



Emergency and Medical Management of Accidental Ingestion of Yellow Phosphorus-based Rat Bait in a Dog

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Abstract

Accidental ingestion of toxicant/poison is common issues in the pets, such kind of a case of one and half year-old Mongrel dog with the history of accidental ingestion of rat kill paste (Ratol@TM) about 2 hrs back, presented to the Veterinary Clinical Complex, VCRI, Orathanadu. Clinical examination revealed panting, tachycardia, dilated pupil and vomiting. Dog was provided with support was done and gastric lavage was done, followed by dog was kept in CCU for further monitoring. Hematology revealed mild anemia. Serum biochemical and blood gas analysis were within the reference interval. Dog was stabilized with fluids, antibiotics, antiemetic and provided supportive care. Acetylcysteine was initiated as protective measures to prevent acute hepatic damage. Further fluid therapy and supportive care continued for 6 hrs and dog improved by the 3rd hour onwards. The dog was successfully recovered with its normalcy. This case documented recovery followed emergency care which was instituted within 2 hrs.

Keywords: Ratol@TM Paste; Rodenticide; Yellow Phosphorus; Acetylcysteine; Gastric Lavage

Introduction

Accidental poisoning in pets is most frequently encountered problem due to over-the-counter medications and use of toxicants for the control of pest, flies, cockroaches and rodents in the household, kitchen, yard and garden also chance to acquire toxicity in pets [1-3]. Rodenticides are commonly using compound to control rodent in household and food/fodder storage unit, among the various types of rodenticides Yellow Phosphorus based rodenticides are commercially available as bait and it's highly fatal to human as well as animals when consumed accidentally or deliberately [4]. Yellow Phosphorus is rapidly absorbed from the gastrointestinal tract and metabolized in liver further it causes multi organ failure [5]. Oral lethal dose of Yellow Phosphorus in dogs is 3-6 mg per kg

bwt [6]. The commonly reported rodenticide poisoning in dogs is due to Warfarin, but Phosphorous based rodenticide poisoning in pets were not well documented. Hence, the present case was documented accidental ingestion of yellow Phosphorous based Ratol paste in a dog and its successful medical management.

Materials and Methods

The present case was recorded at Emergency and Critical Care Medicine Unit of Veterinary Clinical Complex, Veterinary College and Research Institute, Orathanadu. A one and half year-old Mongrel dog was presented with the history of accidental ingestion of rat kill paste (Ratol@TM) about 2 hrs back and owner brought the Ratol paste (3% Phosphorous) which was eaten by dog. Clinical findings revealed dilated pupil, panting, tachycardia and vomiting.

As Rat bait poisoning was diagnosed, the dog was shifted to Critical Care Unit.

Emergency care: Initially animal was sedated with Inj. Xylazine @ 1.1.mg/kg and Inj. Diazepam @ 0.5mg/kg IV to institute respiratory support with endotracheal intubation. Gastric lavage was done with diluted potassium permanganate and stomach contents were evacuated. Dog was kept under fluid therapy and supportive care and dog was kept in CCU for further monitoring. Blood sample was collected to evaluate hemato-biochemical changes and Arterial blood was collected to assess blood lactate by Point of care handheld Arterial blood gas analyzer (Abbott I-STAT). FAST abdominal ultrasound was performed to check abdominal abnormalities. Dog was stabilized with fluids Inj. Ringers lactate, Inj. Benzyl penicillin @ 10000 IU/kg IV, Inj. Ondansetron @ 0.5 mg/kg IV, Inj. Ranitidine @ 2 mg/kg IM along with supportive therapy Inj. Acetylcysteine @ 10 mg/kg IV was initiated as protective measures for acute hepatic damage. Further fluid therapy and supportive care continued for 6 hrs and dog was improved by the 3rd hour onwards.

