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## Case Report

# Hemlock Poisoning in Emergent Patients

## Abstract

**Background:** Although poisoning from the ingestion of toxic plants is rarely encountered in Emergency Departments, it can cause serious complications and even death. It is difficult to recognize, diagnose, and differentiate if the patient is unconscious. Conium maculatum (poison Hemlock) is one of the most highly poisonous plants which can cause death due to respiratory failure. Clinical presentation may also be central nervous system depression, renal failure, rhabdomyolysis, and dermatitis. The similar shape and appearance of the plant to parsley can cause ingestion by mistake, which makes it difficult to obtain an accurate medical history from witnesses. Public awareness regarding mushroom poisoning is descriptive in the treatment of the victims, however, patients and those accompanying them to hospital may not state the ingestion of the parsley-like poison Hemlock0.

**Case Reports :** Two children were admitted to the Emergency Department (ED) with altered mental status, balance disorder and muscle spasms with irrelevant, non-specific medical histories. Their proper management was carried out by an emergency medicine physician who has previously experienced with an adult with respiratory distress and loss of consciousness with muscle spasms, dilated pupils and excessive secretion. Adult patient was immediately intubated for ventilatory support. After his full recovery, ingestion of hemlock poison was learned.

As immediate diagnosis and prompt supportive treatment is the mainstay of treatment, an emergency physician should keep the possibility of Hemlock poisoning in mind for patients with respiratory failure.

## Introduction

Poison Hemlock (*Conium maculatum*) – an umbelliferous member of the parsley family – is a highly poisonous plant, which grows in meadows particularly those located near wet areas (Figure 1) [1,2]. It has also been identified as the main ingredient of the poison mixture used in the execution of Socrates [3].  $\gamma$ -Coniceine and coniine are the most abundant alkaloids responsible for the respiratory paralysis resulting in death. Clinically they have nicotine-like effects and the earliest symptoms include ataxia and headache [2]. Rhabdomyolysis, renal failure, and dermatitis may also be seen in the clinical course [4]. In this paper, three cases of hemlock poisoning requiring intensive care treatment are presented and the importance of early diagnosis and prompt respiratory support in emergency settings is emphasized.

## Case Series

Two children were admitted to the hospital Emergency Department (ED) because of altered mental status, balance disorder and muscle spasms with irrelevant, non-specific medical histories. The early diagnosis of these paediatric

patients and the consequent prompt and proper management was successfully carried out due to the experience of the emergency physician who had previous experience of poison Hemlock [2]. The medical records of 3 patients (2 children, 1 adult) were reviewed for this paper.

On admission, the medical history was taken from relatives and witnesses. Two children, 1 male and 1 female, aged five and four, respectively, were admitted to the ED approximately 1 hour after ingesting a parsley-like plant. On admission, the female child was lethargic but her vitals were normal, so she was transferred to the critical care facility for follow up and supportive treatment. Her GCS improved to 14 with the appropriate supportive treatment. The male child had no lung sounds and the heartbeat could not be heard with auscultation. He was cyanotic, unresponsive to pain stimulation, had shortness of breath, altered mental status and muscle cramps. Intubation was applied immediately and cardiopulmonary resuscitation was initiated. Also, a gastric lavage was performed and blood samples were taken. After 12 minutes of resuscitation, heart rhythm was obtained (120 beats/minute). Blood sample analysis revealed leukocytosis (19.2  $\mu$ /L) and hyperglycemia (323 mg/dl). The patient was admitted to the intensive care

unit and intravenous fluid, antibiotics, methylprednisolone and ranitidin were administered. After 4 hours intensive care unit resuscitative treatment, he was transferred to an advanced facility together with the female child.

A male, aged 59 was admitted to the ED with respiratory distress and loss of consciousness with muscle spasms, dilated pupils and excessive secretion. He was immediately intubated and required mechanical ventilatory support. After 13 hours spontaneous breathing was recovered leading to successful weaning. After two days of further hospitalization for follow-up, he completely recovered without any sequelae.

All the patient characteristics are shown in Table 1.

