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## Terminal Ballistic Characteristics of Hydra-Shok® Ammunition: A Description of Three Cases

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**REFERENCE:** Sperry, K. and Sweeney, E. S., "Terminal Ballistic Characteristics of Hydra-Shok® Ammunition: A Description of Three Cases," *Journal of Forensic Sciences*, JFSCA, Vol. 33, No. 1, Jan. 1988, pp. 42-48.

**ABSTRACT:** The Hydra-Shok® bullet is characterized by a hollow-point construction, with a distinctive central post in the base of the hollow. These features allow such missiles to be easily identified during the course of an autopsy examination of a gunshot victim. Higher velocity loadings of the Hydra-Shok may fragment along the wound path, occasionally forming a ring-like fragment that suggests this ammunition, but this feature cannot be considered unique. Although radiographic examination is helpful in bullet localization, the characteristic central post may be identified by X-ray only if sufficient expansion results in its exposure. Three cases of shooting deaths involving Hydra-Shok bullets are presented and discussed; in each case, the entrance wounds were indistinguishable from entrances associated with conventional ammunition, and in no instance did the missiles exit from the body (including head, chest, and abdominal wounds). Familiarity with relatively unusual ammunition types such as the Hydra-Shok allows for quick identification by the pathologist at the time of autopsy.

**KEYWORDS:** pathology and biology, ballistics, wound ballistics

In the past decade, a great deal of attention has been focused on the development of handgun ammunition with specific designs or features that enhance internal soft tissue and organ disruption, which is generally equated with increased incapacitation of an adversary. An extensive study by the Federal Government of a wide variety of ammunition calibers, manufacture, and projectile configurations, utilizing a computer generated human anatomic model, resulted in the accumulation of a large mass of data that suggest the superiority of certain types over others [1]. However, the conclusions of this study are frequently disputed, if for no other reason than that it is well known in forensic pathology that individuals may sustain extremely severe, inarguably fatal gunshot wounds, yet be able to engage in a variety of strenuous activities before their eventual collapse [2,3].

Under the guise of increasing law enforcement effectiveness, as well as the implication of enhanced protection in the so-called "home defense" situation, new, specialized projectiles and cartridges have been designed, manufactured, and widely marketed. It is inevitable that shootings occur with unusual ammunition, and a pathologist must be familiar with such new and frequently distinctive projectiles to be able to identify them if encountered in the course of an autopsy of a shooting victim. Many such missiles have unique or characteristic fea-

Received for publication 26 March 1987; revised manuscript received 12 May 1987; accepted for publication 13 May 1987.

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tures, either on radiologic or direct examination. The majority of unusual ammunition types have a relatively limited commercial distribution and significantly higher price, as compared with conventional ammunition, and if a unique or uncommon missile is identified by a pathologist, this may provide quick assistance to law enforcement personnel in locating the place of purchase and tracing the buyer.

An example of a recently developed projectile with characteristic features is the Hydra-Shok®. Upon superficial examination, the Hydra-Shok cartridge appears identical to standard semijacketed or nonjacketed hollow point ammunition. However, closer inspection reveals two apparent differences. First, the base of the cartridge is marked with the tradename, "Hydra-Shok." Second and most important, the bullet is manufactured with a central post, which arises from the base of the hollow cavity, and is centrally placed (Figs. 1 and 2). The post may be conical or cylindrical and provides an easy means of recognition for the pathologist. The function of the post is primarily directed toward diversion of hydrostatic pressures laterally as the bullet passes through soft tissues, thus accentuating the expansion of the missile by virtue of acute flaring of the projectile rim (Fig. 3). The overall effect of this

