

# CASE REPORT

## Acute Hydrocephaly Following Methadone Intoxication in a Child

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### Abstract

Infantile methadone intoxication has been on the rise since the usage of methadone in opioid detoxification programs. We report a 30-month-old child with encephalopathy and acute hydrocephaly following methadone intoxication.

**Keywords:** Methadone; Intoxication; Children; Opioid; Acute hydrocephaly

### Introduction

Methadone was produced in 1946 and used as an analgesic in the second world war. After 1960 this medication has been used for dependency treatment of heroin and morphine addiction (1). Methadone is a synthetic, long-acting opioid with a highly variable half-life of 15 to 60 hours applying its effects on the central nervous system (CNS) by acting as an agonist on the  $\mu$  and kappa receptors. Methadone results in cross reaction with other opioids and causes unwilling abuse of other opioids and may also inhibit the withdrawal symptoms of other agents (1-4).

The number of methadone intoxication in children is increasing with the increase of methadone usage in opioid detoxification programs (4-6). The oral intake, rapid absorption and long half-life increase the risk of methadone poisoning in children.

The primary clinical symptoms of methadone poisoning are the same as opium including sedation, drowsiness, euphoria, bradypnea and pinpoint pupil. In severe cases, encephalopathy, inflammation of the brain, ischemia, apnea, cardiac arrhythmias and sudden death and pulmonary edema have been reported (4,6-8).

Opium poisoning manifests most commonly with myosis (90%), a decreased level of consciousness (88.4%), bradypnea (28.4%) and seizure (10.3%) (9). The triad of myosis, bradypnea and loss of consciousness had a prevalence of 25% in opium poisoning(9).

### Case Presentation

A 30-month-old boy was brought to the pediatric emergency room because of tonic seizure and loss of consciousness. His mother said there may have been the possibility of 5 mg methadone tablet ingestion the night before.

In the emergency room, the child was observed in coma situation with a tonic posture and bilateral myosis. Naloxan and phenytoin were prescribed for the patient and he was transferred to the pediatric intensive care unit (PICU).

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On the first visit in PICU, the child had loss of consciousness and convulsive seizure was interrupted. During the first day, the clinical condition deteriorated and gradually decorticate and decerebrate posturing appeared.

In the first brain CT scan, evidence of edema was observed in bilateral cerebellar hemispheres. Supportive care were started to decrease the intracranial pressure (ICP) including injection of mannitol causing gradual improvement of the child's condition during the following hours. Toxicology confirmed methadone poisoning.

Brain MRI was performed on the third day and bilateral cerebellar hemisphere edema with a compressive effect on the aqueduct and third ventricular obstructive hydrocephaly was detected (fig.1).

The general condition of the patient and signs of ICP rising ameliorated in the subsequent days; therefore, surgical management was not performed for acute hydrocephaly.

The child's clinical status was normal on the sixth day of hospitalization, but the neurologic condition deteriorated on the sixth night and torticollis, restlessness and loss of consciousness appeared again and the child was transferred to the operating room and ventriculostomy was performed with the possibility of brain herniation.

The symptoms gradually improved over the next days and after 6 days ventriculostomy was removed. In the control CT scan of the brain, hydrocephaly was reduced. The child was discharged after 18 days with a good general condition.

### Discussion

Opium and methadone intoxication have a high prevalence among children and adults in our country (8, 10-13), but there are very limited published papers about methadone poisoning in children in Iran. Methadone poisoning in four children were reported from Iran's Ministry of Health in 2007(14).

