

## **CASE STUDIES**

- Case 1.** A Cat with Chronic Vomiting
- Case 2.** A Dog with Acute Vomiting
- Case 3.** A Cat with Chronic Vomiting following a Subtotal Colectomy
- Case 4.** A Cat with Intractable Vomiting and Azotemia
- Case 5.** A Dog with Chronic Vomiting
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## **CASE 1 - A CAT WITH CHRONIC VOMITING**

### **Clinical examination**

A 3-year-old DSH was presented with a history of chronic vomiting and occasional diarrhea. The vomiting had been occurring for 18 months and was steadily increasing in frequency to the point where two bouts of vomiting were occurring twice per week. The vomiting was initially small in volume and contained predominantly fluid and remnants of food. Lately, the vomiting had become more liquid, larger in volume and foul smelling. A complete blood count and serum chemistry profile performed by the referring veterinarian were unremarkable. The cat was referred for endoscopy with the primary differential diagnoses of inflammatory bowel disease or lymphosarcoma. Physical examination at Massey University was unremarkable. The cat was scheduled for endoscopy the following day. In view of the history of large volume, foul smelling vomitus, a BIPS study was performed to rule out partial obstructions.

### **BIPS study - method**

The BIPS were given on an empty stomach because the cat was anorexic and the primary aim of the procedure was to rule out obstructions rather than evaluate motility. They were administered late in the afternoon and a left lateral and ventrodorsal radiograph was taken early the next morning 16 hours later.

### **BIPS study - interpretation**

The radiographs revealed a tight bunching of the markers in the small intestine associated with "gravelling". These radiographs were diagnostic of a physical obstruction of the small intestine.

### **Treatment**

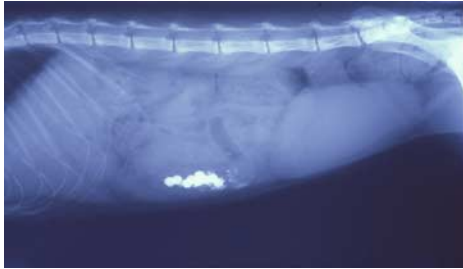
Exploratory laparotomy revealed a narrowed piece of bowel. This was resected and an end-to-end anastomosis was performed. Histology revealed lymphoma.

## Follow-up

The clinical condition of the cat improved rapidly after surgery. Adriamycin therapy was instituted and the cat remains well 1 year after diagnosis.

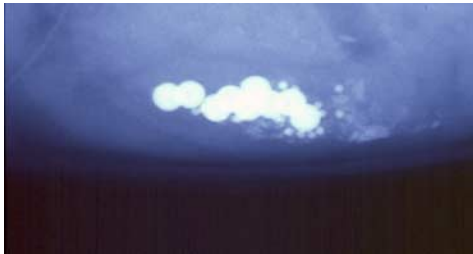
## Comment

The BIPS are tightly bunched in the small intestine and the gravelling and dilated small bowel loop at the site of the obstruction provides firm supportive evidence of a long-standing partial obstruction of the bowel.



### Legend:

Lateral abdominal radiographs of a cat presented with chronic vomiting. BIPS have accumulated orad of a partial obstruction.



### Legend:

Close up of the obstructed segment revealing indigestible material accumulated with the BIPS. This is referred to as the "gravelling sign".

## **CASE 2 -A DOG WITH ACUTE VOMITING**

### **Clinical examination**

A 7-year-old male fox terrier was presented to Massey University with a history of acute onset of anorexia and vomiting. The vomiting was infrequent and contained large volumes of liquid. Physical examination revealed a bight and alert dog with mild cranial abdominal discomfort. A complete blood count and serum chemistry profile revealed no abnormalities except for a mild elevation in amylase along with a normal lipase. Survey radiography revealed a slightly dilated loop of small bowel but was not diagnostic of a physical obstruction of the bowel. A BIPS study was performed to rule out a physical obstruction.

