

Findings in Gunshot Wounds from Tandem Projectiles*

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ABSTRACT: Tandem projectiles are unusual events which can cause erroneous case interpretations if one is unfamiliar with them. This paper presents two such cases. The first case involved three .32 caliber bullets, two of which became lodged in a revolver barrel because of faulty ammunition. A third fired bullet subsequently pushed itself and the lodged bullets out of the barrel resulting in a single entrance wound with three bullets in the body. The second case involved a 20 gauge shotgun shell which apparently was inadvertently loaded into a 12 gauge shotgun. This resulted in an unusual entrance wound and unusual X-rays with fragments of the 20 gauge shotgun shell, as well as 12 gauge shotgun shell wadding, being removed from the same wound. The pertinent findings in such cases are discussed so that they may be correctly identified when they occur.

KEYWORDS: forensic science, forensic pathology, shooting tandem bullets, piggyback bullets, accessory projectiles

Rarely situations arise which lead to multiple projectiles being discharged out of a gun barrel at the same time from a single pull of the trigger (1,2). Such tandem projectiles can cause unusual gunshot wounds, including having multiple projectiles associated with a single entrance defect and/or unusual skin wounding patterns. This paper describes two different cases and reviews the literature with regard to the typical findings in such cases which permit their recognition and correct interpretation.

Case 1

An elderly man with a history of depression because of multiple health problems was found lying in the hallway of his home by his wife. His Smith & Wesson .32 long caliber revolver was beside him. Subsequent external examination revealed two contact gunshot wounds to the head. X-ray examination, however, revealed four bullets, three of which were in an essentially horizontal linear arrangement (Fig. 1). The fatal entrance wound measured .4 cm (.15 in) and was located superior and slightly anterior to the right ear. The associated wound track perforated both cerebral hemispheres with a single .32 caliber round nose lead bullet being recovered under the calvarium on the left. The other gunshot wound was located posterior and slightly superior to the lateral canthus of the right eye in the temple region (Fig. 2). It measured .8 by .6 cm (.3 by .25 in.). There was no grossly appreciable significant

difference in the amount of gunpowder residue associated with either entrance wound. This other wound was a nonfatal wound which only penetrated the right eye orbit. Along the wound track there were three .32 caliber lead round nose bullets located in the eye orbit itself, in the bony defect in the lateral orbital wall, and subcutaneously, respectively. Two of the bullets had deep indentations in their bases into which a corresponding bullet nose would neatly fit (Fig. 3). The third bullet in contrast had a relatively flat base. Examination of the revolver revealed a six shot cylinder which contained four Remington Peters brand Smith & Wesson expended cartridges and two unexpended similar cartridges without firing pin impressions. Subsequent examination of the unexpended cartridges revealed gross changes in the gunpowder felt to be consistent with oil infiltration.

Case 2

The second case involved an adult male who sustained six shotgun wounds. The shooting took place at night in a disorderly house without utilities lit only by a single dim kerosene lamp. Recovered at the scene were four red 12-gauge-expended shotgun shells, three of which were labeled #7-1/2 shot, and one of which was labeled #6 shot. Subsequent X-ray examination of the decedent's wounds revealed that one of them contained irregular larger radiopaque objects in addition to the expected birdshot pellets (Fig. 4). This wound was located in the anterior lower right thigh and consisted of a 5.8 by 4.3 cm (2.3 by 1.7 in.) oval skin defect (Fig. 5). Around the wound border inferiorly and medially, there was an approximate 1.3 cm (.5 in.) rim of widely scattered satellite pellet wounds with there otherwise being a 5.1 by 3.8 cm (2 by 1.5 in.) area along the superior-lateral border of the wound which contained widely scattered satellite pellet wounds. Also present centered approximately 5.1 cm (2 in.) above the superior border of the main entrance defect was a 7.6 by 3.8 cm (3 by 1.5 in.) area on the skin containing several .25 to .5 cm (.1 to .2 in.) abrasion foci. No soot or gunpowder was appreciated. The wound was not covered by clothing. Internal examination revealed an inferiorly directed wound track within which were fragments of a 20 gauge shotgun shell. These fragments included the head of the shell which had its outer rim bent backward relative to the central portion in a concave fashion. Also recovered in this wound track was shotgun shell wadding consistent with a 12 gauge shell as well as #6 shot (Fig. 6). A second wound (Fig. 7), which was located in the region of the lateral left antecubital fossa, contained a crumpled 2.3 by 1.5 by .5 cm (.9 by .6 by .2 in.) plastic yellow apparent shotgun shell fragment. This skin entrance wound measured 10.2 by 6.4 cm (4 by 2.5 in.). It was not covered by clothing and had associated gunpowder stippling. There were no satellite pellet defects or unusual skin markings present. Associated with this skin wound there was a partially perforating inferiorly directed

