

Altered Mental Status in a 22 Month Old NAS Child

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ABSTRACT

Background: Opioid use in the U.S. has become an epidemic resulting in unintended consequences for children. One consequence is increased opioid ingestions and exposures in the pediatric population. This can occur both in a parent who is an active user but also within the setting of reported recovery and active treatment (for example a parent engaged in an opioid treatment program). Differentiating these potential causes of ingestion when suspected involves toxicology testing which can present limitations and challenges.

Case: We present a case of heroin ingestion in a 22 month old child who presented with altered mental status and respiratory distress secondary to ingestion. Mother was noted to be in a methadone maintenance treatment program and therefore an un-witnessed methadone ingestion was on the differential as the cause of the patient's presentation which prompted urine toxicology testing. However, toxicology testing revealed that opiates were present in the patient's urine, thereby excluding methadone. In order to evaluate further, additional testing was ordered which eventually revealed an elevated 6-acetylmorphine level, the metabolite specific to heroin.

Discussion: This case demonstrates that the subset of patients in the pediatric population with parents in a methadone maintenance treatment program remain at high risk for ingestions, which may include drugs of abuse despite the parent's reported history of treatment. It is important as pediatricians to know steps to prevent ingestions by eliciting a drug use history prenatally, continuing with consistent follow up with at risk populations postnatal, and incorporating integrated multidisciplinary interventions throughout.

Keywords: Child abuse; NAS; Heroin; Ingestion; Codeine; Morphine; Altered

CASE REPORT

A 22 month old female was found unresponsive by her mother who then called EMS and initially provided a history that the patient choked on a French fry, vomited and subsequently became "sleepy". When EMS arrived, she was pale, unresponsive, with irregular and slow respirations that required oxygen *via* bag mask. Upon arrival to the emergency department, the patient's initial vitals were; respirations of 8, heart rate of 140 and blood pressure of 120/76. The mother denied the presence of drugs at home; however she then stated she is in a methadone Maintenance Treatment Program (MMT). She disclosed that she takes the methadone in a beverage bottle that was placed on the kitchen counter and said she did not witness ingestion by the patient.

Of note, the patient's past history was significant for admission to neonatal intensive care unit after birth for neonatal abstinence syndrome. While in utero, she was exposed to methadone as the mother was in a MMT program. The mother's urine toxicology was negative for other illicit substances at that time and therefore Child

Protective Services (CPS) were not involved. Prior to the patient's birth, her older sibling was placed into the custody of CPS given the history of substance abuse by the mother in the past.

After this information was obtained, the emergency department staff administered Narcan which the patient responded well to, but immediately after, she had multiple episodes of vomiting and developed respiratory distress during the peri-intubation period.

Arterial blood gas showed a pH of 7.15, CO₂ of 72 and O₂ of 50. Acetaminophen, salicylate, alcohol and phenobarbital levels were negative. Urine culture and blood culture were negative. Non-contrast CT head showed concern for diminished grey-white differentiation. MRI brain was subsequently performed which yielded a normal result.

Urine toxicology showed positive results for opiates and negative results for methadone. Subsequent confirmatory testing showed high levels of morphine 13300 ng/mL and codeine 625 ng/mL. A test for 6-acetylmorphine (6-AM), the direct metabolite for heroin, showed a level of 335 ng/mL with the cutoff being at 10 ng/mL.

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Child Protective Services (CPS) was notified of these results. New York Police Department, when searching the home, found heroin as well as drug paraphernalia.

FINAL DIAGNOSIS

Heroin ingestion

Hospital course: The patient was sedated and intubated with oxygen saturations in the 80's and then transferred to the pediatric intensive care unit. Her physical exam was significant for reactive pupils, limited neurologic exam with response to pain, and spontaneous movement of all limbs. She had spontaneous respirations and coarse breath sounds bilaterally. Chest X-ray showed increasing right upper lobe and retro cardiac opacity confirming aspiration pneumonia. Over the course of six days the patient was weaned off the ventilator and was stable on room air. She was ultimately discharged into the custody of Child Protective Services.

DISCUSSION

Toxicology

When a child presents with altered mental status, regardless of the history provided, drug ingestion should be considered and toxicology testing should be sent without delay. Interpretation of the results presents an additional challenge with these cases. In this case, methadone, which was thought to be the initial substance ingested given the mother's history, had been negative but opiates were positive. Confirmatory testing revealed morphine and codeine as the metabolites. Figure 1 demonstrates the substances that can be metabolized to morphine which include codeine, morphine and heroin, or a combination of these substances [1]. A test positive for codeine and morphine should raise concerns for either codeine and/or heroin ingestion. While codeine is found in prescription cough medications and can be metabolized into morphine, the patient had neither access to any cough medications nor any recent illness necessitating its use. Codeine, if found in urine is usually explained as an impurity in heroin preparations. The literature has suggested that morphine to codeine ratio greater than 1 is an indicator for the presence of heroin. In this case the ratio of morphine 13300 ng/mL and codeine 625 ng/mL was much higher than 1 suggesting a heroin ingestion [2].

