

Gastrointestinal Stasis: Review and Current Therapy

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Overview

- Gastrointestinal Stasis- definition
- Physical examination
- Treatment
- Prevention

Gastrointestinal Stasis

- Rabbit Gastrointestinal Syndrome
- SYNDROME
 - Not a specific disease unto itself
- Set of clinical signs
 - Hyporexia/anorexia
 - Decreased fecal production or absence of fecal production
 - Downward spiral of discomfort and anorexia
- Species affected
 - Rabbits
 - Guinea Pigs
 - Chinchillas

GI stasis

- Timeframe?
 - Varies by species, very general
 - Rabbit- 8-12 hours
 - Guinea pig- 6-8 hours
 - Chinchilla- 8 hours

Unique anatomy

- Dentition

Rabbit

Guinea Pig
30 degree angle

Chinchilla

Unique anatomy

- Stomach
 - Rabbit - pH 1-2
 - Guinea pig - pH 2-3
 - Ever present fiber mat
 - Hair and fiber

Unique anatomy

- Small intestines
 - Higher pH than stomach (6.4-7.4)
- Cecum
 - ~60% of GI volume
 - Fermentive vat of varying bacterial and fungal species
 - *Cynicomyces guttulatus* yeast- Rabbits

Unique anatomy

- Colon
 - Proximal colon
 - Passes indigestible fiber
 - Retropulses digestible fiber for cecotrophs
 - *Fusi coli*- controls peristalsis
 - Descending colon
 - Fluid and electrolyte absorption
 - Goblet cells
 - Mucus for cecotrophs

Types of GI stasis

- Mechanical
 - True foreign body
 - Hairballs (?)
 - Pyloric outflow obstruction
- Functional
 - More common
 - Pyloric outflow obstruction
- Not all stasis is considered equal

Causes of GI stasis

- Primary
 - GI pathology
- Secondary
 - Extra-GI pathology leading to GI signs
- At its core
 - Stress/discomfort
 - Inability to eat food for a set period of time
 - Downward spiral if not corrected

Physical examination

- History
 - Onset of signs
 - Diet history
- Triage
 - HR, RR, mentation
 - Fecal production/appetite history
 - Temperature?
 - Normal range- 101.3-104 F
 - Hypothermia carried a 3x higher risk of death before or within 1 week of discharge
 - For each 1 degree C decrease in body temp on admission, odds of death are doubled

[J Am Vet Med Assoc.](#) 2016 Feb 1;248(3):388-97. doi: 10.2460/javma.248.3.288

Physical examination

- Borborygmi
- Palpation of GI tract
 - Stomach, Cecum, Colon
- Oral examination
 - Incisors and cheek teeth
- Other focal sites?
 - Feet
 - Ears- abscesses
 - Eyes- nasolacrimal duct blockages
 - Respiratory system- URI, pneumonia

Diagnostic testing

- Radiographs
 - Mechanical vs functional ileus
 - Stomach size
 - Cecum size
 - Fecal material present?
 - Musculoskeletal pathology
 - Arthritis
 - Spondylosis
 - Pathologic fractures
 - Pulmonary disease

Diagnostics

- Bloodwork
 - CBC
 - Biochemistry
 - Renal
 - Hepatic
 - Other prognostic indicators?

Diagnostics

- Glucose and sodium as prognostic indicators

Physiologic state	Glucose (mg/dL)	Sodium (mEq/L)
Normal	76-148	136-147
Stressed	144-180	--
Severe disease	360-540	<129 carries a 2.3 times mortality risk
Diabetes mellitus	540-601	--

Other diagnostic tools

- Ultrasound?
- CT scan?

GI Stasis

- Examination
- Determine underlying cause
 - Stress
 - Dental disease
 - Underling metabolic pathology
 - Inflammation
 - Infection

Basis of treatment

- Treatment
 - Rehydrate
 - Analgesia
 - Critical care
 - Exercise

GI Stasis

- Rehydrate
 - Maintenance fluids- 100-125ml/kg/d
 - Peripheral vs GI dehydration
 - Assessing dehydration- difficult
 - Skin turgor
 - Abdominal palpation
 - PCV/TS
 - Single SC doses of 50-75ml/kg q8-12hr

GI Stasis

- IV fluid therapy
 - IV access available?
 - Cephalic vein
 - Lateral saphenous vein
 - Marginal ear vein (NOT CENTRAL ARTERY)
 - Intraosseous catheter placement
 - Young and more debilitated animals

GI Stasis

- IV fluid basics
 - Maintenance requirement of 3-5ml/kg/hr
 - 60-90ml/kg for shock
 - Divide over 10-15 minute boluses
 - Hetastarch
 - 5ml/kg IV over 5-10 minutes
 - Blood products
 - 10-20ml/kg given no faster than 22ml/kg/hr
 - Cross matching advised, but no known blood typing

GI Stasis

- Analgesia
 - Considerations with anorexia
 - PO may not be appropriate if no fecal production
- NSAIDS
- Buprenorphine
 - Decreased GI motility with repeated doses?
- Butorphanol
- Hydromorphone
- Tramadol
- Gabapentin
- Lidocaine

