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Accidental Paint Thinner Ingestion Causing Methemoglobinemia, Chemical Pneumonitis and Multiorgan Failure Culminating in Death: A Case Report.

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Abstract

Paint thinner containing different aromatic, halogenated hydrocarbons and naphtha which is commonly used in paint and plastic industry can cause acute intoxication if ingested. Accidental ingestion of paint thinner is rare, extremely fatal and difficult to treat. Apart from accidental ingestion, intoxication can also be suicidal, recreational or from chronic occupational exposure. Many cases of acute and chronic thinner poisoning leading to a combination of methemoglobinemia, chemical pneumonitis or multiorgan toxicity with varied clinical outcomes have been reported. We herein report a rare case of thinner poisoning which resulted from accidental ingestion under the influence of alcohol. Though the initial presentation was of methemoglobinemia & chemical pneumonitis but the patient rapidly developed multiorgan failure. Intravenous methylene blue & organ support was given but the patient ultimately died. As paint thinner poisoning may be life threatening when accidentally ingested, proper care should be taken to keep them away from household belongings.

Keywords: Paint thinner ingestion, methemoglobinemia, chemical pneumonitis, acidosis, multiorgan failure, methylene blue

Introduction

Paint thinner containing different aromatic, halogenated hydrocarbons and naphtha which is commonly used in paint and plastic industry can cause acute intoxication if ingested. Acute methemoglobinemia is a rare presentation but needs immediate intervention. The clinical features ranging from cyanosis & dusky discolouration of skin to arrhythmia, severe acidosis, seizure, coma & death usually correlates with the level

of methemoglobinemia. Systemic toxicity resulting in cardiorespiratory, renal & hepatic failure leading to death can also occur via inhalational route. Aromatic hydrocarbon present in thinner when ingested can cause severe metabolic acidosis, rhabdomyolysis & multiple organ dysfunction. We herein report a rare case of accidental ingestion of paint thinner under the influence of alcohol presenting with methemoglobinemia, chemical pneumonitis and multiorgan failure leading to death.

Case Report

A 50 years old man was admitted to our Intensive Care Unit (ICU) with history of paint thinner consumption under the influence of alcohol approximately 12-24 hours back. The man was rescued by his neighbour in an unconscious state from his room. He was lying over vomitus containing solid particles and an empty bottle of lacquer thinner was recovered from the floor. On examination in ICU, patient had Glasgow Coma Scale (GCS) score of 6/15 with bilaterally dilated pupils sluggishly reacting to light, saturation of 81% in room air, tachypnea (respiratory rate: 45/min), tachycardia (pulse rate: 140/min), hypotension (BP: 80/42 mmHg), hypothermia (axillary temperature: 33.2^0C) & peripheral cyanosis. Before reaching ICU, patient had two episodes of convulsion in Emergency Department which was terminated by intravenous (iv) injection of Midazolam 2mg.

Arterial blood gas (ABG) analysis showed severe metabolic acidosis (P^H: 7) with hyperkalemia (Sr. K^+: 6.8), hypoxemia with $PaO_2/FioO_2$ (P/F) ratio of 164 & methemoglobinemia of 24%. Chest x-ray showed early features suggestive of aspiration. Patient was resuscitated, intubated and put on mechanical ventilation. Noradrenaline support was started to maintain mean arterial pressure above 65 mmHg. Acidosis and hyperkalemia was corrected with injection sodium bicarbonate, glucose insulin infusion and 10% calcium gluconate from time to time. Intravenous methylene blue 100 mg was given as 1% solution over 5 minutes. Methaemoglobinaemia reduced to 18% after a repeat dose of 50 mg iv methylene blue 30 minutes later. Inj. Ascorbic acid 1.5 gm given iv along with 5% dextrose infusion.

