



Suicide with an unusual home-manufactured firearm

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Abstract

A 22-year-old male with a medical history of depression was found lying on his right side with a pool of blood around his head. A pistol-shaped metal device was found next to the right hand of the deceased. Examination of the body revealed the presence of a gunshot wound to the head. The entrance wound was located in the right temporal area and was partially surrounded by a semicircular muzzle imprint. Analysis of the firearm revealed a home-manufactured device constructed from the posterior part of a captive bolt gun chamber containing a firing pin. The front part of an original captive bolt's cylinder was replaced with a conical iron tube, which could be detached from the chamber by an unscrewing action. The tube was unrifled and drilled in order to accept standard 9 mm ammunition. A hollow rectangular piece of metal was welded to the posterior part of the chamber perpendicularly and used as a grip. Cases of injuries caused by different types of captive bolt guns are well documented in the forensic literature. However, conversions of captive bolts in projectile-discharging devices or their use in the construction of zip guns, as well as the injuries produced by such types of firearms, are extremely rare in forensic and medico-legal practice.

Keywords Gunshot wound · Suicide · Death scene · Home-manufactured firearm · Captive bolt gun

Case report

A 22-year-old male with a medical history of depression was found in front of his vehicle, which was parked next to an abandoned warehouse, approximately 200 meters from the main road. The body was lying on its right side with a pool of blood around the head and a pistol-shaped metal device loosely held with the fingers of the right hand.

An autopsy was performed the next day. The deceased was 179 cm tall with a body mass of approximately 70 kg. In the right temporal area, 9.5 cm from the midline and 9 cm from the top of the head, a stellate entrance wound of 1.6×1.3 cm was found. Several tears, with a maximum length of 8 mm, radiated from the skin defect. The posterior part of the entrance hole was surrounded by a 1.8 cm wide semicircular

muzzle imprint (Fig. 1). The tissues in the depth of the entrance wound were burnt and blackened with soot. The right temporal bone showed a 1 cm circular defect with a cone-shaped widening of the inner table. Three radial fracture lines originating from this bony defect stretched across the vault and the base of the skull, while the anterior cranial fossa showed multiple indirect fractures. The direction of the 15 cm long projectile path was from right to left, slightly upward and backward, and through both cerebral hemispheres. The cerebral injuries were associated with subarachnoid and subdural hemorrhages. The left parietal bone showed a 1.3 cm oval perforation, while there was an oval-shaped skin defect of approximately 1.7×0.9 cm in diameter at the end of the path in the left temporal region, with the edges bent outwards (Fig. 2).

Toxicological examination did not reveal the presence of alcohol, pharmaceuticals or illicit drugs in the body at the time of death.

The immediate cause of death was attributed to a severe 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 head at the moment of firing. Following completion of the investigation, autopsy and toxicological analyses, the death was classified as a suicide.

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Fig. 1 The entrance wound in the right temporal region showing a semicircular muzzle imprint

According to the information from the police investigation, the firearm found at the death scene had been manufactured by the deceased's father, an experienced craftsman who owned a small workshop.

Fig. 2 The exit wound in the left temporal area



Examination of the firearm showed that the weapon's total length was 25.5 cm, and its weight was 1595 g. The firearm was constructed from the posterior part of a captive bolt gun chamber containing a firing pin, while the front part of the original captive bolt's cylinder was replaced with a conical iron tube, 4 cm wide at the posterior end and 1.9 cm wide at the muzzle's end. A hollow rectangular piece of metal perpendicularly welded to the posterior part of the chamber was used as a grip (Fig. 3a). The iron tube could be detached from the chamber by an unscrewing action. There was a 9 mm pistol case (Parabellum) of a discharged bullet in the posterior part of the tube (Fig. 3b). After removal of the case, it was found that the iron pipe was unrifled and drilled in order to accept standard 9 mm ammunition.

The triggering mechanism was extended from the chamber through the upper part of the grip, while a spring from the bottom part of the grip held and returned the trigger to the firing position (Fig. 4).

Discussion

The term “zip gun” is used for homemade weapons or modified cap pistols, tear gas guns, blank pistols or similar devices that are able to discharge standard pistol, rifle or shotgun bullets [1]. Despite the fact that examinations of home-manufactured weapons are common in police firearms laboratories, cases of injuries and fatalities caused by such devices are not frequent in the forensic literature. This emphasizes the importance of close collaboration between medical and police forensic experts and combining the results of medico-legal and ballistic examinations. The production and use of homemade weapons are often associated with terrorism and various

