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CASE REPORT

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Atypical gunshot entrance wound and extensive backspatter

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Abstract This case report describes a suicidal gunshot to the head using a solid hollow-point bullet (Quick Defense). There was an irregular skin defect measuring 16×6 cm on the right side of the head and a bone defect of 9×6 cm while a 1.2×0.7 cm skin defect was located at the left temple. This atypical wound morphology caused confusion at the scene but during autopsy, a muzzle imprint and an abrasion ring were found in the frontal aspect of the large skin defect in the right temporoparietal region, which therefore had to be the entrance wound. In addition, extensive backspatter consisting of brain tissue, bone fragments and blood had been expelled from the huge entrance wound and had travelled up to a distance of 4.6 m. The extraordinary entrance wound cannot be fully explained by special anatomical or ballistic features such as a muzzle velocity of 420 m/s or the solid hollow-point design of the bullet.

Key words Gunshot · Atypical wound · Backspatter · Quick Defense bullet · Suicide

Introduction

Atypical gunshot wounds can cause confusion [1, 3]. In particular, the number and direction of the shots, or the range of fire, can be unclear or misinterpreted. Atypical entrance wounds can be due to a number of anatomical and ballistic reasons, such as the presence of flat bone underneath the skin [6], a bullet contacting an intermediate target [8], or the use of a bullet smaller than the barrel of the weapon [10]. In certain cases, however, the reason for a peculiar entrance wound may not be clear. Publishing such cases may facilitate the future investigation of similar cases by other experts. A gunshot fatality from special handgun ammunition is therefore presented. A large quantity of backspatter was expelled over a remarkably long distance from an extraordinary entrance wound.

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Case report

Scene findings

A 40-year-old police officer announced his suicide during a telephone conversation with his girlfriend. She heard a gunshot over the telephone, after she had tried to deter him for 5 min. The body was found lying across the bed, the soles of the feet touching the ground. A service pistol (Sig-Sauer P6) was found between the legs on the mattress. The telephone receiver was jammed between the right arm and the body; the telephone itself was to the right of the body on a table. A star-shaped wound with a maximum diameter of 2.5 cm (Fig. 1) began 3 cm above the left ear and ended 5.5 cm

Fig. 1 Star-shaped wound in the left temporal region (exit)

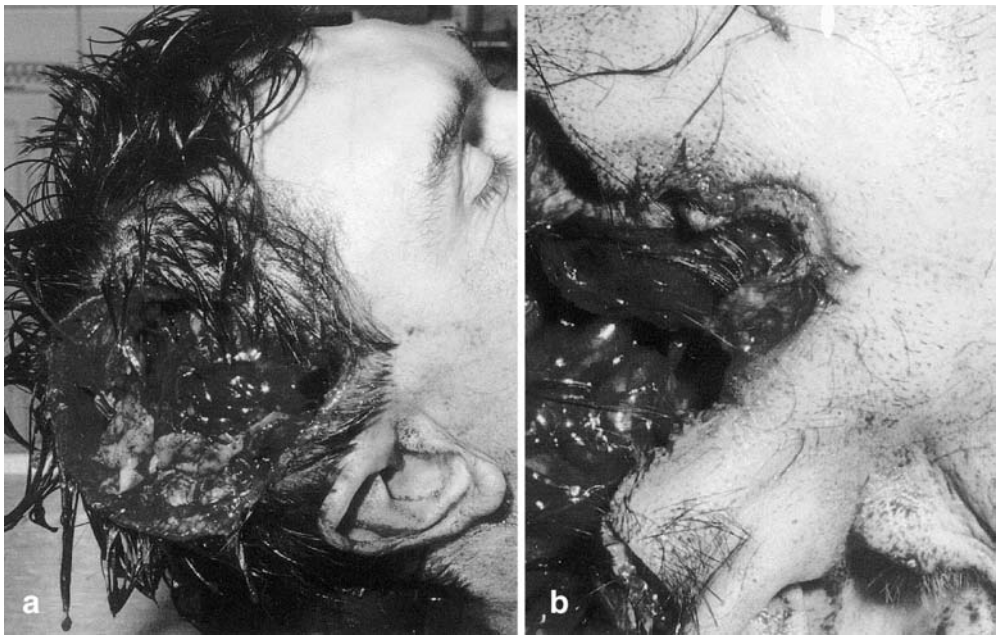

Fig. 2 **a** Large defect in the right temporal and vertex region (entrance), **b** after shaving the hair

