

# Colic, Constipation, and Impaction in Elephants



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## **Disclaimer**

- These materials were excerpted from a presentation given in India in 2023.
- There are few, if any clinical studies of GI drugs in elephants; most information is anecdotal and from adult elephants.
- Be very cautious using any of the drugs mentioned especially in very young calves.
- This information is provided for veterinarians to consider for cases where conservative treatment has failed.

## Causes of Colic, Constipation, and Impactions

- ❑ Course or dry feed
- ❑ Poor water intake (or provision)
- ❑ Tooth issues
- ❑ Parasites
- ❑ Malabsorption
- ❑ Poor motility / gut stasis
- ❑ Excessive gas
- ❑ Compromised blood supply



Colic can often result from inappropriate feeding practices such as feeding large amounts of banana stem or palm leaves. The stems of banana plants and the ribs of coconut palm leaves are difficult to chew and digest and they may result in the formation of large fecal boluses that can be difficult to pass or that may actually cause an obstruction. Inadequate water intake can also predispose to colic. Tooth problems can cause poor mastication especially in very old elephants with worn molars. Geriatric animals may encounter difficulties feeding when their last set of molars are in wear and especially after this final set is lost. The inability to mechanically break down food can lead to malabsorption, weight loss, or colic and impactions.

If motility - the process responsible for moving feed in the gut becomes disrupted, food may stop moving even if there is no blockage. The gut will add fluid to the small intestine to try to move the food along. But this fluid can't move either. If the gut continues to add fluid, dehydration and shock can result. Gas colic may occur when the microbes in the colon produce excessive gas, possibly due to dietary changes or highly fermented feeds. The gas stretches the gut wall causing mild to moderate pain. Poor blood supply to the gut can be caused by tumors. In one case of mine the elephant had a large uterine tumor that compromised circulation and caused a myriad of signs including colic and ventral edema. Impactions occur when feed material builds up in a part of the gut (usually the colon) and becomes immobile. Pain occurs as the gut wall stretches and strongly contracts trying to push the feed through the colon.

# Signs of Colic in Elephants

- ↓ appetite / anorexia
- Restlessness
- Rolling / Stretching
- Straining
- Bloat
- Lying down / getting up
- Biting the trunk tip
- Excessive flatulence
- Passing little or no stool



If untreated dehydration → intestinal stasis → electrolyte imbalance → endotoxic shock → circulatory collapse → recumbency → death

Signs of colic in elephants are similar to those we see in horses. There may be a loss of appetite, changes in posture to try to get comfortable, bloat, more gas than normal and changes in feces production. Biting the trunk tip seems to be a sign of pain. If left untreated, the sequence of events listed at the bottom of the slide may occur and you may find yourself doing a PM exam.

# Diagnostic Workup

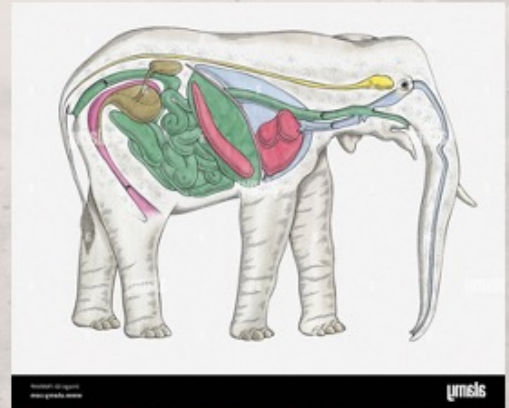
- ✓ History, clinical signs
- ✓ Physical exam (including rectal)
- ✓ Check heart rate and GI sounds
- ✓ Fecal to r/o parasites
- ✓ Fecal culture (r/o salmonella)
- ✓ CBC, Chemistry panel
- ✓ Transit time
- ✓ Measure abdominal girth



Our diagnostic workup starts with a history and clinical signs. The history may give us an idea of the underlying cause and the clinical signs may give us an indication of the severity. The physical exam should be thorough. Pay particular attention to the heart rate and GI sounds – which may be absent. In horses, GI sounds and heart rate are the most important measurements for distinguishing between a simple and a critical colic. Checking a fecal is easy so do that to rule out parasites. It's a good idea to check a fecal culture – we want to make sure we are not dealing with salmonella which can be serious and would warrant antibiotic treatment. Salmonella is usually associated with diarrhea. Submit a CBC and chemistry panel. If the elephant is still eating and defecating, you can check the GI transit time by feeding orange peels. And if your patient is bloated you might want to measure the abdominal girth.

