

# Suicide with two makes of captive-bolt guns (livestock stunners) fired simultaneously to the forehead

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**Abstract** In humans, most fatalities from slaughterer's guns are suicides committed by persons familiar with stunning devices. The great majority of cases accounts for shots to the head, especially the frontal region. Only a small number of two subsequent cranial shots from captive-bolt humane killers have been reported up to now. In the case presented by the authors, a suicide by simultaneous shots to the head fired from two different makes of captive-bolt guns (one of them having two separate outlets for the combustion gases in the muzzle plane, the other type having no additional openings) is described for the first time. One of the shooting devices remained in firm contact with the left hand and produced patterned staining from rust corresponding to the surface relief of the gun. The medico-legal and criminalistic aspects of this unique case are discussed with reference to the pertinent literature.

**Keywords** Two-gun suicide · Livestock stunner · Slaughterer's gun · Captive-bolt humane killer · Soot pattern · Rust staining

## Introduction

Captive-bolt livestock stunners are intended for inducing immediate unconsciousness in animals to be slaughtered [1, 2]. A cylindrical steel bolt is driven by the combustion gases of a blank cartridge and penetrates a few centimeters into the animal's braincase, from where it is drawn back into the barrel.

Therefore, no metallic projectile is left in the cranial vault. Due to the limited length of the bolt, usually no exit wound is to be expected.

In some powder-activated captive-bolt guns, the combustion gases are drained off through two or four smoke conduits opening into the muzzle plane beside the central hole for the steel bolt. Such devices (e.g., tools of the Kerner type) cause a characteristic soot pattern depending on the location of the gas outlets, the muzzle-to-target distance, and any inclined position of the gun [3, 4]. In other makes (e.g., tools of the Schermer type), the soot emerges only laterally [5] or along the bolt's guide thus causing circular blackening around the entrance hole [6, 7].

The stunner cartridges are blanks containing gunpowder but no bullet. There are different sizes of charge designated for the particular kind of animal to be slaughtered. The strongest ammunition intended for heavy bulls usually has a black or red color marking on the base of the case [1].

Both in meat stock and in human victims, the stunner is usually fired in contact with the head. As the bolt is conically excavated and sharp-edged at its end, it causes a clean-cut skin hole. Due to tissue elasticity, the diameter of the roundish entrance wound is typically a little smaller than the cross-section of the bolt. In contrast to contact shots from handguns and rifles, the entrance wound does not show a muzzle imprint or stellate splitting but soot depositions in congruity with any smoke outlets and/or a ring-shaped zone of blackening around the skin hole [1, 3, 4].

In shots to the frontal, temporal, parietal, and occipital regions, the penetrating bolt produces a circular hole in the outer table of the flat bone roughly corresponding to the bolt's size whereas the inner table is beveled. The punched-out skin and bone are forced into the depth of the wound track, where they are left as main components of the so-called *imprimatum* [8]. Indirect bone lesions away from the bolt's path are rare [2, 9]. Despite extensive brain damage with consecutive intracranial

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bleeding, the survival rate in victims admitted to hospital exceeds 50% in some studies [10–12].

According to the published data, most fatalities from captive-bolt livestock stunners are suicides (about 85%) [3, 13–15]. The vast majority of victims are males with a high proportion being experienced in slaughtering procedures (butchers, farmers) [14–16]. The entrance sites are mainly located on the head (frontal, temporal, parietal, and occipital regions) [3, 14, 15]. A considerable number of homicides committed by means of a slaughterer's gun have been published in the relevant literature [4, 13, 15–28]. In comparison, accidental injuries with fatal outcome are seen less often [8, 28–30]. As an exception, a stunner may also be employed as a striking tool [31].

In the following, a suicide with two different types of livestock stunner simultaneously fired to the head is presented. To the best of our knowledge, it is the first suicide of that kind described in the forensic literature.

## Case report

### History and situation at the scene

A 69-year-old pensioner (living alone and divorced for a long time) was found dead in the bathroom of his house after a friendly neighbor had unsuccessfully tried to contact him for 2 days. The front door was locked and had to be opened with a spare key. The man was in the bathtub in a half-sitting and half-lying position wearing a T-shirt and undergarments. The bathtub did not contain water and the tap was turned off. Under the right thigh of the deceased, a Schermer-type livestock stunner was located. The left hand partly embraced another captive-bolt gun (a Kerner-type device; Fig. 1b). A metallic container for the stunners and a box with appropriate blank cartridges were placed on a kitchen cupboard. In a fire-arm locker located in the bedroom plenty of hand guns, rifles and ammunition were stored. During his lifetime, the man was known as a passionate collector and expert of weapons. In the recent past, he had been worried about his deteriorating vision and a planned ophthalmic operation. The increasing health problems in association with a long-standing social isolation are regarded as the most probable suicide motive although no specific announcement was expressed during the last few days. No suicide note was left.

