Diagnostic approach to vomiting and regurgitation

Deborah S. Greco DVM, PhD, Diplomate ACVIM
Senior Research Scientist,
Nestle Purina Petcare
Differentiate Vomiting from Regurgitation

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Approach to Regurgitation

Physical exam
Oral exam

Normal
Abnormal

Chest radiograph

Normal
Abnormal

Perform endoscopy

Normal
Abnormal

Ach receptor antibody test
ACTH stimulation
cTSH, TT4

Rule out Myasthenia, Addisons, hypothyroidism

Foreign body

Remove FB, antacids, PEG tube

Tumor

Persistent RAA

Rule out strictures, inflammation
Bouge esophagus, PEG tube

Pursue diagnostics
Specific to abnormal findings
6 month old Yorkshire Terrier MI

- 3 month history of regurgitation
- Passive regurgitation of undigested food immediately following feeding
- Chest radiographs: Normal lungs
  - No evidence of PRAA
  - Dilated esophagus
Regurgitation: Role of Radiographs

- Look for pulmonary disease such as aspiration pneumonia
- Rule out bone fragments stomach, esophagus and intestine
Approach to Regurgitation

Physical exam
  Oral exam
    Normal
    Abnormal
      Pursue diagnostics Specific to abnormal findings
        Normal
        Abnormal
          Perform endoscopy
            Normal
            Abnormal
              Rule out strictures, inflammation Bouge esophagus, PEG tube
                  Foreign body
                    Remove FB, antacids, PEG tube
                    Tumor
                    Persistent RAA
              Ach receptor antibody test ACTH stimulation cTSH, TT4
                Rule out Myasthenia, Addisons, hypothyroidism
Testing: Diagnosis

- MDB: Normal, ACTH stim and Thyroid testing normal
- Barium esophogram: Megaesophagus
- Tensilon test: Positive: megaesophagus resolves with tensilon administration
- Ach receptor Ab test: positive
- Treated with cholinergic agents and recovered uneventfully
Definition: Vomiting

- Vomiting
  - Forceful expulsion of the contents of the stomach through the mouth

Synonyms
- Rolfing, puking, barfing,
- Talking on the porcelain telephone
- Driving the porcelain bus
Control of Vomiting

Higher centers

Vestibular apparatus

Visceral afferents

CRTZ
Control of Vomiting: Antiemetics

- Visceral afferents
  - Metoclopramide

- Higher centers
  - NK-1 receptor antagonists (maropitant)
  - 5-HT-3 antagonists (ondansetron)
  - Dopamine agonist (metoclopramide)

- Vestibular apparatus
  - Antihistamines

- CRTZ
Indications for antiemetics in an undiagnosed patient

- Frequent or severe enough to cause discomfort
- Persistent vomiting that leads to acid-base or electrolyte imbalance
- Risk of aspiration pneumonia
- GI obstruction is not suspected
CERENIA (maropitant)

- Neurokinin-1 receptor antagonist. Interferes with binding by substance P
- Works at both the CRTZ and emetic center
- Indications: Preventative for chemotherapy and motion sickness.
- 78% effective for vomiting caused by renal disease, hepatic problems, IBD, etc. 97% more effective than metoclopramide
- Side effects: hypersalivation, drowsiness, anorexia and diarrhea
Rational clinical use of antiemetics

- Motion sickness
  - chlorpromazine: cat
  - diphenhydramine: dog
  - Maropitant (Cerenia)

- Uremia
  - Peripheral tx
    - H2 antagonist plus sucralfate
  - Central tx
    - Metoclopramide
    - Maropitant (Cerenia)
Rational clinical use of antiemetics

- Cancer chemotherapy
  - 5HT3 antagonist: ondansetron
  - NK-1 receptor antagonist- Maropitant (Cerenia)

- Delayed gastric emptying
  - Metoclopramide
  - Erythromycin
Irrational use of antiemetics

