

**A CASE OF A STAB-INCISED INJURY TO THE CHEST AND HEART - ACCIDENT OR HOMICIDE - FORENSIC MEDICAL CONCLUSIONS AND SOLUTION OF THE CASE**

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**Abstract**

We present a case of a family scandal between spouses, after which a report was submitted to the police about the death of the man. An inspection of the scene revealed a dead male lying transversely in a bed with a stab-incised wound in the heart area and a kitchen knife with bloodstains on it on the table next to the bed. During the interrogation, the woman testified about the case and stated that she was a victim of domestic violence, her husband had taken a knife and they got into a fight, as they both fell on the bed in the following position – she was lying on the bed and her husband on top of her. After the fall, she managed to push him to the side, and then she saw that the knife handle protruded from his chest. She took out the knife, left it on the table, and began giving him mouth-to-mouth resuscitation, but her husband died before the ambulance arrived. The autopsy revealed a stab wound to the left side of the chest and an injury to the left ventricle from a single-edged weapon, with a wound length of 14 cm. Subsequent bio-trace examination revealed that the blade of the knife was 20.2 cm long, with blood staining along it 14 cm from its tip to the handle. These data, compared with the other available traumatic injuries on the bodies of the deceased and his wife, lead to the conclusion that it is a deliberate stabbing with the knife in the heart area with subsequent rapid removal of the knife. It is impossible for this stab-incised wound to occur in the manner described by the wife. Therefore, this case should be considered a homicide not an accident.

**Keywords:** *self-inflicted injury, homicide, stab-incised wound to the heart, bio-trace analysis, forensic medicine*

**Introduction**

Traumatic injuries caused by sharp-edged or pointed objects are referred to as "sharp force injuries" and are characterized by a relatively well-defined traumatic separation of tissues, occurring when these objects come into contact with the skin and underlying tissues [1, 2]. Depending on the way the sharp object comes into contact with the skin, four types of injuries can occur – stab wounds, incised wound, chop wounds and stab-incised wounds. In the case of a stab-incised wound, it results from penetration of a pointed object into the depths of the body with subsequent cutting of the underlying tissues by its sharp edge/s, causing a wound that is deeper than its length on the skin [3]. According to Peter Vanezis [4], in many countries sharp force trauma—particularly the use of knives—is the most common method of homicide and a frequent source of morbidity seen in emergency departments after gunshot injuries. In the forensic practice, a comprehensive approach is needed in explaining the different aspects of such traumatic injuries, and most importantly, the manner in which the victim has died [5] – accidental, suicidal or homicidal.

**Case presentation**

After a family scandal, an emergency phone call was made for the death of a man in his home. A scene investigation revealed a dead male in a supine transverse position on a bed with a stab wound in the heart area, and a kitchen knife with blood stains on it was on the table next to the

bed. During the interrogation, his wife testified about the case and stated that she had been beaten by her husband that he had taken a knife and they got into a fight, as they both fell on the bed in the following position - she was laying on the bed and her husband on top of her. After the fall, she managed to change that position to a side one, and then she saw that a knife handle protruded from her husband's chest. She took out the knife, left it on the table, and began giving him mouth-to-mouth resuscitation, but her husband died before the ambulance arrived.

The examination and autopsy of the body of the deceased man revealed a stab wound to the left chest area with the following morphological features: almost horizontally located skin wound, 2.8 cm long and 1 cm wide at the distance of the edges. The edges and walls were smooth with a sharp angle at the inner end of the wound and an opposite angle 2 mm wide. From it begins a deep wound canal, passing through the underlying soft tissues of the third intercostal space, without bone structures damage, penetrating the thoracic cavity and continuing through the parenchyma of the left lung at the base of its upper part to its inner surface, through the pericardial sac and the musculature of the right ventricle, ending midway in the musculature of the left ventricle of the heart. The wound canal thus formed, has a length of about 14 cm and a direction combining the components from front to back, left to right and from the top-downwards, judged by the upright anatomical position of the body. This damage was caused by the action of an object in the form of a single-edged weapon (knife) having the following characteristics, judged on the basis of the morphology and size of the skin wound, the slits in the underlying structures and organs, namely:

- \* A blade longer than 14 cm (otherwise there would be traces on the skin around the wound with the appearance of bruises and/or abrasions from the handle protector, which were absent in this case);

- \* Width of the blade around 2.8 cm at a distance of about 14 cm from the tip of the knife;

- \* Width (thickness) of the "back" of the knife of about 2 mm, at a distance of about 14 cm from its tip.

