Diagnostic approach to vomiting and regurgitation

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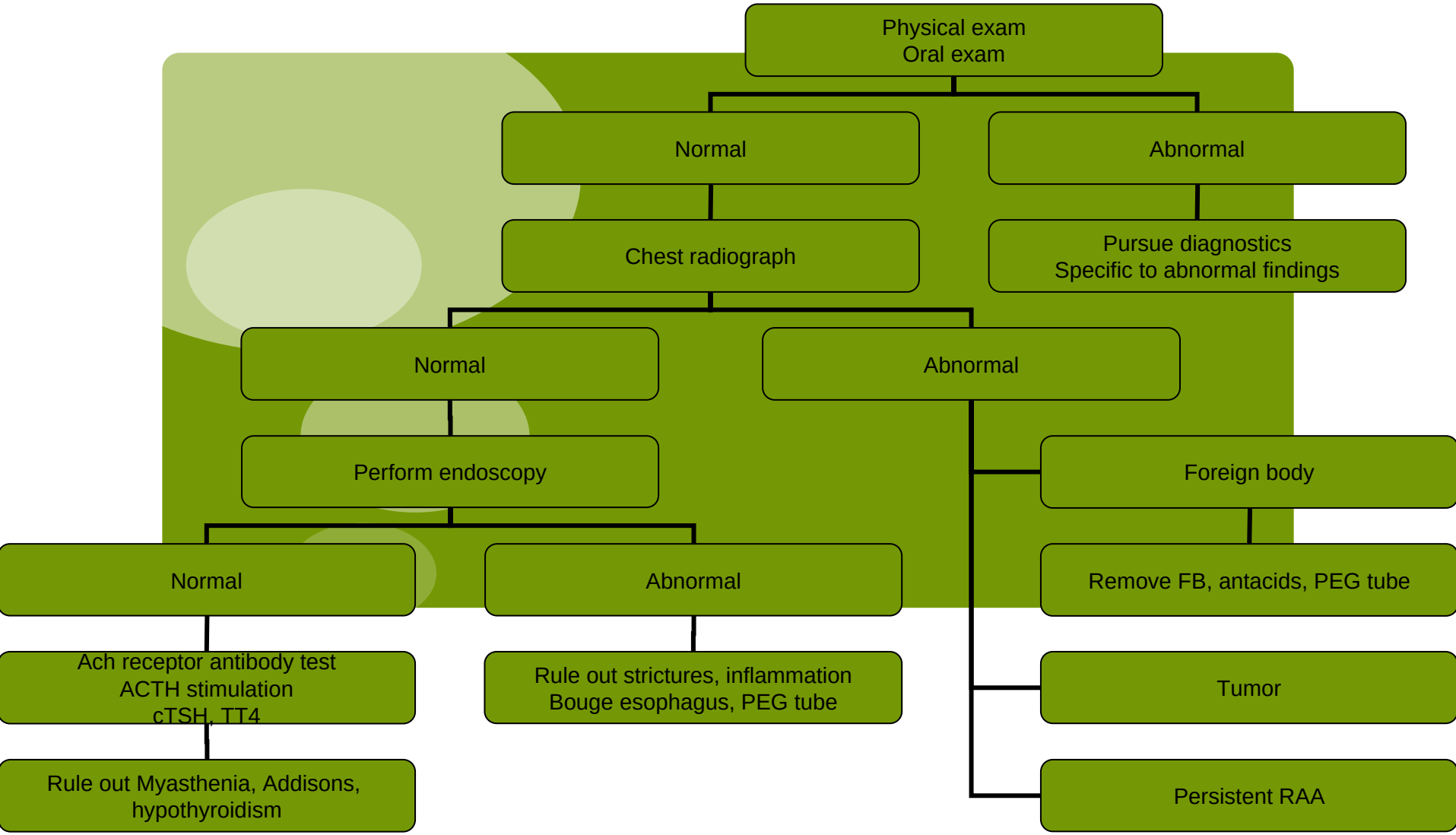
Differentiate Vomiting from Regurgitation

Vomiting	**Regurgitation**
Active	Passive
Abdominal contractions	No contractions
Delayed after feeding	Immediately after feeding