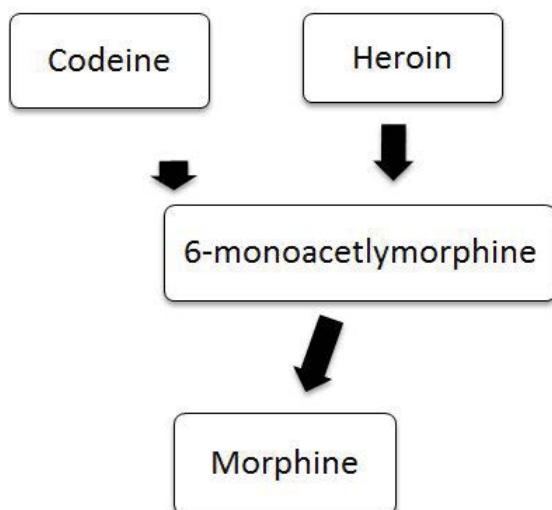


Figure 1: Opiate Metabolic Pathways.

Further testing to confirm heroin as the substance ingested was performed in this case. 6-acetyl morphine (6-AM) is a metabolite directly derived from heroin. It has a very short half-life of 10-20 minutes which allows the detection in blood to be only possible for 1-2 hours after administration. However, in urine the 6-AM metabolite lasts slightly longer [1,2]. In this case the elevated value of 6-AM led to the definitive diagnosis of heroin ingestion.

Child protection

Opioid use in the U.S has steadily increased over the years. In 2012, 2.1 million people were estimated to suffer from opioid abuse secondary to prescriptions alone [3]. From 2002 to 2014, the recorded mortality rate from opioid abuse doubled, whereas the mortality rate from heroin overdose quadrupled [4].

These statistics show the severity of the opioid epidemic. Historically, drug epidemics have a downstream effect on children. The first cases of opioid ingestion in children were published in the late 1960s [5]. Initial cases described accidental ingestion of methadone from caregivers in Methadone Maintenance Treatment (MMT) programs [6]. However, relapse rates of patients on MMT have been reported as greater than 50 percent, which only compounds the risk of exposure of children to methadone and other types of opioids such as heroin [7].

110 cases of preventable deaths of babies and toddlers born to mothers who used opioids during pregnancy was identified by Reuters since 2010 [8]. More than 40 of these children died from suffocation that occurred when someone lay on top of them. There were 13 deaths after swallowing toxic doses of methadone, heroin, oxycodone or other opioids. In more than 75% of these cases, the mother was implicated in her child's death [8]. These are some examples that show how an intoxicated parent's inability to care for their child leads to their deaths. The problem is the parent is leaving the drug in an easily accessible location, which leads to unintentional ingestion by children at various developmental stages.

As pediatricians, we must maintain a high level of concern for infants and children discharged to environments where there is a known history of opiate drug abuse. The steps towards preventing adverse events such as accidental ingestion in children should begin not just at the time of delivery but even prenatally, if possible. Communication between the pediatrician and the obstetric team will help the pediatrician understand the background of the parents and formulate a follow up plan best suited for the patient.

Current steps occurring in hospitals include obtaining a thorough history of drug use in all caregivers, running routine urine drug screens of mothers in the prenatal period, and involving social work and/or reporting to Child Protective Services of known or suspected cases of drug abuse in the parent and caregivers. These actions are all important steps towards ensuring a safe home environment for a child in the immediate setting. Nevertheless, in the long run, children can be easily lost to follow up and thus will need constant and frequent monitoring by their pediatrician for review of their environment at every well child check-up.

Interventions for these families should be multi-disciplinary and integrated with the resources available within the community, which will target the caregiver and the child's needs. It should cover health, mental health, and social service components, as well as educational, vocational, and employment [9].

In the 1990s, Project STRIVE (Support, Trust, Rehabilitation, Initiative, Values and Education) accomplished this multidisciplinary style that involved substance abuse treatment, parent education, home and center based social work, obstetric and pediatric care, and addiction prevention counseling. A parent educator would teach parenting behaviors and would visit the home. The home visits were weekly for the first 2 months, monthly till 6 months then bimonthly till 1 year [10].

Another intervention studied was Home-U-Go Safely (HUGS) which provided home based nursing care for infants. Between 1994-1997, 204 newborns were visited 16 times starting from 1 week old till 18 months of age. This program helped teach parents ways to better understand and perceive their child's behavior which in turn showed a trend for reducing parental stress [10]. Some additional protective factors for these patients that pediatricians can do in their office include, counseling parents about the dangers of accidental medication ingestions and providing information about safe storage of medications. Checking in with the parents by inquiring about their current drug use and asking how often they go to MMT centers. Asking about their stress levels and coping strategies and gaining insight on factors that may lead to a relapse can be crucial. Engaging other family members as those who can provide a support system can also be an important protective factor.

As pediatricians, it is important to have these protective factors in mind and start prevention as early as possible but ultimately a low threshold is needed to call Child Protective Services, local Child Abuse Centers or Child Abuse Pediatricians if any red flags are present such as patients missing appointments or referrals, changes in weight or worsening of any diagnosis requiring recurrent hospitalizations.

CONCLUSION

As opioid abuse is on the rise in the U.S, an increasing number of children are being affected in numerous ways. In cases of unknown ingestion in a child who presents to the emergency room, it is imperative to consider drug ingestion and a toxicology screen should be sent. Moreover, it is best to do levels of all possible types of opiates and also a morphine/codeine ratio and 6-acetylmorphine

to confirm heroin use. This becomes especially important when there is a known ingestion of an opioid. Providing parents with community resources and having early communication with obstetric teams are some ways to help prevent an adverse event. In cases where prevention has failed, it is crucial to have a lower threshold for calling Child Protective Services, local Child Abuse Centers or Child Abuse Pediatricians.

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