

CASE REPORT

B. Karger · A. DuChesne

Who fired the gun?**A casuistic contribution to the differentiation between self-inflicted and non-self-inflicted gunshot wounds**

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Abstract A fatal gunshot wound to the thorax from a .357 Magnum revolver is reported. The entrance wound was located dorsally at the transition of the right shoulder and the upper arm, the exit wound below the left axilla and a re-entry at the medial aspect of the left upper arm. A friend of the victim, who was present when the gunshot was fired, stated that it was a self-inflicted accident. But the inclusion of both upper arms in the trajectory allowed a comparison between the posture of the upper arms at the moment the gunshot was fired and the posture of the upper arms necessary for a self-inflicted gunshot wound. This reconstruction, which is presented in detail, definitely excluded a self-inflicted wound. The friend then confessed that he had fired the gun accidentally.

Key words Gunshot wound · Reconstruction · Suicide · Accident

Introduction

The identification of the person shooting and especially the differentiation between a self-inflicted gunshot wound and one inflicted by another person, frequently plays an important role in the investigation of gunshot fatalities. Apart from the potential for physical activity in cases of multiple gunshots (Spitz et al. 1961; Karger 1995), a thorough investigation in such incidents usually includes the scene circumstances, the shooting distance, an effort to determine the hand used to fire the gun or to steady the muzzle (e.g. gunshot residues, backspatter, injuries from firing the gun) and, especially for long firearms, a comparison between the course of the trajectory and the anatomical features (Sellier 1982; DiMaio 1985; Karger 1996; Karger et al. 1996). This latter approach can rarely

be used for handguns because the easy handling of the weapon enables the person shooting to reach his entire body surface. Consequently, atypical suicidal entrance wounds at the back of the head (e.g. Walcher 1932; Leymann and Althoff 1980), in the eye (Lignitz and Madea 1994), also after perforation of the spectacles (Schyma and Schyma 1996), in the nose (Lee and Opeskin 1995), and even in the back (Hirsch and Adelson 1976) have been reported.

A gunshot wound fatality is reported where the determination of the shooting distance and the hand used to pull the trigger or to steady the muzzle was not possible. However, the location of the entrance wound and the course of the trajectory in relation to the anatomical features allowed a clear differentiation between a self-inflicted gunshot wound and one inflicted by another person.

Case report

A 21-year-old man was killed by a gunshot in the presence of a friend. Both had spent several days at an old manor house during a hunting trip. According to the testimony of the friend, he had been listening to music on headphones while the victim sat on a bed in the same room and played with a revolver Smith & Wesson .357 Magnum, which was holstered. Unexpectedly, the friend heard a gunshot, the victim rose and then sank back onto the bed, where he was found by the police. The bed was soaked with blood but no blood spatter was detected.

An entrance wound with no indication of a close range shot was located dorsally at the transition of the right shoulder and the upper arm. An exit wound was found below the left axilla and a re-entry at the medial aspect of the left upper arm. A deformed lead core was recovered from the left upper arm 4 cm below the skin. The T-shirt worn by the victim did not show gunshot residues or burns at the entrance defect. The trajectory crossed the thorax from right to left in a slightly downwards direction. The second rib on the right side was fractured and the jacket of the bullet was recovered from the upper lobe of the right lung. Furthermore, the trajectory passed through the pericardium, the pulmonary artery, the upper lobe of the left lung and the second intercostal space. Death was due to haemorrhagic shock with a haematopneumothorax on both sides (1.5 l each) and signs of general anaemia. The blood alcohol level was zero and pre-existing diseases could not be detected. The leather holster was torn open in the muzzle area.

B. Karger (✉) · A. DuChesne
Institute of Legal Medicine, University of Münster,
Von-Esmarch-Strasse 86, D-48149 Münster, Germany
FAX: +49 (251) 835 5158