Approach to Regurgitation



6 month old Yorkshire Terrier MI

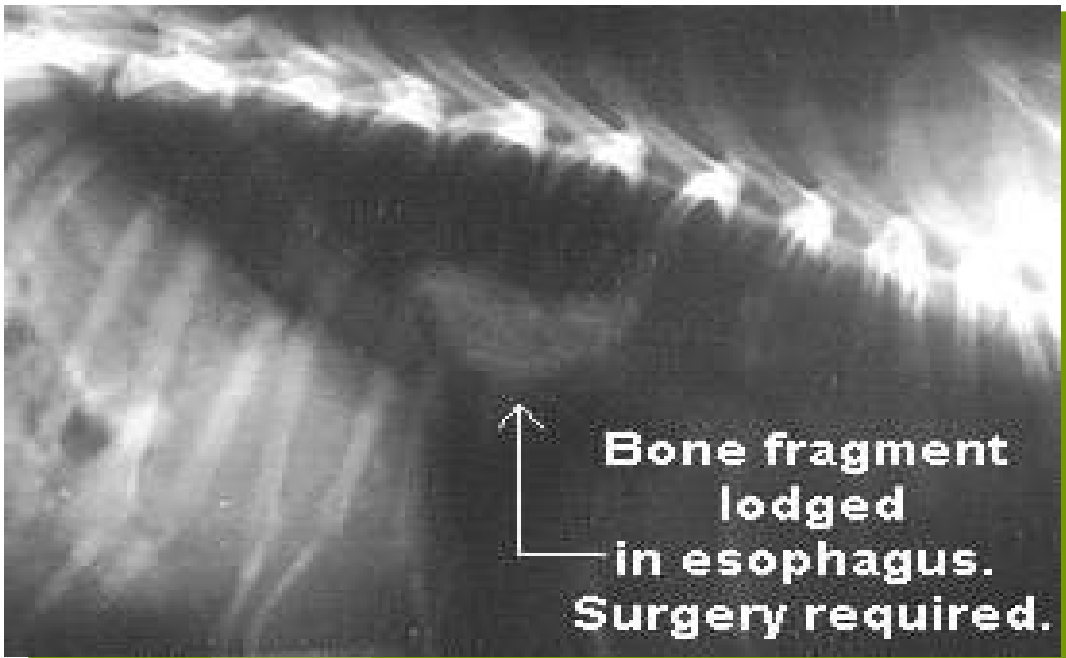
3 month history of regurgitation

Passive regurgitation of undigested food immediately following feeding

Chest radiographs: Normal lungs

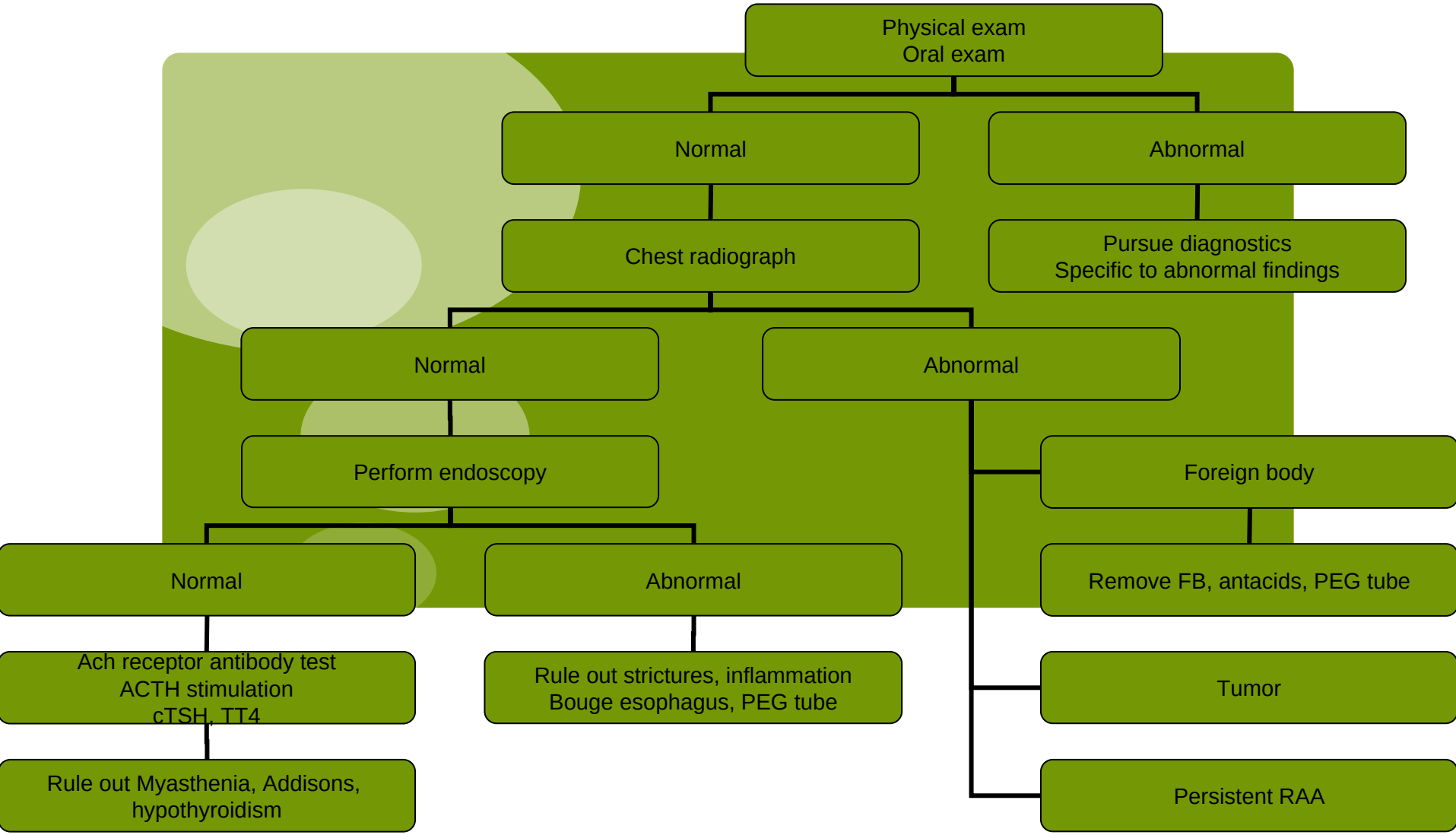
- No evidence of PRAA
- Dilated esophagus