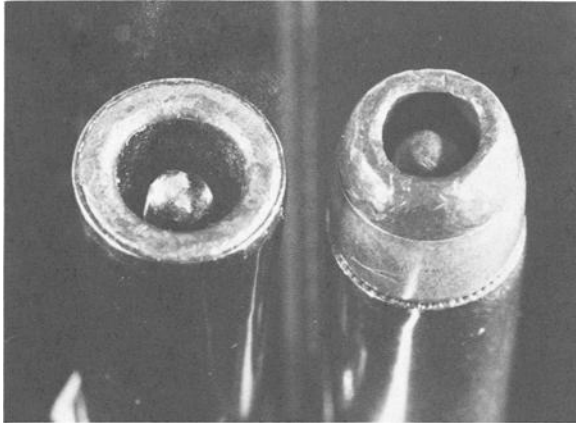


FIG. 1—Unfired Hydra-Shok cartridges in the solid lead, flush-mounted .38 caliber (left) and the semijacketed .357 Magnum caliber (right). Note the distinctive central post arising from the base of the hollow cavity.

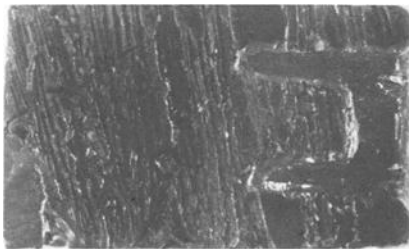


FIG. 2—Cross-sectional view of a .38 caliber, solid lead Hydra-Shok bullet, showing the central post, and the relatively thin peripheral rim that extends beyond the tip of the post.

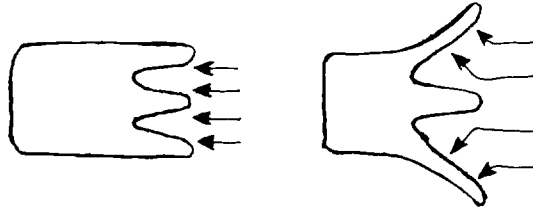


FIG. 3—Diagrammatic representation of the lateral dispersal of hydrostatic forces as a Hydra-Shok bullet penetrates soft tissue. The central post deflects these forces peripherally, with resultant expansion of the thin outer rim of the missile.

design is meant to be a larger-diameter increase after penetration (“mushroom”) than standard hollow-point ammunition, implying more acute kinetic energy dispersion, and thus increased tissue disruption, culminating (it is hoped) in greater incapacitation (with the necessary assumption that these effects are truly interrelated and sequential).

Since 1979 there have been three shooting deaths in the State of New Mexico where Hydra-Shok ammunition has been utilized. In each of these cases this ammunition was readily identified on gross examination of the projectiles (and once through radiologic features).

### Case Reports

#### Case 1

A 49-year-old white female was found in an advanced state of decomposition, lying upon the front seat of her automobile, which was parked in an airport parking lot. Examination of the body revealed three entrance gunshot wounds involving the right chest, without exit wounds. These were confirmed radiographically. At the autopsy, three solid lead, nonjacketed .38 caliber Hydra-Shok projectiles were removed; all had the distinct central post, which remained undeformed despite varying degrees of expansion flaring of the rim from missile to missile (Fig. 4). On the X-ray, the protruding tip of the post was readily identifiable in one of the missiles, but was obscured in the other two bullets either by virtue of position relative to the angle of radiographic exposure, or because of minimal flaring of the missile rim (Fig. 5).

Internally, bullet tracks involved the right chest wall, right lung, liver, mesentery, stomach, and mesocolon. Two of the projectiles struck the vertebral column, one perforating the sixth thoracic vertebra, and the other penetrating the second lumbar vertebra. The third

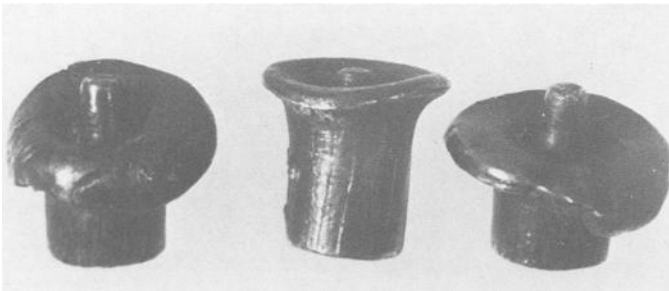


FIG. 4—Case 1: Three variably mushroomed .38 caliber solid lead Hydra-Shok bullets removed at autopsy. The central post remains virtually undeformed in all three projectiles.