# Differential Diagnosis (DDX)

- Simple colic / bloat
- Partial or complete impaction (food, sand, foreign body)
- Bacterial enteritis (r/o salmonellosis)
- Torsion, intussusception
- Neoplasia



The DDX of colic includes simple colic in which the signs are not too severe, and the condition responds well to basic treatment w pain meds and fluids. In many cases of colic, this may be all that is needed. In these instances, the cause of colic is presumed to be spasm of intestinal muscle or excessive gas. Partial or complete impactions are far more serious, and the signs will be more dramatic. There may be a complete absence of feces and a loss of gut sounds. Bacterial infections can also be rapidly fatal. Salmonella is usually characterized by bloody diarrhea but should be ruled out by submitting a fecal culture. Unfortunately, conditions like torsions are usually diagnosed only at postmortem. Neoplasia should be in the DDX of older animals. Neoplasia is not very common but can occur – as in the case of the elephant with the uterine tumor. You can check for sand by mixing the feces with water in a bucket and observing to see if the sand separates out.

# Monitor Frequently

- Appetite /Attitude / Fecal output
- Temp, Pulse, Respiration (TPR)
- GI sounds
- Hydration status (PCV and TP)
- Color / CRT
- Girth if bloated

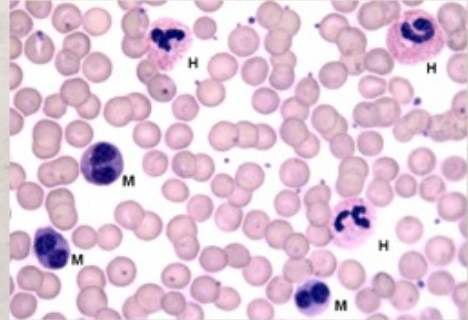


Temp: 97-99°F (36-37°C)  
Pulse: 25-30/min  
Respiration: 4-12/min  
Capillary refill: 1-2 sec

These are parameters to monitor on a regular basis when treating an elephant with colic. Appetite, attitude, and fecal output are obvious. The TPR is important so don't overlook this. Monitor GI sounds and heart rate. Hydration status is equally important and will guide fluid therapy. You can get a rough estimate of hydration by pulling the skin between the forelegs and checking for resilience. Mucous membrane color and capillary refill time will give you information about the circulatory status. If the elephant is bloated, you can measure the abdominal girth and hopefully watch it decrease as your patient responds to treatment. The PCV and TP provide an effective means of monitoring hydration status and fluid administration. A PCV >60 is a poor prognostic indicator and is a signal to increase fluid therapy. You need a refractometer to check TP and you can also use it to check the urine specific gravity.

## Possible Lab Findings

- RBCs, Hgb, ESR, WBC, differential normal
- Hct, BUN, bicarbonate, lactate ↑
- Chloride, glucose, K ↓
- Na, creatinine, AST no change
- Liver fx normal



Cheeran, J. and Chandrasekharan, K. Section II – India Veterinary problems of geographical concern. In: Fowler, M.E. and Mikota, S.K.(eds). *Biology, Medicine, and Surgery of the Elephant*. Blackwell Publishing, Ames, IA. Pp. 444-447.

These are some changes in lab values that you may see. The RBC, Hgb, ESR, WBCs and differential will generally be normal. You may see increases in the hct, BUN, bicarbonate, and lactate, and decreases in Cl, glu, and K. The decreases in Cl and K correspond to a metabolic alkalosis. Hypoglycemia may be due to inappetence. There are usually no changes in Na or AST or liver function tests. But each case is different.



# Therapies and Medications

- Exercise
  - Diet change
  - Manual feces removal
  - Fluids
  - Enemas
  - Transfaunation
  - Acupuncture
  - Other
- Anti-inflammatory/pain meds
  - Anti-spasmodics
  - Anti-gas agents
  - +/- Antibiotics
  - Anthelminitics
  - Gastroprotectants
  - Pro-kinetic agents
  - Laxatives
  - Other e.g. vitamins

These are some of the therapies you may need to treat an elephant with colic, constipation, or impaction. In the next series of slides, we will talk about each of the therapies and medications listed. We will start with medications.

