

Blister Beetle Toxicosis

I. Introduction

A. Synonym - **CANTHARIDIN TOXICOSIS** , striped beetle poisoning

B. Caused by the ingestion of *Epicauta* spp - blister beetles

1. Striped or black beetles
2. Adults are leaf and flower eaters
3. Move and feed in swarms
4. Attracted to alfalfa leaves and blooms
5. Modern hay harvesting techniques include cutting and crimping hay in one operation
6. If the beetles are feeding during cutting/crimping they will be crushed and baled with the hay
7. The beetles will be found in a bale or a section of the bale and not in the entire harvest
8. Not found in pelleted alfalfa (one poorly documented case in lit.) probably because of inactivation during processing or dilution.
9. Horses are particularly susceptible to cantharidin with the minimal lethal dose probably less than 1 mg/kg. Four to 6 grams of dried beetles have experimentally induced fatal toxicosis in horses (100-150 beetles).
10. Other species affected include cattle, sheep, and goat.
11. Cantharidin is an active ingredient in human wart removal compounds. It is also occasionally used by herbalists.

C. CANTHARIDIN

1. Found in hemolymph, genitalia other tissues of beetles
2. Extremely irritating
3. Causes acantholysis and epidermal vesiculation on contact with the skin
4. Absorbed through the GI and excreted in the urine
5. The amount of toxin varies between species of beetle, between the sexes, and the time of year. This has resulted in a wide variation in reported toxic doses.

D. History & Signs

1. Sporadic problem
 - a. single animal
 - b. group in same area of barn or pasture
 - c. horses fed from the same bale
2. Severity of disease varies with the dosage of toxin
3. Signs primarily from shock, GI and UT irritation
4. Initial signs within hours

5. Signs

- a. abdominal pain (colic)
 1. most consistent signs
 2. restlessness, irritability, sweating, pawing, grunting, trembling, reluctance to move
 3. rarely gastric reflux
 - b. depression
 - c. frequent attempts to urinate
 1. pain on urination
 2. gross blood clots can be seen
 3. despite that urine usually looks normal
 4. skin will be irritated where urine has contacted it
 - d. increased TPR - with forceful cardiac contractions
 - e. mucus membranes dark, congested
 - f. decreased CRT
 - g. profuse sweating
 - h. profuse salivation
 - i. continually place their nose in water and splash
 - j. aggressive behavior, violent seizure-like muscular activity
 - k. anorexia - but horses w/ severe oral lesions may eat
4. Diarrhea is rare but may be severe with bloody discharge
5. Oral lesions not consistent but may be on gingiva and oral mucosa - especially the tongue ; mucous membranes may be injected/irritated
6. Shorten stride may be present but no myositis
7. Synchronous diaphragmatic flutter and muscle fasciculations are common
- a. thought to be associated with low Ca & Mg
8. Other signs which have been attributed to hypocalcemia include: depression, anxiety, decreased sensory awareness, head pressing, abnormal facial expression (tightly clamped jaws with lips drawn back-tetanic facial expression), hind limb ataxia, gate stiffness, laryngeal spasm, dyspnea, dysphagia, and cardiac arrhythmias.

E. Laboratory findings

1. Increased PCV - may be >60%
2. TP may be normal or increased during the first 24 hrs but the drops dramatically
3. WBC variable, usually neutrophilic leukocytosis
4. Cr (2-10 mg/dl) and BUN (50-70 mg/dl) maybe elevated with tubular necrosis

5. Electrolytes

- a. striking decreases in Ca and Mg
- b. Ca may be as low as 4-6 mg/dl (usually 6-8 mg/dl)
- c. Mg is <1.5 mg/dl
- d. low levels persist for at least 48 hrs and are refractory to therapy
- e. recent evidence indicates that ionized Ca levels may be normal despite the low total Ca levels

6. urinalysis - hematuria, low specific gravity (despite hemoconcentration)