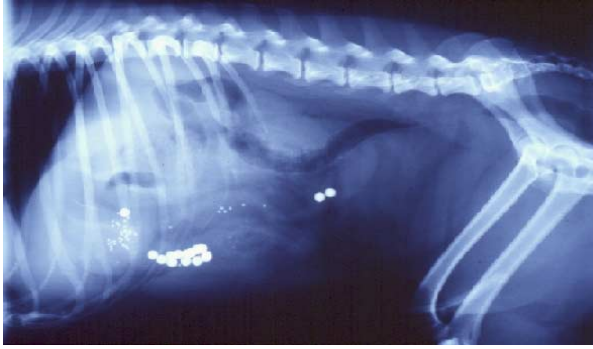
### **BIPS study - method**

The BIPS were given on an empty stomach because the dog was anorexic and the primary aim of the procedure was to rule out a physical obstruction rather than evaluate motility. They were administered early in the morning. The dog vomited 4 hours later losing some of the BIPS. Another set of BIPS was administered and left lateral and ventrodorsal radiographs were taken at a convenient time 7 hours later.



### **Legend:**

Survey radiograph. No convincing evidence of an obstruction can be seen.



**Legend:**

Lateral and ventrodorsal radiographs. The majority of the large BIPS have accumulated orad of an obstruction in the duodenum.

**BIPS study - interpretation**

The radiographs revealed a tight bunching of the majority of the BIPS in the proximal small intestine associated with "gravelling". These radiographs were diagnostic of a physical obstruction of the small intestine.

**Treatment**

Exploratory laparotomy revealed a peach stone in the caudal duodenum. This was successfully removed.

**Follow-up**

Recovery was uneventful.

**Comment**

This case demonstrates the classic BIPS radiographic pattern occurring with physical obstruction of the small bowel. The BIPS are tightly bunched in the small intestine at the site of the

obstruction. The accumulation of other indigestible material ("gravelling") at the same site as the BIPS and the dilated loop of small bowel provides firm supportive evidence of a bowel obstruction. The reason most of the small BIPS remain in the stomach was unknown but may have been due to chance or gastroduodenal reflux.

## **CASE 3 - A CAT WITH CHRONIC VOMITING FOLLOWING A SUBTOTAL COLECTOMY**

### **Clinical examination**

An 11-year-old DSH was presented to Massey University with a 1-month history of a declining appetite and an increasing frequency of vomiting. The cat had been presented 3 months previously with severe obstipation leading to a diagnosis of idiopathic megacolon syndrome. A subtotal colectomy was performed and the cat had been well for 2 months. Physical examination revealed a bright and alert cat that had lost considerable amounts of weight. Small amounts of soft feces were present in the colon but abdominal palpation was otherwise unremarkable. A CBC and serum chemistry profile were non-diagnostic. A BIPS study was performed to rule out a partial obstruction of the bowel.



### **Legend:**

Lateral radiographs of cat with a subtotal colectomy.

### **BIPS study - method**

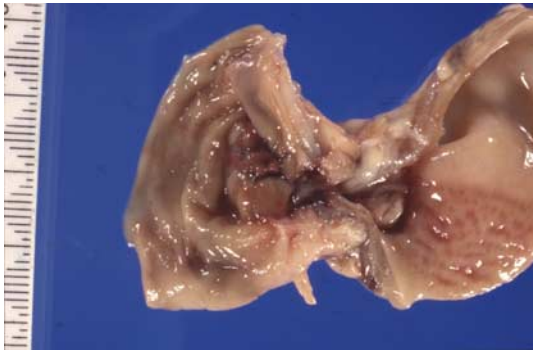
The BIPS were given on an empty stomach because the cat was anorexic and the primary aim of the study was to rule out an obstruction rather than to assess gastrointestinal motility. Left lateral and ventrodorsal radiographs were taken at a convenient time 12 hours later.

## **BIPS study - interpretation**

The radiographs revealed a bunching of the BIPS in a small intestinal loop in close proximity to the colon. Note the gravelling in the stagnant loop (i.e., accumulation of indigestible debris). These radiographs were diagnostic of a physical obstruction of the small intestine. It was considered most likely that a stricture had developed at the ileocolic anastomosis (i.e., where the ileum and remaining colon were sutured back together).

## **Outcome**

An exploratory laparotomy and surgical resection of the stricture was recommended but declined by the owner. The cat was euthanised and a stricture with a luminal diameter of 2-3 mm was confirmed at necropsy.



### **Legend:**

Stricture at the site of the anastomosis .

## **Comment**

This case demonstrates the classic BIPS radiographic pattern occurring with physical obstruction of the small bowel. The BIPS are bunched at the site of the obstruction. The accumulation of other indigestible material at the same site as the BIPS confirms the obstruction.

