

# Two-gun suicide by simultaneous shots to the head: interdisciplinary reconstruction on the basis of scene investigation, autopsy findings, GSR analysis and examination of firearms, bullets and cartridge cases

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**Abstract** Suicidal shots fired simultaneously to the head from two handguns are rare. The authors report about a recent case in which a Smith & Wesson cal. 9 mm pistol and a Smith & Wesson cal. .357 Magnum revolver were used. Sitting on a sofa, a 33-year-old man (member of a shooting club) fired two simultaneous shots to the head; the pistol held in the left hand was discharged into the left temple, and the revolver held in the right hand was fired into the mouth. Both weapons remained in the respective hands. An upside-down muzzle imprint in the left temporal region and recoil injuries of a mandibular incisor, and the lower lip indicated that both the pistol and the revolver had been held in an inverted manner at the time of discharge. Blood stains (backspatter) and gunshot residues were

present on both firing hands, whereas forward spatter originating from the exit wounds was deposited on the wall behind the suicide's head.

**Keywords** Two-gun suicide · Gunshot injury · Bloodstain pattern · GSR analysis

## Introduction and literature review

Whereas single gunshot wound suicides are routinely encountered in forensic pathology, even some medical examiners are quite unaware of the fact that a person intending to commit suicide may fire at himself more than once. Among these “multi-shot firearm suicides”, a rare subgroup is characterized by the use of two different weapons at the same time—a strange constellation giving rise to the suspicion of foul play.

In 1980, Fattah et al. [7] published a report on a suicide with two guns and mentioned that they were unable to find any record of a comparable case. Only 2 years later, Hudson [15] reported a similar fatality dating back to 1955. When, in 1989, Rogers [29] described a man who shot himself simultaneously with two revolvers, he erroneously thought that only three examples of two-gun suicides had ever been recorded in the literature up to then.

In 2002, Parroni et al. [25] gave a summary of ten relevant cases including one observation from their own material and five previous ones from Italy [10, 20–23]. The monograph “Gunshot Wounds” by Di Maio [6] comprises a figure showing entrance wounds in the right and left temples from self-inflicted shots with two .25 pistols. The latest paper in the English language on simultaneous self-

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inflicted shots with two guns (service pistols) was presented by Padosch et al. [24] in 2005.

In actual fact, the phenomenon seems to have existed for a much longer period.

- As early as 1819, Klein [18] referred to a 17-year-old male adolescent who committed suicide by inflicting gunshot injuries to his chest and head with two pistols.
- According to Trélat [34], a 44-year-old man shot himself simultaneously with two pistols discharged against his right and left temporal regions in 1848.
- In 1900, Schaefer [31] compiled 14 suicides with more than one gunshot wound, one of these being committed with two rifles directed towards the head and the abdomen, respectively.
- In the world-renowned textbook of Hofmann and Haberda (10th edition from 1919) [13], two similar suicides are quoted. In each of them, two revolvers had been fired, i.e. one of the victims fired at both temples and the other at the chest.
- In 1932, Gabriel [8] dealt with multiple gunshot suicides in his doctoral thesis. In this context, he cited an observation by Merkel concerning a man who had fired shots from two military rifles to his chest.
- In 1942, Rommeney [30] presented a case of a planned complex suicide carried out by simultaneous pistol shots to both temples followed by hanging in a noose placed around the neck beforehand.
- Another remarkable fatality was published by Hepner and Maurer [12] in 1962. A 34-year-old woman fired shots to the temporal regions with two pistols while kneeling on a cushion in front of a mirror which was spotted with blood, bone fragments, hairs and brain particles as a result.
- The atlas of forensic medicine edited by Weimann and Prokop [35] refers to the suicide of a man who was found dead sitting on a sofa after firing simultaneous pistol shots to the temples.

When summarizing the above review of the literature and taking reference books and journals published in languages other than English into account as well, the number of two-gun suicides by far exceeds the figures previously mentioned in relevant articles. Nevertheless, it seems justified to report one more case, since it is characterized by a unique combination of findings permitting an interdisciplinary elucidation of the incident.

### Case history and scene of death

When a 33-year-old man did not arrive at work and could not be reached by telephone either, his parents were called as an accident was suspected. The father went to the flat of

his son who lived alone and opened it with a spare key. In the living room, he found his son lifeless sitting on the sofa. When the emergency doctor arrived, rigor mortis had already set in. For this reason, no resuscitation attempt was made, and the scene was left unchanged until the police came (Fig. 1).