above the left ear, and a large, gaping defect to the galea with protruding brain tissue was present in the right temporal and vertex region (Fig. 2a). The wall behind the head showed a large smear stain of blood and brain tissue. A pool of blood 40 cm in diameter and brain tissue, totalling about the size of a fist, were present on the floor behind the head.

The ceiling (height approx. 2.5 m) to the right of the body showed 5 elongated blood splashes 3–5 mm in diameter and 2 deposits of brain tissue, 5×2 cm and 3×1 cm in size. The right side of the posterior wall showed a total of 19 blood splashes (maximum diameter 9 mm) in an area of 2.5 m^2. Projected lines through the elongated bloodstains on this wall and the ceiling roughly converged in the region of the feet, however at a height of 1.5–1.8 m. Additionally, the posterior wall showed deposits of brain tissue at a height of 1.05–1.25 m. The wall to the right of the bed showed 9 circular to oval blood splashes with a diameter of 4–7 mm at a distance of 1.7 m from the body spread over a large area. The floor to the right of the bed was covered by further 9 fragments of brain tissue (diameter 2–6 cm), 7 fragments of the calvarium (diameters 2–4 cm) and 17 blood splashes.

An open door on the right side of the body led to the entrance hall. The opposing wall in the hall showed a large blood deposit (diameter 15 cm), including remnants of brain tissue, at a height of 90 cm, and located 3.9 m away from the feet of the corpse. A fragment of the calvarium, 7 cm in diameter, had ricocheted off this site on the wall, and was found together with brain tissue and blood deposits on the floor of the hall at a distance of 4.6 m from the feet.

The police officers at the scene concluded that the entrance wound was in the left temple and a large exit defect on the right. Thus, the gunshot would have had to be fired with the left hand, while the telephone receiver was in the right hand and the victim must have been standing in front of or sitting on the bed. However, no projectile was found to the right of the corpse.

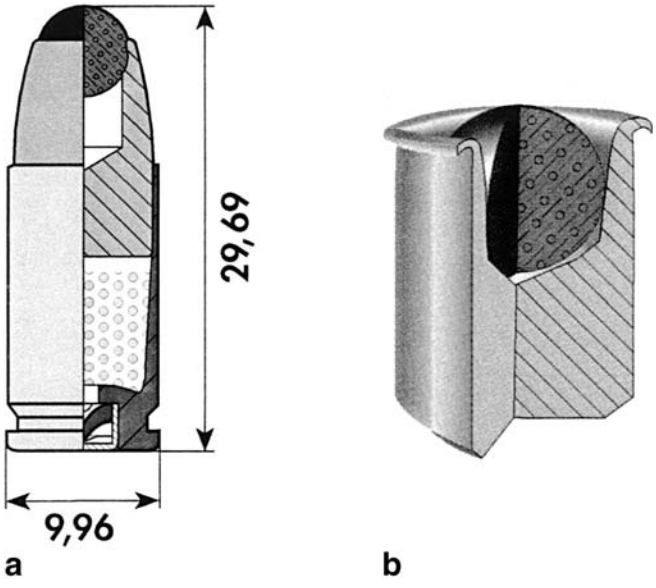

Fig. 3 **a** The Quick Defense bullet "Polizei-Einsatz-Patrone" QD-PEP, 9 mm x 19, Metallwerk Elisenhütte GmbH, Germany, **b** Deformed bullet after contact with gelatine. Figures from the MEN prospect 2001, page 5

Autopsy findings

The irregular galea defect with matching wound rims on the right side measured 16×6 cm**.** After shaving the hair, a muzzle imprint (25 mm in diameter), an abrasion rim and short radial skin tears were visible in the front margin of the defect (Fig. 2b). No soot cavity was present. The skull bone below the entrance wound was shattered and gaping over an area measuring 9×6 cm.