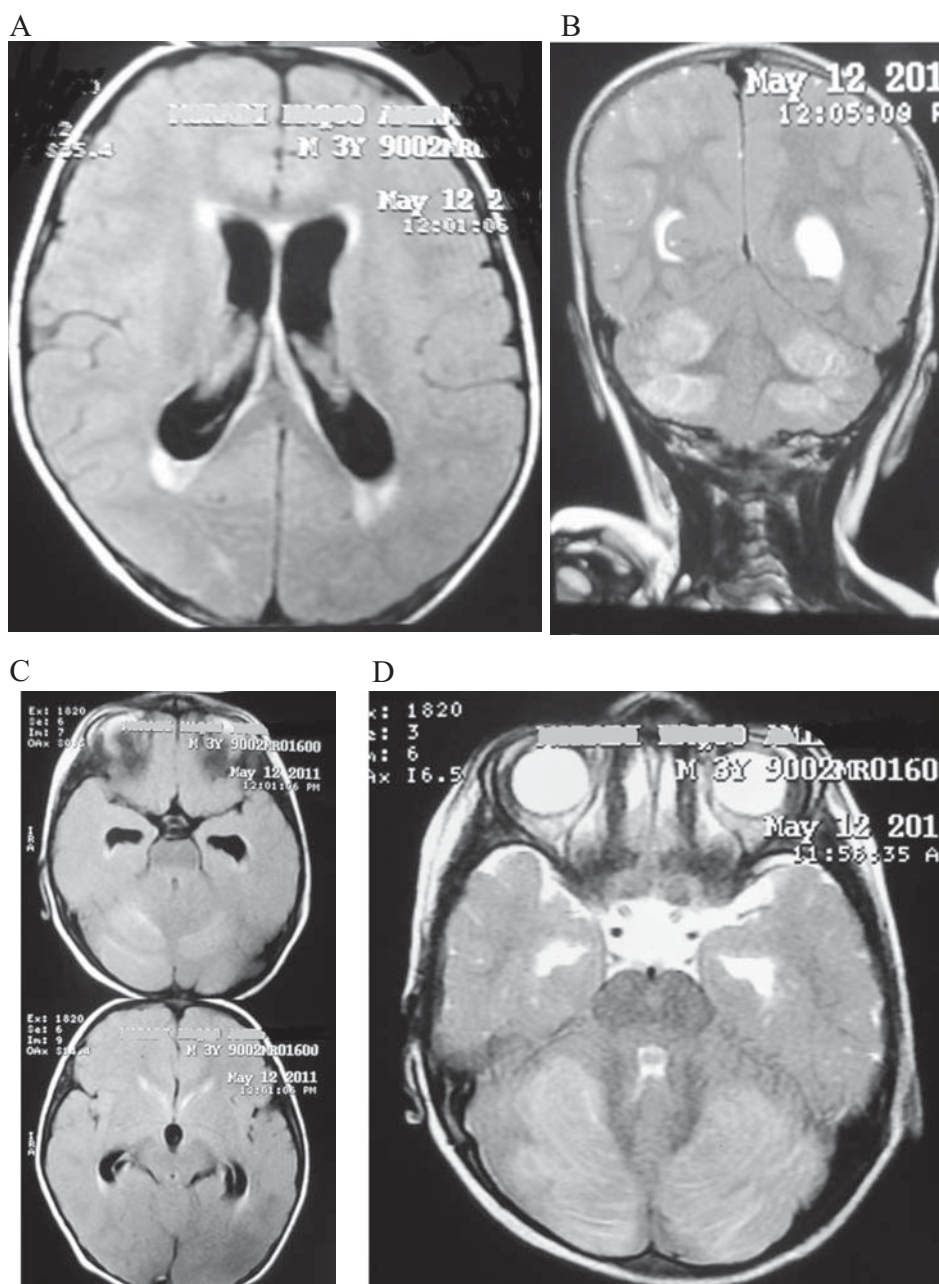
Acute hydrocephaly as an initial sign of methadone poisoning was reported previously by Riascos et al (2007) (4). The case was a 22-month-old infant with methadone poisoning. His condition deteriorated in the following days and acute hydrocephaly and

cerebellar ischemia was demonstrated in his brain MRI. This case is similar to our patient, but because of brain death he was later withdrawn from life support and died. In our patient, interim ventriculostomy was satisfactory.

Cerebellar edema in both patients may have been due to ischemia. Ischemia is the most frequent effect of acute intoxication with opioid and direct effects of heroin and cocaine with reversible vasospasm from stimulation of vascular smooth muscles by the  $\mu$  opioid receptors were proposed (15). Predilection to the cerebellar and posterior cerebral regions with possible reversible changes due to cytotoxic edema have been described (4, 5, 16).

Because of the high rate of pediatric methadone intoxication and the parents' refusal in our country, recognizing the different initial signs of methadone poisoning may be helpful in the early diagnosis and management of patients. Methadone intoxication should be considered in all children with loss of consciousness, myosis with or without respiratory depression (17). All pediatricians must notice the unusual presentation of methadone poisoning such as seizure and other signs related to brain ischemic lesions, especially in the posterior regions and ICP rising (4).

These cases justify the need for proper information of both the addict and their household on the dangers of methadone intoxication.



**Fig 1.** MRI on the 3rd day, Shows acute hydrocephaly with interstitial Edema (A, B) and T2 hyperintensity in cerebellar hemispheres (C,D).

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