CASTOR BEAN TOXICITY
One Mean Bean

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The ASPCA® Animal Poison Control Center is hosting a free online toxicology CE course on the veterinary support personnel network on October 13 and 20 from 9:30 AM to 11:30 AM (ET). Register at http://www.vspn.org.

CASTOR BEAN PLANT

The castor bean plant, R. communis, is a large shrublike herb that is native to the tropics and cultivated in parts of the United States to produce castor oil, which is used medicinally and industrially. It is also an ornamental plant (generally outdoors). In the tropics, the plant may reach 30 to 40 feet in height. The plant has become naturalized in the southern United States due to mild winters and may grow 3 to 15 feet tall.1 There are many varieties of R. communis, but most plants become tree-like with stout, fibrous roots and soft, woody stems. The leaf stalks are long and red or greenish. The leaves are large and notched into 5 to 11 pinnate lobes with toothed margins. The oval seedpods are covered with spines. The seeds are elliptical, glossy, mottled (black, brown, and gray) or white, and 1 to 2 cm long. These attractive seeds are used in craft projects (e.g., handmade jewelry) and musical instruments (e.g., maracas).2 This plant is used to repel moles from gardens and lawns and is sometimes referred to as mole bean. Other common names for R. communis include palma christi, wonder banana, jequirity bean, or the maraca.3

TOXICITY

The toxic principle, ricin, is present in the entire castor bean plant but is most concentrated in the seeds.4 The toxic principle, ricin, is present in the entire castor bean plant but is most concentrated in the seeds, comprising up to 3% of the seed weight.5 Ricin is a toxic glycoprotein that is water-soluble (see Table 1). Therefore, ricin is not found in castor oil.6 Laboratory tests indicate that ricin is one of the most toxic compounds of plant origin, but heat and aging reduce its toxicity. Ricin affects the body at the cellular level, causing cell death after protein synthesis stops.7 It is believed that ricin is released from the castor bean when mastication occurs and the seed coat is disrupted. Therefore, beans that are swallowed whole may not produce clinical signs.8 Ingestion of one castor bean in a companion animal is potentially life threatening.9 In addition to direct toxicity, castor beans are highly allergenic and can cause dermal and systemic hypersensitivity reactions.10

CLINICAL SIGNS

When ricin toxicity occurs, the cells of the gastrointestinal (GI) tract are destroyed, leading to potentially severe GI irritation that may progress to hemorrhagic gastroenteritis.11 Signs often occur within 6 hours of exposure but may begin as late as 24 to 48 hours after exposure. Signs after ingestion may include vomiting (with or without blood), depression, diarrhea (with or without blood), abdominal pain, anorexia, weakness, hyperthermia, ataxia, hypersalivation, recumbency, tachycardia, convulsions, and even death (often from hypovolemic shock).12,13 In a survey of 98 incidents of R. communis ingestion in dogs, 9% of the incidents ended in death or euthanasia.12 Postmortem evaluation indicated that multiple organs (i.e., heart, stomach, lungs, liver, kidneys, pancreas) are affected by ricin.14

TREATMENT

When exposure to R. communis occurs, early decontamination is recommended. In animals without clinical signs, an appropriate emetic should be administered after giving a soft meal. Activated charcoal is also beneficial and should be given with a cathartic, such as sorbitol, provided the animal does not have diarrhea. Because of its potential for inhibiting GI healing, activated charcoal is contraindicated in animals exhibiting hemorrhagic gastroenteritis. Stabilization of a symptomatic animal is crucial. If seizures are occurring, diazepam may be administered. Intravenous lactated Ringer’s solution is recommended to help prevent or treat hypovolemia and maintain hydration and electrolyte balance. If hypovolemia is present, blood replacement therapy may be indicated. GI protectants (e.g., sucralfate or kaolin–pectin) and cimetidine, famotidine, or ranitidine will help protect the GI tract until healing can occur. Other symptomatic care may include antiemetics. Baseline CBC, serum chemistries, and electrolyte levels should be obtained to assess clinical status and potential organ damage as toxicosis progresses.

PROGNOSIS

The prognosis for castor bean toxicity is promising if decontamination and treatment are implemented soon after exposure. The prognosis is guarded if an animal is already symptomatic when presented.

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REFERENCES


TOXICOLOGY BRIEF

Veterinary Technician
August 2002

Veterinary Technician
August 2002

Case Studies

Case 1

A veterinarian called the ASPCA Animal Poison Control Center (APCC) regarding two 4-month-old collie-mix dogs that were both exposed to R. communis about 13 hours earlier. One dog was vomiting and had a bloody stool, both of which began 4 hours after exposure. Chewed castor beans were observed in the vomitus. The dog then went into shock. The APCC veterinarian discussed toxicity, possible signs, and associated risks with the attending veterinarian and recommended aggressive therapy for both dogs. Despite treatment, the symptomatic dog died approximately 26.5 hours after the exposure. Shortly thereafter, the second dog became symptomatic. Aggressive treatment was continued, and the dog recovered 2 days after its signs began.

Case 2

A pet owner called the ASPCA APCC because he thought that his 6-month-old English springer spaniel may have ingested some castor bean seeds more than 24 hours earlier. The owner wanted to know if the castor beans were causing the dog to vomit. The APCC veterinarian recommended that the dog be taken to a veterinarian for intensive care. Approximately 2 hours later, the dog’s veterinarian called the APCC. The APCC veterinarian recommended symptomatic and supportive care, including GI protectants and intravenous fluids. The attending veterinarian implemented the recommended therapy, and the dog recovered completely.

GRAPES OF WRATH?

There have been reports that indicate a connection, the toxic principle of grapes/raisins is currently unknown. Dog owners and veterinary staff who suspect an exposure of this kind are advised to contact the ASPCA Animal Poison Control Center to report the incident and obtain current treatment recommendations. Hotline: 888-4ANI-HELP (888-426-4435) or 900-443-0000.

Just one castor bean (from the plant, handmade jewelry, or a maraca) is enough to kill a cat or dog.