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CASE REPORT

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Unusual Death of a Transvestite: Identification of Crime Weapon and Survival Time*

ABSTRACT: The authors report a case of a transvestite found murdered near his automobile with several lacerated contused wounds to the face and cranial fractures. Autopsy revealed that the cause of death was a serious head trauma with subdural and subarachnoidal hemorrhages. In order to identify the crime weapon, a scanning electron microscopy (SEM) was used which revealed metallic residue on the skin fragments with the same molecular composition of the car paint. As for survival time, antibody anti-beta-amyloid precursor protein (APP) was applied to brain fragments and brainstem tissue, allowing for axonal varicosities (which form 2 to 3 h following death) to be observed under the optic microscope. So, by using SEM we understood that the fatal cranial-encephalic lesions were the result of the victim's head being repeatedly struck against the car door while anti-betaAPP led to the understanding that the time elapsed between injury and death was less than 2 to 3 h.

KEYWORDS: forensic science, beta-APP, immunohistochemistry, survival time, SEM, metallic fragments, transvestite homicide

This case is regarding a 57-year-old transvestite who was found murdered on the outskirts of a small town near Bari, in southern Italy, in an area where he usually worked as a prostitute. The body was found next to the driver's side of the victim's car (Fig. 1). Multiple bloodstains were discovered on the wall next to the car (left side). It was noted at the crime scene that the face and hair were abundantly covered in blood which also leaked from the nose and mouth. Upon palpation of the face, clear signs of multiple fractures on facial bones were detected. Bloodstains and hair traces were also discovered on the lower edge of the left car flank as well as on the car floor (Fig. 2).

The Autopsy

External examination of the body revealed multiple lacerated-contused wounds of the head and face. One such wound of 7×5 cm with epidermal tag on the right temporal region which resulted in the exposure of the underlying bone was present (Fig. 3).

An autopsy was performed and subdural and subarachnoid hemorrhages were discovered, particularly in the right temporo-occipital region as well as cranial base fractures. The brain was then examined after being fixed in formalin for a few days, revealing subcortical hemorrhages, especially on the left temporal-occipital lobe and blood in the fourth ventricle. Brain and brainstem slides were then examined under an optic microscope revealing perivascular hemorrhage of the midbrain.

All of these findings allowed the examiners to assert that the cause of death was a serious head trauma with brain injury and encephalic hemorrhage. Based on the evidence found at the crime scene and major autopsy findings, the cause of death was deemed to be homicide. With regard to the dynamics of the event, fractures of the left forearm bones, surrounded by a large amount of blood, were identified. These types of lesion are usually an indication of attempts by the victim to defend himself. In this case it was evident that the victim raised his forearm in trying to fend off his attacker. Doubts persisted as to the time elapsed between the injury and the occurrence of death as well as the weapon used to attack the victim.

Materials and Methods

The presence of blood in the deep airway passages (vital reaction) suggested that death did not occur immediately after the assault, giving the victim time to inhale blood before dying. In the presence of traumatic injuries of the head, histological evidence of diffuse axonal injury (DAI) (1) was sought out. DAI consists of brain lesions produced by rotational acceleration or deceleration of the head. These forces produce stretching and twisting of the brain tissue (2,3). The particular histologic evidence of DAI sought out was beta-amyloid precursor protein (APP) immunostain. Fragments of the brain and midbrain were processed for paraffin embedding, and cut into 5-μm sections, and then stained with hematoxylin–eosin. Immunohistochemistry for beta-APP was performed with a mouse monoclonal antibody (Mouse Anti-Alzheimer Precursor Protein A4, clone 22C11, Chemicon International, 28820 single OAK drive, Temecula, CA 92590 USA) at a dilution of 1:20. Beta-APP is the earliest marker for DAI, revealing axonal injury within 2–3 h of the insult (4). In this case we used beta-APP as a marker for survival time and it allowed us to highlight a few axonal varicosities of the midbrain (Fig. 4). This slight positiveness of the axons to the antibodies for beta-APP is a sign of vital reaction, pointing out that the victim had a brain injury while he was alive and it suggested that the time elapsed between the injury and the death was less than 2 to 3 h (5).