# Anti-inflammatory / Pain Meds

Flunixin: 1.1 mg/kg IV, IM, PO < 5 days  
Ketoprofen: 1-2 mg/kg PO or IV q 24-48 h



Anti-inflammatory medications are probably the first thing you should reach for because these conditions are often very painful. Flunixin and ketoprofen have been studied in elephants so the dosages are reliable. I think flunixin is readily available everywhere and it is a good drug. I have used ketoprofen and I think it works very well to counter pain. Don't forget the possible side effects of NSAIDs which includes GI ulceration or bleeding. You don't want to use 2 NSAIDs at the same time nor do you want to use an NSAID and steroids. It is a good idea to give a GI protectant at the same time.

# Gastroprotectants

Omeprazole

Equine dosages

Treatment: 4 mg/kg/day PO

Prevention: 2 mg/kg/day PO

Sucralfate

Equine dosage

10-20 mg/kg q 6-8 hours PO



Gastroprotectants work by decreasing gastric acidity or by mucosal protective mechanisms. Omeprazole works by decreasing the acidity of the stomach, which gives ulcers an opportunity to heal and reduces the likelihood of new ulcers forming. The equine dosages are 4 mg/kg/day for treatment and 2 mg/kg/day for prevention given orally once a day. Sucralfate is a mucosal protectant that works by forming a thick gel which acts as a protective barrier. It is only effective for about 6-8 hours so it must be dosed more frequently. Sucralfate is not as effective when used on its own but can be beneficial used together with Omeprazole because the 2 drugs have different mechanism of action. In one equine study omeprazole was more effective than sucralfate so that would be my first choice.

# Anti-spasmodics

## Buscopan

- Spasmolytic
- Anti-cholinergic
- Smooth muscle relaxant
- Equine dosage: 0.3 mg/kg slow IV



*Do not use with impactions, ileus, or glaucoma / may cause tachycardia*

BUSCOPAN is an anticholinergic used in horses for spasmodic or flatulent colic. It relaxes smooth muscle. BUSCOPAN's major side effect is a transient elevated heart rate. It may also cause pupil dilation and dry mucous membranes. Buscopan should not be used in an impaction colic associated with ileus, or in animals with glaucoma. BUSCOPAN effects may be potentiated by use with other anticholinergic drugs. Anticholinergic drugs inhibit or block the physiological action of acetylcholine at a receptor site. The spasmolytic action of BUSCOPAN is based on anticholinergic effects resulting from competitive inhibition of parasympathetic activation (via muscarinic receptors) of smooth muscle cells.

# Anti-spasmodics

Analgin (metamizole) 500 mg/ml

- Analgesic
- Antipyretic
- Mild NSAID
- 60-90 ml IM for adult elephants (Dr. Cheeran, India)

*Do not use with impactions, ileus, or glaucoma*



Analgin is a brand name for Metamizole and is available in India. Dipyrone is another name. It is an analgesic and antipyretic and a mild NSAID. There are no studies that I am aware of, but Dr. Cheeran recommends a dose of 60-90 ml IM for adult elephants.

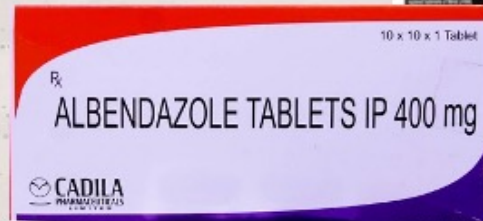


<b>Drug Facts</b>	
<b>Active ingredient (in each softgel)</b>	<b>Purpose</b>
Simethicone 125 mg.....	Antigas
<b>Use</b> for the relief of	
<ul style="list-style-type: none"> <li>• pressure, bloating, and fullness commonly referred to as gas</li> </ul>	
<b>Warning</b>	
Keep out of reach of children.	
<b>Directions</b>	
<ul style="list-style-type: none"> <li>• adults and children 12 years and older: swallow with water 1 or 2 softgels as needed after meals and at bedtime</li> <li>• do not exceed 4 softgels in 24 hours except under the advice and supervision of a physician</li> </ul>	
<b>Other information</b>	
<ul style="list-style-type: none"> <li>• store at controlled room temperature 20-25°C (68-77°F)</li> <li>• protect from light, heat and moisture</li> </ul>	
<b>Inactive ingredients</b> D&C yellow no. 10, FD&C blue no. 1, FD&C red no. 40, gelatin, glycerin, hypromellose, mannitol, medium-chain triglycerides, peppermint oil, propylene glycol, purified water, sorbitol, soy lecithin, titanium dioxide	
<b>Questions or comments?</b> 1-855-328-5204	

