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CASE REPORT

PATHOLOGY AND BIOLOGY

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An Unusual Zip Gun Suicide—Medicolegal and Ballistic Examination

ABSTRACT: Home-made guns are imitations of typical firearms and usually have handgun characteristics. This article presents an unusual case of a suicide carried out by means of a fatal gunshot wound to the head using a home-made zip gun. A 49-year-old male, with a history of paranoid psychosis was found dead in the dwelling place of a family house. The investigation at the crime scene did not lead to suspicion of a gunshot wound because of the unusual nature of the firearm used. A medical examiner diagnosed an opened head injury as the primary cause of the victim's death. The autopsy findings provided immediate grounds for further inspection of the crime scene. Subsequently, a simple zip gun, which had been overlooked during the scene investigation, was discovered. An undeformed projectile recovered from the victim's head was consistent with the use of the home-made firearm. Following the completion of the investigations and autopsy, the death was classified as a suicide.

KEYWORDS: forensic science, home-made firearm, gunshot wound, ballistics, suicide, case report

The majority of gunshot suicides happen in circumstances of legal or illegal possession of a gun of factory/serial production. However, possession of such a gun does not have to be a necessary condition for committing suicide. If a gun of standard construction is not available, then an improvised firearm can be made with sufficient skill, technical background, and determination to bring an intention to its fatal conclusion.

Worldwide, cases in which a home-made firearm is used to perform an intended suicide are very rare. The literature describes only tens of such cases by means of these unusual firearms (1–8). Unfortunate accidents (9,10) and homicides (11,12) are extremely uncommon. Wounds inflicted by home-made firearms and their terminal ballistics are very unique, and their character is unpredictable. The following study presents a case of suicide by a home-made zip gun.

Case Report

Nature of the Crime Scene

The dead body of a 49-year-old male was discovered in a dwelling place of a family residence. The body was found on a floor that was partially hard-wood, partially paved, in the passage hall between two rooms. The victim was positioned on his back, his head was near the doorsill. The upper limbs were bent at the elbows, palms were closed and loosely placed on the abdominal area, and the lower limbs were extended. His fingers were smudged with dark reddish-brown stains. In the proximity of the victim's head, to the right of it and under it, there was a pool of blood. Metal combination pliers were placed on the floor between the victim's head and the doorsill (Fig. 1). The head was slightly tilted to the back, the face showed remains of blood (the nose and oral cavity were clear of blood), and a dried blood stain was present in the right temporal area of the head—signs of a potential penetration wound were not visible. The neck, torso, and limbs were free of signs of injury. A medical examiner diagnosed an open head injury as the primary cause of the victim's death. According to the anamnesis, for several months the victim had been suffering from feelings of danger, paranoia, and fear for his life. The case was closed as paranoid psychosis.

Autopsy Findings

An external examination and autopsy of the victim's body uncovered a gunshot wound to the victim's head—after removal of dried blood from the hairy part of the head, an entrance wound was found in the right temporal area. The wound defect of the skin had a star-shaped character with proportions of 2.5 × 2 cm, with an area of various small abrasions and bruises blending at the upper and bottom edging of the defect (an incomplete muzzle imprint, Fig. 2). Soot and gunpowder tattooing were not detected. At the area of the right temporal bone was situated a circular defect that was widening inwards in a funnel-like fashion, with a diameter of 6 mm at the outer bone plate and 7 mm at the inner bone plate. The surrounding area of the defect showed two short linear fractures, each 5 mm long. An X-ray examination confirmed the presence of a bullet in the cranial cavity: a 7.65 mm caliber cartridge (32 ACP) with minimal deformation. The bullet was located in the base of the skull near the petrous pyramid of the right temporal bone. The bullet path passed from the right side of the head to the left, slightly onward, without height deviations. The projectile perforated the right squama of the temporal bone, tissue of the right temporal lobe, and the petrous pyramid of the right temporal bone respectively, and it embedded in the area of the diencephalon.