As for the crime weapon, the features of the lesions found on the body suggested that the killer used a blunt instrument to attack the victim. This instrument probably had a small surface area as the lesions were delimited. So, in order to identify the crime

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FIG. 1—*The crime scene.*

FIG. 2—*Bloodstains and hair traces on the car floor.*

FIG. 3—*Lacerated contused wound on the right temporal region.*

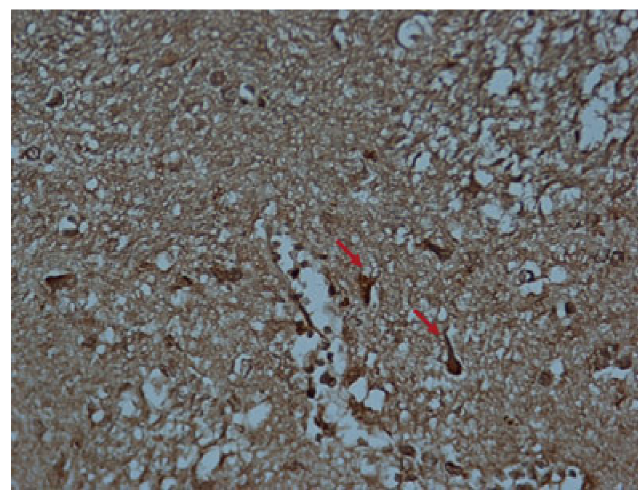

FIG. 4—*Axonal varicosities of midbrain β-amyloid precursor protein immunohistochemistry.*

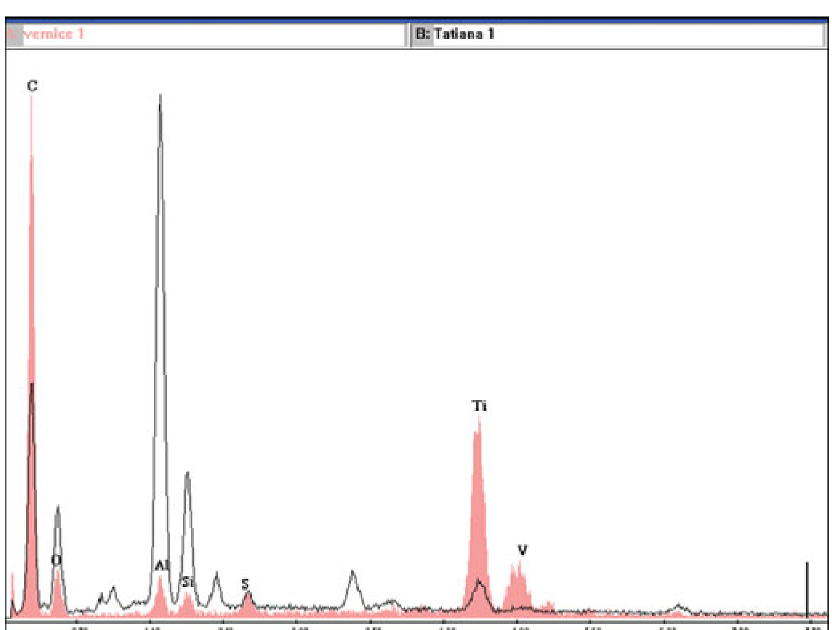

FIG. 5—*Overlap of the metallic composition of the car paint (pink) and the fragments found on the skin (gray).*

weapon, we took a skin sample from the superior edge of the lacerated-contused wound on the right temporal region and examined it under a scanning electron microscopy (SEM) connected to a microanalysis system for the study of the microscopic structure of the substances (6) with the purpose of looking for metallic residue of the weapon used. We took multiple skin samples from the area of the lacerated-contused wound. We also analyzed some car paint fragments, which were taken from the lower edge of the left car flank, where we observed diffuse bloodstains and traces of hair in order to compare them with those present on the skin (7). Under the SEM, anomalous fragments on the skin samples were found, and microanalysis of these fragments was performed in order to determine their composition. It was found that the fragments were composed of metallic elements such as aluminum, silicon and, in particular, titanium, which is a common component of paints. Microanalysis of the car paint fragments was also performed, revealing that their composition was very similar to those of the fragments found on the skin samples. The results of the microanalysis were then compared with the paint fragments and skin samples, and overlapping of metallic composition was found (Fig. 5).

Some differences among the quantities of the single elements were evident due to the fact that the skin samples were kept in formalin which most likely modified the concentration of some elements. Microanalysis of the other metallic fragments found on the skin samples of the same area of the victim's face gave similar results.

Discussion

By using beta-APP immunostain as a marker of DAI, we were able to estimate the time elapsed between injury and death (i.e., survival time), in this case, less than 2 to 3 h. Thanks to the SEM, we were also able to identify with a high degree of probability, the way in which the victim was killed. Due to the fact that the metallic composition of the fragments found on the edges of the lesions was very similar to that of the car paint, we can assert that the bruise lesions on the victim's body were produced by the car door which was repeatedly banged against the victim's head.

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