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A Self-immolation Dilemma

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Abstract: Setting oneself on fire, termed self-immolation, has high mortality and morbidity.

A 60-year-old female patient with a history of depression and anxiety was found by drone search deceased with thermal injuries in a cornfield. Her abandoned vehicle was found with a dead battery and out of fuel 1/4 mile away. A lighter was lying 8 feet from the decedent, and a string of rosary beads, clothing, cigarettes, pliers, and a glass bottle with a cross on it were found nearby.

Autopsy findings were notable for charring of the face, torso, and portions of the extremities, soot deposition in the peripheral airways, erythema of the epiglottis, bilateral lateral tongue hemorrhages, and pulmonary congestion and edema.

The toxicology report revealed a blood carbon monoxide level of 23.8%. A blood volatile screen was negative. Blood drug screen was positive for a metabolite of marijuana and loperamide.

The patient was determined to be alone at the time of the fire and death. No fuel or ignitable fluid was identified. The origin of the fire and the manner of death were listed as undetermined. The cause of death was determined to be thermal injuries and smoke inhalation. Whether this case represents a deliberate act or a possible accident remains in question.

Key Words: forensic pathology, self-immolation, suicide, thermal injuries, smoke inhalation

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Preventable injury, including self-harm, is a leading cause of death worldwide.[1] Setting oneself on fire, termed self-immolation, is an uncommon form of suicide attempt and completion. It has a fatality rate of 80%.[2] Often, self-immolation patients have co-morbid substance abuse and underlying psychiatric illnesses including suicidal intent or previous suicide attempts.[3] Self-immolation is more commonly seen in low and middle-income countries than in high-income countries.[4] Self-immolation has also been used as a form of political protest for decades.[5] This case details the report of a 60-year-old female patient who was found dead and charred in a cornfield. Her cause of death was determined to be thermal injuries and smoke inhalation; however, the origin of the fire and the manner of death are undetermined. In this case, there are features suggestive of both suicide and accident.

CASE REPORT

An abandoned vehicle was discovered parked on the side of a road in a rural area. Local farmers reported the vehicle after they had seen it abandoned for 2 days. It was found unlocked with keys still in the ignition. It was cool to the touch and was not running. Multiple personal and craft items were scattered throughout the interior of the vehicle. Using the license plate, the responding officer checked with dispatch for the vehicle's registration. The vehicle belonged to a woman who had been reported missing for 2 days and lived 205 miles away. The officer then contacted the missing woman's family, who had reported her missing when she did not show up at a prearranged meeting spot with them. This meeting spot was 140 miles from the identified vehicle. The family stated that they had no idea why the decedent was so far from home and in that specific county. They reported that she was in good health and had no mental health history. The family searched her home, and they discovered her purse, wallet, and phone. The decedent always had these items with her. She also always locked her vehicle.

Because of the remote and expansive rural nature of the scene, a K9 search unit was brought in. During the search through the cornfield, three sweatshirts, a wire cutter, and a glass bottle with a cross on it containing clear liquid were found next to a nearby tree abutting the cornfield. The wire cutters had blood on the handles. A brown and white woman's coat was recovered nearby, and it too had blood scattered on it. Under the coat was a pack of cigarettes and a wooden marijuana container. After an extensive ground search, a body was still not found. A law enforcement drone team began to search the scene with multiple drones.

The drone team had made several passes of the area and were about to retire from the search due to low drone battery levels when a burned body was discovered. The body was lying on the left side (Fig. 1) and appeared to have burn injuries extending from the head to the knees. The clothing on the upper torso was burned and missing (Fig. 2). A lighter was found on the ground, and a rosary was hanging from the leaves of a nearby corn plant to the east of the body. Once the decedent was removed from the scene, a burned pile of money, including a 100-dollar bill was identified. Adjacent nearby mature corn plants surrounding the decedent were not burned. The plants directly adjacent to the decedent were not scorched and had very little evidence of thermal damage.

Autopsy findings were notable for charring of the face, torso, and portions of the extremities. There were areas of sparing of the legs where the jeans remained relatively intact, as well as sparing of the socks, shoes, and feet. Soot deposition was found in the oral cavity and peripheral airways. There was erythema of the epiglottis (Fig. 3) and bilateral lateral tongue hemorrhages. Identification was made by dental comparison with antemortem and postmortem radiographs.

