

Acute Disulfiram Poisoning in a Child: A Case Report and Review of Literature

Kapil Bhalla¹, Kundan Mittal², Ashish Gupta³, Deepak Nehra⁴

ABSTRACT

Aim: To determine the significance of acute disulfiram poisoning in pediatric population.

Background: Disulfiram poisoning in children is uncommon, can occur in children who have ingested large amount of drug because of careless and unsafe storage. Only few cases have been reported in literature. Although well tolerated by most patients, severe toxic side effects have been also reported including hepatitis, encephalopathy, psychosis, optic, and peripheral neuropathy.

Case description: This is a case report of disulfiram toxicity in a 4.5-year girl who ingested 4–5 tablets of disulfiram (approximately 1–1.25 g) accidentally and presented with hypoglycemia and encephalopathy. After initial stabilization in emergency room, the child was shifted to intensive care unit (ICU) where the child was managed conservatively. Blood sugars normalized after 8 hours of admission. Magnetic resonance imaging (MRI) brain showed bilateral globus pallidus hyperintensity in T2-weighted (T2W) and diffusion-weighted (DW) images and hypointensity in T1-weighted (T1W) images including diffusion restriction.

Conclusion: Acute disulfiram poisoning can occur in children who have ingested large amount of drug because of unsafe storage. It can lead to hepatitis, encephalopathy, psychosis, optic, and peripheral neuropathy. Mainstay of treatment is supportive care, airway protection, oxygen, and dextrose-containing intravenous fluid should be given.

Clinical significance: Acute disulfiram poisoning should be an important differential in diagnosis of any child presenting with idiopathic encephalopathy along with extrapyramidal symptoms with basal ganglia signal changes in MRI of brain in a previously healthy child.

Keywords: Child, Disulfiram, Literature, Poisoning, Review.

Indian Journal of Critical Care Medicine (2020): 10.5005/jp-journals-10071-23371

INTRODUCTION

Disulfiram is an irreversible inhibitor of enzyme aldehyde dehydrogenase and has been used to treat alcohol dependence for a long time in past. Aldehyde dehydrogenase converts acetaldehyde to acetate. Drinking alcohol while taking disulfiram leads to elevated levels of acetaldehyde (product of alcohol metabolism) and precipitation of unpleasant aversive disulfiram–alcohol reaction. Symptoms of this reaction include diaphoresis, flushing, tachycardia, nausea, vomiting, palpitations, hypotension, etc. For these unpleasant symptoms, it is used in treatment of alcohol dependency. Disulfiram is commonly used in dosages of 250–500 mg/day.¹ Although well tolerated by most patients, severe toxic side effects have also been reported including hepatitis, encephalopathy, psychosis, optic, and peripheral neuropathy.² We are reporting a case of disulfiram toxicity in a 4.5-year girl who ingested 4–5 tablets of disulfiram (approximately 1–1.25 g) accidentally and presented with hypoglycemia and encephalopathy.

CASE DESCRIPTION

A 4.5-year-old female child was brought to pediatric emergency department with complain of recurrent vomiting, dizziness followed by loss of consciousness and tightness of body for last 12 hours. As told by parent, child had ingested 4–5 tablets of disulfiram accidentally 48 hours back. Her father was a chronic alcoholic and was prescribed this medication by a local doctor. On examination, the child was lethargic, pulse rate of 124 beats/minute with low volume and regular, respiratory rate 36/minute with respiratory distress in the form of use of accessory muscle of respiration.

^{1,2}Department of Pediatrics, Pandit Bhagwat Dayal Sharma Postgraduate Institute of Medical Sciences, Rohtak, Haryana, India

³Department of Cardiology, Pandit Bhagwat Dayal Sharma Postgraduate Institute of Medical Sciences, Rohtak, Haryana, India

⁴Department of Pharmacology, Pandit Bhagwat Dayal Sharma Postgraduate Institute of Medical Sciences, Rohtak, Haryana, India

Corresponding Author: Ashish Gupta, Department of Cardiology, Pandit Bhagwat Dayal Sharma Postgraduate Institute of Medical Sciences, Rohtak, Haryana, India, Phone: +91-0124-4010624, e-mail: ashishg19995@gmail.com

How to cite this article: Bhalla K, Mittal K, Gupta A, Nehra D. Acute Disulfiram Poisoning in a Child: A Case Report and Review of Literature. *Indian J Crit Care Med* 2020;24(3):203–205.

