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Limits and pitfalls in a lethal infant cocaine intoxication

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ABSTRACT

The case concerns the first Italian report of a fatal cocaine intoxication in an 8-month-old baby girl found dead in the cradle by her parents at 6 am on a summer day. At arrival to the emergency department, the doctors declared the baby dead and the Prosecutor Office ordered an autopsy and toxicological analyses. Despite no history of cocaine use/abuse by both parents, toxicological analyses evidenced a positivity to cocaine in the post-mortem blood, brain and liver. The legal physician concluded for a fatal cocaine intoxication. A crucial aspect to the Court was to discriminate between administration (accidental or voluntary) and intake (almost accidentally), due to different legal consequences for parents (i.e. voluntary homicide or inadequate supervision). In the here presented case discriminating the exact intake was almost impossible in terms of certainty. Such difficulty mainly derived from lacks in the investigation activities in the first hours following the death. Among all possible intake routes, the 'most probable' was the accidental one, mostly attributable to a cradle contamination. A lack in the site inspection protocol could strongly affect the case solution making it impossible to offer the Court a definitive 'scientific' solution to the case (based on scientifically irrefutable data).

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Introduction

Paediatric poisoning equates to a large proportion of emergency department admission¹. Associated fatalities are a tragic and preventable mortality cause^{2–5}. Prevention efforts have reduced fatalities although being less effective with respect to illicit substances, in cases of malicious intent⁶ or neglect given the difficulty of re-gathering data^{7,8}. Prevalence and types of substances vary considerably across the world and depend on socioeconomic status and cultural practices⁹. Cocaine has a biological half-life of 30–90 minutes and is almost completely metabolized by cholinesterases present in both plasma and liver. In the paediatric population, and particularly in foetuses and infants, hepatic metabolism is prevalent over plasma, given the immaturity of the plasma cholinesterase system¹⁰. The main metabolites of cocaine are benzoylecgonine (BE) and ecgoninemethylester (EME), both not pharmacologically active. The presence of concentrations of cocaine greater than that of the metabolite in samples taken post-mortem and adequately

Table 1. Postmortem concentration values of cocaine and BE detected.

Matrix	[Cocaine]	[Benzoilecgonine]
<i>Blood</i>	0,60 mg/L	0,28 mg/L
<i>Liver</i>	0,10 µg/g	0,12 µg/g
<i>Brain</i>	0,13 µg/g	0,10 µg/g

preserved is indicative of a short interval between intake and exitus^{11,12}. Except for uptake through the placental barrier and breast milk, the possible modes of contact with the substance reported for the paediatric population can be traced to ingestion/administration through liquids or after contact of the infant with contaminated surfaces, as well as by inhalation of second-hand smoke of cocaine in free form ('crack')^{12,13}.

Results and discussion

Autopsy findings show a peripheral shock and terminal acute cardio-respiratory failure, pulmonary vascular congestion and oedema, haemorrhagic petechial changes at the level of the cerebellar vermis, and diffuse visceral congestion. Toxicological analyses evidenced a positivity towards cocaine and BE in blood, brain and liver (Table 1). Blood cocaine concentration higher than BE could support the hypothesis of a short time-interval between absorption and death. The lack of the urinary matrix, the scarcity of the biliary matrix and the impossibility for the Coroner to subject an aliquot of hair to specific analysis aimed at searching for cocaine does not allow for information about little baby previous exposure to the substance.

The possible contamination of the 'cradle environment' could have occurred in the hypothesis of powder residues of the drug substance, which the child, feeling the surfaces and bringing her hands to her mouth, could have ingested. The exposure of little baby to passive crack smoke was excluded because no room saturation was reached (fatality occurred in summertime with no air conditioning). The last hypothesis to consider is voluntary or accidental administration by one of the parents, the only ones present in the house at the time of the events according to their own statements.

Toxicological datum was not sufficient to discriminate the exact intake route. Autopsy and histological data were not significative as well circumstantial one. Police proceeded with house inspection only a couple of hours after the admission of the patient in E.R., while the father and a relative were allowed to return home. Thus, the possibility to alter the crime scene could have brought to the negativity of the search (i.e. no illicit substance found).

Conclusion

The paucity of information that can be deduced from the judicial inspection makes the task of the writing experts particularly arduous, resulting in the impossibility of expressing a certain judgement regarding the dynamics of the facts. Site inspection is a key element and failure to perform the same, failure to delineate the space of a hypothetical crime scene makes it impossible to establish the culprit leaving unsolved cases.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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