Carbonaceous material was noted on the tongue, epiglottis, and airway. The epiglottis also demonstrated focal loss of epithelium. Microscopically, the lungs exhibited congestion, edema, emphysematous changes, scattered intra-alveolar pigment-laden macrophages, and anthracosis.

Postmortem toxicological analysis of cardiac blood reported a carboxyhemoglobin saturation level of 23.8%. The blood volatile screen was negative. A blood drug screen was presumed

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FIGURE 1. Drone discovery of a burned body in the corn field.

positive for a metabolite of marijuana. In addition, a metabolite of loperamide was confirmed to be present in the blood. Despite the decedent's social history of alcohol use, no ethanol was detected.

The cause of death was determined to be a combination of thermal injuries and smoke inhalation.

Determining the exact sequence of events that led to the death of this individual is difficult given the lack of witnesses. Several factors help solidify the conclusion that she was truly alone at the time of her death. There was only one set of tracks seen entering the cornfield, the car had items spread across the passenger and back seats making it unlikely that others were in the car, and there were no signs of a struggle. The driver's seat was positioned within the vehicle at an appropriate distance for a small-statured woman. There were no smudges or fingerprints on the outside of the vehicle. With this information, it is unlikely that other individuals yet to be identified were present in the decedent's last minutes. All investigating agencies were unable to confirm the intentions or fully understand the actions of the decedent before death. Death investigators cited the decedent leaving her phone and purse at home before the fire as a sign that she either planned the event or was in a state of confusion. A police search of the phone yielded no pertinent text messages, phone calls, pictures, or Google searches. Investigators also determined that the vehicle's location appeared random, as it was pulled off on the shoulder of the highway, about 1/4 mile from where the body was found (Fig. 4). This indicated possible confusion or mental distress. Because she was the only person present, the fire

FIGURE 2. Burned human remains with charred clothing.

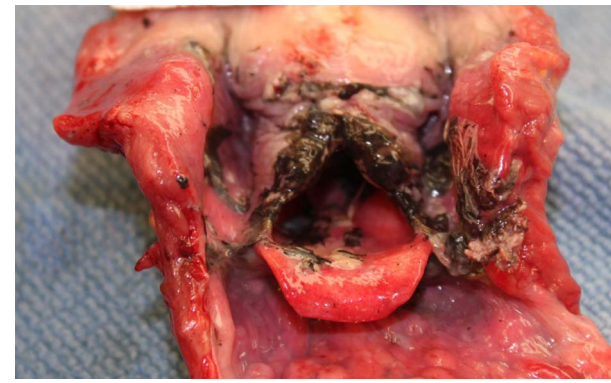

FIGURE 3. Soot deposition was found in the decedent's oral cavity with erythema of the epiglottis.

was likely caused by her actions using the nearby cigarette lighter. It cannot be determined if the act was intentional or accidental. The temperature around the time of death was 50 degrees Fahrenheit, and there was no lightning that could have caused the fire.

The fire marshal could not determine the origin of the fire. No fire accelerants were identified at the scene, within the car, or on the decedent and her clothing. The clear fluid in the glass bottle with a cross on it was analyzed and reported to be water. Given the history of the decedent's alcohol use, ethanol as an accelerant was suggested. There were no containers of ethanol within the decedent's car or located at the scene. The decedent had no ethanol in her system as confirmed by toxicological analysis. Ethanol residue was not identified on the clothing or personal items. The burn pattern was also not consistent with ethanol as an accelerant, per the fire marshal. The fire marshal concluded her report by stating, "The only explanation for the burns on the body is that she somehow ignited her clothing, specifically the shirt she was wearing, and ran into the field or was wandering inside the field, where she was eventually overcome by the fire. Minimal burning present on the cornstalks indicated fire contact was too limited to reach the ignition point for the plants in any area except that immediately surrounding the final resting place of the victim. Testing of the area around the victim revealed no evidence of ignitable liquids using a handheld detector. Because of the lack of an ignitable liquid and the presence of conditions indicating the possibility of confusion, I am currently unable to determine whether the victim's ignition of her clothing was intentional or

FIGURE 4. Drone photograph of the scene.

accidental. The only possible ignition source in the area was the lighter, and with evidence indicating she was the only person present, the fire was somehow caused by her actions, but there is not enough remaining evidence to determine the precise sequence of events." The origin of the fire and the manner of death were listed as undetermined. Whether this case represents a deliberate act or a possible accident remains in question.