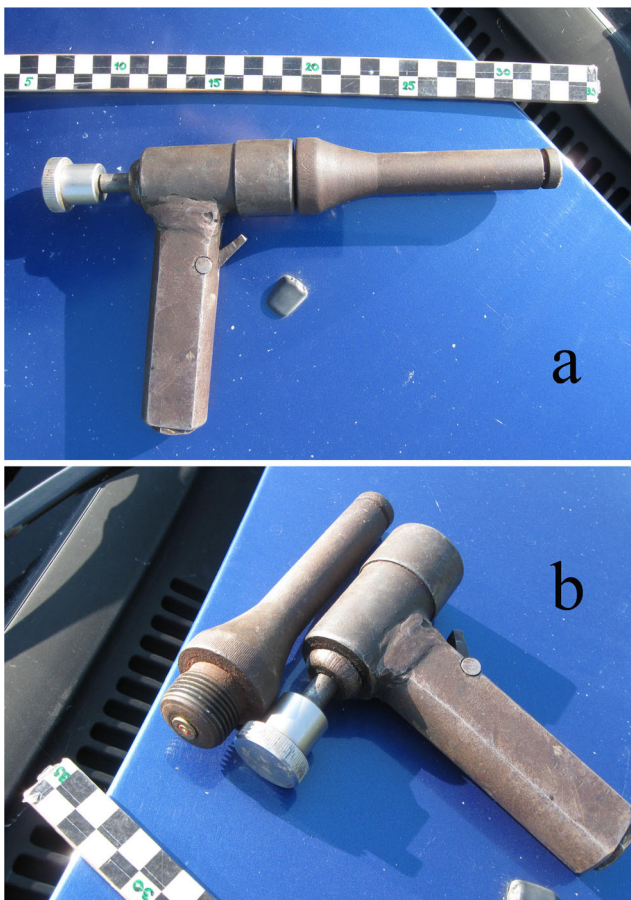


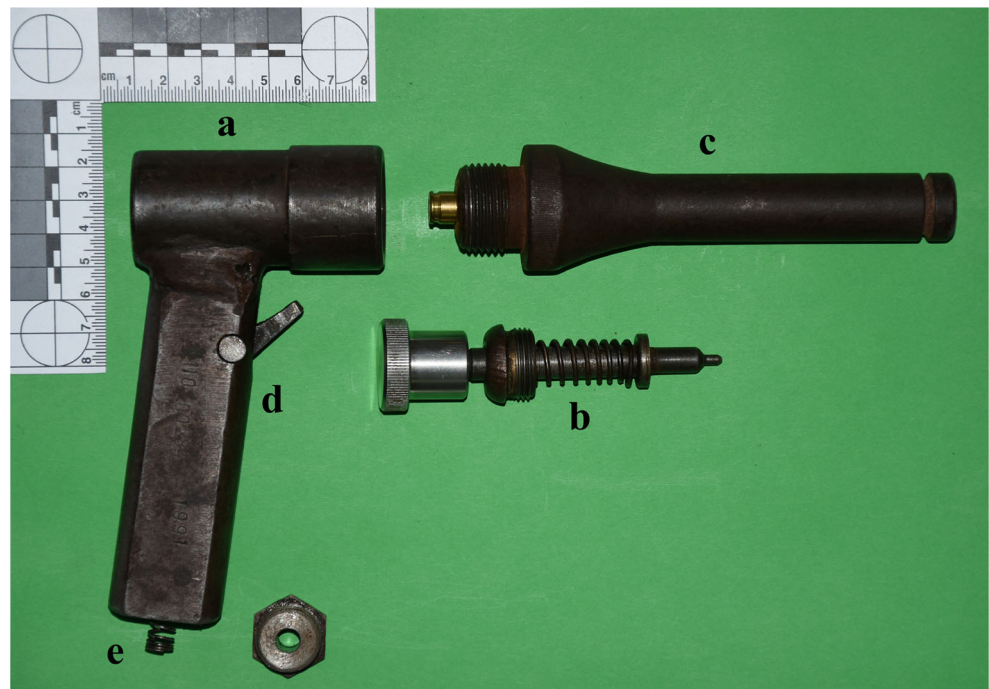
Fig. 3 Photographs taken during the police investigation. **a** The home-manufactured firearm found at the death scene. **b** The dismantled firearm with the 9 mm case in the barrel

criminal activities, but zip guns can also be seen in populations where possession of weapons is prohibited or in areas with more rigorous control of commercial firearms [2–4]. Even in situations in which different types of standard firearms are easily available, zip guns are produced by firearm enthusiasts with sufficient technical skills. The parts used in the production of homemade guns consist of commonly available materials such as metal pipes, nails, screws, springs, bolts or metal plates. Occasionally, arms for other purposes are involved (alarm gun, gas cartridge weapon, blank cartridge weapon, air-powered weapon) [5]. Such cases are usually related to self-inflicted wounds [4–8]. In some cases, original and homemade components are also used, forming a so-called hybrid weapon [9].

Although technical characteristics and potential lethality vary significantly depending on the material used and the skills and technical background of the person, home-manufactured firearms are usually crude single-barreled devices. Due to the lack of rifling and poor fit into the barrel, the bullet is unstable; upon leaving the barrel it almost immediately begins to tumble and lose velocity. This characteristic of most homemade guns makes them extremely short-range weapons [1].

A standard captive-bolt gun, used for the humane slaughtering of animals in the meat industry, consists of a cylindrical metal tube with a heavy flange muzzle. A steel bolt placed in its center is driven by the combustion gases of a blank cartridge and penetrates several centimeters into the animal's braincase. After discharge, the bolt is pulled back into the barrel by a recoil spring or rubber bushings [10].

Fig. 4 The home-manufactured firearm dismantled to demonstrate its components: **a** Posterior part of a captive bolt chamber. **b** Firing pin from a captive bolt gun. **c** Hand-made iron tube with the 9 mm case. **d** Grip with the triggering mechanism extended from the chamber. **e** Spring holding/returning the trigger to the firing position



Cases of accidental injuries, suicides and even homicides, including the analysis of morphological, epidemiologic, clinical, imaging and forensic characteristics of head wounds caused by different types of captive bolt guns, are well documented in the forensic literature [10–17]. Most of these cases come from Central European countries, where the purchase of captive bolt guns is quite liberal and they are available to a wide range of users. This is in direct contrast to English speaking countries, where captive-bolt guns are considered regular weapons and are regulated by a strict license policy [17].

In some cases removal of the rubber bush and withdrawal spring before firing can cause the bolt to break and become a free projectile [18]. However, conversions of captive bolts in projectile-discharging devices or their use in the construction of zip guns, as well as the injuries produced by such types of firearms, are extremely rare in forensic and medico-legal practice.

Compliance with ethical standards

Conflict of interests The authors declare that they have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent For this type of study formal consent is not required.

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