

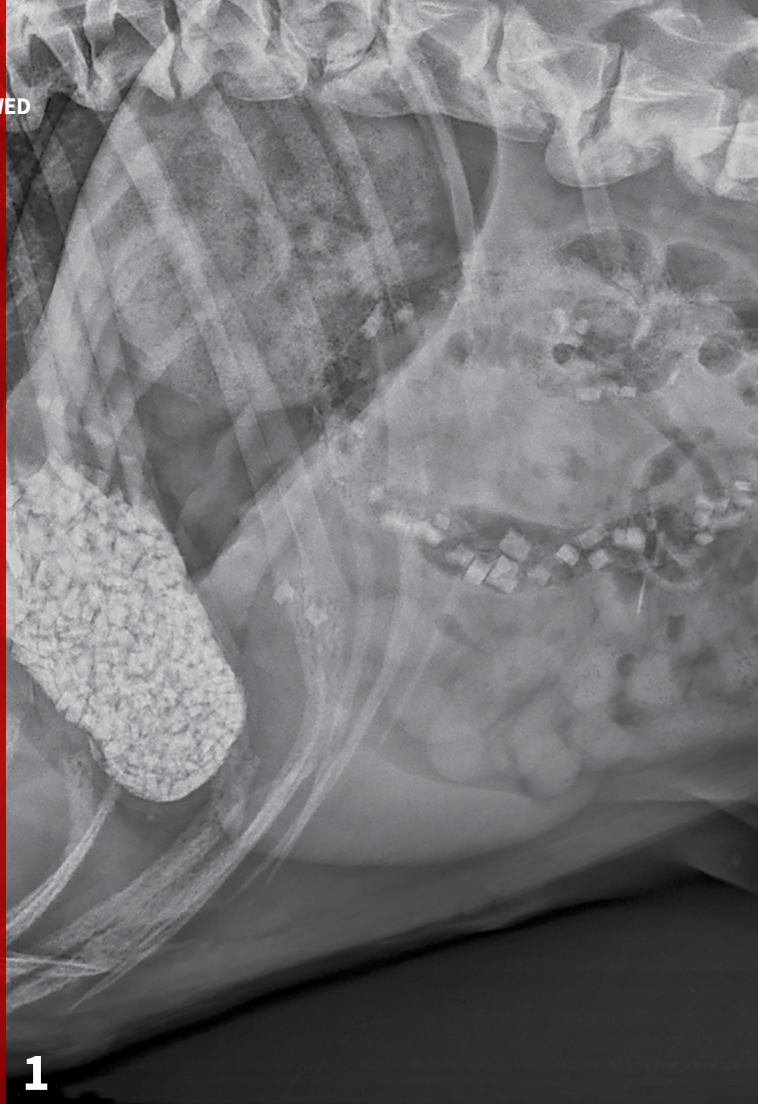
# Glass Ingestion in a Boxer: 1 Case, 2 Options

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▲ A right lateral abdominal radiograph taken approximately 24 hours after glass ingestion. Multiple, irregularly shaped mineral opacities are present within the stomach, small intestine, and colon.

## THE CASE

A 6-year-old castrated boxer is presented ≈24 hours after consuming a 3-lb pork roast and the glass top of a slow cooker. The owners report an episode of vomiting followed by an episode of diarrhea. The patient has a normal energy level with a mildly reduced appetite.

At presentation, the dog is bright and alert with normal vital signs. Mucous membranes are mildly hyperemic and moist with no evidence of oral ulcerations or masses. The patient is tense and nonpainful on abdominal palpation. On digital rectal examination, there are palpable pieces of tempered glass (each ≈10×10 mm) without evidence of blood.

CBC reveals a leukocytosis ( $19.34 \times 10^3/\mu\text{L}$ ; range, 5.10-14.00) characterized by a lymphocytosis ( $5.5 \times 10^3/\mu\text{L}$ ; range, 1.4-4.6) and a mature neutrophilia ( $13.10 \times 10^3/$

$\mu\text{L}$ ; range, 2.65-9.80) with a mild thrombocytopenia ( $171 \times 10^3/\mu\text{L}$ ; range, 147-243). A pancreatic-specific lipase is elevated ( $580 \mu\text{g/L}$ ; range, 0-200  $\mu\text{g/L}$ ) and consistent with pancreatitis. Abdominal radiographs (*Figures 1-3*) reveal a moderately distended stomach that contains a large number of irregularly shaped mineral opacities. Additional mineral opacities are present in multiple small intestinal segments as well as the colon. There is also a mild decrease in serosal detail in the mid-abdominal region.