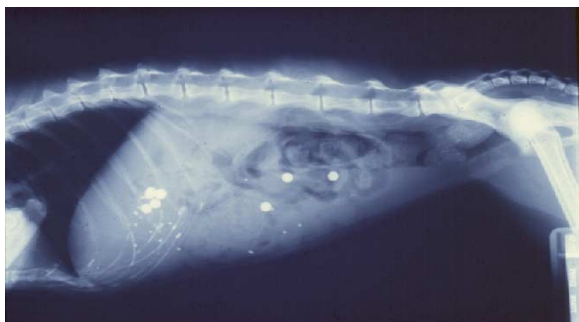
## **CASE 4 - A CAT WITH INTRACTABLE VOMITING AND** **AZOTEMIA**

### **Clinical examination**

A 13-year-old Siamese was presented to Massey University with a 2-week history of inappetence, weight loss, vomiting and polyuria/polydipsia. Physical examination revealed poor coat condition, muscle wasting and small kidneys. Blood work demonstrated a moderate azotemia (BUN and creatinine approximately 2 times normal) in association with a low urine specific gravity. A diagnosis of renal azotemia was made. The clinical signs were considered to be most likely due to uremia although it was acknowledged that the serum BUN and creatinine concentrations were not sufficiently high to be diagnostic of uremia. Diuresis and administration of chlorpromazine antiemetics failed to control the vomiting in spite of a 50 % reduction in the azotemia. A BIPS study was performed to rule out a concurrent physical obstruction or a dysmotility.

### **BIPS study - method**

The BIPS were given on an empty stomach because the cat was anorexic. Left lateral and ventrodorsal radiographs were taken at a convenient time 24 hours later.



#### **Legend:**

Delayed gastric emptying and orocolic transit (without bunching).

## **BIPS study - interpretation**

The radiographs revealed BIPS scattered throughout the GI tract with most still in the stomach and small bowel and only a few in the colon. A glance at the reference intervals for the gastric emptying rates and orocolic transit times of fasted healthy cats reveals that this cat's gastric emptying rate and orocolic transit time are markedly slowed. The scattered pattern of the markers suggests that the delay is most likely due to an adynamic ileus and not due to a physical obstruction.

## **Treatment**

The cat's antiemetics were changed to a prokinetic drug (metoclopramide – Reglan; Maxalon) which increased the bowel's motility and stopped the vomiting. A follow-up radiograph 12 hours later showed all BIPS in colon confirming the diagnosis of a dysmotility associated with uraemia and ruling out a concurrent obstruction.

## **Follow-up**

The cat was discharged on metoclopramide and dietary management and was continuing to do well at the time of writing.

## **Comment**

This case demonstrates the classic BIPS radiographic pattern occurring with functional obstruction of the gastrointestinal tract. The BIPS are scattered throughout the stomach and bowel. The gastric emptying and orocolic transit rates are slow as a result of the weak and ineffectual motility associated with adynamic ileus. It is important to note that this pattern does not rule out a physical obstruction of the bowel because physical obstructions can result in secondary adynamic ileus. For this reason, a follow-up radiograph was performed after the administration of the prokinetic drug. This radiograph revealed the BIPS had arrived in the colon, a location which ruled out physical obstruction of the upper gastrointestinal tract.

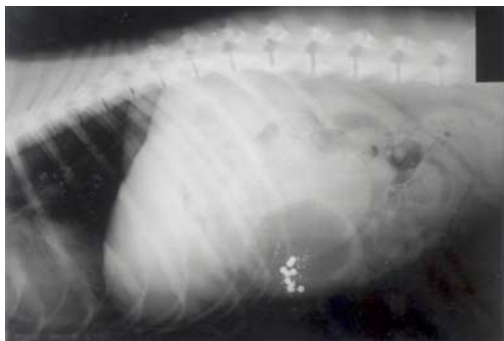
## **CASE 5 - A DOG WITH CHRONIC VOMITING**

### **Clinical examination**

A 7-year-old male dog was presented to Massey University with a 2 month history of vomiting and hematemesis. Surgery at the referring veterinarians had revealed a deep ulcer in the pyloric antrum in association with numerous *Helicobacter* organisms. The ulcer was resected and the dog treated with antibiotics. The response was poor. On presentation to Massey, the dog was vomiting large amounts of food 4-6 hours after eating. Physical examination, a CBC, and a serum chemistry profile were non-diagnostic. Delayed gastric emptying was suspected and a BIPS study was performed to confirm or rule out this possibility.

