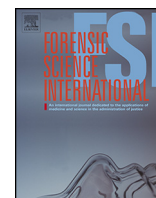




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Case Report

An amazing case of fatal self-immolation

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ABSTRACT

We present a surprising case of suicide by self-immolation. A surveillance camera filmed the victim's agony. We were able to ascertain that he survived 13 min after ignition. This case was the starting point for a review of the literature of the forensic elements required to correctly analyze cases of suicide by self-immolation and to establish the causal link between the burn lesions and death. The authors will focus on the forensic and medical aspects in favor of suicide by self-immolation and on the forensic aspects required to understand the ignition process, the circumstances surrounding the fire with a particular emphasis on determining whether an accelerant was doused on the victim before ignition.

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1. Introduction

In forensic medicine, self-inflicted burns are a frequent source of admissions to burn units [1,2]. Some cases of self-immolation are fatal, although statistically speaking deaths by accidental fire are more frequent. Criminal immolations are seldom observed [3,4]. All deaths where fire is involved must be considered suspicious and require specific investigations in order to identify the victim, determine intent and establish the causes and manner of death. This requires determining on the one hand whether the victim was burned before or after death, and, on the other hand, what the exact method of ignition and fire type were. This relies on a certain number of forensic elements: the degree of carbonization of the body, the presence or absence of soot in the respiratory tract,

the determination of blood and tissue concentrations of toxic substances (in particular HbCO and cyanide), and the presence of traumatic lesions. A review of the literature shows that the study of these parameters is not always straightforward. Discrepancies between findings are possible, making the determination of the causes and manner of death more difficult.

In this paper, we present a case of suicide by self-immolation that was partially filmed by surveillance camera, enabling the investigators to follow the agony of the victim in the flames. This case is exceptional both because of the manner of ignition and the lengthy survival time. The goal of this paper is to help the forensic pathologist in his diagnostic approach with victims of suicide by self-immolation. The discussion will first focus on the medical and forensic aspects of the case that led to the conclusion of suicide by self-immolation. Secondly, the forensic aspects required to understand the ignition process will be reviewed here, with a particular emphasis on determining whether an accelerant was doused on the victim before ignition.

2. Case report

The body of a man was found at night on the side of the road, next to a cemetery. He was on his back, naked and extensively

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Fig. 1. Body of the victim extensively covered in burn wounds.

covered in burn wounds (Fig. 1). No item of clothing and no shoes were found at the scene. The remains of a badly burned car were found 3 m from the body, with an open driver-side door. There was a trail of fuel from underneath the car down the slope of the road to the calves of the body. The external examination of the body showed third degree burns to 100% of the body surface. The skin was a brown-black color and showed signs of having retracted due to the heat. The desquamation of the epidermis revealed the red dermis below. Almost all of the hair had disappeared from the body, save for that at the top of the cranium. The left side of the face, including his eyelashes and eyebrows, was slightly more burnt than the right. The lower limbs were bent at the hips and at the knees. The burns were homogenous in both depth and distribution all over the body, save for the backside of the ankles and calves, which showed the start of carbonization (with destruction of all of the layers of skin and part of the muscle). These areas of carbonization were level with the fuel trail on the road. His face and neck were covered in soot. No other trauma lesion was found upon external examination.

The full-body scan done before the autopsy found no evidence of traumatic or medical pathologies. The autopsy did not find evidence of internal lesion, projectile or bone fracture. The respiratory tract contained an important amount of soot and the tissues had a reddish hue to them. The toxicology assay found a 2% level of HbCO (spectrophotometry) and a blood cyanide level of 0.29 mg/L (GC–MS after head space injection, derivatization using chloramine T and the use of $^{13}\text{C}_{15}\text{N}$ as internal standard) while cyanide concentration in the lung was 0.58 mg/kg. No trace of accelerant (head space GC–MS) was found on the skin and lung samples.