You suspect pancreatitis and elect to admit the patient for hospitalization and supportive care.

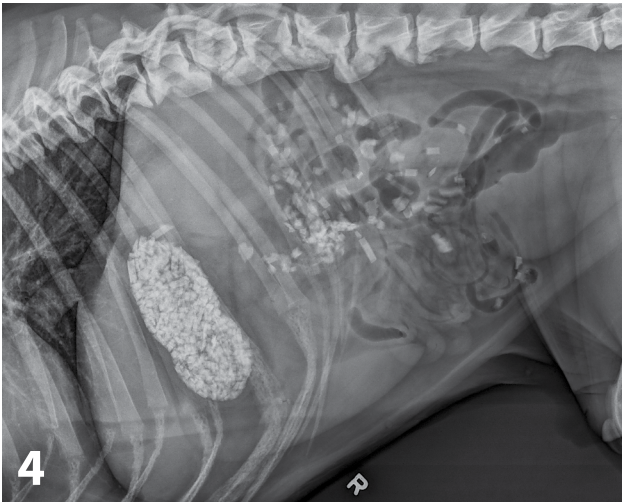
Abdominal radiographs, repeated 14 hours later, reveal minimal aboral movement of the mineral opacities (*Figures 4 and 5*).



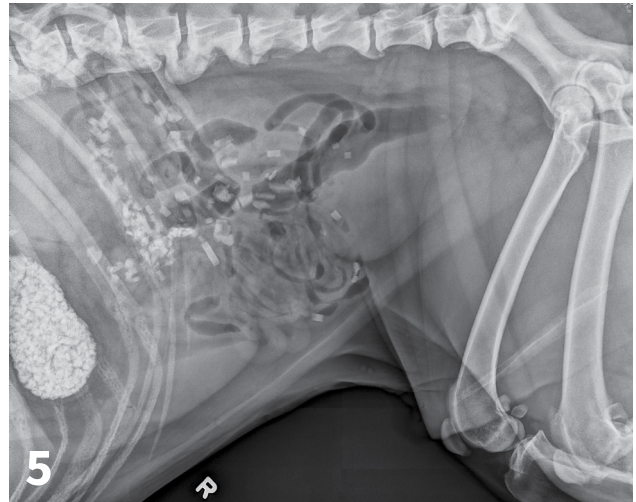
▲ A left lateral radiograph reveals multiple mineral opacities within the stomach, small intestines, and colon.



▲ An abdominal VD radiograph reveals multiple mineral opacities within the stomach, small intestines, and colon.



▲ A right lateral radiograph taken ≈38 hours after ingestion reveals minimal passage of material from the stomach into the small intestines.



▲ A right lateral abdominal radiograph shows a large amount of mineral foreign material in the stomach, small intestines, and large intestine. There is no evidence of obstruction.

## THE CHOICE IS YOURS ...

### CASE ROUTE 1

To hospitalize the patient for management of presumptive pancreatitis and foreign body ingestion without surgical intervention, turn to page 72.

### CASE ROUTE 2

To take the patient to surgery for a gastrotomy and enterotomies, turn to page 73.

**On digital rectal examination, there are palpable pieces of tempered glass without evidence of blood.**

## CASE ROUTE 1

You elect to manage the patient conservatively in hospital with gastroprotectants, IV fluid therapy, antiemetics, analgesics, and frequent enemas.

### Case Progression

An abdominal ultrasound collected on day 2 shows an enlarged, hypochoic pancreas surrounded by a hyperechoic rim. Multiple mineral opacities are present within the stomach and throughout the small intestine with no evidence of obstruction. The patient continues to pass soft stools with intermittent passage of glass pieces.

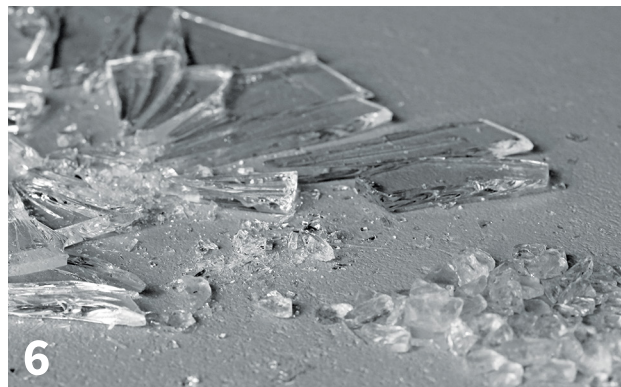
Abdominal radiographs repeated on days 4, 6, and 8 reveal continued movement of glass fragments out of the stomach and small intestines. A focused ultrasound repeated on day 8 shows adequate peristalsis and no evidence of obstruction along the GI tract. A decreased number of opacities are identified within the small intestines and stomach.