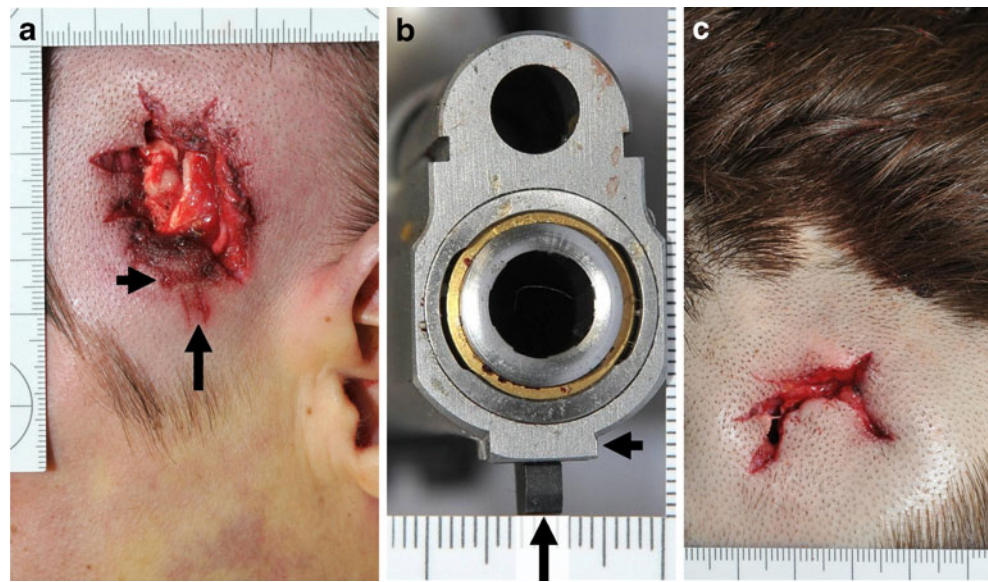
The man's head and the upper part of his body were tilted to the left. In the right hand, he held a revolver and, in the left hand, a pistol; the right index finger was in contact with the trigger. The man, who was a member of a shooting club, had a licence for both firearms. The legs were extended and the feet rested on a low table in front of the sofa. The condition of the clothing was unremarkable. On the left front side of the outer fleece jacket, there was a vertical flow pattern of dried blood consistent with the position of the body.

The wall behind the sofa showed two roundish spots where the wallpaper and the plaster had obviously been damaged by projectiles (114 and 134 cm above floor level). From the impact site next to the right half of the body, a parabola-shaped bloodstain pattern originated which consisted both of blood droplets and tissue



**Fig. 1** a Original position of the deceased's body sitting on the sofa. On the wall behind, two areas of high-velocity blood spatter (arrows). b Both hands clasping guns (revolver on the right, pistol on the left)

**Fig. 2** **a** Hard contact discharge to the left temple with incomplete muzzle imprint representing the front sight (*upwards arrow*) and sight mount (*rightwards arrow*). **b** Front view of the pistol's muzzle plane (held in upside-down position) with the front sight pointing downwards. **c** Exit wound in the right parietal region

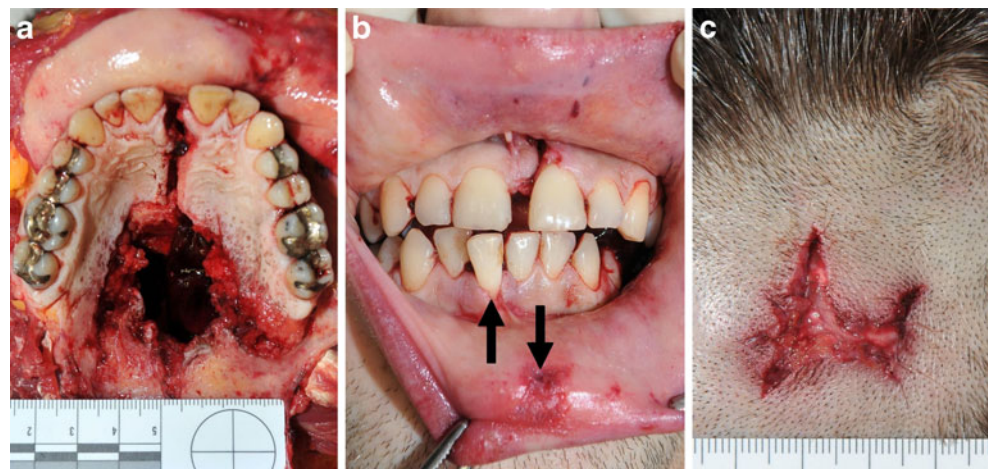


particles (brain, bone, skin) of different sizes. Assuming an upright position of the upper part of the body, the second area of damage was located higher up on the wall above the head, where an oval area was spattered with blood and tissue particles.