7. CPK elevated in severe cases

F. Diagnosis

1. Tentative diagnosis by finding blister beetles in uneaten hay or around manger

2. Definitive diagnosis

- a. high pressure liquid chromatography (HPLC)
- b. gas chromatography - mass spec
- c. urine is the best source for diagnosis (>500ml) – cantharidin levels 8-1,900 µg/kg
- d. large volume of stomach contents – cantharidin levels 20-4,800 µg/kg

3. Necropsy lesions - acantholytic lesions

- a. erosions oral cavity
- b. even if no lesions in oral cavity often erosions of the esophagus and stomach
- c. sheets of epithelium may be lifted off from the surface with normal epithelium in between
- d. intestine/colon range from normal to ulcerated to a pseudomembranous enteritis
- e. hemorrhagic ulcerative cystitis
- f. renal tubular necrosis
- g. lesions generally mild in upper Ut but ulcerative lesions in the bladder may be dramatic
- h. ventricular myocardial necrosis
- i. some horses may have no gross lesions

G. Therapy

1. Largely symptomatic and supportive
2. Maintain hydration
3. Acid base status, Ca, Mg
4. Mineral oil and/or activated charcoal may absorb toxin
5. Analgesics - use with care to avoid exacerbation of ulcerative lesions
6. Remove suspect hay and check hay before feeding

H. Prognosis

1. Fatality rate can be as high as 65%, with aggressive therapy survival rate 80%.
2. May be found dead, die within 3-4 hours of onset; may die 12-18 hrs. after onset.
3. If horse survives the first 72 hrs then recovery is likely

NSAID Toxicity

A. Sensitivity to toxic effects

1. Phenylbutazone can be used for years without any apparent ill effects
2. Toxicity at doses near therapeutic dose
 - a. 8 mg/kg/day for more than 4 days
 - b. 4 mg/kg/day for more than 50 days
 - c. Experimental
 1. 10 mg/kg/day for 1-2 weeks po reliably results in toxicity
 2. 4 mg/kg/day IV
 3. > 15 mg/kg/day uniformly fatal for horses
 - d. Ponies are more sensitive to low levels developing severe lesions and even dying
 - e. Flunixin meglumine will also cause toxicity
3. Gastric lesions
 - a. Glandular mucosal ulceration
 - b. Esophageal mucosal ulceration
 - c. Protein losing enteropathy (PLE)
4. Right Dorsal Colitis - may be only lesion found
 - a. acute signs - colic, severe profuse diarrhea, fever, depression, endotoxic shock
 - b. chronic signs - intermittent colic, soft feces, wt. loss, ventral edema
 - c. often history of dehydration when NSAID given
 - d. multifocal to coalescing ulcerated areas with islands of mucosal regeneration
 - e. colonic stenosis may develop
 - f. responds poorly to medical or surgical therapy
 1. PG therapy has been suggested - response??
 2. Suggested therapy for management
 - a. complete rest (no showing, racing, training, etc.)
 - b. no NSAIDs
 - c. no long-stem fiber (hay or grass)
 - d. complete pelleted feed
 - e. metronidazole (as an antiinflammatory)

- f. psyllium (0.5g/kg 3d/week)
- g. corn oil (1-2 cups on pellets BID)
- h. avoid other oral antibiotics

5. Other lesions

- a. Colonic and cecal erosions progressing to ulceration
progressing to necrosis which may become full thickness
- b. PLE
- c. Oral ulceration
- d. Necrotizing phlebitis of the portal vein
- e. Renal papillary necrosis

6. Clinical signs of toxicity

- a. Depression, anorexia, weight loss
- b. Colic
- c. Diarrhea - cowlike to watery +/- melena
- d. Oral ulcers
- e. Recumbency, weakness
- f. PLE very common
- g. Edema

B. Diagnosis

- 1. History
- 2. Signs
- 3. Low protein

C. Therapy

- 1. Symptomatic
- 2. Anecdotal reports of use of PGs - efficacy after the fact?

