H68 The Dark Side of Sudden Infant Death Syndrome (SIDS): When Isovaleric Acidemia Leads to Unexpected Death

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After attending this presentation, attendees will understand the causes of Sudden Infant Death Syndrome (SIDS), which are not yet clear to date.

This presentation will impact the forensic science community by demonstrating the importance of neonatal screening.

In neonates, fatal blood-chemistry changes could occur, such as Isovaleric Acidemia (IVA). This presentation will impact the forensic science community by illustrating that sometimes the causes of sudden deaths in the newborn are not always unknown, but may also result from acid-base balance alterations. Therefore, newborn screening is essential in order to prevent adverse outcomes such as sudden death, in particular in cases of consanguineous children with genetic mutations.

SIDS is a multifactorial disorder. The environmental risk factors are: prone sleeping, smoking during pregnancy, overheating, and co-sleeping. The biological risk factors may include mutations and polymorphisms in genes involved in metabolism (also in the immune system) and neurochemical alterations in the medullary serotonergic system. The genetic component of sudden infant death can be divided into two categories: mutations that are the cause of death or that might predispose infants to death in critical situations.

Newborn screening is a form of preventative health care that seeks to examine children in their first days of life to detect the presence of diseases whose main symptoms may not be obvious. The screening is performed on genetic, endocrine, metabolic, or hematologic diseases. The investigation of neonatal screening begins with the collection of blood samples from the baby's heel between the second and fifth day of life. If children are positive, surveys are necessary to start treatment within a few weeks after birth. The first case of a patient with isovaleric acidemia was described in 1966 and, several years later, was identified as a deficiency of isovaleryl-CoA dehydrogenase activity. Biological tests show a metabolic acidosis accompanied by increased blood ammonia concentration (hyperammonemia) and the reduction of calcium, platelets, and leukocytes. An important characteristic in isovaleric acidemia is an odor of sweaty feet due to the accumulation of isovaleric volatile acid. The treatment of patients with isovaleric acidemia is based on the restriction of a protein diet and on the administration, orally, of glycine and carnitine. Unfortunately, the isovaleric acidemia in neonates does not always cause important symptoms and signs; therefore, it cannot be recognized and will lead to death as in the case presented.

This study reports a case of sudden pediatric death in babies born to consanguineous parents of Indian nationality and residents in Calabria (Southern Italy). A 2-month-old baby was found dead in his home. This triggered the protocol for SIDS. At external examination, the infant exhibited abundant hypostases and lack of traumatic injury. At postmortem examination, the newborn had a smell of sweaty feet. Histological investigations were performed. At autopsy, the existence of an enlarged and edematous pancreas, with the peripancreatic exudates, confirmed the presence of acute pancreatitis. Analysis of the parents revealed consanguinity. For this reason, the forensic

pathologist performed genetic testing, which confirmed the diagnosis of sudden death by isovaleric acidemia. This study has demonstrated that neonatal screening is characterized by simple and reliable investigations and, if the parents are consanguineous, the family must undergo genetic counseling before pregnancy to avoid fatal pediatric death and to improve neurologic and cognitive outcomes. Additionally, inserting the isovaleric acidemia among the cases of SIDS (poorly understood) is proposed as very often it is not preceded by recognizable signs and symptoms so this pathological condition can lead to unexpected and sudden death of the newborn. It was emphasized that investigations of sudden unexpected death are inconsistent, varying by jurisdiction and by the experience of the forensic pathologist. The addition of genetic testing to autopsy investigation substantially increases the identification of a possible cause of sudden death among neonates and infants.

Forensic Science, Isovaleric Acidemia, SIDS