There are a number of Over the Counter (OTC) drugs that are used for gas and bloating in humans. GasX is one brand name. These medications contain simethicone which works by bringing together the small gas bubbles in the gut to form bigger bubbles, allowing trapped air to pass through. They are generally safe with no known side effects. Some equine vets recommend that horse owners keep this in their emergency kits. There is no specific dose for elephants.

# Anthelmintics

- Fenbendazole
- Albendazole
- Ivermectin
- Triclabendazole (flukes)
- Use equine dosages



These are the anthelmintics commonly used in elephants.

# Pro-kinetic Drugs

- Stimulate motility in upper GI tract
- Metoclopramide
- Tablets, syrup, injectable (human)
- Elephants: 50-60 ml IV for adult elephants (Dr. Cheeran)
- Possible CNS side effects (sedation/excitement)



***Do not use with obstructions***

Prokinetic drugs stimulate motility. They are commonly used in humans for gastro-esophageal reflux disease (GERD). They increase contractions in the esophagus and in the stomach and promote stomach emptying. So they act on the upper GI tract. They have little or no effect on motility of the colon. Metoclopramide is indicated for conditions in which normal motility is diminished. There are no studies in elephants. Dr. Cheeran recommends a dose of 50-60 ml IV for adults. In horses, there can be serious CNS signs so I would use this drug with caution in elephants and give it very slowly if using IV. Pro-kinetic drugs are contraindicated with obstructions. Prokinetic drugs work by stimulating excitatory neurotransmitters like acetylcholine and suppressing inhibitory neurotransmitters like dopamine and serotonin.



# Laxatives (Cathartics, Purgatives) and Surfactants

- Bulk-forming
- Surfactants / Fecal softeners
- Hyperosmotic cathartics
- Lubricants
- Stimulant cathartics



Laxatives, cathartics, and purgatives cause the bowels to empty. These agents work by increasing motility or increasing fecal bulk. Some forms are more gentle than others and some are contraindicated if you suspect an obstruction.

## Bulk-forming Laxatives

- Uses fiber (insoluble carbohydrates) to draw water into the bowel; ↑ fecal mass
- Psyllium (Equine dosage: 1 g/kg PO q 6-24 h)
- Mix w mineral oil / have water available



Plantago ovata

Bulk-forming laxatives use fiber to draw water into the intestines, so they increase the fecal mass. One of the most common bulk laxatives used in humans and animals is psyllium. Psyllium comes from the *Plantago ovata* plant. It is native to India and is grown in the Gujarat and Rajasthan regions. It is available as husks, powder, and pellets for horses. The equine dosage for constipation is 1 g/kg every 6-24 h. Psyllium in water forms a highly viscous gel very quickly so in horses it is usually mixed with mineral oil. Make sure the elephant has access to water.

## Bulk- forming Laxatives

- Beet pulp
- Soak 30-60 min in 2 X volume of water
- Drain for 1 hour to ↓ sugar



Beet pulp is the fibrous material left over after the sugar is extracted from sugar beets. It's an excellent source of digestible fiber, with a relatively low crude protein content (averaging 8 to 10 percent), comparable to good-quality grass hay. You should soak dried beet pulp before feeding so it is more palatable and is less likely to cause choke. Place it in a bucket and add twice as much water as beet pulp by volume. Allow the beet pulp to soak for at least 30 minutes before feeding if using warm water, and 60 minutes if using cold water. When beet pulp is ready for feeding it will have soaked up all or most of the water and will have a greatly increased volume and a fluffy consistency. Draining or rinsing the excess water from beet pulp after soaking it for at least one hour before feeding will significantly reduce the amount of sugar. It is available for horses in various forms such as pellets, mash, and shreds.