### Clinical Considerations

In this clinical scenario, the risks for leaving a large amount of glass in the intestines should be considered.

Of note, the lid of the slow cooker was made from *tempered glass* (vs standard or nontempered glass; **Figure 6**). This glass fragments into pieces with smooth edges, theoretically posing less risk for GI perforation than the sharp glass shards created with standard glass. Patients managed conservatively after ingestion of a foreign body should be monitored closely in hospital for signs of perforation and sepsis (eg, lethargy, abdominal pain, abdominal distension, vomiting, diarrhea, shock). Worsening signs warrant additional diagnostics, such as repeat imaging or abdominal fluid cytology and chemical analysis.

Pancreatitis management should also be considered for this patient. Ultrasound findings and an elevated



▲ Tempered glass is a type of safety glass designed to shatter into fragments with smoother edges as compared with standard glass.

pancreatic-specific lipase, combined with the history of dietary indiscretion, are highly suggestive of pancreatitis. Diagnosis of pancreatitis via ultrasound results has been reported to have a sensitivity of up to 68% in dogs<sup>1</sup> but can be highly variable based on the experience of the ultrasound operator and severity of lesions. Elevations in serum pancreatic lipase are approximately 82% sensitive for diagnosis of pancreatitis.<sup>2</sup>

In general, treatment of pancreatitis is supportive and includes IV fluid therapy, correction of electrolyte abnormalities, gastroprotectants, analgesics, and antiemetics. Prognosis with pancreatitis is difficult to predict given the variable severity of the disease. Mild cases are often self-limiting and can resolve without therapy. More severe cases can result in acute shock, sepsis, and disseminated intravascular coagulation. Patients that recover should avoid high-fat foods to prevent recurrence.<sup>2</sup>

### Outcome

The patient is discharged after 8 days with gastroprotectants. Recheck radiographs repeated 1 week following discharge show few remaining glass fragments.

### Your Choice's Implications

In this scenario, conservative management was elected. Although the outcome was successful, long-term hospitalization was financially costly.

## CASE ROUTE 2

You elect to take the patient to surgery because the amount of glass in the stomach seems unlikely to pass naturally and without serious consequences.

### Case Progression

An abdominal exploratory surgery is performed, and glass is palpated along the entire length of the GI tract. The intestines are diffusely hyperemic, and the pancreas is erythematous and edematous. Moderate splenomegaly is present.

A gastrotomy is performed with manual removal of the glass fragments using a bladder spoon (*Figure 7*). The gastric mucosa is closed with 3-0 PDS in a simple continuous pattern, and the rest of the gastric layers are closed using a continuous Cushing's pattern with 3-0 PDS. Contaminated instruments and gloves are replaced with those that have been sterilized, and the abdomen is lavaged with 3 L of warm saline. An omental pexy is performed over the gastrotomy site with 3-0 PDS to improve vascularity and provide a local seal.

The surgery is without immediate complications, and the patient is managed postoperatively on analgesics, gastroprotectants, antiemetics, and an appetite stimulant. Enemas are performed twice a day to facilitate passage of the remaining glass. The patient is hyporexic postoperatively but otherwise remains largely free of clinical signs for pancreatitis.

### Clinical Considerations

In this clinical scenario, surgical removal is elected to avoid continued, prolonged GI irritation and provide more rapid resolution. Glass ingestion has rarely been documented in the veterinary literature; in human medicine, reports of glass ingestion most commonly occur in young children or psychiatric patients. Reported complications include retropharyngeal abscessation, mediastinitis,<sup>3</sup> esophageal perforation,<sup>4</sup>



▲ A photo taken intraoperatively shows glass fragments removed via gastrotomy.

bowel perforation with secondary peritonitis,<sup>5</sup> hematemesis, and abdominal pain.<sup>6</sup>

Surgical or endoscopic removal, considered when conservative management is risky or fails, is pursued in all cases of GI perforation. Factors such as the location and type of foreign body, time since ingestion, severity of clinical signs, and evidence of bleeding should be taken into consideration.<sup>6</sup> Reports in veterinary medicine are largely limited to avian patients.<sup>7</sup> In the authors' experience, the decision to proceed with surgical removal is largely determined on a case-by-case basis and is based on examination findings, abdominal radiographs, ultrasound, and owner preference.