In an open magazine holder on the couch table, a brass-coloured cartridge case (cal. 9 mm Luger) was found. On the floor in front of the sofa, there was a semi-jacketed bullet, cal. .357, with a mushroom-shaped deformation. In addition, a copper-coloured torn bullet jacket (cal. 9 mm) and two deformed fragments of a lead core were discovered.

The rectal temperature was 25.5°C at a room temperature of 18°C. In three hand-written suicide notes addressed to the parents and siblings, relationship problems were mentioned as the main motive for the suicide. The man wrote that he had already been thinking about committing suicide for 3 years, but had always kept his thoughts to himself. He was right-handed and a heavy smoker.

**Fig. 3** **a** Intraoral entrance wound surrounded by soot deposition and powder tattooing. **b** Luxation of the first incisor of the right lower jaw (*upwards arrow*) with corresponding laceration of the labial mucosa (*downwards arrow*). **c** Bullet exit wound in the upper occipital region



### Autopsy findings

The main results are recorded in Table 1. Detailed information is available in the electronic version of this article ([electronic suppl. 1](#)).

### Weapons and ammunition

The criminological investigation produced the following results:

- The handgun in the left hand was a self-loading Smith & Wesson pistol, mod. 5906 Target Champion, cal. 9 mm Luger ([electronic Suppl. 3](#)). The interior profile of the barrel had five lands and grooves with a right-hand twist. The magazine (holding 16 cartridges) and the chamber were empty. Around the muzzle, there were patchy deposits of blood, and on the slide, fine blood spatter was discernible.



**Table 1** Autopsy findings (abridged version)

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Blood droplets on both hands (backspatter, see <a href="#">electronic suppl. 2</a> )
Stellate contact entrance wound in the left temporal region (Fig. 2a) with imprint of the foresight (Fig. 2b) at the caudal circumference
Bullet exit wound in the right parietal region (Fig. 2c)
Bullet entrance wound in the hard palate (Fig. 3a) with soot soiling and powder tattooing accompanied by luxation of tooth 41 and a corresponding lesion on the inside surface of the lower lip (Fig. 3b)
Bullet exit wound in the upper occipital region (Fig. 3c)
Multiple gunshot fractures of the cerebral cranium
Bullet track running from the palate through the brainstem to the occipital region
Bullet track extending from the left temple through both cerebral hemispheres to the right parietal region
BAC 1.09 per mille

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- In the right hand, the suicide held a double-action Smith & Wesson revolver, mod. 686-3 Target Champion, cal. 357 Magnum ([electronic Suppl. 3](#)). The six-shot cylinder contained one cartridge case. Barrel, cylinder and frame showed multiple small mostly spray-like blood deposits. The face of the muzzle was extensively soiled with blood.
- Test shots from both weapons demonstrated that they were functioning properly. The case located on the couch table was found to be part of a cal. 9 mm Luger pistol cartridge equipped with a copper-coloured hollow-point bullet (mass, 7.52 g) and manufactured by Companhia Brasileiras Cartuchos, Sao Paulo/Brazil ([electronic suppl. 4](#)). The nickel-coloured cartridge case in the cylinder of the revolver was marked with the stamp “CBC-357 MAG” at the bottom. The pertinent semi-jacketed hollow-point bullet had a mass of 10.25 g ([electronic suppl. 4](#)).
- The cartridge cases recovered from the scene and in the cylinder, respectively, showed class and individual characteristics matching those of control samples obtained by test shots from the victim’s pistol and revolver.
- The bullet jacket found on the floor in front of the couch ([electronic suppl. 4](#)) showed class characteristics (number of lands and grooves, direction and inclination of twist) that were consistent with a shot fired from the victim’s pistol. Due to the bullet’s deformation, the individual characteristics (striations) were not suitable for comparative tests.
- The semi-jacketed bullet with the mushroom-shaped deformation recovered from the scene ([electronic suppl. 4](#)) could be assigned to the victim’s revolver by means of comparison microscopy showing striation conformity.