The autopsy also proved that the deceased victim suffered from steatosis of the liver, nodular hyperplasia of thyroid, and benign hyperplasia of the prostate. Examination of the body fluids did not demonstrate the presence of ethylalcohol or other toxins, narcotics,

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FIG. 1—*Situation at the crime scene, combined pliers lay by the head of the victim.*

or psychotropic drugs. The immediate cause of death was contusion of the brain caused by the bullet's penetration into the cranial cavity. The muzzle of the barrel had been placed in the immediate vicinity of the right temporal area of the victim's head at the moment of firing. Following the completion of the investigation and autopsy, the death was classified as a suicide.

Subsequent Inspection of the Crime Scene

The autopsy provided immediate grounds for further inspecting the crime scene. Modified combined pliers were found in the drawer of a kitchen table at the crime scene. The jaws of the pliers clenched a hexagonal box-wrench that was fixed in place by tightly wrapped binding wire of blue color, thus holding the arms of the pliers firmly closed (Fig. 3). A 7.65 mm cartridge case without a primer was placed between the jaws of the pliers where the box-wrench was fixed (Fig. 4). On the opposite side of the room, a wooden lath with measurements of $32.5 \times 4.5 \times 1.5$ cm lay on a sofa cover. Noticeable marks (nicks made by an unknown object) and evident smudges of dark color were discovered on the wooden lath, in 2⁄3 of its length (Fig. 5). Upon further examination of the scene, a 7.65 mm cartridge was found in the drawer of a wardrobe, a small piece of blue-green plasticine lay on a shelf by a mirror, and a metal screw was located on the floor behind the stove. From

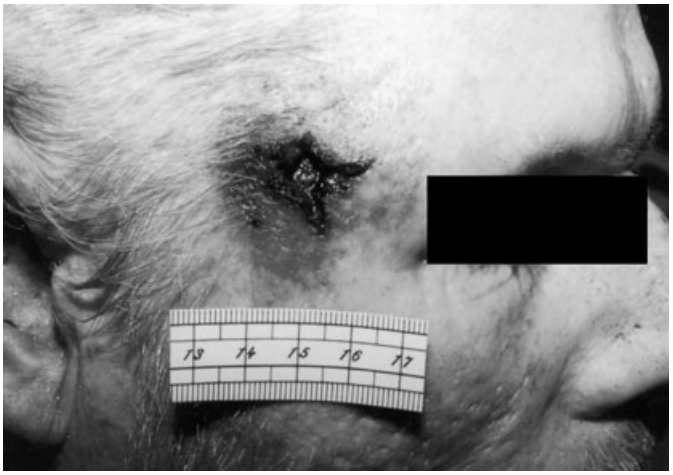

FIG. 2—*Gunshot wound in the right temporal area of the head.*

FIG. 3—*Improvised home-made zip gun.*

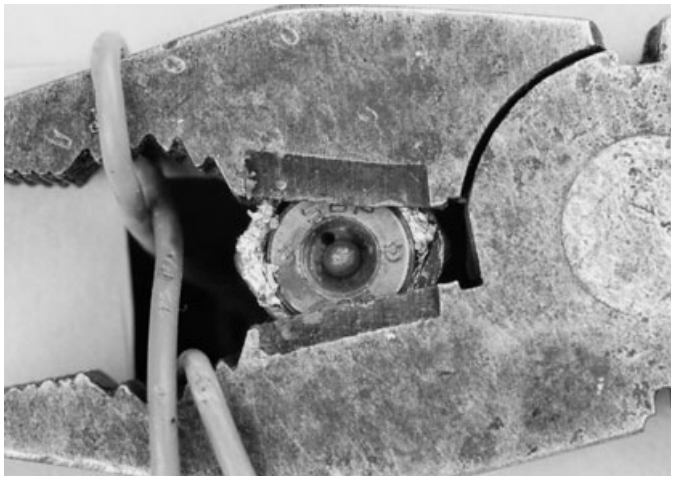

FIG. 4—*A view on the clenched jaws of the combined pliers with the fixation of a primitive barrel and visible bottom of the cartridge case.*