Results and Discussion

Most of the pets accidentally get poisoned at home itself, as they sometimes eat things like repellants, paints, rodenticides and household cleaners. In the present case, the dog had accidental ingestion of rat bait paste and it was managed successfully. According to the authors knowledge, there is no report on accidental ingestion of Yellow Phosphorous based (Ratol @TM) poisoning in a dog. RATOL is a popular brand of yellow phosphorous which is freely available in the form of pastes containing 2-5% of yellow phosphorous in India [7]. There is lack of reference for dogs with Yellow Phosphorous poisoning, author cited literatures of human cases of Yellow Phosphorous poisoning, because and the pharmaco-toxicological effects between human and dogs are same.

Yellow phosphorous poisoning is common in children as the paste is mistaken for toothpaste, or bread smeared with this paste as bait could be accidentally consumed [8,9]. Ingestion of fireworks is another common mode of poisoning in Southeast Asia, commonly seen in children and young adults [10].

Yellow Phosphorous is a corrosive agent which rapidly absorbed in gastrointestinal tract and production of phosphoric acid leads severe erosion and further accumulated in tissues mainly in liver

and directly causes tissue damage due to the production of free radicals [11,12]. Mohideen and Kumar [9] reported that there is no specific antidote for Phosphorous poisoning and only symptomatic treatment protocols like early decontamination of poisoning by gastric lavage with 1:5000 potassium permanganate followed by activate charcoal administration and supportive care [13] and the present case also managed with similar ways.

N-acetylcysteine is an antioxidant, hepatoprotective and reduces tissue damage caused by toxicants which improves by mitochondrial energy metabolism and acts as a scavenger of oxygen free radicals [14]. Nalabothu., *et al.* [15] and Shukkoor., *et al.* [16] reported N-acetylcysteine administration gives very good prognosis in yellow Phosphorous induced hepatic injury. Hence, the present case also acetylcysteine was administered to prevent hepatic damage due to ratol paste poisoning.

Parameters	Measured value	Reference range	
Hb (g/dL)	7.4	11.9-18.9	Fielder [17] (MSD Veterinary Manual)
PCV (%)	32	35-57	
RBC (x 10 ⁶ ul)	3.05	4.95-7.87	
WBC (x 10 ³ ul)	8.15	5-14.1	
BUN (mg/dL)	16	8-28	
Creatinine (mg/dL)	0.76	0.5-1.7	
ALT (mg/dL)	15	10-109	Waddell [18] and Humm [19]
pH	7.47	7.32-7.45	
PCO ₂ (mmHg)	22.5	40-50	
PO ₂ (mmHg)	62	30-42	
Beecf (mmol/L)	-7	-4-+4	
HCO ₃ (mmol/L)	19.5	20-24	Thorneloe., <i>et al.</i> [20]
Lac (mmol/L)	1.42	Less than 2.9	

Table 1: Changes in hematobiochemical and blood gas levels due to yellow phosphorus-based rat bait in a mongrel dog.

In the present case biochemical and blood gas assay revealed normalcy. Brent, *et al.* [11] reported that increased liver enzymes will be appreciated after 2-3 hrs of poisoning due to Phosphorous intoxication. Hence, in the present case was brought to hospital within 2 hrs of ingestion, this may be the normalcy in the both biochemical and blood gas level.

In this case dog showed anemic (7.4g/dl) picture, it may be due to pet was already had anemic episode, because within the short period of exposure with rat paste poison may not alter the hematology values. Focused Assessment Sonography (FAST) ultrasound revealed normalcy of abdominal organs.

Conclusion

Yellow Phosphorous based rat bait is usually fatal in nature and successful recovery is challenging one. If cases are presented more than 8 hrs of ingestion then survival may be questionable. This case documented recovery following emergency care which was instituted within 2 hrs. Prevention is better than cure, hence the pet parents should take care their pets to avoid accidental poisoning by their negligence.

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Conflict of Interest

Authors Declare NO conflict of interest.

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