Case report
An unusual case of suicide by sharp force

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1. Introduction

In the past self-infliction of sharp force was a classical form of suicide, while in modern times it is quite rare, constituting only 2–3% of all self-inflicted deaths [1–4]. Stabbing and cutting injuries seem to be equally frequent (respectively 40% and 37%) in sharp force suicides, with both present in around 25% of the cases [5].

Cutting injuries are generally located at the neck and upper extremities (flexor side of the wrist and antecubital fossa) with varying depth, superficial in tentative marks, deep in fatal injuries (sometimes reaching vertebral bones for the throat cuts) [6,7]; more than 80% of suicides by self-cutting present a small number of injuries (<3), but in rare cases wounds can number more than 20 [5].

Stabbing injuries are generally located at the chest (predominantly left chest), abdomen and neck [8–10], and more rarely at the head [6,11]; the number of stabs varies considerably from one (50% of cases) up to more than 90 [11].

In this paper we present an unusual case of suicide by sharp force with a combination of stabbing and cutting wounds attempting a reconstruction of the sequence of the injuries.

2. Case report

A 43-year-old woman was found dead in the bathtub in a sitting position with a knife embedded in chest. Multiple sharp force wounds were present: 4 stab wounds in the sternal region, 2 cut wounds in the neck, several longitudinal and transverse cuts in the arms. Scene circumstances and autopsy findings pointed toward a suicidal etiology.

The case presented some particular aspects that allowed us to identify the mechanism of production of the lethal thoracic wound and to partially reconstruct the time-sequence of injuries.
Right arm: 1 transverse cut wound (5.5 cm long) on the flexor side of the wrist and 5 incised wounds on the flexor side of the forearm, all parallel to the long axis of the arm, including 4 superficial hesitation marks and a deeper cut wound (10.5 cm long), with a linear scratch (5.5 cm long) at the proximal end; no nerves or vessels were damaged; only the palmaris longus tendon was sectioned (Fig. 2D).

Left leg: 1 transverse deep cut wound (8 cm long) on the anterior-medial side of the third distal segment of the leg (Fig. 2E).

All the wound edges were clean with haemorrhagic infiltration. Histology showed cerebral oedema, haemorrhagic infiltration of lung and heart wounds and renal tubulus necrosis. The cause of death was attributed to exsanguination.

The victim did not have a psychiatric history and had not ever attempted suicide before. She was a healthy 43-year-old woman seldom seen by her general practitioner who had visited her for the last time about 2 years before she died.

No alcohol or drugs were found in the blood and urine.

Hair samples collected at autopsy (black, 30 cm in length) were cut into three segments and analyzed with different gas chromatography/mass spectrometry (GC/MS) methods. All the segments tested negative for amphetamines, cannabinoids, cocaine, ketamine and opiates.

Unfortunately, it was not possible to determine the concentration of LSD and metabolites in the hair because our toxicological laboratory has not validated a suitable GC/MS or LC/MS method for that matrix yet. Although LSD was below the limit of detection in blood and urine [12], considering its low concentration in postmortem specimens, it cannot be excluded that the victim experienced a “flash back” prior to or during her suicide. Indeed, “flash backs” can occur months or even years after the last use of LSD.

3. Discussion

Crime scene investigation, the victim’s medical history and the police report did not show strong evidence of a suicide intention. There were no suicide notes in the house, the victim did not have a psychiatric history and she had not ever attempted suicide before. She was a healthy 43-year-old woman seldom seen by her general practitioner who had visited her for the last time 2 years before she died.

However, scene circumstances (absence of housebreaking marks or bloodstain tracks, sitting position of the victim with the knife embedded in the chest) and autopsy findings (all vital wounds located in accessible sites for the victim’s hands, hesitation marks, absence of defence injuries) pointed toward a suicidal etiology.
A huge number of unusual suicides by sharp force have been reported in forensic literature. Generally the strangeness resides in the great number of self-inflicted wounds [11,13], in their localization [11,14], in the instruments used (unusual or multiple instruments) [15–18] or in the manner in which the suicide is planned and executed [2,19,20].

As reported by several authors the ratio of suicide by sharp force injuries to total suicides is only 3:100 [3–5,21,22], and the ratio of homicides to suicides by sharp weapon is around 5:2 [23].

This statistical evidence sheds light on the importance of a detailed injury analysis in both typical and atypical suicides to discover new methods for a correct differentiation between suicide and homicide. The classical signs associated with suicide are several injuries located in accessible sites for the victim’s hands, the presence of tentative marks and the absence of clothing damage.