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FIG. 1—X-ray from case 1 showing three adjacent tandem bullets and fourth (fatal) bullet.

wound track through the forearm, fracturing the ulnar and radial bones. No other foreign material was recovered within this wound except for #7-1/2 shot. A 12 gauge shotgun shell wadding was however recovered on the floor adjacent to the decedent's arm. Unfortunately, this case is still unsolved and the weapon has never been recovered.

Results and Discussion

The presence of tandem projectiles can cause obvious problems in case interpretation if one is not aware of the phenomenon. In the first case presented, the presence of four bullets within the head on X-ray examination of a reported suicide victim originally was viewed as being suspicious for homicide. However, further reflection led to the realization that it would be unusual for an assailant to fire three separate individual rounds all through a single .8 by .6 cm entrance defect. Thus, the presence of these projectiles associated with a single contact entrance wound lead to a preliminary diagnosis of tandem projectiles before the internal autopsy examination was begun. However, with enough muzzle to target distance tandem projectiles potentially could separate in flight resulting in multiple entrance wounds (3). Such entrance wounds may be larger and/or more irregular than usual as tandem projectiles could be relatively unstable projectiles in flight. Because such projectiles, however, would be coming out of a rifled barrel, this would not necessarily be so with the tandem projectiles at least potentially being capable of causing relatively regular entrance wounds. Therefore, examination of the bullets is important. The

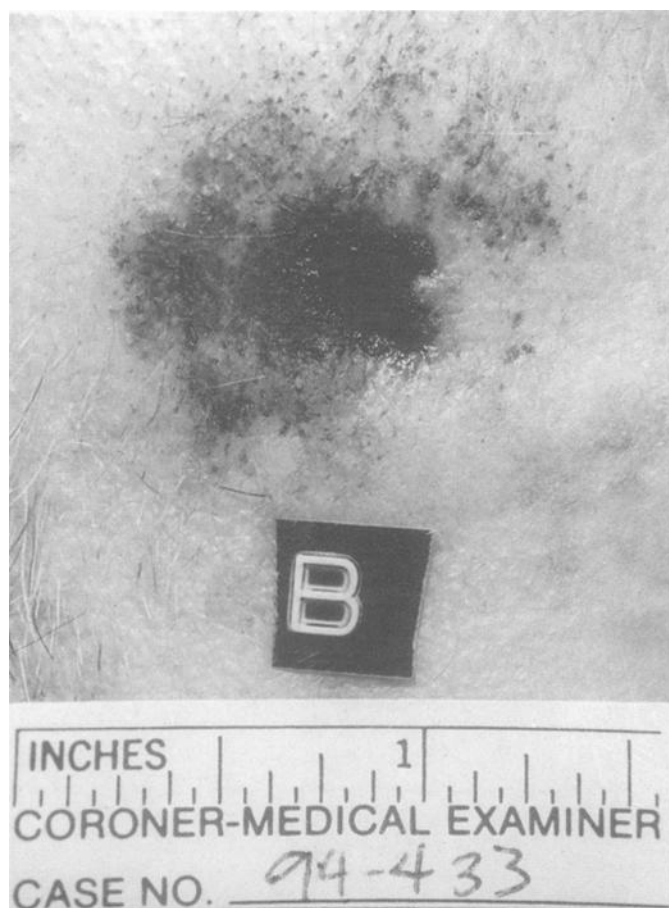


FIG. 2—Entrance wound of tandem bullets from case 1.