Regurgitation: Role of Radiographs



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

Approach to Regurgitation



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

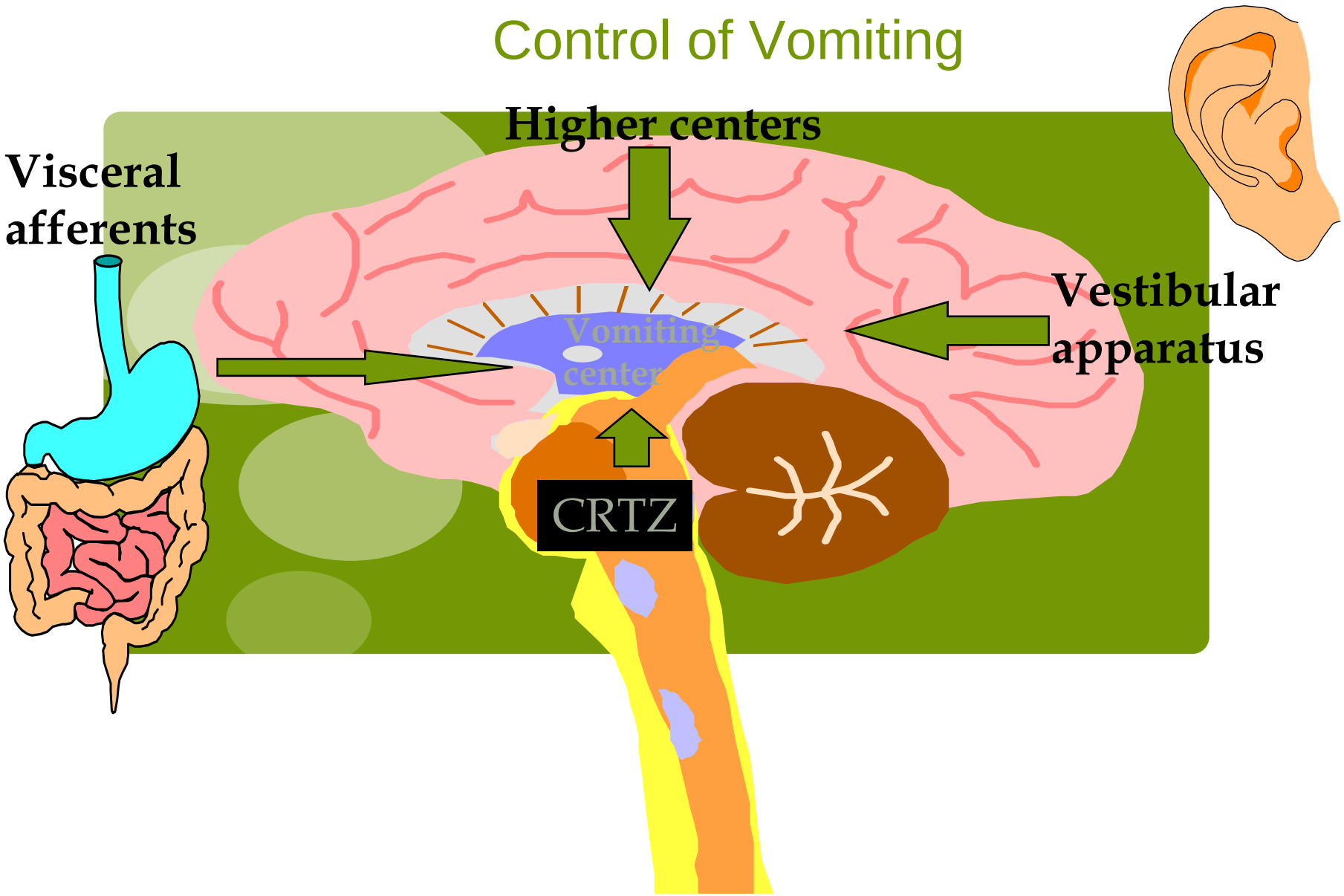
Definition: Vomiting

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

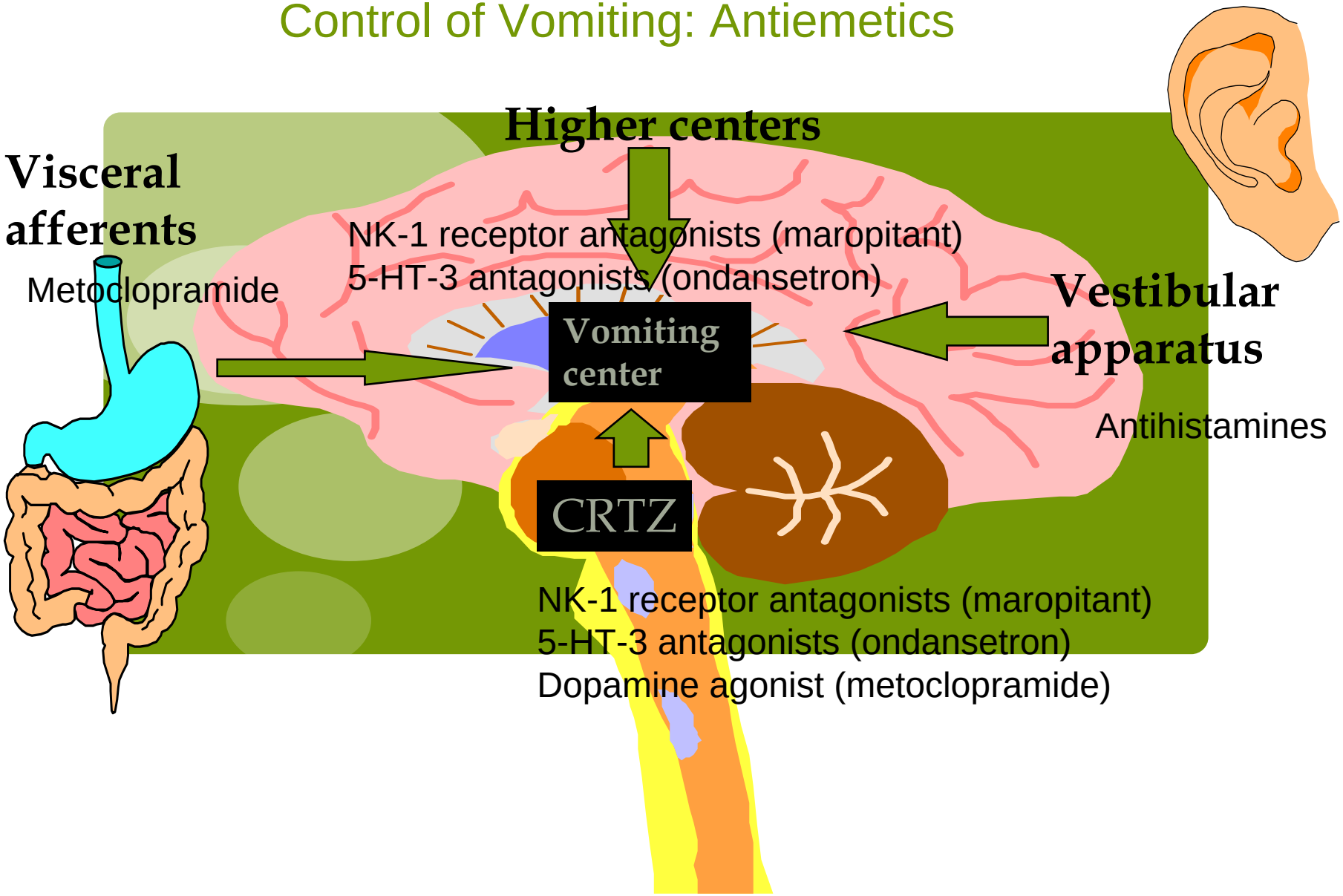
Synonyms

- Rolfing, puking, barfing,
- Talking on the porcelain telephone
- Driving the porcelain bus

Control of Vomiting



Control of Vomiting: Antiemetics



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
- Contraindications: GI obstruction, poisoning (toxins). Pregnancy. Caution in dogs with hepatic disease.
- Side effects: hypersalivation, drowsiness, anorexia and diarrhea

Rational clinical use of antiemetics

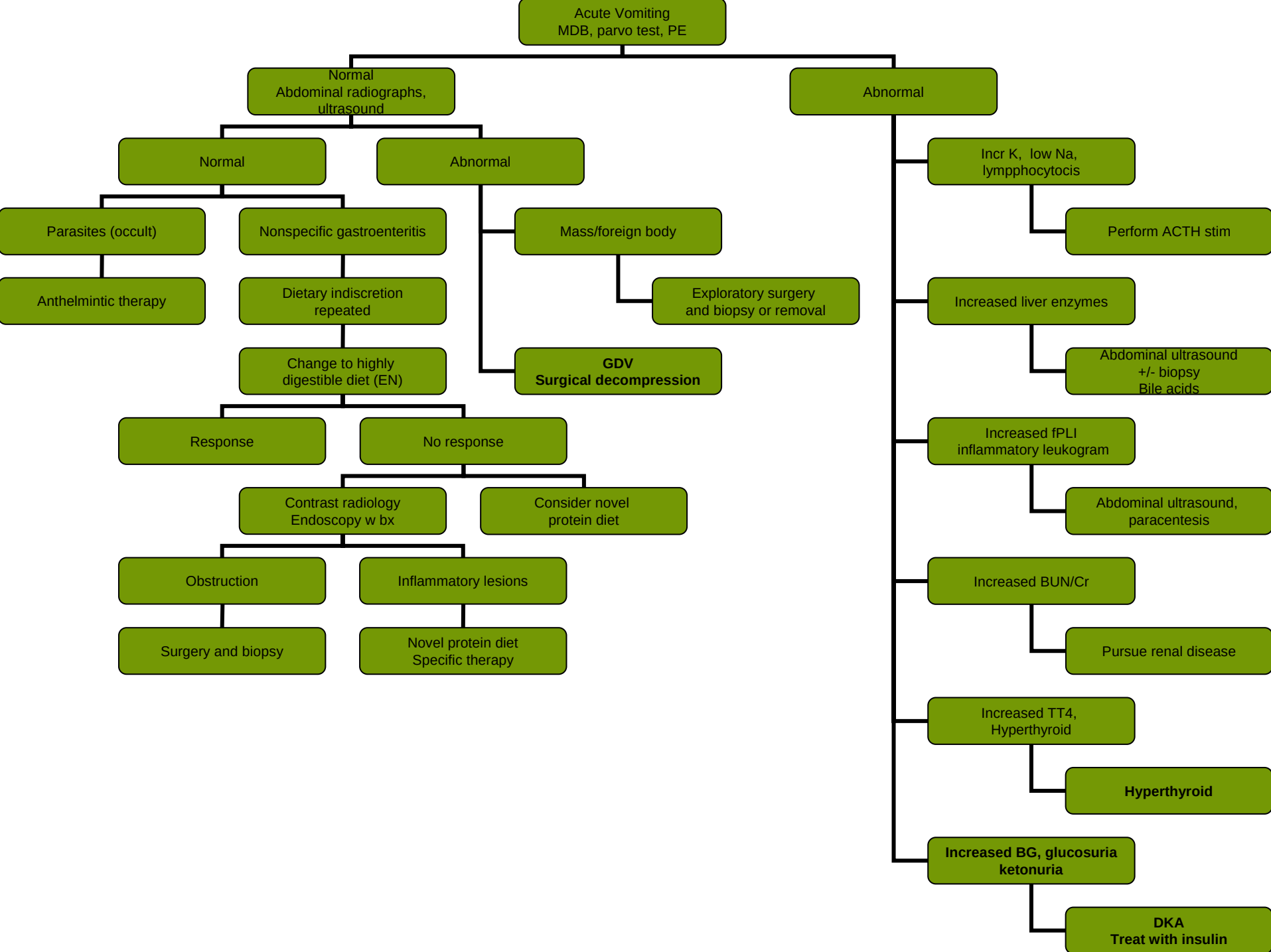
- **Motion sickness**
  - **chlorpromazine: cat**
  - **diphenhydramine: dog**
  - **Maropitant (Cerenia)**
- **Uremia**
  - **Peripheral tx**
    - **H2 antagonist plus sucralfate**
  - **Central tx**
    - **Metoclopramide**
    - **Maropitant (Cerenia)**

