

CASE REPORT

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Gunshot Wound with Asphalt Related Pseudo-Soot, Pseudo-Tattooing, and Pseudo-Scorching

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ABSTRACT: Artifacts which mimic the tattooing and soot deposition of close range gunshot wounds have been described as "pseudo-soot" and "pseudo-tattooing." The origin of such findings includes glass, intermediate targets, insect bites, medical manipulation, graphite, and sutures. The authors present a case of pseudo-soot and pseudo-tattooing as a result of asphalt pavement, and describe the associated entity of pseudo-scorching.

KEYWORDS: pathology and biology, wound ballistics, ballistics, gunshot wounds, pseudo-soot, pseudo-tattooing, pseudo-scorching

In his textbook on gunshot wounds, DiMaio describes the entities of "pseudo-tattooing" and "pseudo-soot" [1]. Such findings mimic tattooing and soot deposition characteristic of close range gunshot wounds, but are due to other agents such as glass, insect bites, sutures, graphite, and asphalt pavement. The authors present a case which demonstrated both asphalt related pseudo-soot and pseudo-tattooing, and a feature we describe as pseudo-scorching. The forensic science import of these observations is discussed.

Case Report

A 42-year-old black male was shot in an ambush-type situation while driving a car. During the shooting, the car ran into a retaining wall and the driver exited the vehicle attempting to flee. He was gunned down and shot multiple times with .44-caliber ammunition and died from gunshot injuries to the head. His body ultimately came to rest on an asphalt road surface where he was pronounced dead at the scene.

At autopsy, the gunshot defect shown in Fig. 1a was observed on the left T-shirt sleeve. The T-shirt appeared to be somewhat burned and soiled with soot not only around the circumference of the hole, but on the crests of nearby folds in the shirt (see arrow, Fig. 1a). The skin itself showed changes which seemed indicative of soot deposition, marginal carboniza-

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FIG. 1(a)—Pseudo-soot, pseudo-tattooing, and pseudo-scorching of an exit wound which mimics a close range gunshot wound. Findings were a result of contact with asphalt pavement. Note apparent soot and scorching of shirt, including soot-like material on folds of shirt.

tion, and tattooing or stippling from gunpowder. Erythematous skin with denuded epidermis, typical of heat effect, was noted around the wound margins (Fig. 1b). There was also soot-like debris in the depths of the wound track. On the nearby posterior portion of the left shoulder was an ovoid gunshot wound with circumferential abrasion and no gunpowder residue on the surrounding skin, overlying clothing, or in the wound track.

The initial impression was one of a close range gunshot wound to the proximal left arm with a shored exit wound on the posterior shoulder. However, closer examination revealed a markedly flattened missile at some depth beneath the skin surface of the apparent entry wound, and closer inspection of the apparent soot on the shirt and skin demonstrated an appearance more typical of petroleum products and asphalt fragments. There were asphalt and pebble debris embedded in the deformed lead missile recovered from the wound track (Fig. 1c), and similar loose debris were found in the soft tissues of the wound track. The "tattooing" was more typical of "pebbling" associated with road surface injury (Fig. 1b), and the apparent erythematous and carbonized heat effect was also consistent with abrasion of epidermis discolored by petroleum products. In addition to the "pseudo-soot" and "pseudo-tattooing" associated with the wound, the authors chose to describe the apparent carbonization and erythema as "pseudo-scorching" since it mimicked the heat defects typically produced by the muzzle flame of close range gunshot wounds.

The scene was revisited, and on the asphalt road surface where the victim ultimately came to rest, the crater-like defect shown in Fig. 1d was noted. The size and shape of the defect was similar to that of the flattened missile retrieved from the arm. The base of the crater was scraped and examined under the stereomicroscope and showed tissue and fibers identical to those in the victim's T-shirt, confirming the defect's relationship to the gunshot wounds of the shoulder.



FIG. 1(b)—Same as 1a. Pseudo-soot, pseudo-scorching, and pseudo-tattooing of skin near exit wound.