DISCUSSION

The carboxyhemoglobin level was slightly higher than most self-immolation cases, which are generally at 1%–10% saturation.[6] Carboxyhemoglobin levels are lower in self-immolations, especially those in which a fire accelerant is used creating a rapidly high temperature. Self-immolations in open air, compared to those in enclosed spaces, will also have lower carboxyhemoglobin saturation levels as the fire has access to more oxygen, allowing it to burn faster and hotter. The intense and rapid rise in temperature is often referred to as "flash fires." It is this heat intensity that contributes to the thermal cause of death with destruction of the respiratory system and cutaneous tissues.[6] The elevation of carboxyhemoglobin saturation in our case corresponds with these findings, as no accelerant had been identified or used. The fire created in this case, although fatal, would burn at a lower intensity, thus not producing the effects of a "flash fire."

The lack of accelerant present in our case is also a unique feature. The origin of a fire often differs between accidental and suicidal causes of a fire.[7] In accidents, the origin of a fire is often traced to faulty wiring or unattended cigarettes. In suicides by self-immolation, a flammable liquid is commonly found. Fire accelerants used in the United States are petrol, paint thinners, lighter fluid, isopropyl, and ethanol.[7] All of these accelerants were tested for in this case in addition to cooking oil and essential oils. This case is unique as no fire accelerants were discovered. Of note, the fire marshal involved in this case tried multiple experiments with lit cigarettes and lighters on a similar fabric to that on the decedent. The fire marshal could not duplicate the charring pattern of the clothes.

Suicide notes, threats, and previous suicide attempts are common, but not present in all suicide cases. Decedents of self-immolation often have psychiatric illnesses, especially depression and schizophrenia.[7] Medical records review indicated the decedent had been diagnosed with both depression and anxiety.

The location in which the self-immolation occurs can be of significance. Self-immolations performed outside in public places are done for attention. Suicides outside in rural settings are very rare.[7]

The use of alcohol and drugs is considered a risk not only for suicide but for self-immolation. However, alcohol and drug use may not play a crucial role at the time of the self-immolation, as many victims of self-immolation have no drugs or alcohol present on a toxicology screen.[7] In this case, the decedent had a history of prior ethanol use. No ethanol and only a cannabinoid metabolite (presumed positive) were found on her toxicological screening.

Numerous studies have shown that intentional self-immolation, as compared to accidental self-burning, has greater total body surface burn areas, higher incidence of full-thickness burns, higher rates of inhalation thermal injury, and relative sparing of the feet.[3] In this case, the decedent had inhalational thermal injuries and thermal injuries sparing her shoes and feet.

Several elements of her case point to potential religious motivations including the string of rosary beads on a nearby cornstalk and the bottle of water with a cross. Religion is a frequent theme, both in terms of the patients' demographics and the nature of their psychiatric condition(s).[3] One systematic review investigating suicide and religion found that religious affiliation did not necessarily protect against suicidal ideation, although it did protect against suicide attempts.[8] Religious organizations may provide individuals access to supportive communities that provide a source of hope and a different way to interpret suffering. This social support may decrease the likelihood of suicide attempts.

CONCLUSIONS

This case details a rare form of suicide in the United States, self-immolation. Our case is rare in that it presents features suggestive of the manner of death as either a suicide or an accident. The lack of accelerant, the lack of a suicide note, the severe charring of the decedent with sparing of her shoes and feet, the remote nature of the scene, the odd location of the abandoned vehicle, the carboxyhemoglobin saturation, and the decedent's history of alcohol use, depression, and anxiety all argue for and against a suicidal intent. Although there was an extensive investigation and communication between multiple agencies, the intentions of the decedent could not be determined, thus leading to an undetermined manner of death.

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