Rational clinical use of antiemetics

- Cancer chemotherapy
  - 5HT3 antagonist: ondansetron
  - NK-1 receptor antagonist- Maropitant (Cerenia)
- Delayed gastric emptying
  - Metoclopramide
  - Erythromycin

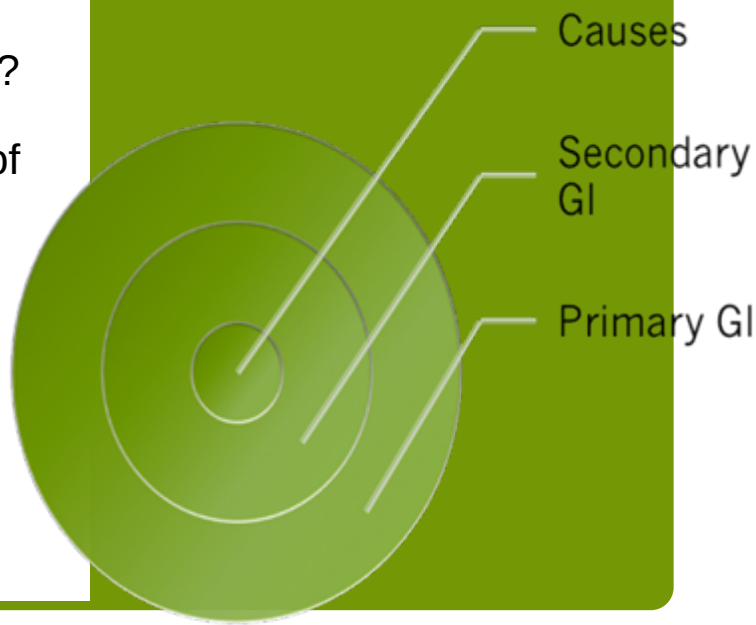
Irrational use of antiemetics

- **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**


Acute Vomiting
MDB, parvo test, PE
Normal
Abdominal radiographs, ultrasound
Abnormal
Normal
Abnormal
Parasites (occult)
Nonspecific gastroenteritis
Mass/foreign body
Anthelmintic therapy
Dietary indiscretion repeated
Exploratory surgery and biopsy or removal
Change to highly digestible diet (EN)
GDV
Surgical decompression
Response
No response
Contrast radiology
Endoscopy w bx
Consider novel protein diet
Obstruction
Inflammatory lesions
Surgery and biopsy
Novel protein diet
Specific therapy
Incr K, low Na, lympphocytocis
Perform ACTH stim
Increased liver enzymes
Abdominal ultrasound +/- biopsy
Bile acids
Increased fPLI
inflammatory leukogram
Abdominal ultrasound, paracentesis
Increased BUN/Cr
Pursue renal disease
Increased TT4, Hyperthyroid
Hyperthyroid
Increased BG, glucosuria ketonuria
DKA
Treat with insulin

Approach to Acute Vomiting: History

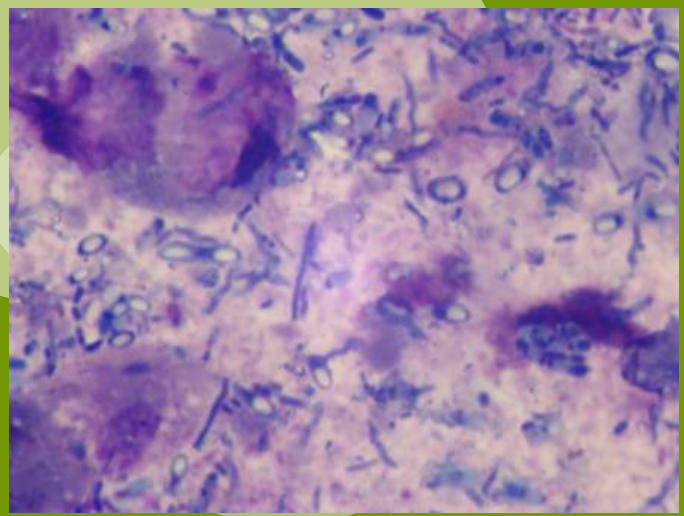
- **History:** Toxins?, Travel? Garbage? Medications?
- Vaccination? Access to outdoors? Duration?
- Fatty meals? Recent boarding? Character of vomitus?
- Hematemesis? Concurrent signs such as PU/PD, diarrhea,
- Icterus, etc.?



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), intusseption, 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—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

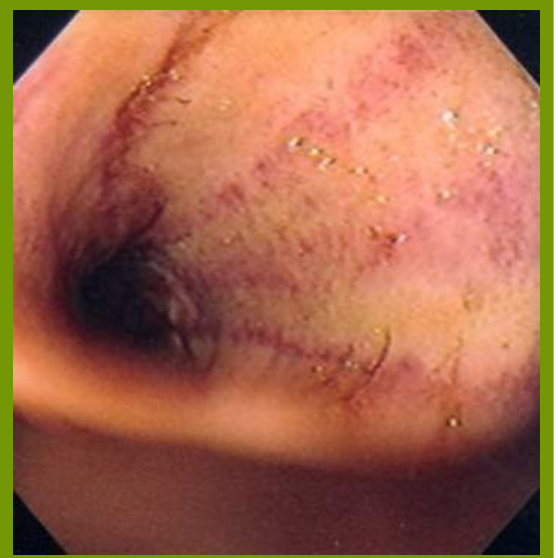
Bambi

- What is your diagnosis?

