G119 Complete Forensic Investigation Reveals SUDEP and Not Homicide

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The goal of this presentation is to focus on a forensic case where an Italian public prosecutor initially suspected a homicide-related death. This presentation will examine a "Sudden Unexpected Death in Epilepsy" (SUDEP) event that required a complete forensic approach, i.e., clinical history collection, autopsy, and histological and toxicological studies.

The presentation will impact the forensic science community by demonstrating the significance of a thorough forensic investigation in reaching a correct postmortem diagnosis and, consequently, in providing an adequate and high-quality service to the judicial authorities. This presentation will also impact society as a whole by showing the crucial importance of protecting epilepsy sufferers, especially if they live alone. Particularly, an evaluation of the environmental conditions as well as periodic medical controls are recommended.

Epilepsy is a common chronic neurological disorder characterized by seizures and significantly increased rates of mortality. However, SUDEP, which is the most common seizure-related category of death, is still a poorly understood phenomenon. The precise frequency of its occurrence is not well defined so far, but a range of 1 in 370-1,100 in the general epileptic population is reported in the literature reviewed. From a pathophysiological point of view, it is possible to talk about SUDEP only in the absence of any identifiable cause of death at postmortem examination, suggesting an underlying arrhythmogenic predisposition or central/obstructive apnea or neurogenic pulmonary edema. Some authors have also suggested the key role played by inadequate therapy.

A 51-year-old Italian man was found lifeless, injured, and partially carbonized at his home during the winter of 2013. The man was supine, with his head inside the fireplace (the fire had recently gone out) with multiple and diffuse second-, third-, and fourth-degree burns mainly placed in the posterior regions of the body. The victim had the typical "pugilistic position" with areas of split skin mixed with burn lesions. The occipital area showed an irregular cranial discontinuity (diameter: 1cm; depth: 1.5cm) without surrounding skull fractures. A right collar-bone fracture was also observed. During the crime scene investigation, the house was in considerable disorder and the victim's brother-in-law, who was questioned by police as an informed witness, presented, according to police officer reports, with "suspect injuries." The combination of these data led the public prosecutor to hypothesize that the man might have been killed during an intra-familiar robbery attempt.

A forensic autopsy was performed within 48 hours in order not only to find the real cause of death, but also to investigate the hypothesis of homicide. The internal examination mainly revealed: "heat-hematoma," no discontinuity of the dura mater, boiled cranial content, absence of internal injuries and/or hemorrhagic infiltrations, no smoke in the upper airways, and pulmonary edema. The evaluation of histological specimens obtained from autopsy samples showed massive edema of the lungs associated with multi-organ congestion, liver steatosis, and no vital signs in the epidermal lesions. Toxicological analysis resulted minimally positive for carboxyhemoglobin (COHb) (8.5%) with a complete absence of alcohol, phenobarbital, and illegal drugs in blood and urine.

Moreover, the forensic pathologist, on analyzing the victim's medical history, discovered that he had suffered from epilepsy (treated with phenobarbital, though with poor medication compliance) with recurrent falls (some of them leading to traumatic injuries clearly shown in previous X-rays and Computed Tomography (CT) images; a therapeutic craniotomy was also performed in 2006). The brother-in-law also underwent a forensic examination which resulted positive due solely to recent tattoos.

Only by performing such a complete forensic investigation was it possible to exclude with certainty the initial suspicion of homicide and to make a final diagnosis of SUDEP. In fact, the victim was undoubtedly subjected to the action of the flames when he was already dead or *in limine vitae*.

It could therefore be concluded that the victim fell into the fireplace after the verification of SUDEP, resulting in postmortem burn injuries. The occipital discontinuity was also explained by the deceased's prior medical history (craniotomy).

This case underlines the need to keep attention levels high in the forensic analysis of all so-called "seizure-related deaths," such as burns, accident, suicide, treatment-related deaths, and SUDEP.

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SUDEP, Forensic Investigation, Differential Diagnosis

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