### Outcome

The patient does well postoperatively and is discharged 24 hours later on analgesics and gastroprotectants.

### Your Choice's Implications

In this scenario, risks of surgery and anesthesia should be considered. In 1 study of 499 dogs with foreign bodies, the overall survival rates were good, with 96% surviving to discharge.<sup>8</sup> Causes for mortality include septic peritonitis, acute respiratory distress or systemic inflammatory response syndrome, intestinal infarcts, or euthanasia because of financial limitations.

In this scenario, the cost of surgery and brief hospitalization was less than in Case Route 1. However, extensive hospitalization for surgical complications or worsening pancreatitis would have resulted in a significant estimate increase. ■

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# NexGard® (afoxolaner) Chewables

**CAUTION:** Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

**Description:** NexGard® (afoxolaner) is available in four sizes of beef-flavored, soft chewables for oral administration to dogs and puppies according to their weight. Each chewable is formulated to provide a minimum afoxolaner dosage of 1.14 mg/lb (2.5 mg/kg). Afoxolaner has the chemical composition 1-Naphthalenecarboxamide, 4-[5-[3-chloro-5-(trifluoromethyl)-phenyl]-4,5-dihydro-5-(trifluoromethyl)-3-isoxazolyl]-N-[2-oxo-2-[(2,2,2-trifluoroethyl)amino]ethyl].

**Indications:** NexGard kills adult fleas and is indicated for the treatment and prevention of flea infestations (*Ctenocephalides felis*), and the treatment and control of Black-legged tick (*Ixodes scapularis*), American Dog tick (*Dermacentor variabilis*), Lone Star tick (*Amblyomma americanum*), and Brown dog tick (*Rhipicephalus sanguineus*) infestations in dogs and puppies 8 weeks of age and older, weighing 4 pounds of body weight or greater, for one month.

**Dosage and Administration:** NexGard is given orally once a month, at the minimum dosage of 1.14 mg/lb (2.5 mg/kg).

**Dosing Schedule:**

Body Weight	Afoxolaner Per Chewable (mg)	Chewables Administered
4.0 to 10.0 lbs.	11.3	One
10.1 to 24.0 lbs.	28.3	One
24.1 to 60.0 lbs.	68	One
60.1 to 121.0 lbs.	136	One
Over 121.0 lbs.	Administer the appropriate combination of chewables	

NexGard can be administered with or without food. Care should be taken that the dog consumes the complete dose, and treated animals should be observed for a few minutes to ensure that part of the dose is not lost or refused. If it is suspected that any of the dose has been lost or if vomiting occurs within two hours of administration, redose with another full dose. If a dose is missed, administer NexGard and resume a monthly dosing schedule.

**Flea Treatment and Prevention:** Treatment with NexGard may begin at any time of the year. In areas where fleas are common year-round, monthly treatment with NexGard should continue the entire year without interruption. To minimize the likelihood of flea reinfestation, it is important to treat all animals within a household with an approved flea control product.

**Tick Treatment and Control:** Treatment with NexGard may begin at any time of the year (see **Effectiveness**).

**Contraindications:** There are no known contraindications for the use of NexGard.

**Warnings:** Not for use in humans. Keep this and all drugs out of the reach of children. In case of accidental ingestion, contact a physician immediately.

**Precautions:** The safe use of NexGard in breeding, pregnant or lactating dogs has not been evaluated. Use with caution in dogs with a history of seizures (see **Adverse Reactions**).

**Adverse Reactions:** In a well-controlled US field study, which included a total of 333 households and 615 treated dogs (415 administered afoxolaner; 200 administered active control), no serious adverse reactions were observed with NexGard. Over the 90-day study period, all observations of potential adverse reactions were recorded. The most frequent reactions reported at an incidence of > 1% within any of the three months of observations are presented in the following table. The most frequently reported adverse reaction was vomiting. The occurrence of vomiting was generally self-limiting and of short duration and tended to decrease with subsequent doses in both groups. Five treated dogs experienced anorexia during the study, and two of those dogs experienced anorexia with the first dose but not subsequent doses.

**Table 1: Dogs With Adverse Reactions.**

	Treatment Group			
	Afoxolaner		Oral active control	
	N <sup>1</sup>	% (n=415)	N <sup>2</sup>	% (n=200)
Vomiting (with and without blood)	17	4.1	25	12.5
Dry/Flaky Skin	13	3.1	2	1.0
Diarrhea (with and without blood)	13	3.1	7	3.5
Lethargy	7	1.7	4	2.0
Anorexia	5	1.2	9	4.5

<sup>1</sup>Number of dogs in the afoxolaner treatment group with the identified abnormality.  
<sup>2</sup>Number of dogs in the control group with the identified abnormality.