NSAIDs

- Caution with:
 - Renal/hepatic insufficiency
 - Severe dehydration
- Concern for GI disease/ulceration
 - Gastric dilation
 - Pyloric outflow obstruction

NSAIDs

- Meloxicam
 - PO or SC/IM
 - Palatable oral formulation
 - Doses 0.5-1.5mg/kg/d PO SID-BID
 - Some safety studies available
 - Give in conjunction with fluid resuscitation

NSAIDs

- Flunixin meglumine
 - PO, IM, IV dosing
 - Caution with long term use (no more than 3 days)
- Carprofen
 - Listed in formulary for osteoarthritis
- Ibuprofen
 - Increased GI side effects, not recommended

Opioids

- Buprenorphine
 - Partial mu agonist
 - Effects on GI transit time?
 - Onset of action -30-60 min
 - Moderate duration of action- 6-12hr
 - Mild sedative effect
 - Guinea pigs- transmucosal appears to be effective at higher doses
- Buprenorphine SR
 - Evaluated in NZ white rabbits

Opioids

- Butorphanol
 - Partial opiate agonist/antagonist
 - Mild sedative, short acting (2-4 hr), minimal analgesia
- Hydromorphone
 - Mu receptor agonist
 - More potent pain control
 - Nausea?

Other pain medications

- **Tramadol**
 - Questionable efficacy in rabbits, oral dosing (small study size)
 - Unable to determine analgesic effects at high doses in chinchillas
- **Gabapentin**
 - No published studies
- **Lidocaine CRI**
 - Reduced MAC of isoflurane under anesthesia
 - Better post operative outcome compared to buprenorphine with respect to fecal output, food intake, and glucose concentrations following OVH

GI Stasis

- **Critical care**
 - Assist feedings
 - Critical care for herbivores
 - 15-20ml/kg q4-6hr until eating
 - More art than science
 - Mixtures with water, natural fruit juice, Ensure
 - Emerald for Herbivores
 - Pellet/greens/hay blenderized mash

GI Stasis

- **Exercise**
 - Encourage movement with feedings
 - Stimulating GI motility

Adjunct therapies

- All additional therapies should be dependent on the situation and underlying cause

Motility agents

- Metoclopramide
 - Blocks dopamine in the chemoreceptor trigger zone
 - Increase tone and amplitude of gastric contractions, increases duodenal and jejunal peristalsis
- Cisapride
 - Upper GI prokinetic
 - Increases gastric emptying via increase of Ach at myenteric plexus
 - Side effect- Torsades de pointes arrhythmias experimentally and clinically in people. Experimentally induced in rabbits
- Trimebutine
 - Not available in the US

Other GI agents

- Famotidine
 - Histamine H2 receptor antagonist
 - Reduces acid content in stomach
- Ranitidine
 - Histamine H2 receptor antagonist
 - Reduces acid content in stomach
- Simethicone (Gas X)
 - Detergent based breakdown of gas bubbles
 - May be more helpful in guinea pigs and chinchillas, antecdotally

Appetite stimulants

- Cyproheptadine HCl
- Midazolam
- Vitamin B complex

- No controlled studies on efficacy

Antibiotics?

- Rare indications
 - Use your PE and diagnostics as a guide
 - Urinary tract disease
 - Oral ulceration/dental abscessation
 - Respiratory disease
 - URI
 - Pneumonia
 - Vestibular disease
 - Otitis media/interna

Additional support

- Thermal support
 - Temperature based
- Midazolam
 - Anxiolytic
 - Appetite stimulant?
- Maropitant citrate (Cerenia)
 - Anti-inflammatory in other species
 - Targets visceral pain in other species
 - Potent anti-nausea effects in other species
 - No controlled studies in small mammals

Additional support

- **Laxatives**
 - For use in mechanical obstructions?
- **Pineapple juice**
 - Bromelain- enzymatic degradation of hair
 - Questionable at best
 - Increasing sugars in diet
- **Massage**
 - Possible help in the right hands, movement of GI tract
 - Risk of trauma

Other therapies

- **GI surgery**
 - For true mechanical obstructions
 - High post op mortality
 - Case selection bias?
 - Rapid adhesion development
 - Post op functional/mechanical stasis

Measuring treatment success

- **Time in stasis = time in recovery**
 - Refilling an empty tank
- **Time to urination**
- **First fecal pellets**
 - 12-18 hours?

Now what?

- When stable, look for primary causes
 - Sedated oral examination
 - More advanced diagnostics
 - CBC/Chem
 - Radiographs
 - CT
 - Ultrasound

Summary

- GI stasis as a syndrome, while common, can be induced by various underlying etiologies
- Rely on your PE and diagnostics to guide your clinical decisions
 - Temperature
- Core treatments:
 - Rehydrate
 - Analgesia
 - Critical care
 - Exercise
- Other therapies based on PE and diagnostics