The autopsy also showed the presence of liquid blood and clots in the left chest cavity in an amount of 600 ml and in the pericardial sac - 300 ml. In addition, five grouped limited lesions of the left chest area, located around 3.5 cm below the above-mentioned stab-incised wound, with linear, slightly arcuate and round shape with dimensions up to 0.7/0.2 cm were found. Also, one linear scratch was found in the waist area on the left and towards the chest (along the middle armpit line) located horizontally, 3/0.2 cm. Furthermore, three limited scratches on the left forearm on its outer surface were observed with the following size: 0.3/0.2 cm; 0.5/0.3 cm and 0.4/0.3 cm. During the autopsy a linear scratch was found with a linear wound in its middle part located on the back surface of the right hand (towards the wrist) with lengths of 3 cm for the scratch and 0.7 cm for the wound, respectively, the latter having sharp corners and smooth edges stained with reddish blood. We observed hemorrhage on the back of the nose on the left with a reddish-bluish color on an area of 1.5/1 cm. Three more abrasions were found on the right cheek with reddish-brown color and dimensions, respectively 0.6/0.2 cm, 0.5/0.3 cm and 0.6/0.3 cm. In addition, multiple bruises on the mucous membrane of the oral cavity, upper and lower lips were observed, corresponding to the dentitions with sizes from 0.5/0.2 cm to 1/0.5 cm.

It should be mentioned that during the forensic examination of the suspected perpetrator, the following traumatic injuries were found:

- Two reddish bruises on the back, located in the middle in its upper part with small dimensions, respectively 0.5/0.3 cm and 1.5/0.2 cm, as in the middle of the second described bruise there was a linear brownish scratch, 0.4 cm in length.

- One hemorrhage on the posterior surface of the right arm, in its lower third, with a reddish-brownish color and dimensions 2/1 cm and one hemorrhage in the area of the elbow of the same arm with dimensions 1.5/1 cm.

- A linear superficial cut wound (mainly of the epidermis) on the palm surface of the thumb of the right hand, in its middle third, with a length of 0.3 cm.

When inspecting the knife presented for expertise, the following characteristics were established: Knife made of white metal and handle made of ferrous plastic and white metal and inscription on its left side (when viewed from its back) "BergHOFF", with a total length of 33 cm and blade length 20.2 cm, with black oval plates on both sides of the handle, with brownish matter on both sides of the blade, as follows: on the left side surface (judged when viewed from the back) up to 14 cm towards the back of the knife and up to 14, 7 cm from the cutting edge. On this surface, in addition to longitudinally arranged and parallel to each other many traces of brownish matter, also such with a spotty appearance were differentiated, fixed when the deposited matter dried; on the right side plane of the blade there are basically well visible longitudinally located and parallel to each other many traces of brownish matter (Photos № 1-4). The width of the knife from the tip to the base along the cutting part is as follows:

Distance from the top (cm)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
8	12	15	17	19	20	21	23	24	25	26	26	27	28	28	29	29	29	29	29

Blade width (mm)

The back of the knife is 2 mm wide throughout its length, without the first 6 cm (estimated from the tip to the handle), where its thickness gradually increases, reaching 2 mm.

Examination with the naked eye and stereomicroscopic examination of the knife revealed numerous scratches on both sides along the metal blade, coming from the cutting edge with different oblique directions, some of which almost transverse to the length of the blade direction - characteristic traces of attempts at unprofessional manual sharpening of the blade. When viewed with the naked eye and feeling the cutting edge, it looks well sharpened, and the stereomicroscopic examination shows many different in size small defects of the same - characteristic traces of manual sharpening and repeated use when cutting different materials (Photos № 5 - 7).

In the detailed analysis of the suspects' testimony, regarding the stages and sequence of development of the overall incident, compared with the traumatic injuries of different types, localization, morphology, respectively mechanism of receipt, significant and major discrepancies were found as follows: Nowhere was mentioned that the victim was struck with various objects to explain their presence; in addition to the stab wound to the chest - the cause of death, there were many injuries with different mechanisms of occurrence (both blunt and sharp objects), some of which with the possibility to be obtained during protection, as well as from "stinging", "threatening" impacts with the tip of the knife.