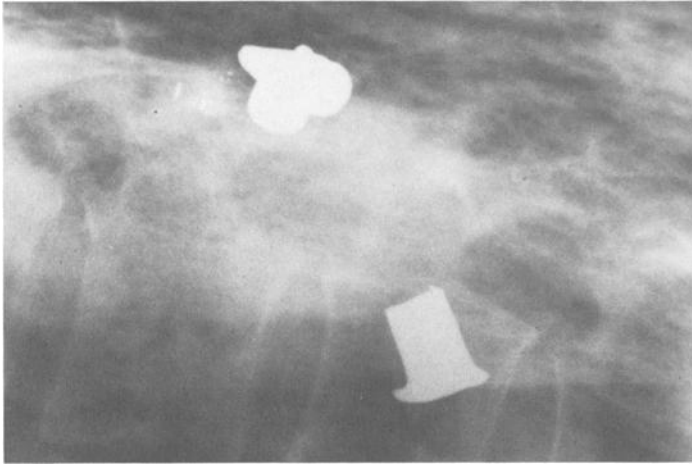


FIG. 5—Case 1: Autopsy radiograph, revealing two of the three missiles. The rim of the upper bullet has opened sufficiently to expose the central post (this is the bullet in the far right of Fig. 4). In contrast, the lower projectile is within the second lumbar vertebra, but has mushroomed only minimally, to a degree insufficient to expose the post.

bullet fractured the right fifth and sixth ribs, injuring no other bony structures; interestingly, this missile was greatly mushroomed, to a degree similar to the bullet that went through the thoracic vertebra, while the bullet that penetrated the second lumbar vertebra was only minimally expanded. Although multiple internal organs were involved, the degree of injury to each organ was not appreciably more extensive than that of comparable wounds sustained with standard solid or hollow point .38 caliber ammunition.

### Case 2

A 27-year-old white male was found in a room within his house, following an argument with his wife, dead of a contact gunshot wound which entered the right temple region. The wound exhibited the typical circumscribing barrel abrasion and peripheral extension tears of a contact wound (Fig. 6). A .357 Magnum revolver was near his right side, and an expended Hydra-Shok casing was under the hammer. Other Hydra-Shok cartridges of .357 Magnum caliber, semijacketed, were on a nearby table.

At the autopsy examination, multiple fragments of lead projectile and copper jacket were removed from the brain. No exit wound was present. Multiple fractures radiated from the inwardly beveled entrance defect. The largest lead fragment had the heavily deformed remnant of a central post, and one other lead fragment was in the shape of a ring (Fig. 7).

### Case 3

A 28-year-old white male was found in the drained remnants of his waterbed, the victim of 7 gunshot wounds involving the head, chest, and abdomen. The wounds had been sustained at contact range, through a thick, quilted bedspread, and all but two had exited. The entrance wounds associated with the two bullets that remained in the body were located in the right abdomen and were similar, with large circumscribing abrasions and heavy peripheral soot deposition as a consequence of the thick, intervening quilt. An X-ray revealed two minimally deformed projectiles in the lumbar and pelvic regions, without specific distinctive characteristics. After removal, the missile corresponding to the superior most of the two



FIG. 6—Case 2: Contact entrance wound, right temple, with characteristic muzzle abrasion and three small radiating extension tears of variable lengths.



FIG. 7—Case 2: Fragments of .357 Magnum recovered from brain. The post is identifiable only as a small remnant in the middle of the centermost fragment. The rim of the missile has separated as a single ring-like piece (right).

entrance wounds was identified as a minimally deformed, nonjacketed .38 caliber Hydra-Shok, and the missile from the inferior most wound was a nonjacketed semi-wadcutter slug.