## Fecal Softeners (Surfactants)

- Docusate Na, Ca, K
- Dioctyl sodium sulfosuccinate (DSS)
- ↓ surface tension
- Draw water and fat into feces
- Tablets, capsules, liquids, enemas (some bloat products - others may be mineral oil)
- Equine dosage: 10-30 mg/kg PO as a 10% solution



**CAUTION: Overdosing can cause ileus. Monitor electrolytes. Do not use with impactions.**

Fecal softeners or surfactants work by decreasing surface tension and drawing water into the feces. The sodium, calcium, or potassium salts of docusate are the most commonly available products. DSS - Dioctyl sodium sulfosuccinate - is another name for the same product. Do not exceed equine dosage – 3-5X the dosage has caused diarrhea, dehydration, and death in horses. DSS should not be given together with mineral oil; soaps are formed, and oil absorption is increased. Some bloat products are DSS but others are mineral oil so check the label.

# Lubricants

- Coat the surface of feces w a water-immiscible film
- ↑ fecal water content
- Mineral oil (liquid paraffin)
- May pass around a partial obstruction
- Equine dosage: 5-10 ml/kg PO

May indicate GI transit time



Lubricants coat the surface of feces to promote passage. Mineral oil is the most commonly used. The equine dosage is 5-10 ml/kg. Mineral oil can provide an estimate of GI transit time as it is usually visible in the stool or on the anus after it has moved through the GI tract. One word of caution is that oil can pass around an incomplete obstruction, or “over the top” of an impacted cecum.

## Saline Cathartics (Hyperosmotic)

- Draw fluid into the GI tract by osmosis
- ↓transit time to reduce absorption of oral toxins
- For constipation: MgSO<sub>4</sub> Equine dose: 0.5-1 g/kg in water PO
- For plant intoxication: Activated charcoal (AC) slurry 1-5 g/kg (~ 1g AC per 5 ml water plus 250-500 mg/kg MgSo<sub>4</sub>)



***Can cause dehydration so watch water intake and electrolytes***

Saline cathartics like magnesium sulfate draw fluid into the GI tract. In horses, they are used for constipation or to help increase the elimination of toxins. The equine dose for constipation is 0.5-1 g/kg in water. For plant intoxications MgSO<sub>4</sub> is used in combination with an activated charcoal slurry. Watch water intake and electrolyte balance.

# Stimulant Cathartics

- Irritate mucosa
- Promote fluid accumulation in lumen
- Potent; fluid and electrolyte loss
- Bisacodyl
- Dosage for adult elephants: 30 (10 mg) tablets BID X 3-5 days PO; 400 mg as a rectal suppository BID (Dr. Ashoka Dangolla, Sri Lanka)

*Do not use if you suspect an obstruction*



Stimulants cathartics promote intestinal motility by irritating the mucosa or by stimulation of intramural nerve plexuses. They also activate secretory mechanisms, causing fluid to accumulate in the GI lumen. These drugs can have potent effects, and excessive fluid and electrolyte loss can result. So, you have to be careful with them. Bisacodyl is the main type. Ducolax is a common brand name.

# Traditional Therapy (Sri Lanka)

- 1 kg tamarind + 1 kg Epsom salts PO
- Give early before appetite ↓



Silva I, and Dangolla, A. Veterinary Problems of Geographical Concern: Sri Lanka in Fowler, M.E. and Mikota, S.K.(eds). 2006. Biology, Medicine, and Surgery of the Elephant. Blackwell Publishing, Ames, IA.

A traditional remedy used in Sri Lanka is feeding 1 kg of tamarinds mixed with 1 kg of Epsom salts. Most elephants like tamarind and will readily accept this if they are still eating.



## Other Supportive

- Favorite foods or treats
- B Vitamins
- Probiotics (not much research)
- Access to fresh water 24/7



Other supportive treatments include offering favorite foods, making sure water is always available, and giving B vitamins because we all like to do that! Probiotics might help but I don't have any specific product recommendations because there is no research yet to support any.

# Therapies and Medications

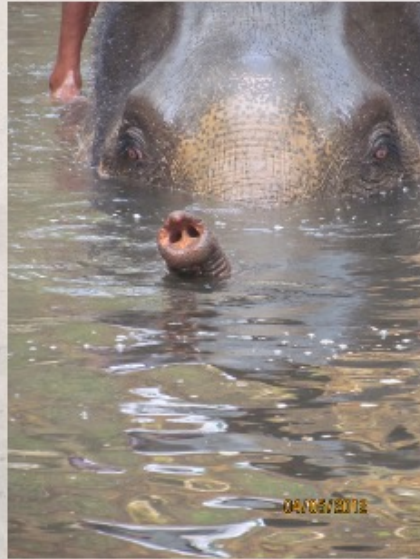
Exercise  
Diet change  
Manual removal of  
feces  
Fluids  
Enemas  
Transfaunation  
Acupuncture

Anti-inflammatory/pain meds  
Anti-spasmodics  
Anti-gas agents  
+/- Antibiotics  
Anthelminitics  
Gastroprotectants  
Pro-kinetic agents  
Laxatives  
Other e.g. vitamins

Let's look at other therapies.