### Discussion

The analysis of all data in the case gives grounds for drawing the following conclusions:

- The characteristics of the knife and the lack of involvement of bone structures in the course of the wound canal do not allow the expertise to accept as possible the mechanism described by the

suspected perpetrator of occurring of the stab-incised wound, namely the victim falling ontop of the knife, due to the following facts:

\* with such a mechanism at the time of the heart injury (due to the developing sharp collapse of hemodynamics), the victim is unable to maintain the weight of his body and under the action of this gravitational force, the knife would continue its stabbing and cutting action in depth, until the moment of the limiting compression of the handle in the anatomical structures surrounding the wound;

\* in these circumstances, the wound canal would be at least 20.2 cm long, and due to the known susceptibility of the tissues that make up the chest, it may be longer than this value due to the action of body weight;

\* as a result, injuries in the form of bruising and/or abrasion from the impact of the knife handle would be realized in the area around the wound, which morphological data were not established at the autopsy;

\* the length of the wound canal has been definitely established, which corresponds to the level of stains on the knife presented for examination.

- The morphology, shape and grouping of the abrasions found in the vicinity of the stab wound gave reason to the assumption that they were caused by the action of an object with a limited contact surface and cannot be ruled out that they were due to pressure and tangential action caused by the tip of the knife, in case of "threatening, stinging" and oblique impacts in this area.

- The bruises on the right upper limb of the suspected perpetrator can be obtained by grasping and squeezing with fingers of the victim's hand, both in case of an attack towards the perpetrator in his attempts to restrict the movements of her hand, or in an attempt of protection – to stop the hand holding the knife. If we assume that the suspected perpetrator was holding a knife with this hand and tried to strike him with the knife, it is in such "blocking" and restriction of her movements that the five grouped limited abrasions / scratches / on the left chest side of the victim, located near the main injury, can be realized and explained;

- The victim has injuries with morphology corresponding to the time of the incident, which are obtained both from the action of hard blunt objects and from sharp ones located in different areas of the body, the location of some of them does not exclude the possibility to be realized in attempts to prevent the impacts, i.e. they may be of a protective nature:

\* the linear scratch found in the waist area on the left and towards the chest (along the middle armpit line) was due to the tangential (oblique) impact of an object with a limited contact surface and can result from the tangential action of the knives tip or its cutting edge.

\* the three limited scratches on the left forearm on its outer surface with their morphology, limitation and grouping, as well as their uniform dimensions, give grounds to the assumption that they were obtained from the action of an object with limited contact surface and cannot be ruled out, that they were due to a slight force of contact tangential action with the tip of the knife, given their location, they can be attributed to the so-called "parade" or "protective" injuries in an attempt to prevent more serious ones [3];

\* the linear scratch with a linear wound in its middle part located on the back surface of the right hand (towards the wrist) was caused by the slight tangential traction action of a cutting edge and the characteristics of the injury was due to the rounded shape of this area of the human body;

\* the hemorrhage on the back of the nose on the left was due to the impact of a hard blunt object, but due to the lack of other characteristic morphological features cannot be determined more accurately the characteristics of the contact surface of the object and it cannot be ruled out that it may have been received by impact with parts of a human body.

\* The three abrasions found on the right cheek with their morphology, limitation and grouping, gave grounds to the conclusion that they were derived from the action of an object with a limited contact surface and cannot be ruled out, that they are due to pressure and tangential action caused by the tip of the knife;

\* the multiple bruises on the mucous membrane of the oral cavity, upper and lower lips were a result of compressive action in the area of the cheeks and lips on the dentition and could be obtained by applying pressure with an open palm on these areas. Such injuries are often found when the perpetrator is trying to block the external airways of the victim in order to "close the mouth" and/or prevent the victim from taking a "breath" or screaming for help [3].

- In the testimony of the suspected perpetrator there is no data on impacts on the victim, which would explain (outside the stab wound) the injuries found on his body during the autopsy.

- The suspected perpetrator has two limited bruises and one scratch on the skin of the back, which can be obtained by contact with the edges of objects from the furniture in the manner described in the given testimony by the suspected perpetrator;

- The linear superficial cut wound (mainly of the epidermis) on the palm surface of the thumb of the right hand, in its middle third, corresponds to the action of a cutting edge, which is a characteristic of each knife. The surface of this injury, involving mainly the epidermis, can be obtained by accidental handling of a knife, and such data was contained in the testimony of the suspected perpetrator [3].

