



Contents lists available at ScienceDirect

Forensic Science International

journal homepage: www.elsevier.com/locate/forsciint



Case Report

Intentional heroin administration resulting in homicide in a 10-month old infant

Anthea B. Mahesan Paul^{a,b,*}, Lary Simms^c, Althea M. Mahesan^d

^a Department of Pathology, University of Ottawa, Ottawa, ON, K1H 8M5, Canada

^b Nuffield Department of Obstetrics and Gynaecology, University of Oxford, Oxford, OX3 9DU, United Kingdom

^c Office of the Medical Examiner, Clark County Coroner, 1704 Pinto Lane, Las Vegas, NV, 89106, USA

^d University of Southern California, Los Angeles, CA, 90007, USA

ARTICLE INFO

Article history:

Received 23 January 2018

Received in revised form 23 February 2018

Accepted 26 June 2018

Available online xxx

Keywords:

Forensic science

Homicide

Infant mortality

Heroin

Toxicology

Opioids

ABSTRACT

Homicide occurs in approximately one in five injury-related deaths among infants in the United States and studies suggest that male caretakers (fathers or mothers' intimate partners) are the perpetrators of the majority of infant homicides. Opioid abuse is common and it is estimated that between 26.4 million and 36 million people abuse opioids worldwide. In this case report, we add to the literature the first reported homicide by intentional heroin administration in a 10-month old infant. Toxicology revealed morphine 1092 ng/L, codeine 74 ng/mL, and 6-monoacetyl-morphine 359 ng/L in cardiac blood. Morphine 803 ng/g, codeine 54 ng/g in liver tissue, and morphine 181 ng/mL was found in vitreous humor. With the prevalence of opioid abuse on the rise accidental opioid ingestions in the pediatric population have increased. However, forensic personnel must recognize the possibility of intentional poisoning in this vulnerable population.

© 2018 Elsevier B.V. All rights reserved.

1. Introduction

Poisonings attributed to opioids are the leading cause of injury-related mortality in the United States [1]. The U.S Surgeon General has declared an opioid epidemic that shows no signs of abating in the near future [2]. The human cost of opioid abuse and overdose is accompanied by a substantial financial price: for 2013 alone the financial burden of opioid abuse was estimated at \$78.5 billion [3].

Heroin (diacetylmorphine, (5,6)-7,8-didehydro-4,5-epoxy-17-methylmorphinan-3,6-diol diacetate (ester)) is a semi-synthetic morphine derivative and is used as a powerful opioid analgesic [4]. Heroin was developed in 1874 by A.C. Wright and was first marketed in 1898 as an antitussive for patients with asthma and tuberculosis [5]. In human plasma, heroin is rapidly hydrolyzed to 6-monoacetylmorphine (6-MAM) and finally into morphine. After intravenous administration, about 70% of the total heroin dose is

recovered in urine, mainly as conjugated morphine (55%) [6]. 6-MAM is lipophilic and is considered to be responsible for the acute effects following heroin administration [7,8]. After heroin injection 6-MAM is detected in plasma for 1–3 hrs in adults [4]. Like morphine, 6-MAM is a μ -opioid receptor agonist however, morphine has greater affinity for the μ -opioid receptor thought to be responsible for many of the adverse effects of μ -receptor agonists most notably respiratory depression, gastrointestinal effects, and sedation [9].

The most common cause of death involving heroin is overdose which occurred in approximately 12,990 deaths in the U.S in 2015 [10]. Homicide can be difficult to ascertain in toxicology deaths involving adults, however in infants can be more easily determined. Death in infants due as a consequence of maternal opioid abuse has reported in the context of opioid exposure in utero, the increased incidence of sudden infant death syndrome, increased incidence of congenital malformations, developmental delay and more recently a complication of breast feeding in maternal users [11–13]. Literature has been reported on opioid-related homicide in infants using methadone however to the best of our knowledge has never reported using heroin [14,15]. In this case report we share the first reported case of homicide by heroin in an infant.

* Corresponding author at: Department of Pathology and Laboratory Medicine, University of Ottawa, Ottawa, ON, K1H 8M5, Canada.

E-mail addresses: abm.paul@hotmail.com (A.B. M. Paul),

LSI@ClarkCountyNV.gov (L. Simms), mahesan@usc.edu (A.M. Mahesan).

2. Methodology

2.1. Data collection

At the Clark County Coroner's Office in Las Vegas, all pediatric deaths (under 18) have an on-site scene investigation including interviews of caregiver(s), complete medical history, and scene investigation. Decedents undergo a standard autopsy examination using the modified Virchow method (7). Routine ancillary studies include:

1. Comprehensive toxicological examination of heart blood, subclavian blood, urine, liver tissue, stomach contents, and vitreous fluid. Screening and confirmation was performed by enzyme-linked immunosorbent assay (ELISA), gas chromatography/mass spectrometry, headspace gas chromatography, multidimensional gas chromatography/mass spectrometry, and liquid chromatography/tandem mass spectrometry.
2. Microbiological cultures of blood (cardiac, and peripheral), CSF, lungs, nasopharynx, airway, and spleen.
3. Histopathological examination of all organs.
4. Pre-autopsy radiographs reviewed by a pediatric radiologist.
5. Metabolic screening including urine organic acid profile and acylcarnitine profile.
6. Genetic testing.

