, and celiotomy.

Regurgitation can be broadly classified into noninfectious and infectious etiologies. The two most common examples of noninfectious causes are inappropriate ambient temperature and excessive handling of the reptile. each reptile taxon has its unique preferred optimal temperature zone (POTZ) which represents a temperature range at which normal physiologic processes take place. For example, most tropical boids are maintained at a thermal gradient of 27.78-32.22°C (82-90°F) while temperate colubrids are kept at a range of 25.56-28.89°C (78-84°F). Regurgitation with or without diarrhea can occur upon prolonged exposure to temperatures above or below these ranges. Food is regurgitated 1-3 d later as a fetid, mucous-covered, partially digested mass. Stress due to overcrowding with cagemates and handling a snake within 72 hr after feeding also predispose snakes to regurgitation. Feeding a snake with a voluminous meal can overload gastric capacity. Prey should either be fresh-killed or fresh thawed. Autolyzed prey can cause regurgitation and "wild caught" animals such as road kills should be avoided due to the risk of parasitism. If an anorexic snake is force-fed prior to being redehydrated, regurgitation may occur due to reduced secretary ability of the gastric and enteric glands. Physical obstruction can be caused by ingestion of foreign material such as substrate (wood chips, sand) during feeding. Objects that have been contaminated with prey's urine or feces (heating pads, towels) may also be ingested although this is usually a problem in the larger boids. Palpation, plain or contrast radiology, ultrasound, and endoscopy are invaluable tools in identifying foreign bodies. Trauma to the pharynx or esophagus can occur due to lacerations or perforations from prey that have sharp teeth or claws. This can also occur due to inappropriate force-feeding techniques that employ excessive force, sharp objects, or lack of lubrication. Frequently, these problems can be identified during the initial examination. Cysts, granulomas (chronic abscesses), and neoplasms of the upper gastrointestinal tract also occur in snakes. Examples of the latter are lymphosarcoma, fibrosarcoma, and adenocarcinoma. Transcutaneous aspiration and cytology of questionable masses we very helpful. Intussusception calms anorexia and regurgitation in snakes (Frye,1991). This condition develops as a consequence of increased peristaisis commonly due to granulomas and parasitism. Diagnosis is by palpation, contrast radiography, or ultrasound.

Infectious causes of regurgitation include parasitic, bacterial, and viral diseases. Parasitism is probably the most common cause especially in wild caught snakes or collections maintained under unhygienic conditions. Vomitus and feces should be checked for evidence of infestation. Gastric wash is performed by inserting a sterile ball tipped feeding needle or naso gastric tube into the stomach and infusing 10 ml/kg of sterile saline. After massaging the stomach, gentle suction is applied to the tube and the aspirated material is examined for cytology and parasitology. Fecal matter should be directly examined for protozoa such as flagellates and amoebae. Nematodes can be checked for by standard floatation technique. If fecal material is not available, a cloacal wash can be performed. This is accomplished similarly to the gastric wash. Ascarids, hookworms and tapeworms can cause gastric ulceration with secondary abscess formation and septicemia. Cryptosporidiosis is caused by a protozoan parasite and is characterized by two syndromes in snakes. The first is a subclinical state in which oocysts are passed intermittently for years. The second type is characterized by severe gastric hypertrophy and regurgitation. The diagnosis is made by examining the mucous of regurgitated food, or feces after staining the samples with acid fast stains containing carbol fuchsin and malachite green. Multiple gastric biopsies via endoscopy or celiotomy may have to be performed if the index of

suspicion is high despite negative results from testing vomitus and feces. There is currently no effective treatment of cryptosporidiosis in snakes (Bone, 1994).

Primary bacterial causes of regurgitation in snakes are considered rare in the author's experience. Bacterial cultures harvested from the gastrointestinal lumen contents in and by themselves do not confirm a diagnosis of bacterial disease. The diagnosis of bacterial gastroenteritis should be based upon histopathologic findings of epithelial erosion, bacterial invasion, and heterophilic infiltration of biopsied portions of the upper gastrointestinal tract. Disruption of the mucosal lining secondary to stress, parasites, trauma, or neoplasia frequently permits bacterial invasion and subsequent septicemia. Antimicrobial therapy should be based upon culture/sensitivity results.

The most common viral diseases causing regurgitation in snakes are inclusion body disease and ophidian paramyxovirus. Inclusion body disease is caused by a retrovirus and predominantly affects boids. In pythons it is commonly characterized by an acute encephalomyelitis; whereas, in boas, regurgitation is the most common presenting sign. The diagnosis is made by demonstrating intracytoplasmic inclusions upon biopsy via endoscopy, ultrasonography, or celiotomy of the liver, kidneys, stomach, or pancreas; however, epithelial cells of any of the major organs can harbor viral particles. Ophidian paramyxovirus affects the respiratory, intestinal and nervous systems of snakes. Anorexia and regurgitation typically occur weeks to months prior to the onset of pneumonia or encephalitis. A presumptive diagnosis is made by performing a hemagglutination inhibition test. Titers greater than 1:20 accompanied by clinical symptoms are consistent with viral exposure. A definitive diagnosis is made by identifying intracytoplasmic inclusions in postmortem tissue samples. There is currently no treatment for these viral diseases.

In summary, the diagnostics of regurgitation in snakes is an easier task than in other domestic animals due to the relative ease of examination/palpation of snakes (except larger boids) and linear conformation of the alimentary canal. Identifying and correcting husbandry mistakes should be an initial priority. Subsequent communication with the lesion(s) is approached in a logical and direct mariner. Remember to rule out the more common causes of regurgitation before proceeding with further diagnostics.

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