Based on the analysis of the data, the results of the examinations, the discussion and the conclusions, the expertise considered that in this case there is reliable evidence of inconsistency between the testimony of the suspected perpetrator regarding the manner of death. There is also a lack of explanation for the occurrence and the mechanism of receiving the other injuries found on the body of the deceased.

### Conclusion

The detailed and in-depth analysis of the found traumatic injuries, regarding their morphology, localization, possible grouping, etc., compared with the characteristics of a given incriminated object/weapon, represent the basis of the bio trace evidence examination and the derivation of conclusions to give grounds for the investigation and the Court for correct interpretations of a case, resp. the passing of objective sentences.

With the help of the conducted bio-trace evidence examination and comparison of the characteristics of the knife in relation to the type and morphology of the injuries found on the body of the deceased, it is proved that it is a homicide and not an accident, as described by the suspected perpetrator.

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Photo № 1 - General view of the knife - left side surface of the blade



Photo № 2 - General view of the knife - right side surface of the blade



Photo № 3 - General view of the knife - view from the "back" of the blade



Photo № 4 - general view of the knife - view from the cutting edge of the blade

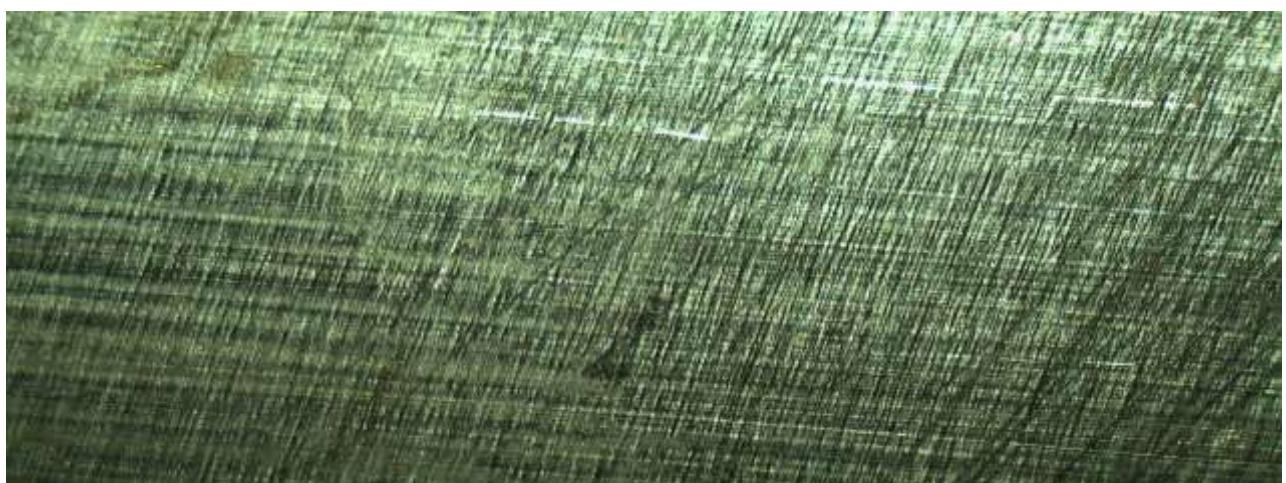


Photo № 5 - Presence of multiple scratches along the metal blade – stereomicroscopy

