E26 "Comet-Tailing" Associated With an Intermediate-Range Gunshot Entrance Wound

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Learning Overview: After attending this presentation, attendees will be more cognizant of the fact that, in certain instances involving susceptible ammunition, gunshot entrance wounds may display an associated "comet-tailing" pattern of vaporous lead/soot. This report will alert police, death investigators, forensic pathologists, and others of this rare but classic-appearing lesion.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by highlighting a multiple gunshot wound homicide case in which one of the entrance wounds had associated "comet-tailing."

Projectiles can be completely composed of lead or contain a lead core covered by a partial or full "jacket" of metal. Bullets are jacketed in part to prevent fouling of the weapon's barrel while being fired. Metal bullet coverings can range from fully jacketed to "gilded." Jacketed bullets have a relatively thick metal (usually copper, sometimes other metals) covering, while many .22 caliber rounds are "gilded" or "washed" with a copper-colored coating that appears to be sprayed onto the bullet surface. "Plated" or "electroplated" bullets can be considered "in-between" gilded and traditionally jacketed bullets. The metal covering of plated bullets is not as thick as the metal on classic jacketed bullets, but it is thicker than the light "wash" present on gilded bullets. Because this coating is thinner than classic jacket material, the thinner metal plating can, in some instances, fracture while being fired.[1,2] A homicidal gunshot wound demonstrating an unusual feature associated with a fractured plated bullet known as "comet-tailing" is presented.

A 23-year-old male was shot outside of his father's house after visiting family. His wife, who was inside the residence at the time of the shooting, described hearing five to ten shots. The male was found by the driver's side tire in front of his vehicle. Police and Emergency Medical Services (EMS) were called. Police found five 9mm casings and a fragmented bullet at the scene. EMS attempted resuscitation but was unsuccessful. At the medicolegal autopsy, the examination of the body was most significant for multiple gunshot wounds, predominantly of the head and neck. A perforating intermediate-range gunshot wound of the right side of the face had a very unusual feature, characterized by a dense area of soot-like material spiraling in a counter-clockwise direction, outward from the entrance defect, with a greatest dimension of approximately twice the diameter of the entrance wound. Although not previously described in the forensic pathology literature, the finding is nearly identical to what has been previously described in the firearms literature as "comet-tailing."

"Comet-tailing" is an effect that can occur with certain bullets, usually those that are electroplated or plated.[1] This unusual effect occurs when a plated bullet's electroplating material fractures upon firing.[1,2] Vaporous lead (presumably from the energy/heat caused by the firing of the projectile) escapes through the fracture site of the plating material.[1] Since the bullet is spinning along its longitudinal axis as it flies through the air, the vaporous lead stream spins as well. Thus, when the bullet enters the target, a spiral-shaped, so-called "comet tail" deposition of vaporous lead can appear on the surface surrounding the entrance site.[2] It has been suggested that in addition to the susceptibility of plated bullets to fracture when fired, features of the firearm itself, such as a flaw in the barrel, may predispose to fracturing of the electroplated covering of these bullets.[1] In the presented case, the entrance wound associated with "comet-tailing" was an intermediate-range shot, with an estimated distance of one to three feet. This case serves to alert police, death investigators, and forensic pathologists of this unusual feature that may be seen in certain cases of gunshot wounds wherein plated bullets fracture when fired from a weapon.

Reference(s):

1. Spinder T., Allen S.B., Engel D. Comet tailing. *AFTE Journal*. 2001;33(4) 336-337.
2. Prahlow J.A., Allen S.B., Spinder T., Poole R.A. Psuedo-gunpowder stippling casued by fragmentation of a plated bullet. *Am J Forensic Med Path*. 2003;24(3):243-247.

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