

The Expanding Threat of POLYURETHANE ADHESIVE INGESTION

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Glue left unattended can
attract a curious dog.



Chaffield, a 9-month-old neutered Labrador retriever weighing 44 lb (20 kg), presented to the veterinary clinic with a moderate degree of vomiting that had been ongoing for 3 hours. The previous night, the dog had ingested the contents of a 2-oz bottle of Gorilla Brand Premium Glue (Lutz File & Tool Co, Cincinnati, OH), which contains diphenylmethane diisocyanate as the active ingredient. On physical examination, the dog's stomach was distended and painful. A large, firm mass was palpable in the cranial abdomen. A lateral abdominal survey radiograph revealed a mottled, soft tissue foreign body within the stomach lumen. A gastrotomy was performed, and a 6-cm, friable aggregate of solidified glue was surgically removed. Chaffield recovered completely and uneventfully from the surgery.

Polyurethane adhesives are a type of common household product that dogs may ingest because of their indiscriminate chewing and eating habits. Although exposure in cats is possible, cats tend to be more discriminate eaters. Most cases of glue ingestion result only in gastrointestinal upset; however, expanding wood glues have been associated with foreign bodies in dogs.¹ There are several different brands of polyurethane adhesive that can form a gastric foreign body when

ingested. The most common brands in the cases on which the ASPCA Animal Poison Control Center has consulted are Gorilla Brand Premium Glue and Elmer's Probond (diphenylmethane diisocyanate; Elmer's Products, Inc, Columbus, OH).²

Other household products containing similar ingredients may pose a threat if the pet gains access to these products. These products include expanding adhesives, expanding spray foam, paints, and floor and wood fin-

ishes. However, to date, gastric foreign bodies have been reported only in dogs that ingested household polyurethane adhesives containing diphenylmethane diisocyanate.

MECHANISM OF ACTION

Most cases of adhesive exposure occur when dogs bite through plastic containers. Dogs chewing on bottles containing as little as 2 oz of the adhesive have developed gastric foreign body obstruction.¹ The adhesive has been reported to form an expanded, friable ball of glue in the gastric lumen. The warm environment and the moisture in the stomach may aid in this expansion. In one report, surgery to remove the obstruction was required in eight of 10 cases of dogs that had ingested polyurethane glue.¹ Not all dogs exposed to these products develop foreign bodies. Dermal exposure is also a possibility. Fortunately, contact with the skin or haircoat usually results in mild irritation or inflammation at worst.³

CLINICAL SIGNS

Clinical signs usually develop within

12 hours of ingestion and may include vomiting with possible hematemesis (vomiting of blood), anorexia, lethargy, abdominal distention and pain, and tachypnea. Secondary dehydration is possible in patients with protracted vomiting. If a foreign body obstruction exists, signs may persist until surgery is performed, depending on the size of the mass. The mass may or may not be detectable on abdominal palpation. Although not usually severe, gastric hyperemia and ulceration have been noted during surgery. In one case in which veterinary intervention was delayed for 9 days after ingestion, a dog developed gastric perforation that was successfully corrected with surgery.² In patients in which a foreign body has not developed, gastrointestinal signs generally resolve within 3 to 9 days.²

DIAGNOSIS

Radiography is advised if the dog becomes symptomatic following oral exposure to the glue. Evidence of a foreign body obstruction has been noted on radiography as early as 4 hours after ingestion, but radiographs taken 24 hours after ingestion are more reliable. Reported findings include gastric dilation and a large, mottled, radiopaque density in the

gastric lumen that resembles a stomach full of dog food kibble.¹ Contrast techniques are recommended if plain films are inconclusive.

DECONTAMINATION

Because formation of a gastric foreign body is thought to begin within minutes of ingestion, induction of emesis should be considered only if the exposure just occurred. Because of the potential for an expanding mass of glue to become lodged in the esophagus, much caution should be exercised if induction of emesis is attempted. Expansion of the adhesive in the esophagus may cause serious complications. Dilution with water or administration of activated charcoal is also not advised because more rapid formation of a foreign body may occur by providing liquid for the adhesive to absorb.

Dermal exposures to polyurethane adhesives should be managed by washing the exposed area thoroughly with a liquid dishwashing detergent. Once the glue cures, skin irritation is minimal and residual glue will usually flake off the haircoat or skin over the next several days. Ingestion of cured glue from the haircoat is not expected to cause any serious problems.

TREATMENT

The owner should be instructed to take away the dog's food for at least 6 hours following exposure. The dog can be given water after 3 or 4 hours. The dog should be monitored for clinical signs (e.g., vomiting) over the next 24 hours. Administration of sucralfate and famotidine is recommended to protect the gastric lining. If signs develop, IV fluids may be required to maintain hydration. Gastrotomy is indicated if foreign body obstruction is suspected. Complete recovery is expected, unless surgical complications arise.

CONCLUSION

Diphenylmethane diisocyanate may not be listed on the label of all polyurethane expandable products. Products that contain expandable polyurethane adhesives should be considered to have the potential to cause gastric foreign body obstruction if ingested. In cases of polyurethane adhesive ingestion, technicians should be advised to warn owners that it only takes a small amount of the glue to cause very expansive results.

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3. Lewis R, Sullivan JB: Toxic hazards of plastic manufacturing, in Sullivan JB, Krieger GR (eds): *Hazardous Materials Toxicology: Clinical Principles of Environmental Health*. Baltimore, Williams & Wilkins, 1992, pp 510-513. VI



▲ Radiograph of a dog that ingested polyurethane adhesive. Note the expanded ball of glue in the distended stomach (arrow). (From Horstman CL, Eubig PA, Khan SA, Selcer BA: Gastric outflow obstruction after ingestion of wood glue in a dog. *JAAHA* 39:47-51, 2003; with permission.)