- Gastrointestinal infection
- Gastrointestinal obstruction
  - Metoclopramide and other antiemetics that promote motility could cause perforation
- Gastrointestinal toxicity
  - Prevents animal from eliminating toxin
- Systemic hypotension
  - Alpha antagonists will worsen low BP
- Epilepsy
  - Phenothiazines
Approach to Acute Vomiting: History

- **History:** Toxins?, Travel? Garbage? Medications?
- Vaccination? Access to outdoors? Duration?
- Fatty meals? Recent boarding? Character of vomitus?
- Hematemesis? Concurrent signs such as PU/PD, diarrhea,
- Icterus, etc.?
Approach to Acute Vomiting:
Physical Examination

Look under tongue: string foreign body, Thyroid nodule
Posture of animal (praying position)
Localizing signs such as cranial abdominal pain (pancreatitis), intussusception, mass
Organ size: hepatomegaly, kidney size, etc.
Assess hydration, mucous membrane color, CRT, etc.
Acute vomiting: Role of the minimum data base: CBC, SMA, U/A, fecal exam, viral testing (FeLV, FIV, Parvo)

- Rule out systemic disease!
  - Endocrine: Addisons, DKA
  - Renal: ARF, ethylene glycol poisoning
  - Neoplasia
  - Hepatic: Hepatitis—infected, infectious, metabolic, inflammatory
  - Pancreatitis
  - Infections: viral, bacterial, parasitic

- Document electrolyte abn such as hypochloremic alkalosis that need correction
Vomiting: Role of Radiographs

- Rule out bone fragments stomach, colon and intestine
- May be helpful to determine organ size
- May give indication of pancreatitis
  - Ground glass appearance
  - Dilated “reverse 7” duodenum
Bambi: 3 yr old FS DSH

- Acute onset of vomiting
- Several episodes starting 24 hrs ago
- Bile stained
- Not eating
- Drooling
- Abdominal discomfort
  - Hypochloremic alkalosis on MDB
Bambi

- What is your diagnosis?
Oral exam under sedation
Diagnostic approach to vomiting: The role of endoscopy

- Rule out secondary GI causes of vomiting
- After non-invasive tests such as fecal, MDB, endocrine testing, ultrasound, etc
- Requires anesthesia
- Indicated for foreign bodies, chronic vomiting from suspected IBD or neoplasia
Endoscopy

Duodenum

Retroflexing the scope
Chronic Vomiting

**Normal**
- Primary GI Abdominal radiograph
  - Normal
    - Parasites (occult)
      - Anthelmintic therapy
    - Nonspecific gastroenteritis
      - r/o Dietary indiscretion repeated
        - Change to highly digestible diet (EN)
          - Response
          - No response
            - Contrast radiology
              - Endoscopy
              - Surgery and biopsy
              - Obstruction
                - Surgery and biopsy
            - Motility disorder
            - Inflammatory lesions
          - Increased liver enzymes
            - Increased lipase, inflammatory leukogram
              - Abdominal ultrasound, TLI paracentesis
            - Increased BUN/Cr
              - UPC, BP, Ultrasound, urine culture
        - Mass/intussusception
          - Exploratory surgery and biopsy
          - Endoscopy or surgical removal
            - Endoscopy
            - Surgery and biopsy
            - Abdominal ultrasound, TLI paracentesis
  - Abnormal
    - Foreign body
      - Endoscopy or surgical removal
    - Increased K, decreased Na, eosinophilia lymphocytosis
      - Perform ACTH stim
    - Coagulation tests
      - ACTH stim, endoscopy gastrin

**Abnormal**
- Secondary GI
  - Hematemesis anemia
    - Foreign body
      - Endoscopy or surgical removal
    - Increased K, decreased Na, eosinophilia lymphocytosis
      - Perform ACTH stim
    - Coagulation tests
      - ACTH stim, endoscopy gastrin
  - Increased liver enzymes
    - Increased lipase, inflammatory leukogram
      - Abdominal ultrasound, TLI paracentesis
    - Increased BUN/Cr
      - UPC, BP, Ultrasound, urine culture
Normal MDB
Abdominal Radiographs
Ultrasound