## Exercise

- Encourage movement
- Walking
- Swimming
- Use clinical judgement



Just as with horses with colic, exercise can be beneficial for elephants w colic. That can take the form of walking or swimming – whatever works for an individual elephant. How often and how long depends on the overall situation so use your clinical judgement

## Diet Change

- Depends on underlying etiology
- Tooth issues: chop browse, provide soft gruels
- Stop hard to digest foods
- Add beet pulp (easy to digest)



Depending on the underlying etiology, a change in diet may be indicated. An elephant that has feces like in this image clearly is not digesting food properly. Stop giving hard to digest food like unpeeled bananas. If tooth issues are the cause you may need to chop the browse or offer soft cooked gruels. Beet pulp is a good addition – it is easy to digest and has a protein content comparable to a good quality grass hay (8-10%).

## Manual Removal of Feces

- Do a rectal exam if the elephant is large enough
- Lubrication!
- Remove palpable feces
- May move things along!



If you have a colic case, you are going to do a rectal exam (if the elephant is large enough) so you may as well remove whatever feces you can palpate while you are in there. That alone may help to stimulate movement.

# Enemas

- Use lots of lube!
- 1<sup>st</sup> remove palpable feces
- Warm water best
- Pond pump and large barrel helpful



Stomach 60-70 liters  
Small intestine 11-22 meters; 133 liters  
Cecum: 90 liters  
Large intestine 6-12 meters; 400 liters

When doing aa enema, 1st manually remove the feces that can be reached. Use lot of lubrication. Warm water is best, and soap can be added. How much water to use may be a question. I put the GI organ capacities on this slide to remind us just how big these organs are. As you are putting water into the colon, some of it is coming back out, hopefully mixed with feces. A pond pump and a large barrel of water can speed up the process.

## **Fluid Therapy**

- PO, IV, rectal, or a combination
- Hydration important
- Monitor with PCV (<50)
- Check mucous membranes and CRT
- Maintenance: 40-60ml/kg/24 h

Fluids can be given by any of the routes or by a combination. Hydration is important so you want to be monitoring the PCV and I would recommend not letting it exceed 50. Check the mucous membranes and the CRT too. Also recall that maintenance fluid requirements are 40-60 ml/kg/24 h. Additional fluids may be needed if the elephant is dehydrated.

# Transfaunation (Fecal Microbial Transplant)

- Process of transferring fecal bacteria from a healthy donor
- Used in humans, cows, horses
- In elephants probably most useful for diarrhea but may help with inflammatory conditions or malabsorption

Mullen, K.R. et al. 2018 Equine faecal microbiota transplant: Current knowledge, proposed guidelines and future directions. Equine Veterinary Education 2018 Vol. 30 Issue 3 Pages 151-160.

Transfaunation is the transfer of fecal bacteria from a healthy donor. It has been used in human, cows, and horses. In humans it is particularly effective for treating *Clostridium difficile*. In elephants it is probably most useful for diarrhea, but I did use it in an elephant that had an impaction. If you are thinking of using this procedure, please refer to the article by Mullen for instructions and precautions.



## **Acupuncture: Empirical Points for GI Disorders (Equine)**

Constipation: ST-25; TH-6; ST-36; BL-25; CV-6; CV-12; GV-1; LI-4

Colic: St-36; BL-20; BL-25; ST-2; Bai-Hui; GV-1; CV-12

Flatulent colic: St-39; St-29; SP-6; LIV-3

Spasmodic colic: ST-37; ST-25; BL-25; BL-20

Impaction: St-36; SP-6; CV-4; Bai-Hui

Schoen, A.M. Veterinary Acupuncture. 2001. Mosby. St.Louis.

If you do acupuncture these are some empirical points that are used in horses for constipation, colic, and impaction,