Case Report

A CASE OF NITROBENZENE POISONING
Dr. MB Chandurkar, Dr. SS More, Dr. PS Bhole, Dr A Jadhavar, Dr. S Garkal

Authors

Dr. MB Chandurkar, Associate professor Medicine, Rural Medical College, Pravara Institute of Medical Sciences (DU), Loni, Dist. Ahmednagar, Maharashtra.

Dr. SS More, Senior resident, Dept. of Medicine, Rural Medical College, Pravara Institute of Medical Sciences (DU), Loni, Dist. Ahmednagar, Maharashtra.

Dr. PS Bhole, Senior resident, Dept. of Medicine, Rural Medical College, Pravara Institute of Medical Sciences (DU), Loni, Dist. Ahmednagar, Maharashtra.

Dr A Jadhavar, Senior resident, Dept. of Medicine, Rural Medical College, Pravara Institute of Medical Sciences (DU), Loni, Dist. Ahmednagar, Maharashtra.

Dr. S Garkal, Senior resident, Dept. of Medicine, Rural Medical College, Pravara Institute of Medical Sciences (DU), Loni, Dist. Ahmednagar, Maharashtra.

Number of Pages: Four
Number of Tables: Nil
Number of Photographs: Four
Corresponding Author: Dr. MB Chandurkar, Associate professor Medicine, Rural Medical College, Pravara Institute of Medical Sciences (DU), Loni, Dist. Ahmednagar, Maharashtra.
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Abstract:
A young female referred as a case of unknown poisoning was diagnosed as a case of methemoglobinemia due to Nitrobenzene poisoning from history and clinical examination she was treated with intravenous methylene blue with complete recovery.

Keywords: Nitrobenzene, Methemoglobinemia, Cyanosis, Methylene blue

Case:
A 16 yrs young female referred from private practitioner with alleged history of consumption of about 25ml of unknown compound around 11 pm after domestic quarrel with parents. Patient had history of 4-5 episodes of vomiting after consumption. There was no history of excessive salivation, convulsions, and loose motions. No h/o breathing difficulty, loss of consciousness, headache or giddiness. Patient’s relatives had not brought the container of compound consumed on admission. There was no significant past history of major medical, surgical or psychiatric disorder. No history of suicidal tendencies or similar attempt in past.

Patient’s general and systemic examination was normal on admission. There were no signs of organophosphorus or sedative poisoning, no smell of any compound to soiled clothes or gastric lavage. Patient received gastric lavage, antiemetic and was referred with nasogastric tube and Foleys catheter in situ. Within four hours after admission patient developed peripheral and central cyanosis and was not maintaining oxygen saturation as seen on pulse oximetry. Chest was normal on clinical examination, X-ray chest was normal and patient was hemodynamically stable. Arterial blood gases ABG PH: 7.1, PCO$_2$: 27, PO$_2$:105, HCO$_3$:10.3, SO$_2$: 96%.

Complete blood count on admission was Hb:11.5gm%, TLC:21,500/cumm, DLC: meta+band:7%, N:85% and L:8%. Platelet count: 3,40,000/cumm, PBS: Normocytic normochromic RBC. Other investigations like renal and liver function tests were normal. By this time patient’s relatives had brought container of compound consumed. It was a chemical used to enhance flowering of plants with nitrobenzene as one of its component (Photo 1).

In view of cyanosis with blood gases showing metabolic acidosis and container of compound of nitrobenzene, a diagnosis of methaemoglobinemia due to nitrobenzene poisoning was made. Patient was immediately treated with intravenous Methylene blue (Photo 4). Patients ABG returned to normal after Inj. Methylene Blue. ABG after injection methylene blue pH: 7.35, Pco$_2$: 31, Po$_2$:182, Hco$_3$:15.3 and SO$_2$: 100%. Cyanosis disappeared and patient made an uneventful recovery and was discharged on fourth day of admission.

Discussion:
The first report of poisoning due to nitrobenzene was in 1886 and subsequently several cases have been reported (1). Nitrobenzene, a pale yellow oily liquid with an odor of bitter almonds is used as intermediate in the synthesis of aniline dyes, and as a solvent for the manufacture of cellulose ethers and acetate, as a flavoring agent, as a perfume for soap and in rubber industry (2).
Nitrobenzene is an oxidizing nitrite compound. Acute ingestion of nitrobenzene leads to rapid development of methaemoglobinaemia (3). Methaemoglobin is normally present as less than 1% of the total hemoglobin under physiologic conditions (4). Levels above it are defined as methaemoglobinaemia. The estimated lethal dose ranges from 2 to 6 gms in adults; and doses less than 0.8mg/kg/day does not normally cause methaemoglobinaemia (5). In normal individuals methaemoglobin level must be greater than 10% to be clinically recognized and only mild symptoms, headache, fatigue and nausea occur at level of 20-30% (6). Dyspnoea on exertion, lethargy and tachycardia at 30 to 45% levels, and at 50 to 70%, arrhythmias, coma, seizures, respiratory distress and lactate acidosis. Levels greater than 70% cause cardiovascular collapse and have a high degree of mortality if left untreated (7). With significant nitrobenzene poisoning with methaemoglobinemia, arterial blood gas analysis reveals lactate metabolic acidosis, tissue ischemia and hypoxia. PaO2 remains normal, measured (not calculated) oxygen saturation will be low (3). Transcutaneous pulse oximetry estimation of oxygen saturation is lowered by methaemoglobinaemia. Spuriously high pulse oximetry readings are possible with increasing concentrations (2). Patients with symptomatic methaemoglobinemia require intensive monitoring until symptoms clear or the methaemoglobin level is below 15% (4).

Methylene blue is the antidote of choice for acquired (toxic) methemoglobinemia (8). It acts as an exogenous co-factor which greatly accelerates the NADPH dependent methaemoglobin reductase system (8). Methylene blue is indicated for acquired methaemoglobinaemia when the level is greater than 35 to 40% and the patient has cardio-
respiratory symptoms (4, 8). The initial dose is 1 to 2 mg/kg or 0.1 to 0.2 ml/kg of the 3% solution given intravenously over five minutes (3). Response occurs within 1 hour and reduces the elimination half-life of severe methaemoglobinemia to 45-90 minutes. Methaemoglobin levels should be checked 1 hour after infusion and a repeat dose may be warranted if levels remain high and the patient is still symptomatic.

In higher doses, methylene blue itself is an oxidizing agent and as little as 5 mg/kg has caused asymptomatic methemoglobinemia (9). Cumulative doses greater than 7 mg/kg have an increased risk of methaemoglobin induction and can cause chest pain, nausea, vomiting, dizziness, hypertension, confusion, diaphoresis, tremor, dyspnoea and cyanosis.

If methylene blue is contraindicated or ineffective, ascorbic acid is often mentioned as an alternative therapy, but its reducing effect is probably too slow to have significant benefit (8). Exchange transfusion is indicated in severe cases, when both fail. Exchange transfusions equal to or less than the total volume and up to / greater than twice the volume have been used (3). The case represents an uncommon poisoning with nitrobenzene, which was managed successfully with intravenous methylene blue.

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