A case of respiratory failure due to poison hemlock poisoning presented to an emergency department

一個毒參導致呼吸衰竭的急診中毒個案

AK Erenler, A Baydin, L Duran, T Yardan, B Turkoz

Poison hemlock (Conium maculatum) is one of the most poisonous plants in the world. Accidental ingestion of the plant could result in central nervous system depression, respiratory failure and even death. Airway and breathing management followed by fluid resuscitation is the mainstay of treatment. Poison hemlock poisoning is an important differential diagnosis for patients with impaired consciousness and respiratory failure after plant ingestion in areas of natural habitat for the plant. Early and proper diagnosis is vital for patients with poison hemlock poisoning. In this report, we present a case of life-threatening poisoning due to taking the poison hemlock mistaken for Helichrysum arenarium. (Hong Kong J Emerg Med. 2011;18:235-238)

毒參（Conium maculatum），是世界上最毒的植物之一。誤食可能會導致中樞神經系統抑制，呼吸衰竭，甚至死亡。氣道和呼吸管理，然後加上液體復甦，是為治療的要點。在毒參自然生長地區，如有患者進食植物後出現意識障礙和呼吸衰竭，毒參中毒是一個重要的鑑別診斷。及早正確診斷毒參中毒，至為重要。在這份報告中，我們報告一例誤以毒參為沙生蠟菊，服用後危及生命的中毒個案。

Keywords: Conium maculatum, intoxication, toxic plants

關鍵詞：毒參，中毒，有毒植物

Introduction

Conium maculatum, also known as poison hemlock, is a highly poisonous plant growing particularly in meadows located near wet areas. The natural habitat of this plant includes Europe, Northern Africa and Western Asia. The most important toxins of the plant are a group of piperidine alkaloids including coniine and γ-conicine.1,2 They cause clinically nicotine-like effects. The earliest symptoms of poisoning include headache and ataxia. Patients may develop respiratory distress or even failure in severe intoxication. Hyper-salivation, tachycardia and pupil dilation can be observed due to the effects on autonomic ganglia. In some cases, overstimulation of cholinergic receptors may cause cholinergic block, muscle paralysis, depression of central nervous system and bradycardia.3 Poison hemlock poisoning causes death by respiratory paralysis via its neurotoxins and the most famous case is the death of Socrates in 399 BC. Severe poisoning may also cause rhabdomyolysis which could lead to acute renal failure. It is also known that skin exposure cause dermatitis.4,5 We present a case report of accidental poison hemlock ingestion and suggest the clues for the diagnosis of this lethal poisoning.

Correspondence to:
Ahmet Baydin, MD
Ondokuz Mayis University, Faculty of Medicine, Department of Emergency Medicine, Samsun, Turkey
Email: abaydin@omu.edu.tr

Ali Kemal Erenler, MD
Latif Duran, MD
Turker Yardan, MD
Burcu Turkoz, MD
Case report

A 59 year-old male farmer was referred from a local state hospital to our Emergency Department for loss of consciousness and respiratory distress after self-taking some parsley-like plants. The patient arrived at our hospital 3 hours after ingestion. On arrival, the patient was unconscious with Glasgow Coma Scale (GCS) of 7 and intubated. On arrival, his vital signs were temperature of 36.2°C; heart rate of 100 beats/min; blood pressure of 120/80 mm/Hg; and O₂ saturation of 90% measured by pulse oximeter. On physical examination, he had spontaneous extremity movements but with muscle spasms. His pupils were dilated with minimally responsive to light stimulation. His chest was clear but there was excessive secretion in the endotracheal tube which required frequent suctioning. Bowel sounds were hyperactive. Initial laboratory evaluation showed an arterial blood gas of pH 7.39; PCO₂, 43 mm Hg; and PO₂, 150 mm Hg. Blood chemistry analysis was normal. Complete blood count revealed mild leukocytosis with white blood cell count of 11.4 thousand/µL. A chest radiograph was unremarkable and electrocardiogram revealed sinus tachycardia (105 beats/min). Computed tomography of brain showed no haemorrhage or ischaemia.

Further history from the patient’s relatives revealed that he had picked up and ingested two pinches of an unknown plant. After watching a TV show about herbal medicine, the patient (who was a farmer) decided to gather dwarf everlasting (Helichrysum arenarium also known as Immortelle) and took them for treating his sorethroat. He complained of headache, generalised weakness starting from his legs and developed shortness of breath 30 minutes after the exposure. He was then found to be unconscious. Hemlock poisoning was suspected when his relatives showed the plants to the doctor. The patient was subsequently referred to our university hospital for management. His relatives brought the plant to our hospital and the plant was subsequently identified to be poison hemlock by our Faculty of Agriculture (Figure 1).