The Hydra-Shok bullet track coursed through the right thoracic cavity, perforating the margin of the lower lobe of the lung, and subsequently passed through the right hepatic lobe, right colon, right kidney, and was recovered beneath the skin of the back. Notably, the defect in the liver was stellate and fragmented in character, with the radiating parenchymal lacerations measuring to a maximum diameter of 15 cm. No bony injuries were associated with the Hydra-Shok track. None of the missiles that exited the body at the scene were of the Hydra-Shok type.

### Discussion

One feature of each of the three previously delineated cases was that the Hydra-Shok missiles remained within the body without exiting. Although this may be the result of increased expansion of the missile, thus decelerating the projectile inside the body, it is clear that there was extremely variable degree of mushrooming from missile to missile, which seemed independent of whether or not the bullets struck bone. It is more probable that the failure to pass completely through any of the victims was a consequence of a lower muzzle velocity with .38-caliber gunpowder loads, with a concomitant decreased kinetic energy. In the third described case, the bullet was recovered just under the skin of the back, having come very near to exiting the body. The relative deeper penetration most likely was achieved through the contact nature of the wound. This may also explain the severe damage to the liver that was observed during the autopsy, since this bullet was the least deformed of all those examined as a part of this study.

The higher velocity .357 Magnum cartridge used in the suicidal gunshot wound of the head exhibited a relatively uncommon fragmentation pattern, that of "ringing," where the rim of the hollow projectile peels back more or less uniformly, finally separating from the central core, forming a doughnut-shaped fragment. This has been seen in ballistic gelatin tests of the semijacketed form of the Hydra-Shok missile and may serve as a characteristic that suggests the use of Hydra-Shok ammunition, although it is possible for standard hollow-point ammunition to fragment in this way [4]. The central post was nearly obliterated in the suicidal shooting, most probably from direct impact against the bony tables of the calvarium. As the ring formation of the missile fragment cannot be regarded as absolutely specific of the Hydra-Shok, the severe deformation of the central post made confirmation of the missile type somewhat difficult. Fortunately, a careful examination of the handgun utilized in the shooting revealed an expended Hydra-Shok casing. This underscores the importance of a careful inspection of the weapon, if it is available.

The intact projectiles were easily identified after their removal from each of the shooting victims as previously described. Radiographic examination, which should be performed as a part of all gunshot autopsy evaluations, was certainly helpful in missile localization, but did not greatly assist in the exact identification of the missile type, except in one instance where there was enough expansion of the Hydra-Shok rim to expose the protruding central post. In contrast, there were no characteristics of the entrance wounds which differentiated Hydra-Shok missiles from any other conventional ammunition. Likewise, the patterns of internal injury were not significantly different from wounds sustained with the usually encountered solid lead, semijacketed, or fully jacketed types.

### Conclusion

The Hydra-Shok round has a distinctively structured missile composed of a hollow-point bullet with a centrally located metal post. The bullet may be either solid lead (as a .38 caliber, flush mounted cartridge), or semijacketed (commercially available in .38, .357 Mag-

num, .45 automatic, and .44 Magnum chamberings, in a variety of powder loads). The relatively low-velocity solid lead projectile remains intact within a body, and may open up (flare or mushroom) to a varying degree. At higher velocities the semijacketed form may break up, sometimes forming a ring-like fragment when the missile rim separates from the central body as one piece. If severe fragmentation is present in a gunshot victim, this ring may suggest a Hydra-Shok, although such a finding is not completely specific in the absence of an identifiable central post. Based upon three described Hydra-Shok shootings, we suggest that the missile has a low propensity for exit from a body, at least in .38 and .357 Magnum calibers; no shootings with larger caliber Hydra-Shoks have been described to date. The primary feature of the central post should serve as an easily recognizable characteristic for the pathologist who removes such a missile (or its fragments) from a shooting victim during the course of an autopsy.

#### *Acknowledgments*

The authors wish to thank Linda Ham for her assistance in manuscript preparation.

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