Oral exam under sedation

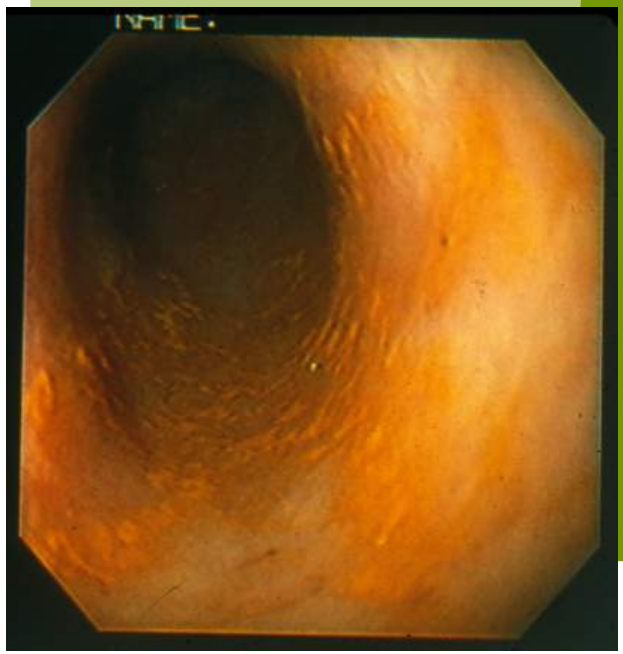
Diagnostic approach to vomiting: The role of endoscopy