The first investigations at the scene were performed by the emergency physician and the police officers on duty. At that time, postmortem lividity and rigidity were fully developed. Starting from the forehead, a vertical flow pattern of dried-up blood extended downwards on the front of the trunk (Fig. 1a). The palms of the hands, the exterior of the stunners, and the spent cartridge cases were clear of any blood soiling. Before autopsy, the emergency physician and the police detectives

were of the opinion that only one shot had been fired against the forehead.

### Autopsy findings

Body height 180 cm, body weight 108 kg. Faint soot deposits on both hands, especially the thumbs and the index fingers (as usually found after handling an uncleaned stunner in the course of loading) [3]. Patterned yellowish-brown skin discoloration on the left hypothenar and middle finger reflecting the ribbed surface relief of the Kerner stunner (transition between barrel and head part of the device; Fig. 2). Peripheral corneal opacity on both eyes, clouding of the right lens.

Slightly above the medial part of the right eyebrow, there was a sharp-edged, circular skin hole (diameter, 1 cm). It was eccentrically surrounded by a circumscribed zone of intense skin blackening (maximum diameter, 3 cm). A second skin hole of similar appearance, but smaller in diameter (8 mm), was situated on the upper margin of the left eyebrow. This wound was accompanied by two opposite soot deposits, each of them located at a distance of a few millimeters from the skin defect, with a maximum diameter of 15 and 18 mm, respectively (Fig. 3).

The squama of the frontal bone showed two perforations according to the entrance wounds in the skin (Fig. 4). The holes in the outer table had diameters consistent with the profiles of the steel bolts (13 and 11 mm, respectively). On the left margins of each hole, small bone chips were broken out. The inner table was beveled out in a crater-like manner.

A linear fracture ran from one entrance hole to the other. Further fractures extended to the left temporal squama and the orbital roofs. The intracranial wound tracks were running backwards along the basal aspects of the frontal lobes and involved the optic chiasma, the infundibulum, the vessels of Willis' circle, and the cerebral peduncles. About 9 cm away from the entrances in the forehead, the horizontal bolt tracks ended close to the pons Varolii. The punched-out pieces of scalp and bone fragments had been displaced into the interpeduncular cistern (Fig. 5). Away from the bolt-related tissue destruction, the brain surface did not show any cerebral contusions as they are often seen in conventional gunshot injuries to the head. The craniocerebral trauma was associated with subdural and subarachnoid hemorrhages, which predominantly covered the basal parts of the brain.

In addition, autopsy revealed hypertrophic cardiomyopathy (heart weight 618 g) and pulmonary emphysema as well as agonal aspiration of chyme and blood.

### Weapons and ammunition

Details are given in Table 1. Both shooting devices used by the suicide victim and their muzzle ends are depicted in Fig. 6.

**Fig. 1** Body at the scene. **a** Head in the original position. The vertical flow pattern of blood originates from two entrance wounds above the eyebrows. **b** The Kerner-type stunner is still in the left hand



### Test shots

For assignment of the soot patterns on the forehead, test shots were fired with the stunners found in the bathtub. The blank cartridges used corresponded to the ones inserted in the chambers of the two stunners (RWS 9 × 17 mm, red color marking). Blocks of ballistic soap covered with white cardboard served as a target medium. At the time of discharge, the muzzle was in contact with the target plane and the barrel perpendicular to it.