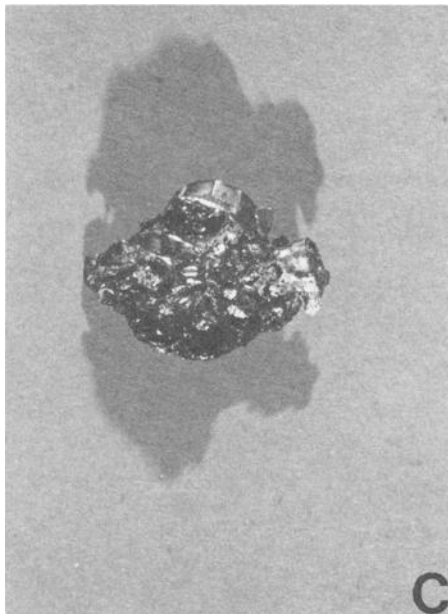


FIG. 1(c)—Same as 1a. Deformed missile impregnated with asphalt and pebble debris.

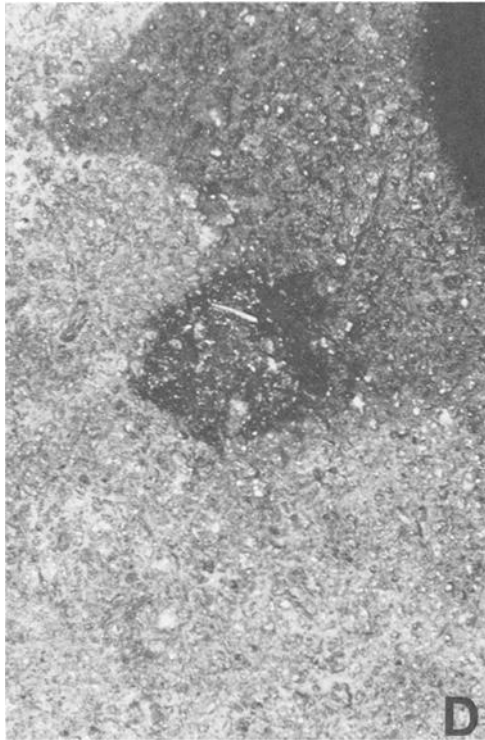


FIG. 1(d)—Same as 1a. Defect in road surface similar in size and shape to deformed missile.

The authors concluded that the actual entry wound was a distant-type wound on the posterior shoulder, initially considered as a possible shored exit wound. The pseudo-soot, pseudo-tattooing, and pseudo-scorching of the anterior wound were actually associated with a shored exit wound (that some would refer to as “incipient”) which occurred while the skin and shirt were in contact with, and were forced into the asphalt pavement. The “bounce-back” or recoil forces of the missile then carried asphalt products back into the wound track which was in intimate contact with the pavement.

Discussion

Misinterpretation of pseudo-soot, pseudo-tattooing, and pseudo-scorching could hamper investigation and adjudication by several mechanisms. First, angle reconstruction could be erroneous because of confusion between exit and entry wounds. Second, distance estimates for muzzle-to-target correlations would not only be incorrect, but inappropriate in the case of an exit wound. Third, confirmation or refutation of statements and witness accounts would be impossible because of inaccurate information concerning the true nature of injuries and circumstances. Finally, this case illustrates the potential hazard of rendering opinions based on photographs alone.

A helpful factor in evaluation of the present case was the finding of a missile in what appeared to be the entry wound end of a wound track which also had an exit wound, a finding which cannot simply be accepted without questioning and explanation. If it were not for the marked deformation of the missile, which probably served to promote its retention in the soft tissues of the wound track, the missile may have escaped from the wound and rendered interpretation far more difficult. Further, examination of apparent soot required

more than a cursory examination, using such techniques as magnification, solubility, chemical comparison techniques, microscopy, and most importantly, correlation with findings at the scene.

Conclusion

Whenever a gunshot wound initially appears to be of the close range or contact type, systematic examination is required to ascertain that observed changes are not due to intermediate targets, missile fragments, insect bites, medical manipulation, glass, pebbling, abrasion, graphite, asphalt products, or other agents described by DiMaio [1]. Pseudo-soot, pseudo-tattooing, and pseudo-scorching may be associated with either entry or exit wounds, depending on the circumstances under which the wounds were sustained and the events which followed.

Reference

- [1] DiMaio, V. J. M., *Gunshot Wounds: Practical Aspects of Firearms, Ballistics, and Forensic Techniques*, Elsevier, New York, 1985, pp. 84-88.

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