Utility of Upper Gastrointestinal Endoscopy for Management of Patients with Roundup® Poisoning

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Introduction: Roundup® is a herbicide widely used in Japan for gardening and agriculture. Many preparations of this herbicide are available, containing various amounts of glyphosate (N-
[phosphonomethyl] glycine), surfactant, and water. The toxicity of herbicide derives from the glyphosate and surfactant [1,2], with mortality rates following its intentional ingestion reported to range from 3.2% to 29% [3,4]. Patients poisoned with these preparations generally receive symptomatic and supportive management [5]. Although gastrointestinal decontamination, including gastric lavage, is not performed routinely [6,7], the retrieval of residual toxic contents from the stomach may benefit patients. Direct observation of gastric residual contents by upper gastrointestinal endoscopy may reveal the need for gastric decontamination [8]. Endoscopy in patients poisoned with liquid herbicide may be useful for assessing gastric residual contents and mucosal damage, as well as for direct retrieval of the toxic agent by aspiration.

Case Report: A 73 year old, 40 kg female with a history of depression was transported to our emergency room by ambulance 1 h after attempting suicide by ingesting 100 ml Roundup, which contains 48% glyphosate-potassium, and 52% surfactant and water. This volume was below a fatal dose (<5000 mg/kg), but may have caused organ dysfunction and mucosal damage. After confirming respiratory and circulatory stability and after obtaining informed consent from the patient, endoscopy (XQ 260; Olympus, Tokyo, Japan) was performed in the emergency room. About 80 ml of herbicide in the stomach were aspirated endoscopically with only mild erosion observed in the mucosa of the stomach. The patient was able to resume oral intake 2 days after endoscopy and was discharged without any complications on day 5.

Conclusion: Endoscopy may be useful in cases of liquid poisoning including, Roundup, both to determine the amount of residual toxin and to remove it from the stomach.
Discussion

Roundup®, a trade name for a herbicide containing various formulations of glyphosate salts, is widely used worldwide for agricultural purposes. The herbicide ingested by our patient contained 48% potassium glyphosate salts. Glyphosate has an oral LD50 >5000 mg/kg in animals. Our patient had ingested 1200 mg/kg of glyphosate. Although below a fatal dose, the volume [9] and concentrations [10] put her at risk factor for severe toxic effects, including gastric erosion, renal dysfunction, hepatic impairment and shock [11]. Furthermore the surfactant used in this product could not be determined.

Although gastric lavage for gastrointestinal decontamination is not performed routinely in these patients [12], the need to retrieve any residual toxic substances in the stomach is unclear. A three-step method of evaluating the need for gastrointestinal decontamination has been proposed [13], with treatment decisions based on assessing the risk of poisoning and the immediate and long-term benefits and risks of the decontamination procedure. Endoscopy was previously used in the diagnosis and treatment by gastrointestinal decontamination of a patient with gastric bezoars [14]. Because the herbicide ingested by our patient is a liquid, it could be retrieved by aspiration using endoscopy. Endoscopy thus confirmed the gastric contents, with endoscopic aspiration facilitating gastric lavage and preventing further passage of toxic substances into the small bowel. Furthermore endoscopy could estimate the erosion of the stomach, not only improving patient outcomes but avoiding hospital admission. Endoscopy in poisoning patients should only be used after airway protection. Although there is little clinical evidence on the effectiveness of gastric lavage for managing patients with liquid poisoning, we found that endoscopy confirmed the presence of residual substances, and also facilitated the clearance of residue from the stomach.

Conclusion

Endoscopy may be useful in patients with liquid poisoning, including Roundup, both for determining the amount of residual substance and for removing it from the stomach.

References