- **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**



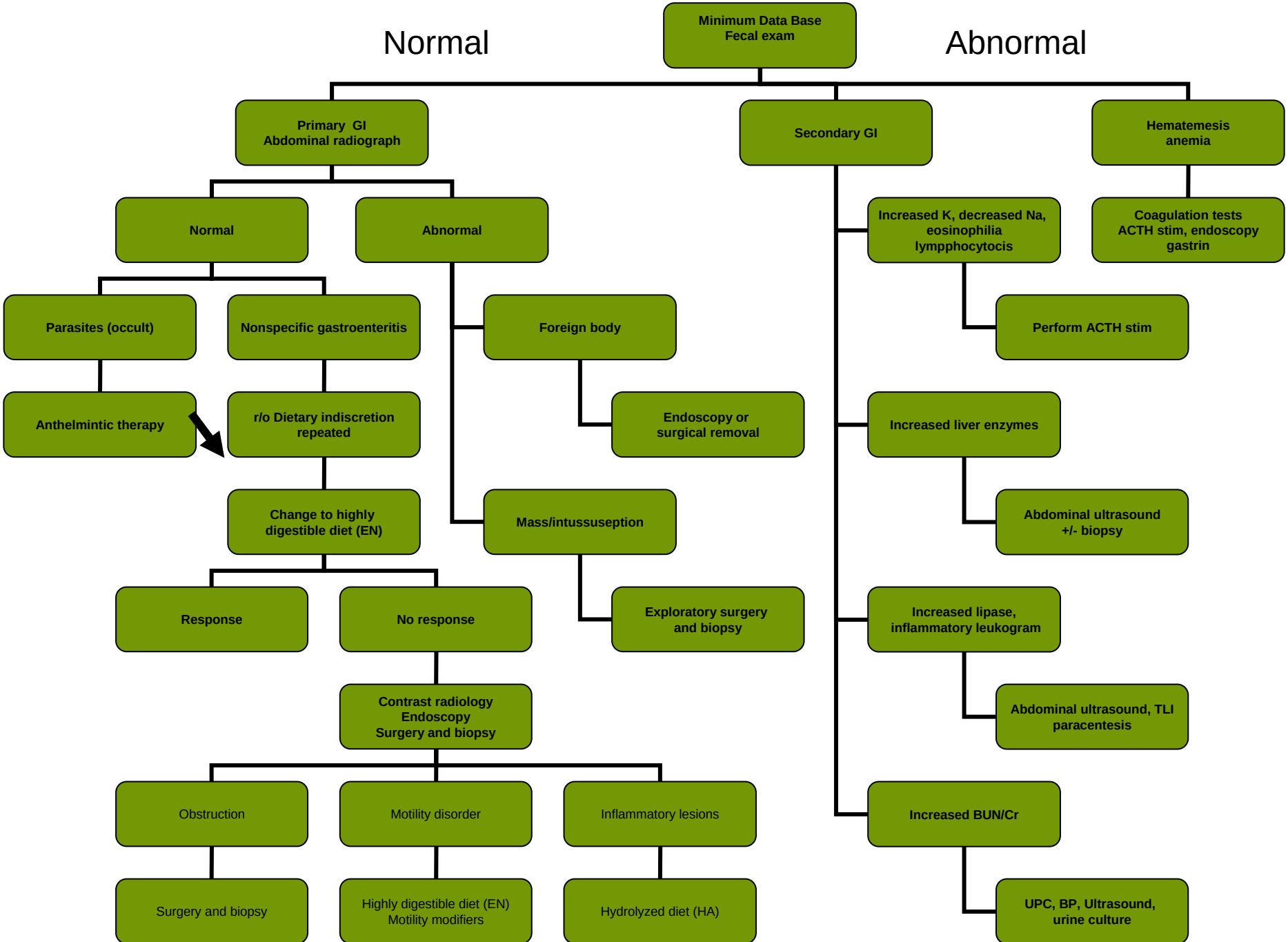
Endoscopy

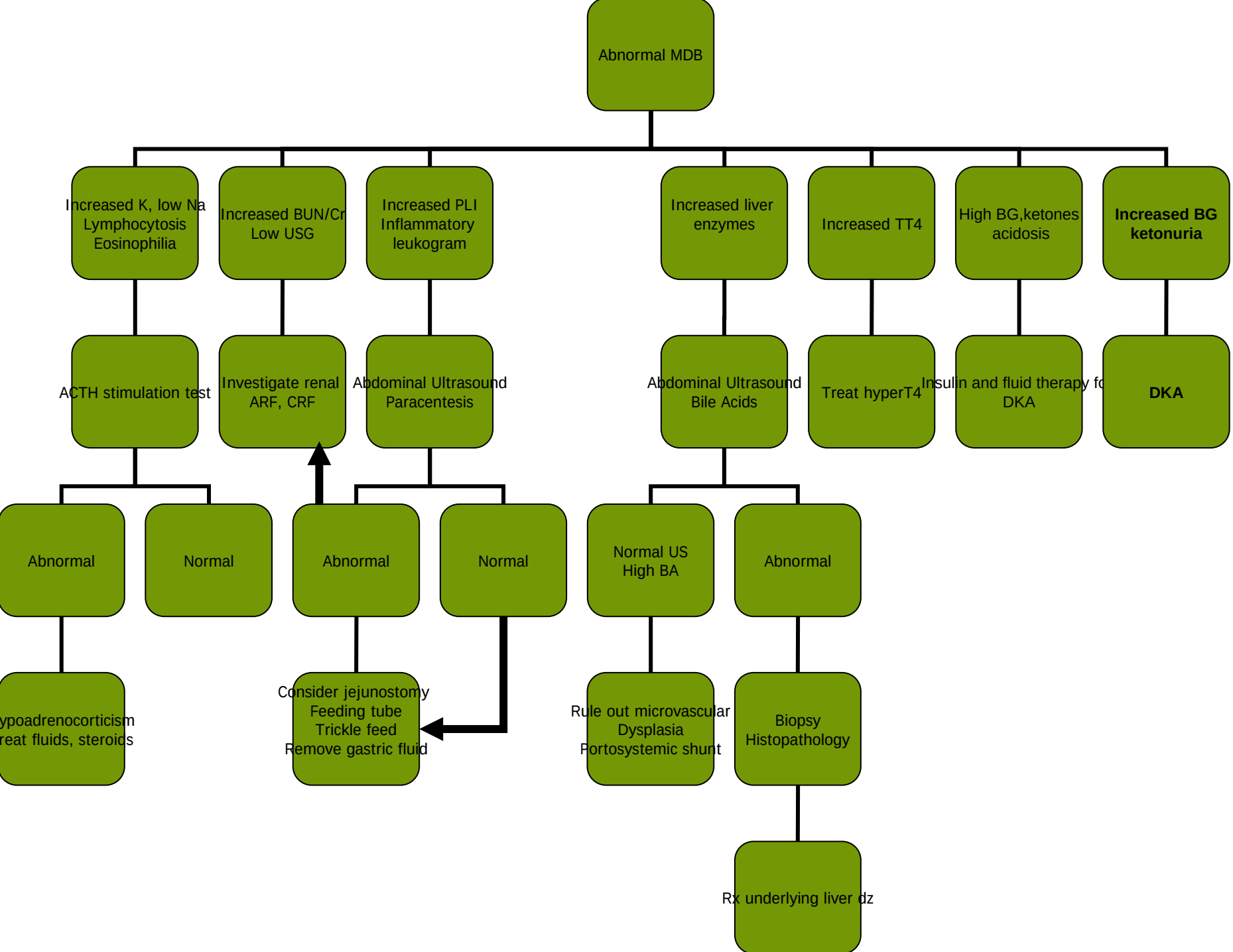
Duodenum

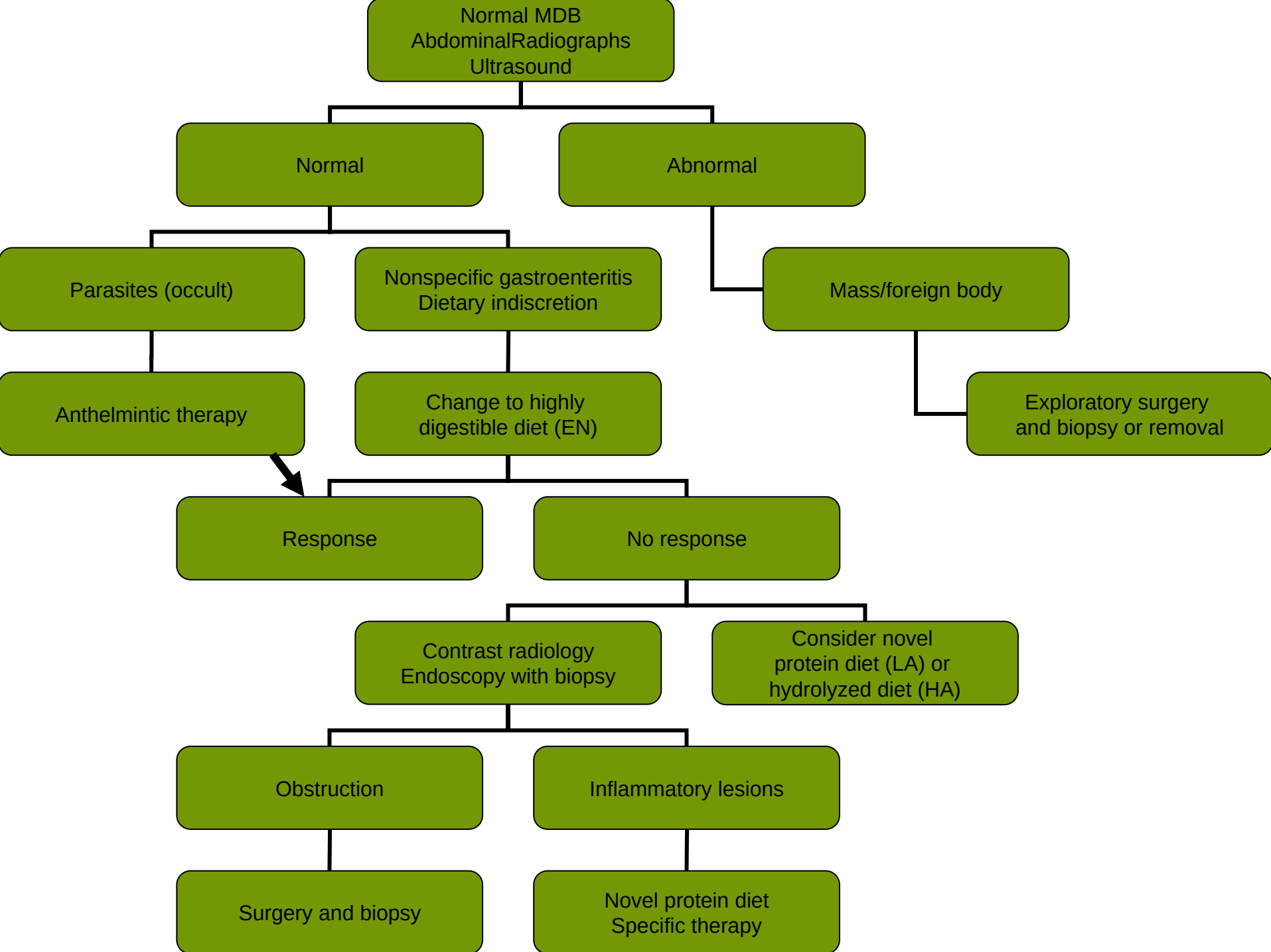


Retroflexing the scope

Chronic Vomiting




Abnormal MDB
Increased K, low Na
Lymphocytosis
Eosinophilia
Increased BUN/Cr
Low USG
Increased PLI
Inflammatory
leukogram
Increased liver
enzymes
Increased TT4
High BG,ketones
acidosis
Increased BG
ketonuria
ACTH stimulation test
Investigate renal
ARF, CRF
Abdominal Ultrasound
Paracentesis
Abdominal Ultrasound
Bile Acids
Treat hyperT4
Insulin and fluid therapy fo
DKA
DKA
Abnormal
Normal
Abnormal
Normal
Normal US
High BA
Abnormal
ypoadrenocorticism
reat fluids, steroids
Consider jejunostomy
Feeding tube
Trickle feed
Remove gastric fluid
Rule out microvascular
Dysplasia
Portosystemic shunt
Biopsy
Histopathology
Rx underlying liver dz


Normal MDB
AbdominalRadiographs
Ultrasound
Normal
Abnormal
Parasites (occult)
Nonspecific gastroenteritis
Dietary indiscretion
Mass/foreign body
Anthelmintic therapy
Change to highly
digestible diet (EN)
Exploratory surgery
and biopsy or removal
Response
No response
Contrast radiology
Endoscopy with biopsy
Consider novel
protein diet (LA) or
hydrolyzed diet (HA)
Obstruction
Inflammatory lesions
Surgery and biopsy
Novel protein diet
Specific therapy

“Mika”

- 12 yr FS DSH
- Now vomiting, depressed
- Physical examination:
  - depressed, dehydrated, ketotic breath

Diagnostics

- 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, HCo_3= 10.1 (LOW), add 60 meq KCL/l
- 1/2 unit regular insulin IM hourly
- Check electrolytes at 2hours:
  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 4units 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!