Normal
Parasites (occult)
Anthelmintic therapy
Response
Obstruction
Surgery and biopsy

Abnormal
Nonspecific gastroenteritis
Dietary indiscretion
Mass/foreign body
Exploratory surgery and biopsy or removal
Change to highly digestible diet (EN)
Response
Contrast radiology
Endoscopy with biopsy
Obstruction
Surgery and biopsy

No response
Consider novel protein diet (LA) or hydrolyzed diet (HA)
Inflammatory lesions
Specific therapy
Novel protein diet
"Mika"

- 12 yr FS DSH
- Now vomiting, depressed
- Physical examination:
  - depressed, dehydrated, ketotic breath
Urine dipstick- 4+ glucose, + ketones

Blood glucose 680

Assessment: Diabetic Ketoacidosis

Plan: Emergency therapy
- IV 0.9% NaCl
- 1 unit regular insulin IM
- monitor blood glucose hourly
- monitor for development of hypokalemia and hypophosphotemia
**1st 24 hours**

- BG @ 1 hour: 510mg/dl, electrolytes normal, HCO₃⁻ = 10.1 (LOW), add 60 meq KCl/l
- 1/2 unit regular insulin IM hourly
- Check electrolytes at 2 hours:
  - K⁺ = 3.1, increase to 80 meqKCl/l, phosphorus OK
- Blood glucose-2hr: 433, 3 hr: 383, 4 hr: 274, 5 hr: 232
- Add 2.5% dextrose to IV fluids
- Well hydrated @ 8 hrs; 2 units regular SQ QID
- Blood glucose between 200 and 400 mg/dl all day
Further diagnostics

- CBC- neutrophilic leukocytosis (moderate)
- Panel: Glucose 712, ALT 418, AST 346, ALP 583, GGT 25
- UA- S.G.1.036, submitted for culture & sensitivity
- Chest/Abdomen radiographs: NSF
What is the correct interpretation of the MDB?

Suggestive of hepatic neoplasia

Compatible with hepatic lipidosis

Diagnostic for acute pancreatitis

Suggestive of cholangiohepatitis or biliary obstruction secondary to pancreatitis
Assessment/Plan

- Abdominal ultrasound: hyperechoic pancreas, distended bile duct
- Underlying dz is **pancreatitis**, partial biliary obstruction.
- Days 2-3: well hydrated, won’t eat
- Surgery: Gastrostomy tube placement
  - biopsy pancreas, liver, bowel
  - pancreas- mod/severe mixed inflammation
  - fPLI-- 3x elevated
Revised plan day 4

- Medrol 4 mg Q24 for pancreatitis
- NPH 4 units SQ BID
- Ursodiol 60mg PO Q24
- Feeling better within 24 hours
- Home on NPH, ursodiol, Recheck with RDVM- no changes
1 week recheck

Eating some, also using G-tube

FBG 384, Nadir 140, Fructosamine 614

Urinalysis: 4+glucose, no ketones, inactive sediment, 1.032 S.G.

ALT 276, AST 86, ALP 380, GGT 13
1 month recheck

Feeling great, eating, no tube feeding for 2 weeks

FBG 186, Nadir 41, Fructosamine 440

ALT 204, ALP 312, others WNL

Pull G-tube

Decrease medrol to 4 mg q48

Continue with 2 units NPH BID
What diet should Mika be fed and what ancillary treatment?

- Low fat diet, corticosteroids
- High fat diet, corticosteroids
- Low carbohydrate, moderate fat diet, corticosteroids
- High fiber diet, corticosteroids
2 month recheck and beyond!

- fPLI Normal!!
- FBG 243, Nadir 139, Fructosamine 426
- ALT 212, ALP 281

Long term management and results
- recheck every 3 months:
- Placed on EN diet
- Current meds: medrol 4 mg EOD, NPH 2 units SQ BID,
Hematemesis

Blood in vomitus is an important diagnostic clue!