In the US field study, one dog with a history of seizures experienced a seizure on the same day after receiving the first dose and on the same day after receiving the second dose of NexGard. This dog experienced a third seizure one week after receiving the third dose. The dog remained enrolled and completed the study. Another dog with a history of seizures had a seizure 19 days after the third dose of NexGard. The dog remained enrolled and completed the study. A third dog with a history of seizures received NexGard and experienced no seizures throughout the study.

To report suspected adverse events, for technical assistance or to obtain a copy of the MSDS, contact Merial at 1-888-637-4251 or [www.merial.com](http://www.merial.com). For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at <http://www.fda.gov/AnimalVeterinary/SafetyHealth>.

**Mode of Action:** Afoxolaner is a member of the isoxazoline family, shown to bind at a binding site to inhibit insect and acarine ligand-gated chloride channels, in particular those gated by the neurotransmitter gamma-aminobutyric acid (GABA), thereby blocking and post-synaptic transfer of chloride ions across cell membranes. Prolonged afoxolaner-induced hyperexcitation results in uncontrolled activity of the central nervous system and death of insects and acarines. The selective toxicity of afoxolaner between insects and acarines and mammals may be inferred by the differential sensitivity of the insects and acarines' GABA receptors versus mammalian GABA receptors.

**Effectiveness:** In a well-controlled laboratory study, NexGard began to kill fleas four hours after initial administration and demonstrated >99% effectiveness at eight hours. In a separate well-controlled laboratory study, NexGard demonstrated 100% effectiveness against adult fleas 24 hours post-infestation for 35 days, and was > 93% effective at 12 hours post-infestation through Day 21, and on Day 35. On Day 28, NexGard was 81.1% effective 12 hours post-infestation. Dogs in both the treated and control groups that were infested with fleas on Day -1 generated flea eggs at 12- and 24-hours post-treatment (0-11 eggs and 1-17 eggs in the NexGard treated dogs, and 4-90 eggs and 0-118 eggs in the control dogs, at 12- and 24-hours, respectively). At subsequent evaluations post-infestation, fleas from dogs in the treated group were essentially unable to produce any eggs (0-1 eggs) while fleas from dogs in the control group continued to produce eggs (1-141 eggs).

In a 90-day US field study conducted in households with existing flea infestations of varying severity, the effectiveness of NexGard against fleas on the Day 30, 60 and 90 visits compared with baseline was 98.0%, 99.7%, and 99.9%, respectively. Collectively, the data from the three studies (two laboratory and one field) demonstrate that NexGard kills fleas before they can lay eggs, thus preventing subsequent flea infestations after the start of treatment of existing flea infestations.

In well-controlled laboratory studies, NexGard demonstrated >97% effectiveness against *Dermacentor variabilis*, >94% effectiveness against *Ixodes scapularis*, and >93% effectiveness against *Rhipicephalus sanguineus*, 48 hours post-infestation for 30 days. At 72 hours post-infestation, NexGard demonstrated >97% effectiveness against *Amblyomma americanum* for 30 days.

**Animal Safety:** In a margin of safety study, NexGard was administered orally to 8 to 9-week-old Beagle puppies at 1, 3, and 5 times the maximum exposure dose (6.3 mg/kg) for three treatments every 28 days, followed by three treatments every 14 days, for a total of six treatments. Dogs in the control group were sham-dosed. There were no clinically-relevant effects related to treatment on physical examination, body weight, food consumption, clinical pathology (hematology, clinical chemistry, or coagulation tests), gross pathology, histopathology or organ weights. Vomiting occurred throughout the study, with a similar incidence in the treated and control groups, including one dog in the 5x group that vomited four hours after treatment.

In a well-controlled field study, NexGard was used concomitantly with other medications, such as vaccines, anthelmintics, antibiotics (including topicals), steroids, NSAIDs, anesthetics, and antihistamines. No adverse reactions were observed from the concomitant use of NexGard with other medications.

**Storage Information:** Store at or below 30°C (86°F) with excursions permitted up to 40°C (104°F).

**How Supplied:** NexGard is available in four sizes of beef-flavored soft chewables: 11.3, 28.3, 68 or 136 mg afoxolaner. Each chewable size is available in color-coded packages of 1, 3 or 6 beef-flavored chewables.

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1050-4493-03  
Rev. 1/2015