A city surveillance camera filmed the victim going around his car, alone, before the start of the fire. The ignition of the car was filmed, as was the rapid and violent development of the fire. The exploitation of this video coupled with the investigation data led to the conclusion that the subject was seated in his car when the fire was lit. Unfortunately, the view of the car was partially obstructed by a tree. He probably used the spark caused by a cigarette lighter or a match to ignite the gasoline contained in open gas tanks placed beside him. The clothes ignited first. The victim got out of the car, explaining the open car door, before falling to the ground not far from the fire center. For the next 3 min the victim cannot be seen on the video. He reappears on the video for 4 min, crawling along the road with great difficulty, in immediate proximity to the fire center, flames visible on both of his arms. He then disappears again, probably crawling on the ground behind a tree, before appearing again 8 min later, slowly turning over on himself on the ground, flames visible on both his arms and upper body. He no longer had

on any clothes or shoes. He finally came to a rest on his back 1 min later. Total survival time, from ignition to immobilization, is 13 min.

Police investigation did not uncover any evidence in favor of a homicide. The car ran on diesel fuel and gasoline was found inside the car, which argued in favor of intentional placement before ignition. Based on the police investigation and the autopsy findings, the cause of death was declared to be extensive burn wounds incompatible with life, and the manner of death was determined to be suicide.

3. Discussion

Self-immolation is an uncommon method of suicide [5] especially in developed countries. It is more frequent in Asia and Africa [6,7] and in particular on the Indian subcontinent where immolation by fire has a ritual connotation [8]. A review of the literature did not yield any answers as to why an individual would chose to die this way. It is possible that certain victims have an abnormal indifference to pain [9], as is the case with a number of schizophrenic individuals. Even though most of the victims of self-immolation suffer from some type of mental disorder [6,10–12], cases of suicide by self-immolation have been observed in patients without a history of mental disorder [10,13,14]. In some cases, social and ethno cultural processes are a better predictor of self-immolation than mental illness [7]. Immolation can be linked to the notion of purification by fire, or sacrifice [15].

Self-immolation is defined as the act of pouring a flammable liquid onto oneself and igniting it. There are many ways of achieving this. Accelerants are the main agents chosen both in self-immolation victims and victims of assault [16], because it is difficult to set fire to a living individual. Gasoline is the most often used accelerant [17,18] because it is the easiest to obtain [19]. Alcohol and methylated spirits can also be used [13], as well as kerosene [10,11,14], benzene [20] and paraffin [5], products that are available to populations of lower socioeconomic status. Some self-immolation victims chose to forego liquid accelerant [5,14,20,21] in favor of propane–butane gas [20]. Burns due to electricity, dangerous liquids and caustic agents are excluded from this discussion.

In cases of immolation, assessment of the cause and manner of death is based on autopsy, toxicological, histological examinations and police investigation records. It is important to differentiate the homicides disguised as suicides [22], and the cases of suicide that initially appeared to be homicide. These are rare cases of self-immolation combined with other methods of suicide [21,23–25], where the investigations are complicated by the presence of multiple fatal lesions. Certain scenarios are so complex that the case cannot be resolved if the manner of ignition is not elucidated. This requires establishing whether an accelerant was used, and whether this accelerant was poured on the victim before the fire was started. To this end, analyzing the burn pattern of the clothing and of the body yields essential information.

On the one hand, heavier fabrics such as jeans can be difficult to completely consume, and remnants of clothing are often left after the fire dies out. If the carbonization of the clothing is incomplete, black streaks can be observed on the clothing, resulting from the ignition of the fabric in contact with the accelerant. The distribution of the black streaks indicates the way it was poured on the victim before ignition. On the other hand, synthetic fabrics such as nylon are easily flammable and can thus disappear completely, releasing cyanide. Blood cyanide levels above 0.20 mg/L are considered toxic [26]. High blood cyanide levels combined with the presence of high levels of cyanide in the lung tissue is consistent with the inhalation of toxic vapors either from the combustion of synthetic fabrics (i.e. the victim's clothing) or with

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