Source of support: Nil

Conflict of interest: None

Chest auscultatory findings were normal. Per abdomen examination was normal without any organomegaly. The child was responsive to painful stimuli in the form of grimacing with eye opening. Pupil size was normal with pupillary and corneal reflexes preserved. Cranial nerve examination does not show any deficit although we could not perform all because the child was on minimal conscious state. Glasgow Coma Score was 7/15 (E2V2M3). Deep tendon reflexes were brisk and plantar extensor. Blood sugar was 12 mg/dL and was low despite dextrose infusion. Hemoglobin was 11.5 g/dL, total leukocyte count 13,000 with 66% polymorphs and 30% lymphocytes. Platelet count and peripheral smear was normal. Blood urea, creatinine, sodium, potassium, and calcium were normal. Coagulation profile was normal, and hepatic enzymes

were elevated (AST 127 U/L and ALT 95 U/L). After initial stabilization in emergency room, the child was shifted to pediatric intensive care unit (ICU) where the child was managed initially with intravenous fluids, routine bed care for ICU, and subsequently intragastric (IG) feeds were started along with medications for prevention of gastroesophageal reflux disease. Blood sugars normalized after 8 hours of admission. Magnetic resonance imaging (MRI) brain showed bilateral globus pallidus hyperintensity in T2-weighted (T2W) and diffusion-weighted (DW) images and hypointensity in T1-weighted (T1W) images including diffusion restriction (Fig. 1). After 7 days, she was shifted in patient ward where she remained for 3 days and was discharged on request of the attendants on IG feed. Initially, the child came every third day for follow-up for removal of IG feeds for first 2 weeks. Subsequently, when the child did not come for follow-up, a telephonic call to attendants was made, and they informed that the child had died 7 days back at home during sleep at night.

DISCUSSION

Disulfiram poisoning in children is uncommon, can occur in children who have ingested large amount of drug because of careless and unsafe storage. Only few cases have been reported in literature. Safety and efficacy for children has not been determined.² Acute toxicity can occur with dose higher than 500 mg/dL, and death can be possible at dose of 10–30 g/day.³ Symptoms of overdose

include nausea, vomiting, pruritus, skin rash, headache, aggressive or psychotic behavior, drowsiness, coma, and ascending flaccid paralysis that can also involve cranial nerves.^{2,4} Vykuntaraju and Ramalingaiah reported basal ganglia infarct, encephalopathy and extrapyramidal features with globus pallidus and substantia nigra involvement in 2-year-old child.⁵ The exact mechanism of disulfiram-mediated encephalopathy is not known. Besides the inhibition of the acetaldehyde dehydrogenase, disulfiram also inhibits the brain dopamine β -hydroxylase to a similar degree and thereby augments dopamine and depletes norepinephrine concentrations. Dopamine-mediated cellular injury may be related to its ability to induce excitotoxic effects of glutamate, calcium-mediated cell death, and impairs the cellular ability to eliminate free oxygen radicals.³ Disulfiram and its metabolite diethyldithiocarbamate also inhibit cytochrome P450 2E1 enzyme.⁶

A similar case was also reported by Mahajan et al., where a 5-year-old child accidentally ingested disulfiram, complete loss of developmental milestones, and spastic tetraparesis.⁷ Our patient presented with hypoglycemia and encephalopathy 2 days after ingestion with raised hepatic enzymes. Hypoglycemia may be secondary to hepatic damage. No specific antidote is available for disulfiram toxicity. In acute disulfiram overdose, activated charcoal can be used, if available, and if the patient is alert and able to drink it safely. Mainstay of treatment is supportive care, airway protection, oxygen, and dextrose-containing intravenous fluid should be given.