## Discussion

*Conium maculatum* (hemlock, poisonous hemlock) is a member of the *apiaceae* family which is one of the most poisonous plants. It contains various piperidine alkaloids (coniine, N-methyl-coniine, conhydrine, pseudoconhydrine,  $\gamma$ -coniceine), which 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 by cicutoxin, a long chain alcohol containing double and triple bonds. Poison hemlock is often easily mistaken for water hemlock because they have similar appearance and belong to the same family. The toxin in water hemlock, cicutoxin, has an effect primarily on the central nervous system effects [2]. The plant species *Conium maculatum* is one of the most toxic members of the plant kingdom. There have been numerous reports of deaths of a wide range of animal species including humans. *Conium maculatum* is found throughout the world as it is a very common plant species, a member of the family *Apiaceae* (formerly *Umbelliferae*), and the carrot family. The plant is reported as a very common weed in Europe, North and South America, North Africa, Australia and New Zealand [5]. The cases reported here were from Çorum, a city in central Turkey. This plant may reach 10 feet in height, with pinnate leaves divided three to four times, giving a fern-like appearance similar to parsley, for which it is sometimes mistaken [6]. Accordingly, the 2 paediatric patients reported here had picked and eaten the plant, thinking that it was parsley.

Hemlock has long been known as a poisonous plant. William Shakespeare was first to use the modern name "poison hemlock" in his play "Henry V". The most famous death by poison hemlock was that of Socrates in 399 BC. After his trial, Socrates was condemned to death for impiety and forced to drink a cocktail of extract from *Conium maculatum* mixed with opium [7].

Since there is not a specific antidote therapy, the mainstay of management of poison hemlock poisoning is supportive care including airway protection and ventilatory support. West et al. (2009), reported the case of a 2-year old boy who developed respiratory failure after hemlock ingestion. After extubation the next day, the boy was discharged with total neurological recovery [1]. In the cases presented here, one patient did not develop respiratory failure probably as the amount of plant ingested was not sufficient to cause toxication. Coniine has



Figure 1: Long stalked poison hemlock with numerous leaves.

Table 1: Characteristics of the patients.

Parameter	Patient 1	Patient 2	Patient 3
Age	59	4	5
Gender	Male	Female	Male
GCS	7	8	3
Temperature (°C)	36.2	37.5	36.6
Heart rate (beats/minute)	105	84	120
Blood pressure (mm/Hg)	120/80	100/60	124/86
O <sub>2</sub> saturation (%)	90*	100	100*
Pupil light reflex	Dilated, minimal response	Isochoric, minimal response	Dilated, no response
Muscle spasm	Positive	Positive	Positive
Bronchial secretion	Excessive		Excessive
WBC (10 <sup>9</sup> /uL)	11.4	15.9	19.2
Immediate intubation	Yes	No	Yes

GCS: Glasgow Coma Scale

\*with immediate oxygen supply

a nicotine-like effect on autonomic and skeletal muscle, stimulating the neuromuscular junction, and progressing to a curare-like effect and paralysis. Early nicotinic effects (15–60 minutes) would include nausea, vomiting, salivation, bronchorrhoea, hypertension, tachycardia, agitation, ataxia, confusion, and muscle fasciculations that are managed via supportive care. After large ingestions, delayed symptoms (0.5–4 hours) such as diarrhea, apnea, bradycardia, hypotension, weakness, lethargy, and muscle paralysis would be expected. The median lethal dose of coniine in humans is 150 mg/kg, although at smaller doses it may produce neurotoxic effects, acute rhabdomyolysis and acute renal failure [1,8].

On admission; nausea, vomiting, salivation, bronchorrhoea, hypertension, tachycardia, agitation, ataxia, confusion and

muscle fasciculations which are called early nicotinic effects may be seen. In addition, diarrhoea, aponea, bradycardia, hypotension, weakness, muscle paralysis, and lethargy may occur as delayed symptoms in large ingestions [2,9].

Asymptomatic patients with hemlock poisoning may be discharged after the administration of activated charcoal and observation for 4 hours. The dose of activated charcoal is 50 to 100 g for adults and 1 g/kg for children. Activated charcoal should be delivered to a comatose patient after the patient's airway is secured. In the current cases, muscle fasciculations and lethargy were observed. Seizures and muscle symptoms are treated with diazepam or phenobarbital [6]. In one case, respiratory failure developed due to respiratory muscle paralysis and required mechanical ventilation. Fluid loss as a consequence of diarrhea and vomiting is treated with proper fluid replacement. Rhabdomyolysis confirmed via measurement of creatine phosphokinase can be managed by maintaining adequate urine output and urine alkalization. Efforts such as hemodialysis or hemoperfusion for enhancing excretion of toxic materials have been shown to be in-effective [6].

The current patients were transferred to an advanced center for intensive care treatment after the initial stabilization.

## Conclusion

Conium maculatum poisoning is a lethal poisoning that must be diagnosed early and managed appropriately. When patients are admitted to the ED with altered mental status and respiratory failure, emergency physicians should consider plant ingestion and must keep poison hemlock in mind.

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