### Gunshot residues

Using purpose-built stainless steel studs with adhesive surfaces, samples of gunshot residues (GSR) were taken

from specific areas of both hands (index finger, anatomical snuffbox, thumb, back of the hand corresponding to the metacarpals II–V, palm). The material removed was examined for GSR particles with a scanning electron microscope (SEM Supra 35 VP Gemini, Zeiss, Jena, Germany). Acceleration voltage of 25 kV, magnification of 324, and resolution of 2048×1536 pixels—this configuration facilitates the detection of primer particles down to a size of 1 µm. The metallic elements were identified by energy-dispersive X-ray spectrometry (EDX) using the INCA system (Oxford Instruments, Tubney Woods, UK).

The results are indicated in Tables 2 (for the right hand) and 3 (for the left hand). Particles of lead–antimony–barium and antimony–barium composition are considered characteristic of GSR [6, 32]. On the right hand, a high proportion of the particles consisted of lead only. This finding can be explained by the discharge of revolver ammunition which is prone to produce fine lead dust (metal fouling) contributing to GSR.

### Discussion

The reconstruction of events has always been a specific feature and domain of legal medicine [28]. The evaluation of gunshot wounds is an example of how the purpose of investigations goes beyond the purely medical findings to criminalistic questions of evidence. Solving complex firearm injuries requires the interdisciplinary cooperation of detective officers, forensic pathologists and ballistic experts. In exceptional cases, a publication seems justified under criminalistic aspects, if relevant new information is provided. As far as two-gun suicides are concerned, previous reports mostly lack a comprehensive description of the medical findings in connection with the scene investigation, the weapons and ammunition, the cases and bullets, any backspatter and forward spatter as well as the GSR on the shooter’s hands.

Suicides with more than one gunshot wound are uncommon (for references see [electronic suppl. 5](#)). Hudson

**Table 2** Gunshot residue particles removed from the right hand by steel studs with adhesive surfaces and analysed by SEM–EDX as to the composition of elements (antimony Sb, barium Ba, lead Pb)

Right hand	Sb/Ba/Pb	Sb/Ba	Sb/Pb	Ba/Pb	Pb
Index finger	21	72	28	6	225
Anatomical snuffbox	5	3	8	3	70
Thumb	8	8	19	1	22
Back of the hand (metacarpals II–V)	7	1	4	0	3
Palm	5	47	7	9	29

The numbers indicate how many particles with the respective compositions could be detected in the different hand areas

[14] evaluated the data of 7,895 firearm fatalities including 3,522 suicides, among which 58 (1.6%) had been committed by two or more shots. Thus, it is a well-known phenomenon that persons intending to commit suicide may discharge the gun repeatedly (up to 14 times [4]), if the victim manages to either retain or regain the capability to act [16, 19]. According to Hudson [14] and other authors, the characteristics of the individual entrance wounds (e.g. body regions involved and muzzle distance) are the same as those of single shot suicides. In most cases, the shots are fired one after the other into the region of the heart and/or neurocranium using one and the same weapon.

Apart from this “prototype” of suicidal multi-shot injuries, some special constellations may be defined, e.g. multiple shots from automatic rifles and submachine guns, failure/manipulation of the gun or ammunition, graze shots in the region chosen for the bullet entrance site, additional shots into the upper extremities and extracranial head injuries followed by penetrating shots to the cerebral cranium (for references see [electronic suppl. 5](#)). Cohle et al. [5] reported a suicide which was committed by using two different weapons in sequence. Firstly, the victim shot himself in the head and neck with an air rifle and then fired the fatal shot in the chest with a shotgun. Simultaneous or repeated gunshots may be combined with another suicide method (e.g. hanging, drowning, poisoning). According to some authors, suicides with two or more consecutive gunshots and those committed with two weapons are considered as special types of complex suicide [3, 25, 27].

In our case, the victim of the two-gun suicide had remained in his original sitting position on the sofa. Both the pistol and the revolver were found clutched in the respective firing hand with the right index finger touching the trigger. In 365 handgun suicides studied by Garavaglia and Talkington [9], the gun was still located in the hand in 25.7% of the cases. The chance of it staying in the deceased’s hand was greater, if the person was lying or sitting when firing the shot. It is therefore not surprising that the weapons may also be found in the victim’s hands in two-gun suicides, as already described by several authors [7, 10, 15, 20, 21].

The vertical flow pattern of blood on the man’s clothing corresponded with an unchanged sitting position. The radial aspects and the backs of both hands were spattered with blood. In suicidal contact wounds to the head and neck, the presence of high-velocity blood droplets (“backspatter”) on the shooter’s hand is a common finding [17, 19] with a frequency of about 32% when handguns are used [1]. According to Stone [33], in the majority of cases, backspatter droplets originating from suicidal entrance wounds are also to be expected on the outside or inside of the barrel and on other components of the weapon, such as the cylinder.