FIG. 3—Case 1 tandem bullets placed nose to base in order.

typical finding is that of an indentation in the base of the struck bullet into which the nose of the striking bullet neatly fits (2,4). This finding can easily be appreciated at the time of autopsy (Fig. 3), helping to confirm that one is dealing with tandem projectiles. Another potential finding, as reported by Sinha and Bhattacharyya (3), is the presence of striations in the base of the struck bullet caused by the nose of the striking bullet. This, however, was not observed in this case.

Useful information may also be obtained by examination of the gun and the cartridges. The expended cartridges associated with tandem projectiles may be expanded because of increased pressure due to barrel occlusion by the lodged projectile(s). This expansion may be such that the cartridges are difficult to extract from the gun (4). Similarly, increased barrel pressure may cause barrel

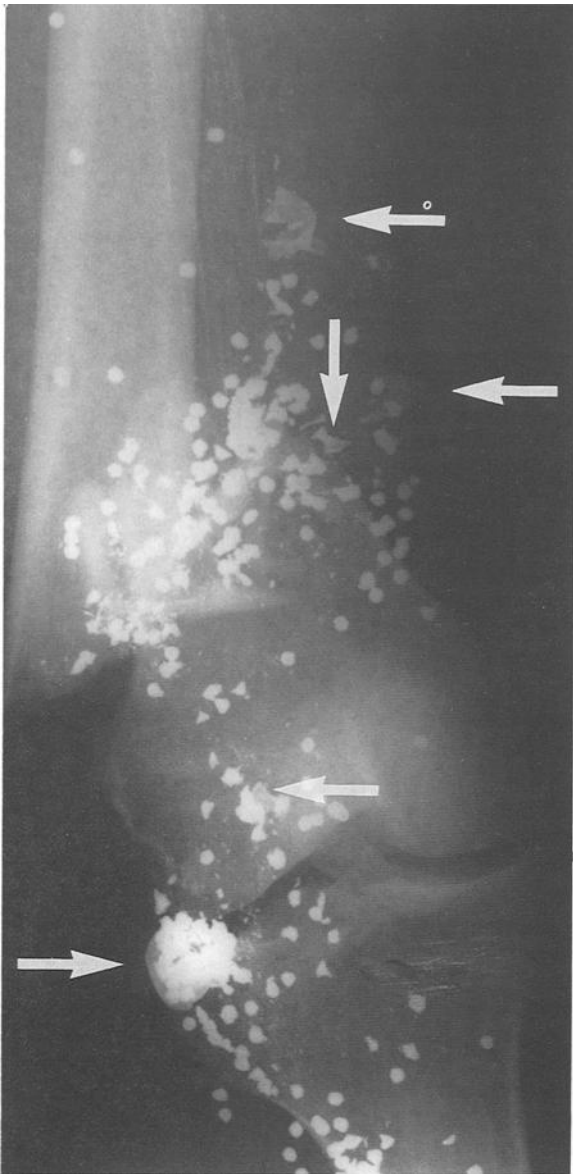


FIG. 4—X-ray from thigh wound from case 2 showing larger, irregular metallic fragments of shotgun shell head (arrows) in addition to birdshot.



FIG. 5—Thigh entrance wound from case 2.

swelling or rupture. However, in this particular case, neither of these scenarios occurred. This may have been due to the revolver cylinder gap which helped relieve some pressure, faulty gunpowder which did not build up normal pressures, the actual construction of the cartridges and/or gun themselves, or some combination of these factors. Examination of the gun in this particular case was still rewarding because of the presence of the two unexpended cartridges. Disassembly of these two cartridges revealed abnormal appearing shiny clumped gunpowder grossly suggestive of oil infiltration. Such oil infiltration can cause a misfire and subsequent failure of the bullet to completely exit the barrel. Other possible causes of such a misfire include insufficient gunpowder present in the cartridge or a chemical breakdown of the gunpowder due to age or heat (5).