Rule out causes of gastrointestinal ulceration

- NSAIDS
- Corticosteroids
- Zollinger Ellison
- Helicobacter gastritis
- Liver disease
Hematemesis

Coagulation profile
ACT, bleeding time
PT, PTT

ACTH stimulation test

Normal
Endoscopy
Gastritis
With ulceration
Rule out drugs
NSAIDS, steroids
Gastrin levels
High Zollinger Ellison
Rule out liver disease

Abnormal
Pursue coagulation disorder

Normal

Abnormal
Addisons disease

Contrast Radiographs
Ultrasound

Normal
Endoscopy

Abnormal
Mass Hepatic disease

Surgery or Laparoscopy and biopsy

Hepatic disease
Surgery or Laparoscopy and biopsy

Neoplasia
Gastic carcinoma

Ulcers

Rule out liver disease

Laparoscopy and biopsy

Gastritis
With ulceration
Signalment

- 11 year old female spayed Labrador-Chow cross
- Current complaint: anorexia, vomiting “coffee grounds”
- Mild dental tartar
- Abdomen is slightly tender
- T= 102.5, P-120 bpm, R-pant
- Weight: 55 lbs, slightly less than last visit
What laboratory tests are indicated?

- Dental radiographs?
- Minimum data base?
- Lipase? TLI?
- Urine culture?
- Thyroid testing?
Minimum data base

- Mild neutrophilia (18,000) with left shift
- Liver enzyme elevations: ALT – 480, ALP – 600, GGT – 12
- Lipase normal, TLI pending
- Urinalysis: USG: 1.045, 4-5 WBC/hpf,
What is your next step?

- Anesthetize the patient for dentistry?
- Anesthetize the patient and perform endoscopy?
- Prescribe antibiotics for dental disease and presumed UTI?
- Run an ACTH stimulation test?
- Biopsy the liver?
- Endoscopy, biopsy and placement of a gastrostomy tube?
Endoscopy
Ulcerative disease

Biopsy—look for neoplasia, Helicobacter

Culture for helicobacter

Place feeding tube if animal anorectic
Hematemesis

- Coagulation profile
  - ACT, bleeding time
  - PT, PTT

- ACTH stimulation test
  - Normal
  - Abnormal

- Contrast Radiographs

- Ultrasound

- Abnormal Mass
  - Hepatic disease

- Pursue coagulation disorder

- Endoscopy
  - Gastritis
    - With ulceration
  - Ulcers
    - Rule out drugs
      - NSAIDS, steroids
    - Gastrin levels
      - High
      - Zollinger Ellison
  - Neoplasia
    - Gastrointestinal carcinoma

- Normal
  - Addison's disease

- Normal
  - Endoscopy

- Normal
  - Surgery or Laparoscopy and biopsy

- Normal
  - Rule out liver disease
Pharmacologic control of gastric ulceration
Drugs that cause gastric ulceration

- Non-steroidal anti-inflammatory agents
  - aspirin
  - ibuprofen

Corticosteroids
- prednisone
- dexamethasone!
Pathophysiology of gastric ulcer formation

Parietal cell

H+ proton pump

H-2 receptor

Gastrin receptor

Gastrin receptor
Drugs that heal or prevent the formation of gastric ulcers

- H2 receptor antagonists
  - Cimetadine (*Tagamet*)
  - Ranitidine (*Zantac*)
  - Famotidine (*Pepcid*)
- Hydrogen pump inhibitors
  - Omeprazole (*Axid*)
Drugs that heal or prevent the formation of gastric ulcers

- Protectants
  - Antacids
  - Sucralfate (*Carafate*)

Synthetic prostaglandins
- Misoprostel (*Cytotech*)
11 year old Lab/Chow cross

- Biopsies no evidence of Helicobacter or neoplasia
- Gastrin levels are elevated
- Dog sent for exploratory surgery
- Resection of small pancreatic mass (Gastrinoma)
- Treated with Misoprostel, sucralfate for several weeks.