The wall behind the suicide’s seat showed two distinct areas with high-velocity blood-spatter patterns corresponding to the impact sites of the projectiles and consistent with their trajectories through the head, should the trunk have been in an upright position at the time of

**Table 3** Gunshot residue particles removed from the left hand by steel studs with adhesive surfaces and analysed by SEM–EDX as to the composition of elements (antimony Sb, barium Ba, lead Pb)

Left hand	Sb/Ba/Pb	Sb/Ba	Sb/Pb	Ba/Pb	Pb
Index finger	55	58	63	13	47
Anatomical snuffbox	8	31	19	3	23
Thumb	43	26	56	9	67
Back of the hand (metacarpals II–V)	1	4	1	0	10
Palm	6	24	6	3	5

The numbers indicate how many particles with the respective compositions could be detected in the different hand areas

discharge. In both areas, the bloodstain pattern was characterized by a mist-like dispersion of small droplets and the additional presence of some larger spots which were elongated relative to the respective angle of impact. As a whole, the appearance could be explained by forward spatter from two gunshot exit wounds [26].

On the basis of the autopsy findings, the conclusion could be drawn that two through-and-through gunshot injuries had been inflicted, i.e. a contact shot against the left temple and an intraoral shot. In the left temple region, the muzzle imprint mark located below the bullet entrance hole mirrored the front sight of the pistol. This means that the pistol had been held upside down. The laceration of the tongue, the luxation of tooth 41 and the corresponding lesion of the lower lip could be interpreted as recoil injuries caused by the front sight which had obviously pointed downwards at the moment of discharge.

The entrance and exit holes in the skull were cratered in the typical manner and associated with radial and circular fracture lines. The bullet track originating from the oral cavity involved a vital area (brain stem) belonging to the “structures of immediate incapacitation”. The shot to the left temple passed through central parts of both cerebral hemispheres and would have brought about the immediate loss of consciousness even without the additional intraoral shot.

The fired cartridge case from the revolver and the other case found on the couch table could be assigned to the respective handguns of the deceased by matching class and individual characteristics with those of control cases obtained by test shots. It could also be demonstrated by comparison microscopy that the .357 Magnum bullet in question had the same kind of markings as “control” bullets fired from the revolver. The strongly deformed jacket of the 9 mm bullet was only evaluable as to class characteristics which were compatible with the pistol’s rifling specifications.

The SEM–EDX analysis of the particulate matter deposited on the deceased’s hands revealed element compositions characteristic of GSR and a distribution pattern indicating that the weapons had been fired by the victim himself.

Summing up the results of all the investigations, a suicide committed by simultaneous self-infliction of two through-and-through gunshot injuries can be taken for granted. The victim’s left hand fired a pistol cal. 9 mm, whereas the right hand discharged a revolver .357 Magnum. Both weapons had been held upside down when shooting into the left temple and the mouth, respectively. The hands were found clutching the grip/butt with the right index finger touching the trigger. Both shots were accompanied by backspatter (blowback) on the shooter’s hands and the weapons as well as forward spatter with two distinct high-velocity bloodstain patterns on the wall behind the deceased.

As a sporting marksman, the suicide was not only entitled to own handguns, but was also familiar with the use

of these weapons. According to the suicide notes, it can be assumed that partnership problems were the man’s main motive for taking his own life. The blood ethanol concentration of 1.09 per mille indicated that he was under the disinhibiting influence of alcohol (so-called courage dose [11]). In the study material of Blumenthal [2], which comprised 406 suicidal gunshots to the head, a positive blood alcohol concentration (BAC) was seen in 40% of the cases.

## Conclusions

- The two-gun suicide described by us is characterized by a unique constellation of findings which has not been reported in forensic literature so far, i.e. two different kinds of weapon were used (pistol and revolver), the entrance sites of the bullets were the left temple and the mouth, both guns had been discharged in an upside-down position and afterwards they remained in the respective shooting hand.
- The interdisciplinary cooperation of police investigators, ballistic experts, crime lab representatives and forensic pathologists is an indispensable prerequisite for the comprehensive elucidation and reconstruction of uncommon gunshot fatalities.
- Former reviews of two-gun suicides need a supplementation, as they have considerably underestimated the real number of published cases.

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