Squamous cell carcinoma

A. Introduction

1. Second most common internal neoplasm of the horse (lympho 1st)
2. Generally involves the esophageal region of stomach
 - a. Often cauliflower mucosal mass which ulcerates
 - b. Invades serosa and may result in adhesions to the liver and diaphragm
3. Causes gastric ulceration with significant bleeding which can lead to marked anemia
4. Metastasis
 - a. Diaphragm
 - b. Liver
 - c. Spleen
 - d. Parietal peritoneum
 - e. Omentum
 - f. Kidneys
 - g. Parietal pleura
 - h. Visceral pleura
5. Affects males more often than females

B. Clinical signs

1. Progressive weight loss
2. Anemia and melena or occult blood positive feces
3. Inappetence, dysphagia, esophageal obstruction, foul odor from mouth
4. Lethargy
5. Rectal mass, below left kidney
6. Increased BSP
7. Lipemia
8. Respiratory signs
9. Ascites secondary to lymphatic obstruction

C. Diagnosis

1. Gastroscopy and luminal biopsy
2. Ultrasound exam of anterior abdomen
3. Peritoneal fluid cytology
4. Surgical or percutaneous biopsy

Choke in Horses

A. Introduction

1. causes

- a. bad teeth
- b. greedy eaters
- c. pellets
- d. caustics
- e. corncob
- f. apple
- g. wood

2. location

- a. pharyngeal area at most proximal part of the esophagus
- b. mid cervical esophagus
- c. at thoracic inlet
- d. at heart base
- e. at diaphragmatic hiatus

B. History

1. sudden onset of signs
2. previous history of choke may be present
3. recent medication in bolus form or exposure to caustics

C. Signs

1. salivation
2. retching
3. tense neck muscles

D. sweating on one side of the neck

E. lump on left neck may be palpated in jugular groove

F. Dx

1. physical exam
2. pass stomach tube and meet an obstruction
3. endoscopic exam
4. barium study

G. Rx

1. external massage - breakup of impacted ingesta
2. pass stomach tube
 - a. sedate with xylazine to get head down
 - b. **be gentle**
 - c. flush with water but watch out for aspiration
 - d. food on top of obstruction is easily removed
 - e. esophageal contraction/spasm at site of obstruction makes it difficult to dislodge by flushing
 - f. do not force tube
 - g. use lidocaine 10 cc in 50 cc of water through stomach tube to help relax esophagus

- h. mineral oil - its use is questionable because of the real danger of aspiration
 - 3. atropine has been used to decrease esophageal spasm but problems associated with secondary ileus make its use questionable
 - 4. analgesics (i.e. NSAID)
 - 5. sedatives
 - 6. **TIME TIME TIME** never force the situation - if you are not making progress back off ; if you continue you may do more harm than good - one exception to this rule if there is indication of **necrosis or exposure to caustics** then more aggressive techniques (e.g. surgery) are needed
 - a. place in stall without food or bedding
 - b. give sedatives
 - c. give analgesics
 - d. +/- IV fluids
 - e. try to tube again in 12 hours
 - 7. place under general anesthesia
 - a. intubate
 - b. pass tube with head over table
 - c. surgery may be required
 - 8. Reintroduce diet after obstruction is relieved
 - a. grass - very good because of high water content
 - b. wet, soupy mashes - pellet mashes
 - c. hay - no concentrate
- H. Follow up
- 1. search for cause
 - a. stricture - barium study or endoscopy - can miss with either procedure
 - b. check teeth
 - c. watch eating habits
 - d. look into management factors
 - 2. damage to esophagus
 - a. endoscopic exam
 - b. barium swallow
 - c. if acute damage is present can treat with steroids
 - d. strictures can be dilated
 - e. esophagostomy
 - f. adjust diet - grass, sloppy pellets, wet hay, stones