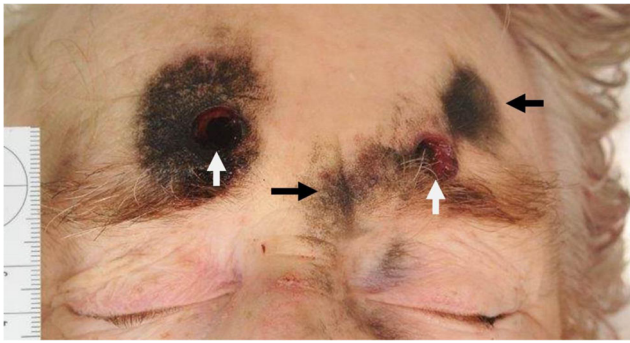
As expected, the resulting soot depositions differed dependent on the type of weapon: The Schermer stunner, which has

no separate smoke conduits, produced a broad, ring-shaped zone of blackening encircling the bolt's entrance hole similar to a near-contact shot fired from a conventional gun (Fig. 7a). In contrast, the Kerner-type stunner with the two opposite gas outlets on the muzzle end generated a soot pattern characterized by two roundish blackenings close to the entrance hole. For size, shape, and arrangement of the paired areas of powder soiling, see Fig. 7b.

With reference to the presented case, it can be taken for granted that the right-sided wound was caused by the Schermer stunner whereas the shot against the left forehead was fired from the Kerner stunner.

**Fig. 2** **a** Patterned rust stains on the skin of the left hand due to a prolonged contact with the Kerner-type device in the postmortem period. **b** Contact area of the Kerner-type stunner





**Fig. 3** Forehead with two entrance wounds (*arrows pointing upward*). The right one is eccentrically surrounded by intense soot soiling. The left one is accompanied by two roundish soot depositions located opposite to each other (*arrows pointing sideward*)

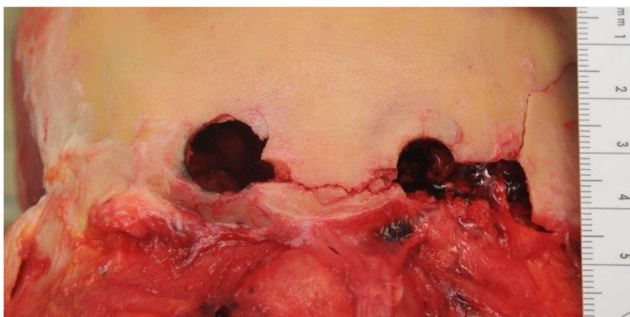
### Supplementary investigations

Apart from specimens of the inner organs, skin and bone pieces from the depth of the wound paths (Figs. 8a, b) were fixed in buffered formalin (4%). Decalcification of bone fragments was performed with formic acid in a 10% concentration. After embedding in paraffin, the specimens were cut into thin slices (4 mm) and stained with hematoxylin-eosin.

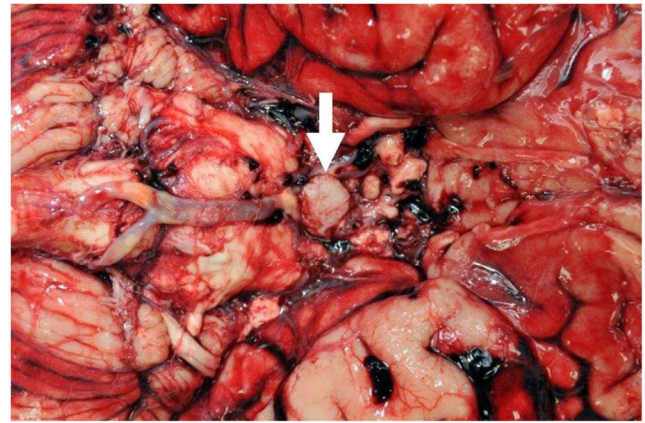
The punched-out scalp patches displayed regular stratification of the skin including hair follicles and perspiratory glands. The most remarkable deviation from the normal structure was a striking disintegration and basophilic coloration of the papillary layer whereas the epidermis appeared nearly intact (Fig. 8c).

According to the toxicological analyses, the victim was not under the influence of alcohol, illicit drugs, or pharmaceuticals at the time of death.

DNA analysis of the biological traces adhering to the excavated ends of the bolts with PowerPlex17® ESX System (Promega, Mannheim, Germany) produced a male short tandem repeat (STR) profile matching the one obtained from a blood sample of the deceased (frequency of the STR pattern, ca.  $1: 20.7 \times 10^{24}$ ).



**Fig. 4** Entrance holes in the squama of the frontal bone. The size of the bone defects is in line with the different cross-sections of the bolts



**Fig. 5** Undersurface of the brain showing damage to the optic chiasm and the cerebral peduncles. An imprimatum (*arrow*) is located close to the pons Varolii

### Discussion

The presented case is characterized by the following peculiarities: two suicidal contact shots from different kinds of captive-bolt livestock stunners fired simultaneously to the frontal region, postmortem location of a slaughterer's gun in the victim's left hand, patterned iron staining on the palmar skin corresponding to the weapon's surface relief.