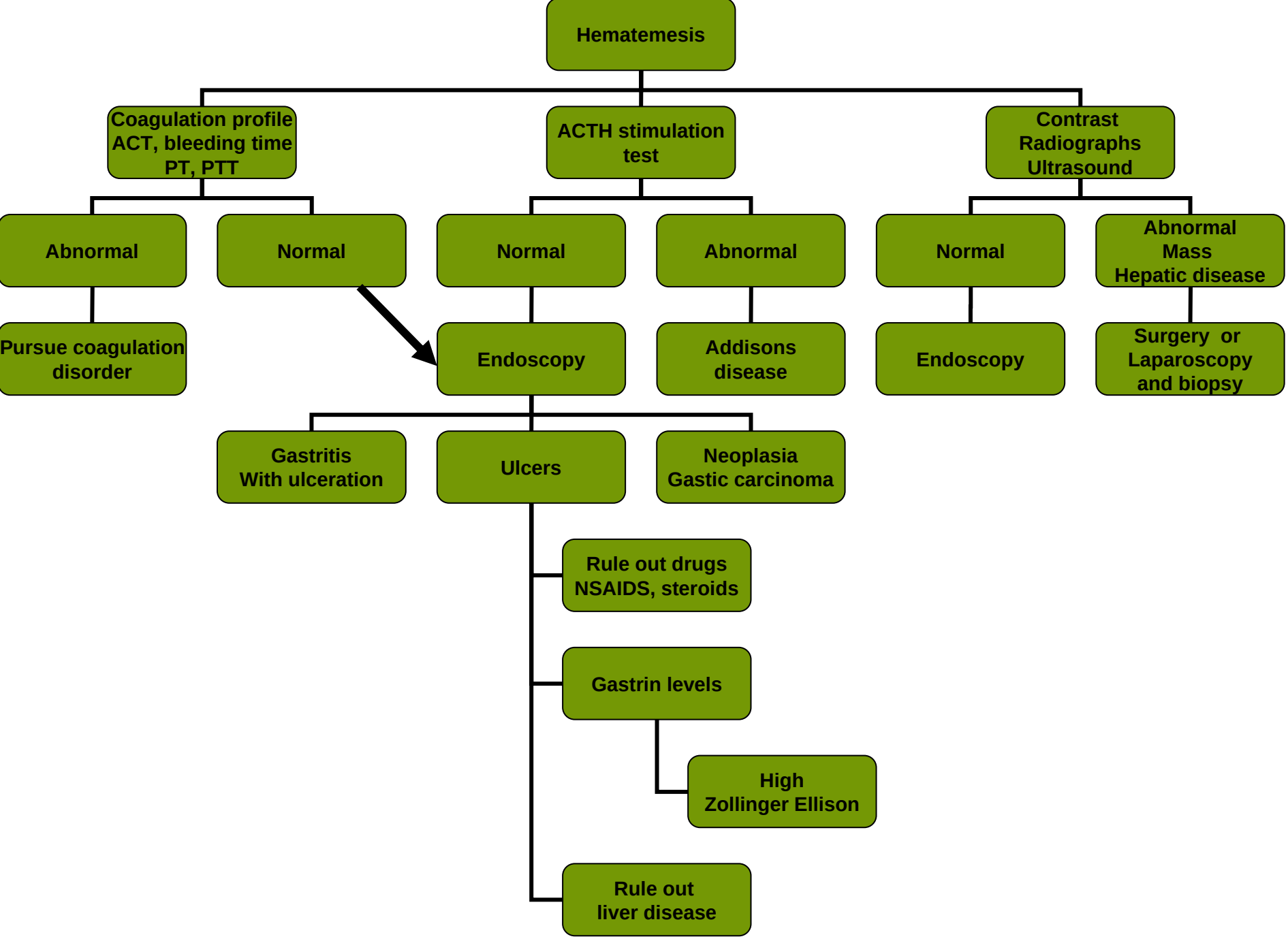
- **fPLI Normal!!**
- **FBG 243, Nadir 139, Fructosamine 426**
- **ALT 212, ALP 281**
- **Long term management and results**
  - **recheck every 3 months:**
  - **Placed on EN diet**
  - **Current meds: medrol 4 mg EOD, NPH 2 units SQ BID,**

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
Contrast
Radiographs
Ultrasound
Abnormal
Normal
Normal
Abnormal
Normal
Abnormal
Mass
Hepatic disease
Pursue coagulation disorder
Endoscopy
Addisons disease
Endoscopy
Surgery or
Laparoscopy
and biopsy
Gastritis
With ulceration
Ulcers
Neoplasia
Gastic carcinoma
Rule out drugs
NSAIDS, steroids
Gastrin levels
High
Zollinger Ellison
Rule out
liver disease

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?