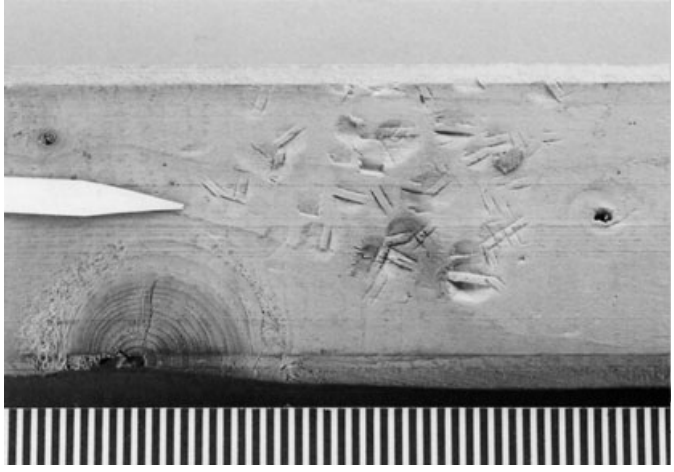

FIG. 5—*Indentations on the wooden lath created from the contact with the screw functioning as a hammer.*

the original testimony of the person who first reported finding the dead body, the victim's brother, it was pointed out that on the following day after the initial inspection of the crime scene he came to his brother's house to clean up. Combined pliers including the fixed box-wrench were left in place from the previous day. He examined them and found the presence of a cartridge case, from which he understood that it was some kind of firing mechanism. He did not handle the pliers any further, but rather placed them back in the drawer where they were later found and then left.

Technical Ballistic Expertise of the Firing Mechanism

Technical examinations of the projectile mechanism revealed that the inner and outer sides of the wooden lath contained numerous dents and pressure indentations created by the semicircular head of the screw. The most pronounced indentation with a groove of 1 mm wide in the middle was 3 mm deep and had a diameter of 7.6 mm. The head of the presented screw (diameters of the head and shank were *c.* 7.7 mm and 3.6 mm, respectively) was imprinted into plasticine. Experimental imprints were compared with indentations on the wooden lath. It was stated that with respect to the shape and measurements, the indentations on the wooden lath were most likely created by the head of the presented screw. Scrapings of the box-wrench that was fixed in the combined pliers showed particles indicating gunshot residues from the primer of the cartridge, consistent with the particles of gunshot residues found on the scrapings of the wooden lath, plasticine, screw, and combined pliers, as well as on the hands of the victim. By examining the mechanism, composed of combined pliers and a box-wrench with a cartridge case, it was determined that the mechanism represented a simple home-made zip gun. This type of firearm consisted of stainless steel combined pliers *c.* 160 mm long, and a hexahedral stainless steel box-wrench that was 56.5 mm long with an inner diameter of *c.* 9 mm, which was fixed into the jaws of the pliers with the help of copper wire isolated by means of green plastic 0.7 mm in diameter. A fired brass cartridge case (Browning 7.65 mm) without a primer was found in the lower part of the box-wrench, clenched to the jaws of the pliers' cutting edge. The cartridge case had a burned primer cap, and it was fixed to the cavity of the box-wrench with a strip of tinfoil wrapped around its body with the surrounding remnants of green plasticine. In respect to the bulge of the cartridge case, great force had to be applied in order to remove it from the wrench. Indentations from the combined pliers were found in the bottom of the cartridge case. A test of the mechanism's firing ability was performed. The fired cartridge case on the box-wrench was "reloaded" with an identical ammunition. Plasticine was stuck to the primer of the cartridge case and a screw was placed headfirst into the cartridge case (Fig. 6). It was revealed that the thus constructed simple home-made zip gun was capable of firing.