Two-gun suicides by simultaneous shots from handguns and rifles are extremely rare events. In 2011, we compiled 20 pertinent reports from the literature, the oldest one dating from 1819, and added a case from our own material (concurrent pistol shots into the mouth and left temple) [32]. As far as we know, only one two-gun suicide using humane killers was presented in 1988. The case was communicated at a regional medicolegal conference (suicide of a butcher by inflicting two simultaneous shots from slaughterer's guns to the chest [33]).

Apart from the majority of suicides committed by a single shot from a livestock stunner, there are cases in which a second suicide method is applied, either in parallel or in close succession. This kind of taking one's own life is usually referred to as complex suicide [34, 35]. Most often, shots from humane killers are combined with hanging [4, 13, 15, 16, 23, 36–43]. In very few instances, other additional suicide methods have been reported such as drowning [8, 44], wrist-cutting [7, 15, 16, 45, 46], self-induced car collision [15, 16], and self-incineration [47].

The different manifestations of complex suicide have to be distinguished from the repeated use of one and the same captive-bolt stunner: Even in shots to the head, the bolt injury is not necessarily followed by immediate or persistent unconsciousness. In these instances, the suicide victims may maintain or regain their capacity to act so that they are able to reload the livestock narcotic device and fire a second time [4, 29, 48–52]. Until now, in suicide cases with two consecutive shots, the entrance sites were always located either on the

**Table 1** Livestock stunners applied by the suicide victim

Type/make	Manufacturer	Weight	Bolt diameter	Ammunition	Final position
Powder-actuated captive-bolt livestock stunner without additional smoke outlets at the muzzle end, mod. Kaska	Karl Schermer GmbH & Co. KG, 76275 Ettlingen, Germany	2900 g	13 mm	Cattle-killing blank cartridge RWS 9 × 17 mm, red color marking (meant for heavy bulls)	Bathtub, under the deceased's right thigh
Powder-actuated, self-retracting captive-bolt stunner with two opposite smoke outlets at the muzzle end, mod. 289	Karl-Heinz Kerner Co., 51371 Leverkusen, Germany	1700 g	11 mm	Cattle-killing blank cartridge RWS 9 × 17 mm, red color marking (meant for heavy bulls)	Bathtub, in the deceased's left hand

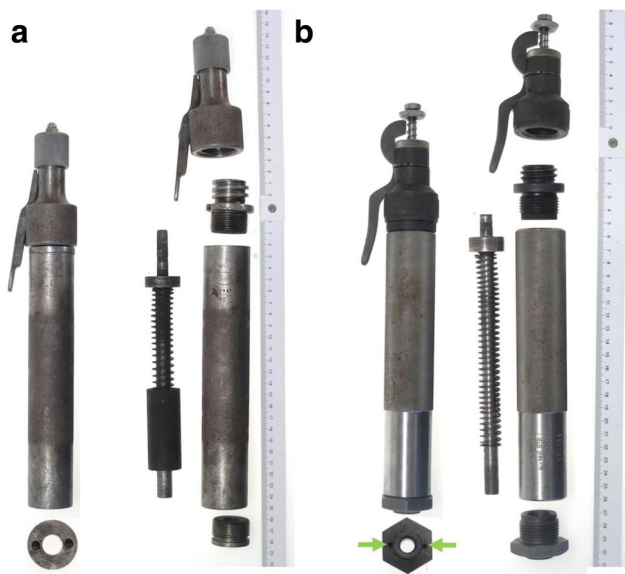
forehead or in the temporal region. As a matter of course, the presence of more than one bolt injury obliges the investigating officers and the medicolegal examiner to thoroughly consider whether there is any evidence that another person may have been involved. Homicide victims often receive two shots to the head with the entrance sites not being limited to the frontal or temporal region.

Even shots involving the brain need not be accompanied by unconsciousness or other neurological disorders. In a case formerly reported by us [53], an alcohol-dependent suicide victim fired a shot to his right temple but remained capable to act. The family members did not believe his story and regarded the skin wound as a trivial injury until symptoms of meningitis developed.