Although these three aspects can generally contribute to the discrimination of cutting by suicide or stab from homicide, they have been reported to be absent in many atypical suicides [22].

In our case study we have attempted a partial time sequencing of injuries (based on their morphological characteristics) as an adjunctive tool to differentiate between self- and non-self-inflicted wounds.

The main autopsy findings were:

- 2 superficial cut wounds on the left side of the neck;
- 2 stab wounds in the chest with an oblique axis of entrance, parallel to the transverse plane, oriented from left to right with 45° of inclination in both the sagittal and coronal planes;
- 1 stab wound in the chest with an oblique axis of entrance, parallel to the transverse plane, oriented from right to left with 60° of inclination in both the sagittal and coronal planes;
- 1 stab wound perforating the xiphoid process of the sternum (knife in situ) with an axis of entrance quite parallel to the sagittal plane, with 30° of inclination in the coronal plane and 60° of inclination in the transverse plane;
- 2 longitudinal cut wounds, one at the left arm (35.5 cm long) and one at the right forearm (16 cm long), both with upward direction;
- 1 transverse cut at the left wrist directed from left to right, with complete section of flexor digitorum superficialis tendons;
- 1 transverse cut at the right wrist directed from right to left, intersecting only the palmaris tendon.

The cut wounds at the neck are quite superficial and can be classified as hesitation marks. Although it is not possible to reconstruct the exact moment of their production it seems quite probable that they were the first self-made injuries.
The complete section of flexor digitorum superficialis tendons prevents grabbing and efficiently using a knife, thus we can assume that the wounds at the right arm precede the transverse cutting wound at the left wrist. Consequently the victim, also being right-handed, began to hurt her arms with the left hand (non-dominant).

Longitudinal cut wounds at the flexor side of arms and forearms have already been reported in sharp force suicides [13] and are due to an ignorance of anatomy. Most people, in fact, do not know the exact location of major vessels and other vital structures.

Concerning the thoracic stab wounds, the last one was surely the longitudinal stab wound perforating the sternum (number 4 in Fig. 1A): indeed it is the only lethal injury and the knife was found in situ.

The victim used a single-edged kitchen knife with a blade of 19 cm in length and a maximal width (measured at the ricasso) of about 3 cm to produce all the injuries (Fig. 1B).

Stabs number 1, 2 and 3 are V-shaped in the lower end, which means that the cutting surface of the blade was oriented downwards, whereas stab number 4 is V-shaped in the upper end. Three of the four stab wounds (number 1, 2 and 3) are quite superficial and do not damage thoracic organs:

- Stabs number 1 and 2 have a parallel axis of entrance, oriented from left to right with 45° of inclination in both the sagittal and coronal planes;
- Stab number 3 has a different axis of entrance, oriented from right to left with 60° of inclination in both the sagittal and coronal planes.

Morphological characteristics of these stabbing injuries indicate that they had an analogue etiology (simple stabbing, knife grabbed with the right hand and blade oriented downwards).

The fact that stabs number 1 and 2 have the same orientation leads us to assume that they probably were produced one after another, although it is impossible to determine which one was made first.

What is clear is that stab number 4 was the last one self-inflicted by the victim. Its axis of entrance is very different from that of the other chest injuries, being quite parallel to the sagittal plane, with 30° of inclination in the coronal plane and 60° of inclination in the transverse plane. This orientation (Fig. 1A) enhances the cutting surface of the blade during the stabbing; indeed the wound is 6.5 cm long and the blade has a maximum width of only 3 cm.

So, regarding time-sequence of thoracic injuries it is possible to state that stab wound number 4 was the last one and it is probable that injuries number 1 and 2 were produced one after another.

On the other hand, analyzing the morphology of wound number 4 (upper end V-shaped), its axis of entrance and the bone perforation that it produced, it seems quite difficult to think that it had the same mechanism of production of the other thoracic stabs (simple stabbing with the right hand).

Actually, considering the wound track’s direction, the victim’s position, her left hand out of use and the remarkable strength required to perforate a bone [24], it can be assumed that the knife’s handle was pressed against the right thigh or against the bathtub to enhance the penetrating force of the blade. This hypothesis is partially confirmed by the position in which the victim was found during CSI (sitting position, with the trunk flexed forwards on the legs).

In conclusion, as proposed by this case report, if scene circumstances and wound morphological characteristics (length, depth, direction, vitality, accessibility to the victim’s hands) allow a time sequencing of injuries, this could gain importance in confirming a suicide hypothesis.

References