### **BIPS study - method**

The BIPS were given with Prescription Diet d/d (Hills Pet Products). The BIPS were given with food because the aim of the study was to determine if the gastric emptying rate of food was delayed. Prescription diet d/d was used because the gastric emptying rate of this diet and that of BIPS have been shown to be closely correlated. Lateral and ventrodorsal radiographs were taken 8 hours later.



#### **Legend:**

Lateral radiograph revealing a dilated pyloric antrum containing the BIPS.

## **BIPS study - interpretation**

The radiographs revealed that all the BIPS remained in the stomach, specifically in the pyloric antrum, which is the dilated thick-walled circular, structure surrounding the BIPS. A glance at the reference intervals showing the gastric emptying rates of BIPS in dogs fed Prescription Diet d/d reveals that this dog's gastric emptying rate is significantly delayed. Retention of BIPS in the stomach can be due to many different causes including pyloric stenosis, obstruction of the pylorus by a foreign body or tumor, primary gastric motility disorders (e.g., due to damage to the stomach's intrinsic nervous system), secondary gastric motility disorders (e.g., due to gastritis or electrolyte disturbances), generalized depression of gastrointestinal motility (adynamic ileus) or even a physical obstruction of the small bowel resulting in a secondary adynamic ileus. Obviously, further diagnostic steps were required.

## **Further Diagnostic Steps**

An endoscopy was performed. This revealed that the previous surgery to remove the ulcer had interfered with antral motility. Food was no longer being carried adequately to the pylorus but instead was remaining in the gastric body.

## **Treatment**

The dog underwent a Y-U pyloroplasty procedure which resulted in an immediate improvement in its clinical signs and gastric emptying rate (as confirmed by a follow-up BIPS study).

## **Follow-up**

Unfortunately, the dog died acutely several weeks after the surgery of unknown causes.

## **Comment**

This case demonstrates the classic BIPS radiographic pattern occurring with markedly delayed gastric emptying. This pattern is the least specific of the BIPS patterns. It indicates a serious gastrointestinal dysfunction but gives little indication as to the cause of that dysfunction. Therefore, the veterinarian must choose his or her next diagnostic steps carefully depending on which disorders he or she considers most likely. Further diagnostic steps of value include blood work to rule out systemic disorders; endoscopy, double-contrast or liquid gastrograms to detect ulcers, foreign bodies or tumors; and ultrasound to detect outflow obstructions. Ultimately, however, biopsy of the stomach is often required and hence endoscopy or exploratory laparotomy is usually necessary.

## **CASE 6 - A CAT WITH ACUTE VOMITING**

### **Clinical examination**

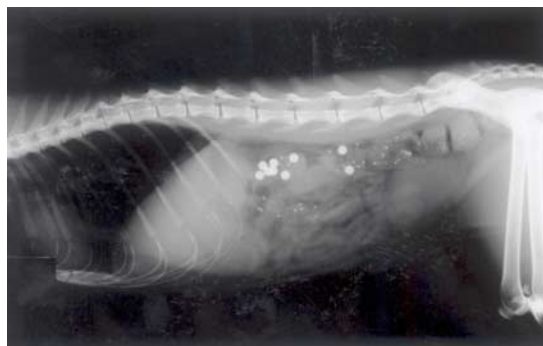
A young cat was presented to an evening emergency clinic with an acute onset of vomiting. The cat was bright and alert and hemodynamically stable but the clinician could palpate a tender area in the abdomen along with some gas-filled loops of bowel. The clinician was concerned about the possibility of an obstruction but did not have enough evidence to justify an exploratory surgery. She decided to place the cat on fluids and antibiotics and rule out a physical obstruction with a BIPS study.

### **BIPS study - method**

The BIPS were given on an empty stomach because the primary aim of the study was to rule out a physical obstruction. Radiographs were taken early the next morning.

### **BIPS study - interpretation**

The radiographs revealed that the BIPS were scattered throughout the ascending, transverse and descending colon. This effectively ruled out an obstruction and the cat was spared an unnecessary exploratory laparotomy.



Legend:

Lateral radiograph of the cat showing BIPS in ascending, transverse and descending colon.

## **Treatment**

Fluids and antibiotics were continued and the cat made a rapid and uneventful recovery.

## **Comment**

This case demonstrates the value of BIPS in ruling out an obstruction. Note on the lateral view the apparent bunching of the BIPS. This is due to collection of BIPS in the transverse colon (revealed by a VD radiograph - not provided). If a clinician is in doubt as to whether the BIPS are in the colon an air enema can be performed to outline the colon.