In the case presented here, it has to be assumed that both shots to the forehead were triggered simultaneously and not

one after the other. This appraisal is supported by the following facts:

- The chambers of both stunners contained spent cartridge cases with red color markings indicating the maximum strength of ammunition (meant for heavy bulls [54]).
- The remarkably wide wound tracks involved the basal parts of both cerebral hemispheres and extended to the brain stem which belongs to the “targets of immediate incapacitation” [55]. In view of the extensive damage of intracranial structures, it cannot be assumed that the victim was still able to act after having received one of the bolt injuries.
- The different soot patterns on the frontal skin and the varying diameters of the entrances in the bone as well as the tissue traces adherent to the excavated front of the bolts being in accordance with the DNA profile of the victim can be regarded as further arguments that both stunning devices found in the bathtub had been used.
- The flow pattern of blood originating from the two entrance wounds in the forehead was consistent with an unchanged posture of the body after firing.
- The palms of the hands did not show any blood staining as it would have to be expected if a bleeding victim handles a stunning device to fire a second shot [4, 51]. The outside of the guns and the cartridge cases were also clear of blood stains.
- Stunners of the Kerner and Schermer type allow one-handed operation. Therefore, the muzzles of both devices could be positioned on the forehead with the victim's right and left hand, respectively.

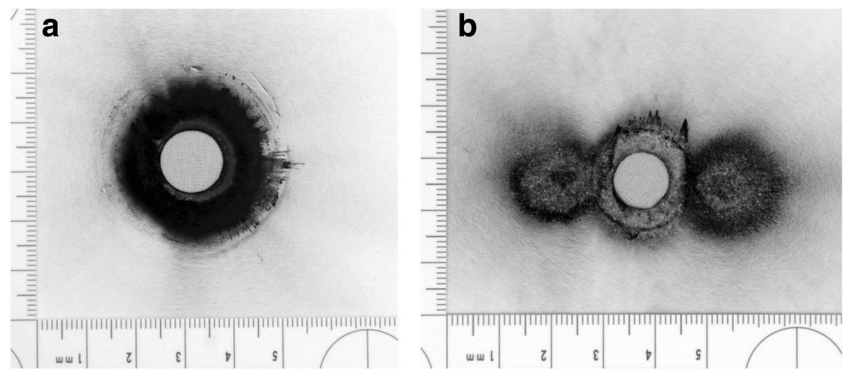


**Fig. 6** **a** Schermer-type stunning device (lateral view and muzzle end with centric bore for the bolt). **b** Kerner-type stunner (lateral view and muzzle end with centric bore for the bolt). The gas outlets are marked by arrows. On the right, the components of both devices are shown in a disassembled state

The suicidal use of captive-bolt livestock stunners by butchers, slaughterhouse workers, and farmers is considered to be a typical example of an occupation-related procedure [35, 56]. In the case presented here, the victim did not belong to one of the mentioned professional groups, but as a collector of arms and shooting devices, he was familiar with guns.

Nowadays, suicides in bathtubs are by no means rare. They comprise a wide range of methods such as cuts to the neck