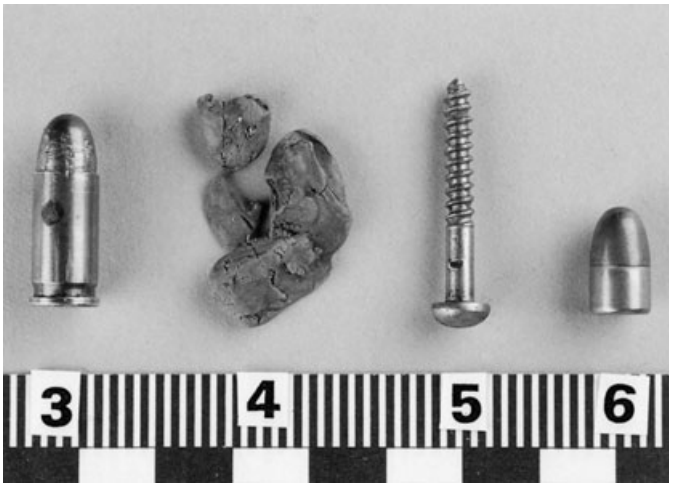

FIG. 6—*From left to right: cartridge 7.65 Browning; plasticine; screw used for initiation of the primer; bullet 7.65 Browning recovered from the body during autopsy.*

Discussion

The inability to acquire a gun legally is one likely reason to produce a home-made firearm. The possible uses of such a weapon are numerous: for the protection of property, for self-defense, for poaching, for sport or as a hobby, or even for committing suicide.

If we exclude the other possible reasons in this case, we are left with suicide as the only other plausible reason for constructing such a weapon. In such cases as these, in which suicide is the reason for the weapon's production, we are generally dealing with relatively simple, single-shot firing mechanisms, made from commonly available materials. The prerequisite is at least a basic knowledge of the working principles of a firearm. Such knowledge can be acquired, for example, by reading specialized publications, through military duty, or even via leisure activities (hunting, sports involving firearms, etc.).

The literature (1–8) shows that persons using home-made guns to commit suicide were exclusively men. Women who commit suicide with a firearm typically use guns of serial production. The parts used in the production of a homemade gun consist of common items or equipment—wrenches, screws, wires, bolts, springs, metal plates. Occasionally, arms for other purposes are involved (an alarm gun, a gas cartridge weapon, a blank cartridge weapon, an air-powered weapon). Sometimes, however, original and home-made components are also used, forming a so-called hybrid weapon (13). It is to be expected that the firing mechanism, once made, is then tested and adjusted, if necessary, before the so-called clean-cut use. The feeling of a certain technical skill and pride of an almost professional nature could be the reason for choosing this more complicated means of suicide as opposed to a more "traditional" method (hanging, suicide jump, etc.). It is presumed that home-made guns are produced according to the intended ammunition. In cases where the caliber of the cartridge does not correspond to the caliber of the barrel, attempts to tighten or fix the cartridge into the chamber are common (i.e., with the use of plasticine, a strip of fabric, tinfoil, etc.) (6).

A home-made gun could cause complications for professionals examining the crime scene and investigating the body (3,8). For example, the home-made gun itself might be overlooked during the initial search or, if observed, not given much consideration due to its innocuous appearance. In addition, the atypical appearance of the wound, which could be expected with the use of a home-made gun, might cause the wound to be mistaken for a laceration or a laceration/contusion type wound (as it was in our case). The result can be an insufficient, unprofessional, incorrect, or misguided evaluation of the wound. In cases where a gunshot wound is suspected, it is best for medical examiners and ballistics specialists to cooperate from the beginning (at the crime scene) (8).

At the scene of death or in the autopsy room, the gunshot wound alone might have an atypical appearance (3,11). It can be on the one hand very small and discreet, but on the other hand it can exhibit characteristics of a widely forked laceration/contusion wound with fading defects of the skin and soft tissue. The wound could also be marked by abundant tattooing of gunpowder particles

or a wide, dense soot ring. This unusual appearance is a result of the crude mechanisms of a home-made gun, for example the disproportion present in the caliber of the cartridge and the caliber of the barrel (wider barrel), the deficiency in the length of the barrel or insufficient tightness between the parts of the firing mechanism, etc.

Finally, it can be stated that an unusual home-made firing mechanism is usually a direct (but not the only) indication of a suicide.

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