The standard toxicology screening panel is completed by ELISA on all pediatric cardiac blood in un-natural deaths which includes: Acetone; Amphetamines; Barbiturates; Benzodiazepines; Blood Alcohol Concentration (BAC); Buprenorphine, Metabolite; Cannabinoids; Cocaine, Metabolites; Ethanol; Fentanyl, Acetyl Fentanyl; Isopropanol; Methadone, Metabolite; Methamphetamine, MDMA; Methanol; Opiates; Oxycodone, Oxymorphone; Phencyclidine [16]. The standard toxicology screening panel on fluid (vitreous) requires 7 mL and is inclusive of Acetone; Amphetamines; Barbiturates; Benzodiazepines; Buprenorphine, Metabolite; Cannabinoids; Cocaine, Metabolites; Ethanol; Fentanyl, Acetyl Fentanyl; Isopropanol; Methadone, Metabolite; Methamphetamine, MDMA; Methanol; Opiates; Oxycodone, Oxymorphone; Phencyclidine [17].

The lower limit for ELISA opioid detection by NMS labs is 20 ng/mL [17]. On ELISA confirmation of opioids was performed by High Performance Liquid Chromatography/Tandem Mass Spectrometry (LC-MS/MS) [16]. The reporting lower limit of detection for free morphine by NMS labs is 5 ng/mL and 1 ng/mL for 6-MAM [16].

All findings are examined thoroughly by the attending forensic pathologist and peer-reviewed before cause and manner of death are established.

2.2. History

The 10-month-old infant had a normal developmental history with an uncomplicated vaginal delivery and neonatal period. On the day of her death, she awoke around 09:00 hrs. She was not acting irritable or ill, with no remarkable events occurring during the day. She was fed normally throughout the day with her last feed at approximately 1600 hrs by her biological father. The family was watching TV together, with the mother, father, maternal aunt, and older sibling present. At around 20:00 hrs the mother went to check on the infant and found her unresponsive. Paramedic services were called and the infant was pronounced dead on arrival to the hospital. Examination of the home revealed a clean and well kept home with appropriate toys. There were no signs of drug abuse in the home. The child's bedroom revealed a tidy room with crib and toddlers bed. Excessive bedding or pillows were not seen. There were no signs indicative of violence. The mother and

maternal aunt underwent and passed extensive police questioning, drug and polygraph testing. The biological father was charged with the homicide, however fled the country to evade capture. As per U.S. law the biological father is innocent until proven guilty in a court of law.

2.3. Autopsy

On autopsy external examination revealed a normally developed infant (Table 1). Rigor mortis was present and lividity was fully developed posteriorly and in a patchy distribution anteriorly. The head hair was dark and scalp unremarkable. The anterior fontanelle was closed. Each ear was pierced once. The corneas were cloudy and irides dark brown. The nose, lips, and mouth were unremarkable. The jaws are edentulous. There were no injuries identified to the external neck. The chest and abdomen were unremarkable. The extremities were equally and symmetrically developed. There was a single needle puncture present in the left antecubital fossa. The fingernails and toenails were short in length. The external genitalia were female and otherwise unremarkable. The back shows no evidence of natural disease. The lumbosacral and buttock areas demonstrated an irregular Mongolian spot. Signs of medical intervention included: bilateral needle punctures in the front of both legs, and an endotracheal tube. At the time of autopsy, there was no indication from history or preliminary criminal investigation to suggest intentional overdose and as such needle puncture marks were all thought to be medical intervention. Tissue samples were not taken from the injection sites for toxicology or histology. Internal examination demonstrated generalized edema and congestion of the pulmonary parenchyma with 12 mL of white paste stomach contents. On microscopic examination, findings were unremarkable apart from broad areas of alveolar edema and generalized vascular congestion on lung histology. Remaining X-ray, autopsy, blood investigations, viral nucleic acid sequences, cultures, metabolic testing, genetic and histopathological examination were unremarkable. X-rays were reviewed by a pediatric radiologist. Toxicology revealed morphine 1092 ng/mL, codeine 74 ng/mL, and 6-monoacetyl-morphine 359 ng/mL in cardiac blood (Table 2). Morphine 803 ng/g, codeine 54 ng/g in liver tissue, and morphine 181 ng/mL was found in vitreous humor. The 6-monoacetyl-morphine metabolite was not present in liver. The sample of vitreous humor was insufficient for further testing. No other positive toxicology was found in these specimens.

3. Discussion

Poison exposures are common in children with the highest incidence occurring in 1 and 2 year olds (8243 and 7903 exposures/100,000 respectively) [18]. Poison-related deaths in infants however are exceedingly rare in the United States with a total of 9 accidental poisoning exposures, and 12 poisonings of unknown intent in 2015 nationwide [19]. From 2010 to 2015 the CDC reported 29 infant deaths associated with narcotic exposure; 7 of these infant deaths were in 2015 [19]. Fatalities associated with pediatric poison exposure must be thoroughly investigated to rule

Table 1
Summary of measurements and weights for this infant.

Height:	28 in. (50th percentile)
Weight:	20 lbs. (50th percentile)
Heart:	43 g
Lungs:	230 g
Liver:	390 g
Spleen:	30 g
Kidneys:	60 g
Brain:	1050 g

Download English Version:

<https://daneshyari.com/en/article/11000136>

Download Persian Version:

<https://daneshyari.com/article/11000136>

[Daneshyari.com](https://daneshyari.com)