Investigation revealed Hemoglobin: 10.3 gm%, Total Leucocyte Count: 8000/mm^3, Platelet Count: 1.4 lakhs/mm^3 , Serum Urea: 98 mg% ,Serum Creatinine 2.8 mg%, INR: 1.24, AST/ALT: 203/234 U/L, Serum Bilirubin: 2.3 mg%, Random blood sugar: 120mg%. Patient was started on inj. Ceftriaxone 1 gm iv twice daily, inj. Thiamine 200 mg iv once daily, Inj. Levetiracetam 500 mg iv twice daily, inj. Pantoprazole 40 mg iv twice daily. Serum electrolytes, blood sugar and temperature was monitored and corrected accordingly. No urine output was noted since admission. Patient had recurrent metabolic acidosis which was corrected using sodium bicarbonate infusion & prepared for dialysis. Meanwhile patient developed sudden life-threatening arrhythmia, multiple ventricular premature contractions followed by pulseless ventricular tachycardia. He was immediately resuscitated and sinus rhythm restored. ABG showed deteriorating parameters, P/F ratio of 118, P^H of 6.9 & methaemoglobinaemia of 21%. Within the next 10 minutes patient had cardiac arrest twice & could not be revived inspite of best resuscitative efforts.

Discussion

Lacquer thinner intoxication is a consequence of modern industrialisation. Apart from chronic occupational exposure, intoxication can also be accidental, suicidal or recreational. Methemoglobinemia is a feature of thinner poisoning

which usually presents as cyanosis with little or no dyspnea & a normal PaO_2. Blood is characteristically chocolate brown in colour. Clinical features of methemoglobinemia are the results of hypoxia because methemoglobin, which is formed due to oxidization of hemoglobin (loses electron), is unable to transport oxygen. Sanjay Verma and Sunil Gomber reported a case where a three years old child presented with only cyanosis & mild dyspnoea after ingesting 2-4 teaspoons of thinner. The presence of chocolate brown coloured blood during blood draw pointed to the possibility of methemoglobinemia & suspected poisoning with oxidizing substance.[1] A methemoglobin fraction of more than 15% results in cyanosis while arrhythmia, seizure, coma, severe acidosis are common with levels above 50-70%. Death usually occurs at level above 70% but correlation of symptoms and outcome with the level of methemoglobinemia is not constant. This patient had severe metabolic acidosis, seizure & coma although the methemoglobin level was only 24%. The presence of other factors like acute kidney injury and acute hypoxemic respiratory failure added to tissue hypoxia & acidosis here. Multiorgan involvement in this patient as evidenced by seizure, coma, vomiting, anuria, deranged renal & hepatic function worsened the outcome. Aromatic hydrocarbons (toluene, xylene) present in thinner has the potential to cause gastrointestinal symptoms like nausea, vomiting, abdominal cramps, neurological symptoms like seizure, renal & hepatic toxicity. Zaidi SA et al. presented a case of multiorgan toxicity and death who was unintentionally exposed to paint thinner fumes.[2]

Mehmet Koçak et al. reported chemical pneumonitis in a case of thinner ingestion.[3] A similar case was reported by Hilal Ibrahin Yakar et al.[4] Our patient also developed chemical pneumonitis which might have resulted from aspiration in intoxicated state of the vomitus containing ingested thinner. He subsequently developed signs of acute hypoxemic respiratory failure.

Chronic poisoning with mild methemoglobinemia & asymptomatic patients usually require no treatment. On the other hand, acute intoxication following thinner intake requires immediate stabilization with specific organ support & intensive monitoring. IV methylene blue therapy is required when methemoglobin is more than 20% or associated with co-morbidities or symptomatic with a methemoglobin of more than 10%. Methylene blue has reductive effects which activate hexose monophosphate shunt to increase NADPH regeneration. Usually it is administered in a dose of 1-2 mg/kg as 1% solution in iv saline over 3-5 minutes. Dose can be repeated as 1 mg/kg every 30 minutes to control symptoms. Since methylene blue itself acts as an oxidizing agent, a dose of more than 7mg/kg may worsen methemoglobinemia & should be avoided. In acute settings ascorbic acid is not useful, however, in chronic methemoglobinemia & pregnancy it is a potential alternative.[5] Exchange transfusion may be required in patients with G6PD deficiency or in cases where methylene blue therapy is ineffective. Hyperbaric oxygen by increasing the fraction of dissolved oxygen may be of use in critical cases. Ranju Singh et al. reported two cases of thinner poisoning where iv methylene blue could not completely reverse the methemoglobinemia; one patient survived after exchange transfusion but the other did not. [6]

Conclusion

Paint thinner poisoning can be extremely fatal and difficult to treat. Rare cases of its unintentional ingestion have been reported in literature. So, extreme care must be taken not to keep such products near household staffs & especially away from the reach of

children as they are more susceptible to haemoglobin oxidation.

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