The second case differed from the first in that it involved not a bullet but an entire shotgun shell. What apparently happened in this case was that a 20 gauge shotgun shell was inadvertently loaded into a 12 gauge shotgun. Because the rim diameter of a

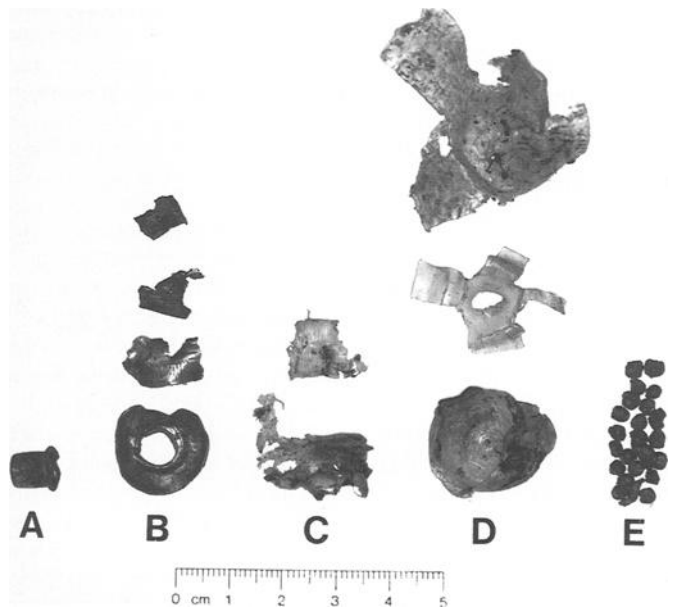


FIG. 6—Material recovered from thigh wound from case 2. Column A, battery cup; column B, metallic fragments of head of shell; column C, yellow plastic fragments of the body of the shell; column D, 12 gauge shotgun shell wadding; column E, representative sample of #6 shot.



FIG. 7—Arm wound from case 2.

20 gauge shell is approximately .3 cm less than that of a 12 gauge shell (approximately 2.2 cm versus 1.9 cm), the entire 20 gauge shell can slide out of the chamber and down the barrel until it becomes lodged as the barrel tapers to its bore diameter. The bodies of shotgun shells are generally color coded to help prevent such misloadings with 20 gauge shells typically being yellow and 12 gauge shells red. This same color coding can also be useful in case interpretation at the time of autopsy if parts of the body of the shotgun shell are removed from the wound, as happened in this case. In this case, not all of the shell was recovered within the wound as the shell fragmented. Some of these shell fragments may have deviated out of the main pattern and impacted the skin as evidenced by the .25 to .5 cm abrasion foci superior to the main entrance defect on the leg. Such small abrasion foci are not typical in shotgun wounds, providing an early clue when the wound was first observed that the lesion was atypical.

The presence of an additional small plastic fragment of the shotgun shell body in a separate shotgun wound in the left arm could not be definitively explained with interpretation efforts being hampered by not having the actual shotgun available or a firsthand

history of the incident. One possibility would be that the 20 gauge shell fragmented as it was hit and expelled out of the gun barrel with this single piece flying out of the pattern as a "flier" that happened to go into the left arm shotgun wound. Although the arm shotgun wound was a partially perforating wound, the two wounds could not have been caused by a single shot perforating the arm and then continuing on to penetrate the thigh as evidenced by the thigh wound consisting of a central defect with a relatively narrow rim of satellite pellet defects. Additionally, the arm wound contained #7-1/2 shot whereas the thigh wound contained #6 shot. Another possibility is that when the 20 gauge shell was hit by the 12 gauge round in the gun barrel, the 20 gauge shell fragmented and the 12 gauge pattern was disrupted such that one piece of the 20 gauge shell was not expelled at that time. This piece could have subsequently been expelled by another 12 gauge round and thus came to be found in the decedent's arm. Such an occurrence may have been facilitated by barrel swelling/partial rupture which could have increased the diameter of the barrel. Of note, blood was found at the scene on an outside doorknob leading out of the residence. This blood was type B whereas the decedent's blood was type O. This at least raises the possibility of a barrel failure which subsequently cut the offender's hand. Unfortunately, because the case has not been solved and no gun has been recovered, it could not be determined which, if any, of these scenarios actually occurred.

Conclusions

Two cases of tandem projectiles are presented. In the first case, understanding the phenomenon of tandem projectiles was important in preventing the misinterpretation of the autopsy findings as being those of a homicide. In the second case, understanding tandem projectiles helped explain the unusual autopsy findings and possibly explained the different blood types found at the scene.

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