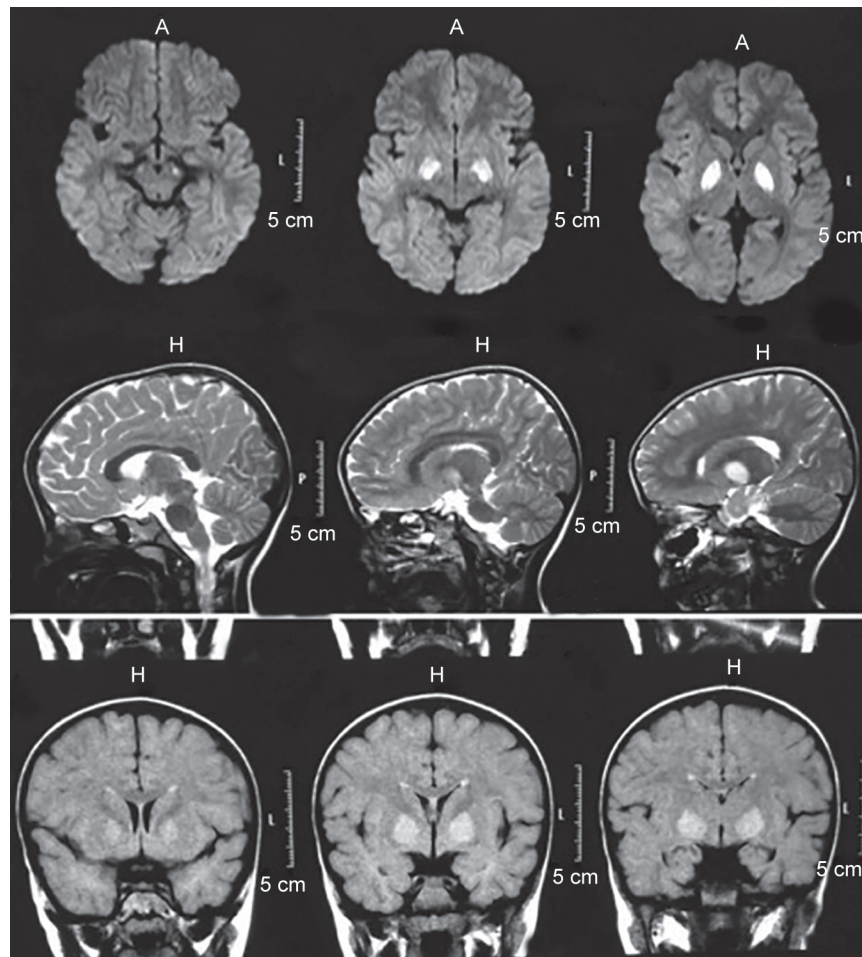


Fig. 1: Magnetic resonance imaging brain showing bilateral globus pallidus hyperintensity in T2-weighted and diffusion-weighted images and hypointensity in T1-weighted images including diffusion restriction

CONCLUSION

Acute disulfiram poisoning should be an important differential in diagnosis of any child presenting with idiopathic encephalopathy along with extrapyramidal symptoms with basal ganglia signal changes in MRI of brain in a previously healthy child. Mainstay of treatment is supportive care, airway protection, oxygen, and dextrose-containing intravenous fluid should be given.

REFERENCES

1. Mohapatra S, Rath NR. Disulfiram induced psychosis. *Clin Psychopharmacol Neurosci* 2017;15(1):68–69. DOI: 10.9758/cpn.2017.15.1.68.
2. Treatment C for SA. Chapter 3-Disulfiram [Internet]. Substance Abuse and Mental Health Services Administration (US); 2009 [cited 2017 Nov 22]. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK64036/>.
3. Petersen EN. The pharmacology and toxicology of disulfiram and its metabolites. *Acta Psychiatr Scand Suppl* 1992;369:7–13. DOI: 10.1111/j.1600-0447.1992.tb03309.x.
4. Singh H, Rahul Rao M, Radha A, Thyloth M. Disulfiram induced psychosis. *J Addict Depend* 2017;3(2):1–3. DOI: 10.15436/2471-061X-17-042.
5. Vykuntaraju KN, Ramalingaiah AH. Disulfiram poisoning causing acute encephalopathy. *Indian Pediatr* 2013;50(9):887–888. DOI: 10.1007/s13312-013-0222-x.
6. Kharasch ED, Thummel KE, Mhyre J, Lillibridge JH. Single-dose disulfiram inhibition of chlorzoxazone metabolism: a clinical probe for P450 2E1. *Clin Pharmacol Ther* 1993;53(6):643–650. DOI: 10.1038/clpt.1993.85.
7. Mahajan P, Lieh-Lai MW, Sarnaik A, Kottamasu SR. Basal ganglia infarction in a child with disulfiram poisoning. *Pediatrics* 1997;99(4):605–608. DOI: 10.1542/peds.99.4.605.