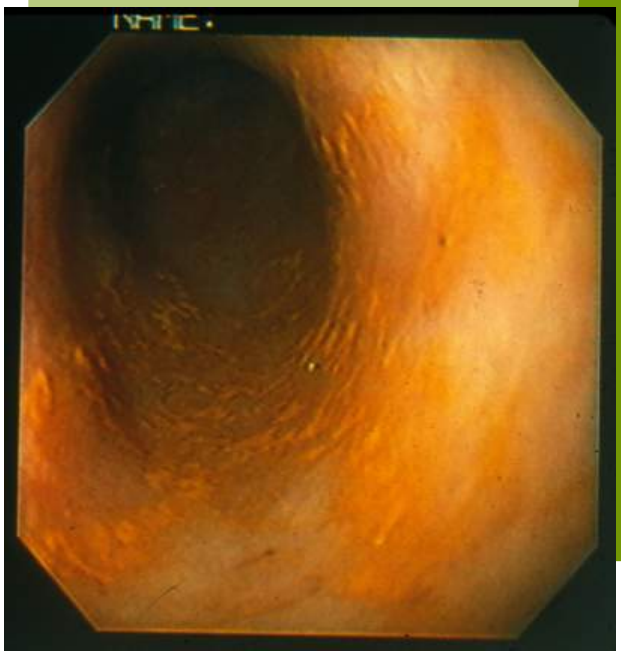
Minimum data base

- 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

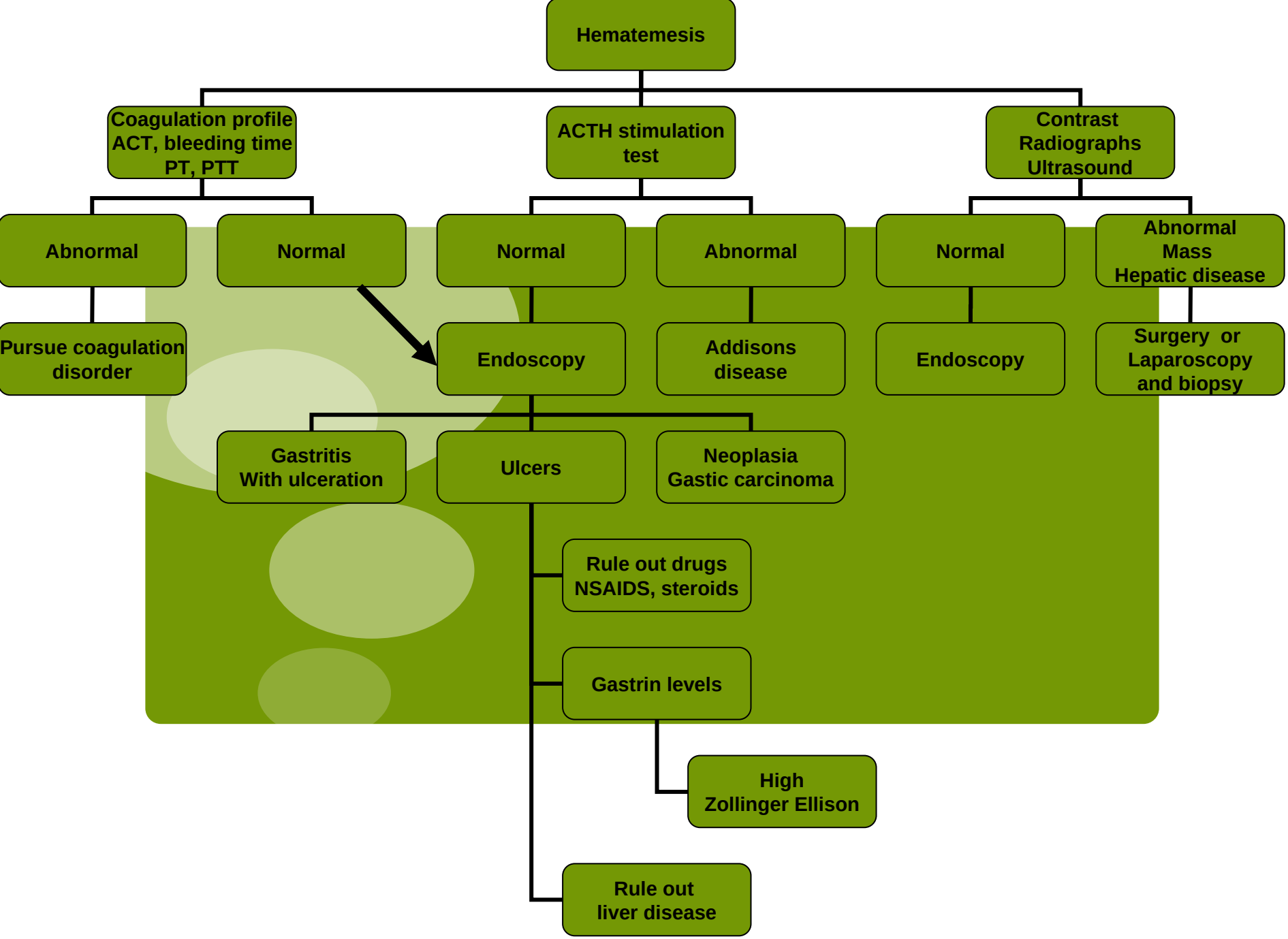


Ulcerative disease

Biopsy—look for neoplasia, Helicobacter

Culture for helicobacter

Place feeding tube if animal anorectic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Endoscopy
Addisons disease
Endoscopy
Surgery or Laparoscopy and biopsy
Gastritis
With ulceration
Ulcers
Neoplasia
Gastic carcinoma
Rule out drugs
NSAIDS, steroids
Gastrin levels
High
Zollinger Ellison
Rule out
liver disease

Pharmacologic control of gastric ulceration

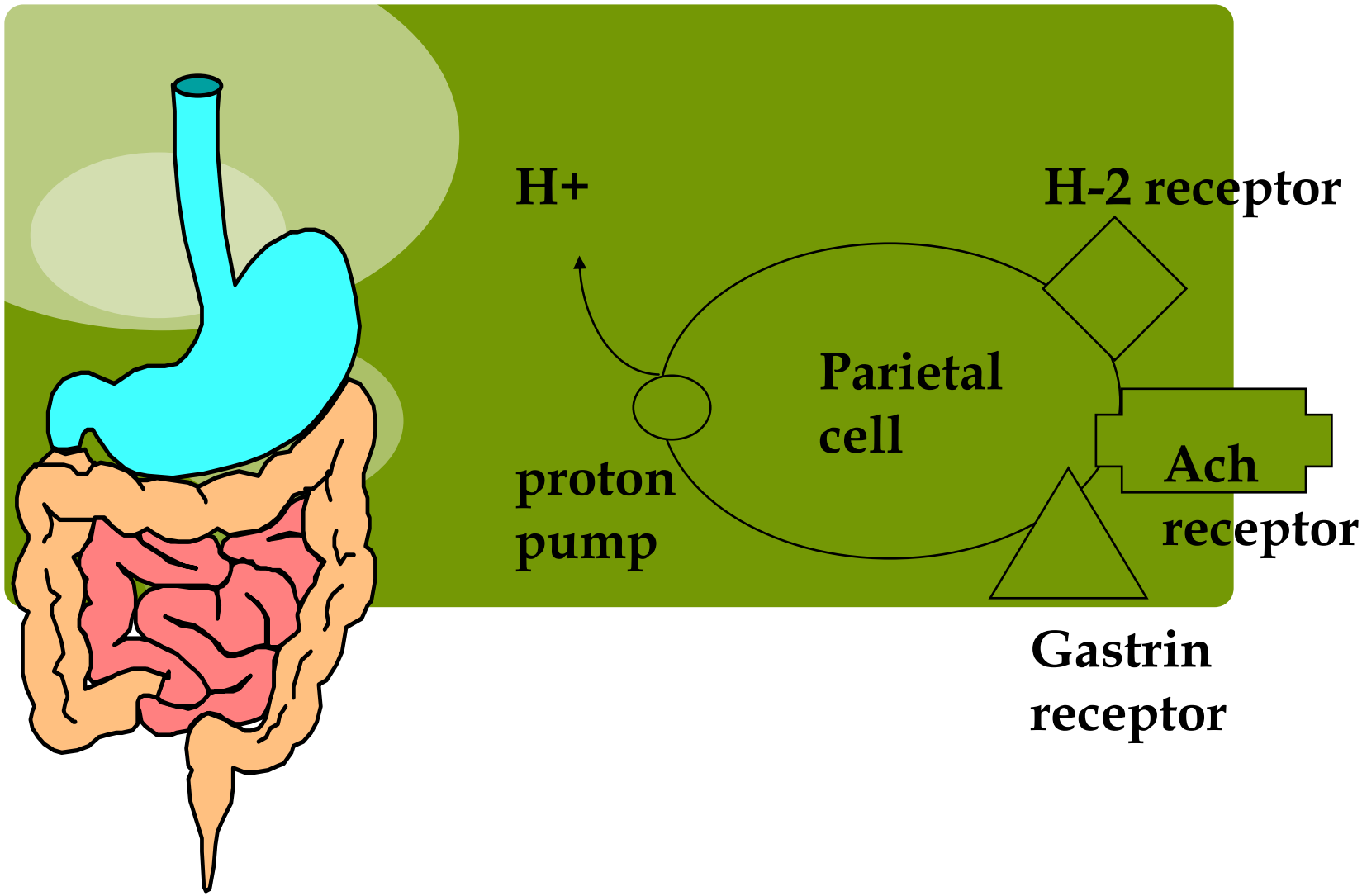
Drugs that cause gastric ulceration

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

Corticosteroids

- **prednisone**
- **dexamethasone!**

Pathophysiology of gastric ulcer formation



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.