In the left temple, there were several short skin tears originating from a 7×12 mm defect (Fig. 1). No soot cavity or abrasion ring was present and the skull bone showed a circular defect, which broadened in a cone-shaped fashion towards the exterior. The defect in the tabula externa measured 20 mm in diameter compared to 16 mm in the tabula interna. Upon further preparation it was found that the whole vault had burst into fragments of various sizes and there were only remnants of brain tissue. The cause of death was extensive brain injury.

The blood ethanol concentration was 2.09 g/kg. Toxicological analyses showed no traces of legal or illegal drugs.

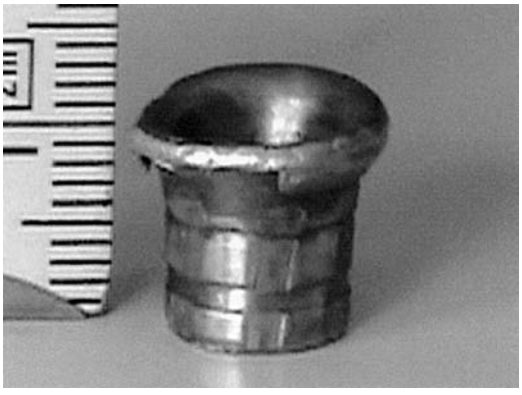

Fig. 4 The bullet found to the left side of the body with deformation comparable with the deformation after contact with gelatine (compare with Fig. 3b)

The bullet

The autopsy findings suggested a contact gunshot to the right temple. The bullet tract was strictly from right to left in the horizontal plane. This information directed the search for the missing bullet to the left side of the corpse, where a 9×19 mm Quick Defense bullet was subsequently found 2.3 m away from the body on the floor underneath a desk. This special solid hollow-point bullet (Metallwerk Elisenhütte GmbH, Germany, Fig. 3), issued to the Hessian Police Force, has a mass of 5.9 g and a muzzle velocity of approximately 420 m/s. The frontal cavity is filled with a plastic ball. The projectile recovered from the floor showed a deformation typical for contact with tissue or gelatine (Fig. 4).

Discussion

The irregular morphology and the large size of the defect in the right side of the head were atypical, and a large quantity of blood and tissue had been expelled to the right of the corpse. However, internal findings and the muzzle imprint left no doubt that this was the entrance wound, and definitely not the exit defect, as assumed by police officers at the scene. This was confirmed by the cone-shaped circular defect towards the exterior exit hole in the left temporal bone and the subsequent recovery of the bullet on the left side of the body.

It appears from the morphology of the skin defect that a more conventional contact entrance wound had resulted initially, including a muzzle imprint and short radial skin tears (Fig. 2b). The large opening to the back of the head may have been caused secondarily by expanding muzzle gases, by intracranial overpressure from temporary cavitation, by bone fragments accelerated backwards, or by a combination of these factors. The large skin burst was restricted to the upper and posterior quadrant of the entrance wound, whereas the bullet path was parallel to the frontal plane and the muzzle imprint was complete, thus excluding a tilted muzzle contact.

The magnitude of the directed expelling force responsible for the skin burst must have been extraordinary. Most of the bony cranium was shattered and there was a large bone defect underneath the entrance wound measuring 9×6 cm. The force inside the cranium was also sufficient to expel large amounts of brain tissue, bone fragments and blood. Some of this extensive backspatter travelled more than 4 m, which is a very long distance compared to experimental findings [2, 4] and case reports [11].

However, neither the direction nor the high magnitude of the expelling force can, in this case, be explained by special anatomical or ballistic features. The ballistic parameters of the bullet, including a muzzle velocity of 420 m/s, are not extraordinary. Conventional contact entrance wounds and less backspatter were caused by similar Action-1 bullets in experimental gunshots to the head [4, 5] and case histories from other high-powered solid hollow-point handgun bullets do not report such large skin burst and bone fractures or extensive backspatter [6, 7, 9].

Future gunshot injuries involving Quick Defense ammunition and experimental testing will show if this bullet has a tendency to create such atypical morphology or if the case reported remains an unexplained exception to the rule.

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