Two Cases of Severe Methomyl Pesticide Intoxication

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Introduction

Methomyl is carbamate pesticide, highly lipid-soluble, inhibits reversibly acetylcholinesterase. In suspension concentrate, methanol is usually used as solvent in Korea. In this article, we have summarized two cases of methomyl intoxication, one is of suspension concentrate with methanol and the other is of wettlable powder without methanol.

Case Presentation 1

A 43-year-old woman was brought to the ED in stuporous mental status after ingestion of 100ml solution of liquor (20% of ethanol) and Lanate (methomyl in wetttable powder). She ingested it about 40 minutes before arrival at ED, the exact amount of Lanate was not known.

Initial vital sign was 160/100-120-38-93%-37.3°C, Glasgow coma scale score was 10. She showed cholinergic symptoms of pin-point pupils, diaphoresis, salivation, urination, fasciculation, vomiting and diarrhea. Endotracheal intubation was performed under rapid sequence intubation (RSI), mechanical ventilator was applied. Metabolic acidosis was checked with high anion gap of 20.7mEq/L, normal osmolar gap of 9.8mOsm/kg.

Atropinization was initiated, total 5mg of atropine was used until decrease of diaphoresis and salivation, mental status recovered to be alert, continuous infusion of atropine was started with rate of 1mg per hour.

On 2nd hospital day, systolic blood pressure fell below 80mmHg, continuous infusion of vasopressors was started. In echocardiography, akinesia of mid to apical wall of left ventricle with 39.8% of ejection fraction was shown, infusion of dobutamine was started.

On 4th hospital day, after 50 hours of ingestion, PEA was checked. After 2 cycles of resuscitation, ROSC was achieved. After ROSC, the patient’s mental status was stuporous, vital sign unstable, infusion of epinephrine started.

On 5th hospital day, cyanosis on 4 distal extremities was observed. With consultation of vascular department of general surgery, IV heparin was started.

On 11th hospital day, patient’s mental status recovered to drowsy status with one-step command obedience.

On 23rd hospital day, both below-knee amputation and both wrist disarticulation were performed with consultation of orthopedic surgery

Initial pseudocholinesterase level was 2173IU/L.

Case Presentation 2

A 53-year-old woman was brought to the emergency department in an unresponsive state after ingestion of 200ml of Dongbu Methomyl (methomyl in suspension concentrate, 24.1%). She ingested it in front of her husband about 40 minutes before arrival at ED, collapsed in 1 minute after ingestion. She drank 1L of liquor (6% of ethanol) before ingestion of methomyl.

Initial ECG rhythm was asystole, immediately she got cardiopulmonary resuscitation. After 6 minutes, her spontaneous circulation returned, but her mental status still remained comatose, vital sign was unstable (50/30-110-35°C). Salivation and lacrimation of cholinergic symptoms were observed. High-anion gap metabolic acidosis was checked with anion gap of 28.1mEq/L, high osmolar gap of 12.4mOsm/kg

IV atropine, vasopressor, ethanol and mechanical ventilator treatment were initiated. Therapeutic hypothermia treatment (THT) started with active external cooling device for post-cardiac arrest neuroprotection, but hourly urine output was under 30ml, metabolic acidosis was still observed. With consultation of nephrology, continuous renal replacement therapy (CRRT) started after 6 hours of ROSC. After 1 hour of initiation of CRRT, systolic blood pressure fell below 80mmHg, THT was stopped. After 10 hour of initiation of CRRT, with consultation of thoracic surgery, extracorporeal membranous oxygenation (ECMO) was started.

On 3rd hospital day, mental status was not changed, after 54 hours of ROSC, ventricular fibrillation was checked, after 1 cycle of resuscitation, spontaneous circulation returned.

On 4th hospital day, after 4 hours of second ROSC, asystole cardiac arrest occurred. After 20 minutes of resuscitation, asystole still checked, under consent of patient’s husband, resuscitation was suspended.

Initial serum ethanol level was 161mg/dL, pseudocholinesterase level 391IU/L, methanol level in urine was 569mg/L.

Discussion

Decreased mental status of the patient in case 1 might be related to the increased effect of methanol by ethanol co-ingestion as both of them are metabolized by the same enzyme, alcohol dehydrogenase.

Initial osmolar gap of the patient was in normal range, we are sure that this is because wetttable powder of methomyl does not contain methanol. Though the patient had experienced cardiac arrest because of stress-induced cardiomyopathy, we believe that had affected recovery of metabolic acidosis, vital sign and mental status of the patient.

Methanol is rapidly absorbed in gastrointestinal tract reaching peak serum concentration in 1 to 2 hours. Acute poisoning of methanol can cause metabolic acidosis with elevated anion gap and osmolar gap, neurological deterioration, visual disturbance and death.

Because the patient in case 2 presented high anion gap metabolic acidosis with high osmolar gap and the bottle of Dongbu Methomyl was brought to the ED with 119 rescue, we could carry out the treatment of carbamate-and-methanol co-poisoning as reported in the several reports of methanol poisoning with methomyl in suspension concentrate in Korea.

Very early collapse of the patient might be due to additive or synergistic effect of methanol and methomyl, we think more sophisticated research should be performed for this effect.

We assume that earlier treatment with hemodialysis rather than CRRT and ECMO would have brought better result for the patient.

Conclusion

We reported 2 cases of methomyl intoxication with methanol and without it. The patient who ingested suspension concentrate with methanol had collapsed in 1 minute and expired, the other patient who ingested powder without methanol had survived in the end.

This may suggest that methanol as solvent can cause very serious adverse effect to the patient of poisoning with carbamate pesticides as methomyl and that the patient suspected intoxication with methomyl in suspension concentrate should be treated in the manner of co-ingestion with methanol such as hemodialysis.