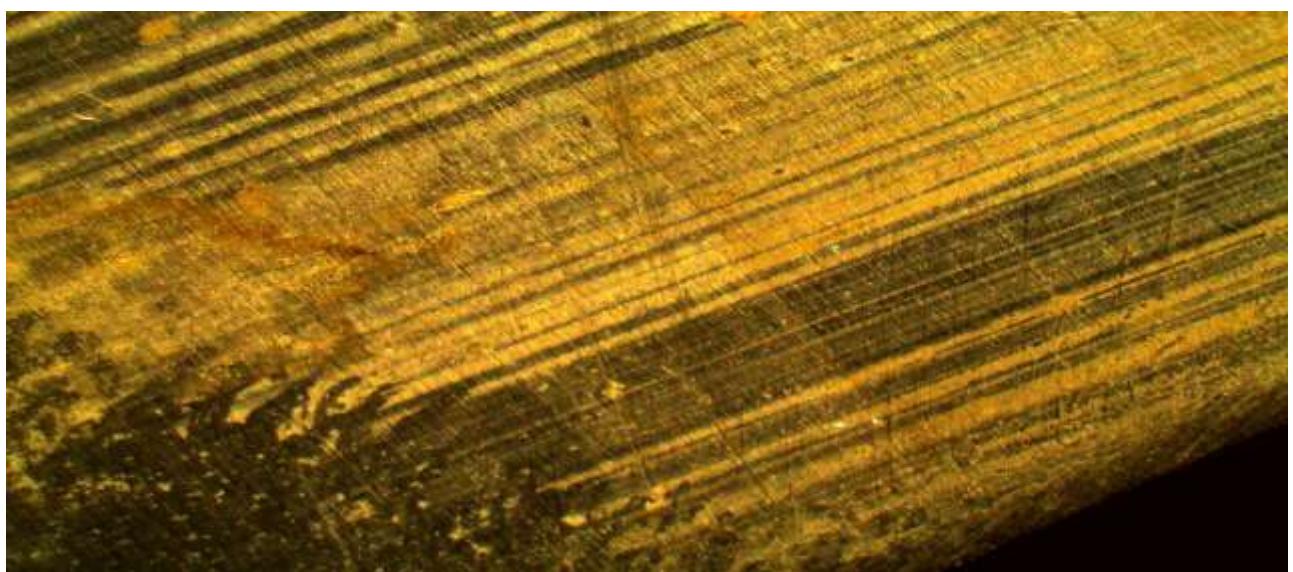


Photo № 6 - Presence of many scratches along the metal blade, directed to the cutting edge in the area of the transition between the clean and stained with brownish matter areas- stereomicroscopy

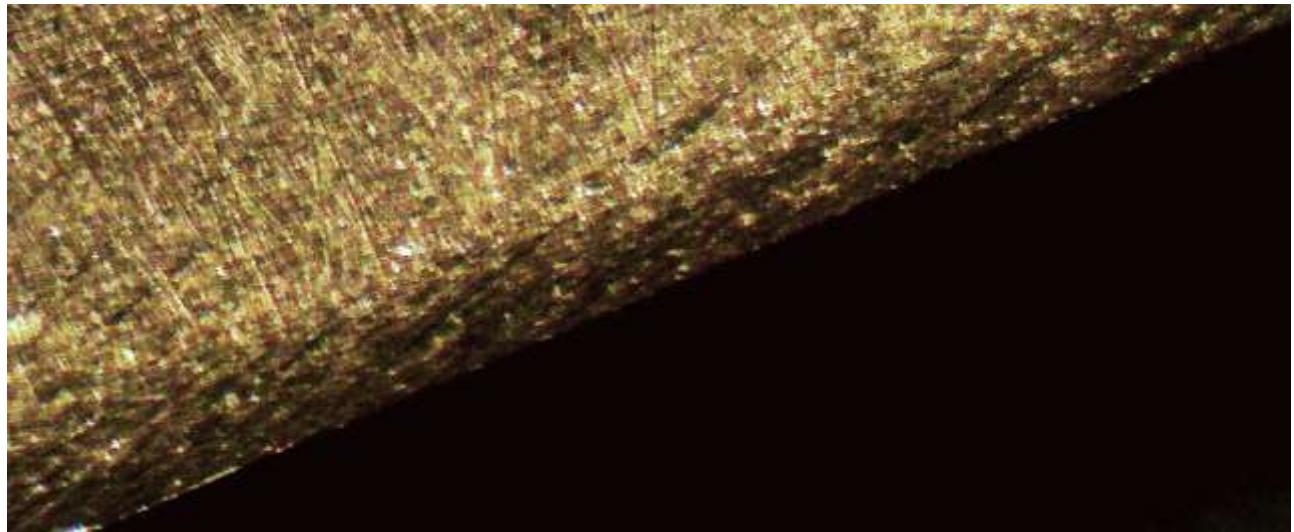


Photo № 7 - Many different-sized small defects along the cutting edge - typical traces of manual sharpening and repeated use when cutting different materials – stereomicroscopy