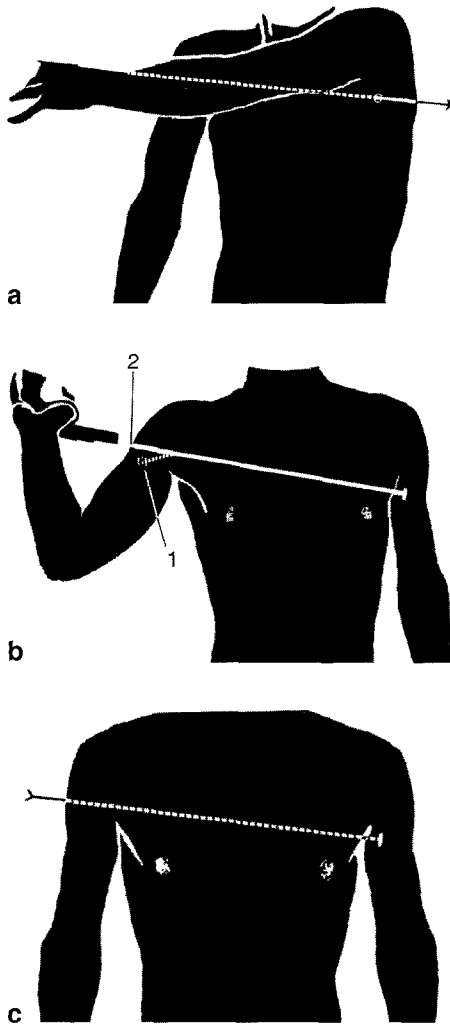


Fig. 1a–c Schematic diagrams of the different positions of the upper arms that are discussed. 1a. Position of the left upper arm in a self-inflicted gunshot with the left hand: a re-entry at the left upper arm would not have occurred. 1b. Position of the right upper arm in a self-inflicted gunshot with the right hand: the abduction and the external rotation of the right upper arm causes considerable shifting of tissue layers and the bullet would have taken a different course if the location of the entrance wound at the dorso-lateral aspect of the upper arm (1) is maintained. In combination with the trajectory in the thorax, this would have resulted in an angled trajectory (see Fig. 2). A straight trajectory would have necessitated an entrance wound located at the ventro-lateral aspect of the right upper arm (2). 1c. Positions of both upper arms at the moment of the hit (adduction, no rotation): a straight trajectory with a re-entry at the corresponding site of the left upper arm results. But a self-inflicted gunshot was not possible in these positions

Discussion

Initially, the statement of the friend suggested a self-inflicted accidental gunshot wound with the weapon inside the holster. Determination of the shooting distance was not possible because the holster obstructed the escape of gunshot residues. For the same reason, no signs of a close range shot were found during autopsy. Also, the lack of backspatter, the holster obstructing the lateral aspect of



Fig. 2 Reconstruction of a self-inflicted gunshot with the right hand: although the necessary external rotation was not yet reached, the pole in the trajectory threatened to break because of the considerable deformation

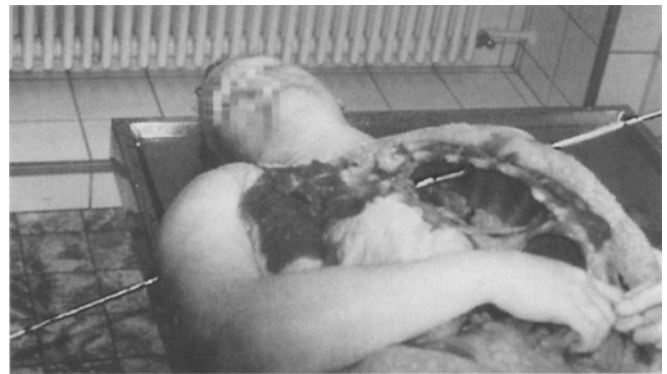


Fig. 3 When the right upper arm is adducted and the rotation is zero, the resulting trajectory is straight and the pole is not bent. But it is obvious that the gunshot cannot be fired with the upper arms in these positions

the weapon and the fact that both persons had previously been shooting while hunting prevented the identification of the person firing the revolver using routine methods.

The site of the entrance wound at the back of the transition of the right arm and shoulder was however suspicious. But a reconstruction with the firearm inside the holster verified that the man could have fired the gunshot with the right or the left hand in the case of a close range shot. However, when firing with the left hand, the left upper arm would have been located in front of the thorax (Fig. 1a). When firing with the right hand, the right upper arm would have to have been abducted and externally rotated to the maximum (Fig. 1b). Both of these upper arm positions could be excluded by a reconstruction during autopsy. For this purpose, a flexible pole was pushed completely through the trajectory after preparation. It was possible to demonstrate that both the left and the right upper arm must have been adducted at the moment of the hit because of the inclusion of both upper arms in the trajectory (Fig. 1c). When an effort was made to bring the right hand of the corpse into the appropriate position for a self-inflicted gunshot (abduction and external rotation), the pole threatened to break because the trajectory now showed a considerable angle (Fig. 2). But when the right

upper arm was adducted, the resulting trajectory was straight (Fig. 3). A gunshot with the left hand would not have caused a re-entry in the left upper arm (Fig. 1a) and was only possible with the left upper arm adducted (Fig. 1c). When the friend was confronted with this reconstruction, he confessed that he had fired the gun during a wrangle about the revolver. The man was convicted of manslaughter.

A self-inflicted gunshot wound, either by suicide or accident, could be excluded although the determination of the shooting distance and of the hand used to fire the gun or to steady the muzzle was not feasible. Exclusion was possible because the trajectory included both upper arms. For this, a comparison between the positions of the upper arms necessary for a self-inflicted gunshot and the positions of the upper arms at the moment of the hit in the case of a straight trajectory was performed. Special cases such as when a slow projectile ricochets from bone and thus causes an angled trajectory, must of course be excluded in advance.

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