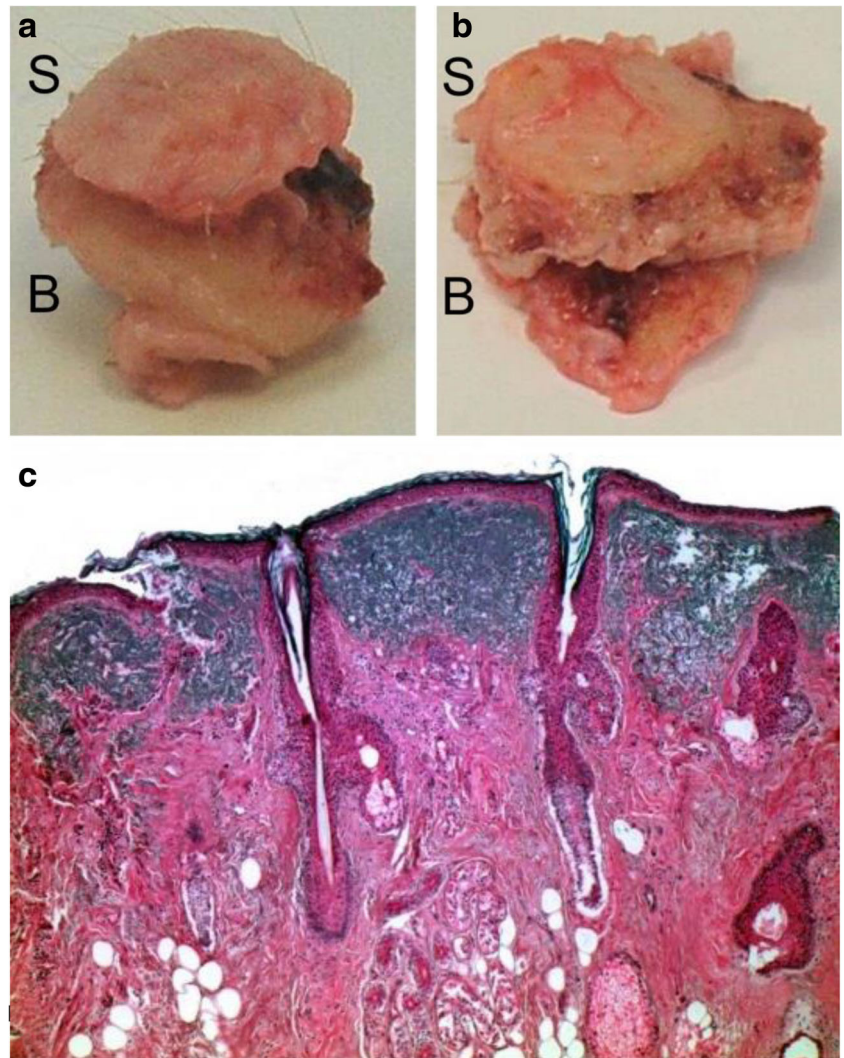
**Fig. 7** Soot pattern after experimental contact shots to ballistic soap covered with white cardboard. **a** Schermer device. **b** Kerner device



and/or the wrists, stabs to the heart, overdosing of drugs and/or narcotics, electrocution, and last but not least shooting [57–59]. The spatial confinement within the bathtub may increase the probability that a gun stays in the shooter's hand. According to Garavaglia and Talkington [60], in suicides by firearms, the location of the weapon depends on the position

of the body at the time of shooting. In sitting or lying persons, the gun was found more often in the deceased's hand than in a standing position. With handguns, the overall frequency of weapons found in the victim's hand amounted to 25.7%. With regard to slaughterer's guns, data have not yet been analyzed in this respect. As far as we know, the presented case

**Fig. 8** **a, b** Punched-out tissue complex (so-called imprimatum) consisting of skin (*S*) and bone (*B*). **c** Stained tissue section of the skin imprimatum with intact stratification and basophilic discoloration of the papillary layer (hematoxylin and eosin)



is the only one in which the hand evidently was still in contact with the stunner when the scene of death was examined. The absence of prior mentions in the subject literature can be attributed to the considerable weight of humane killers and to the fact that there is no trigger guard which may prevent a gun from dropping out of hand.

Another quite unusual finding was directly related to the postmortem contact between the Kerner-type stunner and the suicide's left hand. The hypothenar and the middle finger showed a detailed pattern corresponding to the surface relief of the shooting device. The brownish discoloration was caused by rust from the barrel. Such iron staining is seen only after a contact time of at least several hours and cannot be wiped off. The probably first report on rust marks on the skin in victims of gunshot injuries dates from 1914 [61]. Since then, several authors have described patterned imprints of iron weapon parts [62–68] but only in the context of handguns and long guns.

It is well known that the evaluation of gunshot injuries is particularly prone to misinterpretation. According to DiMaio [66], "it is quite common for the pathologist at autopsy to discover gunshot wounds missed by the police at the scene or physicians in an emergency room." The same is true for injuries from livestock stunners. In our case, the emergency physician performing the first external examination of the corpse and the police officers at the scene erroneously assumed that only one shot had been fired although both entrance wounds could easily be seen on the forehead.

## Conclusions

- A two-gun suicide by simultaneous shots to the head from different captive-bolt livestock stunners is presented.
- Customary slaughterer's guns can be operated with one hand.
- In some makes of humane killers, the soot pattern accompanying the entrance wound allows conclusions as to the shooting distance, the angle of the shot, and the type of the weapon.
- Under special circumstances, a livestock stunner may remain in contact with the suicide's hand.
- Tight and prolonged contact between the steel surface of a bolt stunner and the skin of a suicide victim may produce patterned iron staining.

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