Activated charcoal was administered via nasogastric tube and 1 mg of atropine intravenous was given for the treatment of his nicotinic symptoms. After 5 hours of observation the blood gas analysis of the patient was as follows: pH 7.42; PCO₂, 40.8 mm Hg; PO₂, 77.7 mm Hg; and O₂ saturation, 96.2%. The GCS of the patient improved to 13 six hours after admission. Patient started breathing spontaneously. The patient was extubated and supported by O₂ via mask. Patient became more alert 1 hour after extubation, his vitals were noted to be normal and his GCS improved to 14. After 2 days of observation the patient was discharged with total recovery. No neurologic deficit was recorded.

Discussion

William Shakespeare was the first to use the modern name "poison hemlock" in his story titled "Life of Henry the Fifth". The most famous death due to poison hemlock was of Socrates 399 BC. According to Memorabilia by Xenophon, after performing his "Apology", Socrates was condemned to death by drinking a cocktail of extract from Conium maculatum mixed with opium because of his "impiousness".
Conium maculatum is a member of apiaceae family which is one of the most poisonous plants. It contains some piperidine alkaloids (coniine, N-methyl-coniine, conhydrine, pseudoconhydrine, γ-coniceine). They are formed by the cyclisation of an eight-carbon chain derived from four acetate units. Unlike poison hemlock, Cicuta verosa (water hemlock) shows its effects not by an alkaloid but cicutoxin, a long chain alcohol containing double and triple bonds. Poison hemlock is often easily mistaken as water hemlock because they are similar in appearance and belong to the same family. The toxin in water hemlock, cicutoxin, has primarily central nervous system effects. Poison hemlock is a tall, glabrous umbelliferous plant with hollow purplish-spotted stems and much divided leaves. Active alkaloids coniine, γ-coniceine and N-methylconiine reveal their toxic effects by blocking the spinal reflexes through their action on the medulla. They produce an initial stimulus followed by the depression of the autonomic ganglion. These toxins in high dose produce a stimulus of the skeletal muscles and a subsequent neuromuscular blockage through the action on nicotinic receptors. When respiratory muscles become paralysed due to phrenic nerve paralysis, death occurs. Nausea, vomiting, salivation, bronchorrhea, hypertension, tachycardia, agitation, ataxia, confusion and muscle fasciculations which are called early nicotinic effects may be seen in the first 15-60 minutes after ingestion. Delayed symptoms such as diarrhoea, aponea, bradycardia, hypotension, weakness, muscle paralysis, and lethargy may occur in large ingestions. In 2009, Colombo et al reported 2 cases of adults who had eaten poison hemlock by misidentification with sweet fennel (Foeniculum vulgare). Both of the patients developed nausea, dizziness and leg cramps. Their symptoms subsided on supportive care. Asymptomatic patients with hemlock poisoning may be discharged after administration of activated charcoal and observation for 4 hours. The dose of activated charcoal is 50 to 100 g for adults and 1 gm/kg for children. Activated charcoal should not be given to a comatose patient until the patient’s airway is protected. Coniine, the most important alkaloid of Conium maculatum, can be lethal in a dose of 150 mg, but in smaller doses it produces neurotoxic effects, acute rhabdomyolysis, and acute renal failure. In our case, even though we could not determine the exact amount of toxin ingested, we believe that it was a potentially fatal dose based on the signs and symptoms developed.

The mainstay of management of poison hemlock poisoning is supportive care including airway protection and ventilator support. A 2 year-old boy who developed respiratory failure after hemlock ingestion was described by West et al in 2009. After extubating himself the next day, the boy was discharged with total neurologic recovery. In another case described by Ferah et al, death occurred due to respiratory muscle paralysis in the ninth day of ingestion. Patients may develop seizure in severe poisoning and should be treated with diazepam or phenobarbital. Fluid replacement is often required for the loss due to vomiting and diarrhea. Measurement of creatine phosphokinase should be done to rule out rhabdomyolysis. Treatments of rhabdomyolysis include maintaining adequate urine output and urine alkalization. No benefits of haemodialysis or haemoperfusion have been shown.

**Conclusion**

Although most of the poisonings due to plant ingestion are of minimal toxicity, poison hemlock poisoning could be fatal. Physicians should be aware of the possibility of poison hemlock poisoning in patients with unexplained respiratory failure and coma in areas of habitat of this highly poisonous plant.

**References**