

## Shotgun Wounds: Multiple Probes and Shielding Effects as Adjuncts to Determining Position of the Deceased at Time of Injury

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**ABSTRACT:** Careful and meticulous probing of sites of individual pellet injuries in distant shotgun wounds with repositioning of the body to allow parallel alignment of pellet tracts makes possible the determination of the position of a deceased at time of injury. Spared areas, or "gaps," within the pattern may result from shielding either by body parts or by an intermediate object. The present case reports illustrate the method and its importance.

**KEY WORDS:** pathology and biology, gunshot wounds, wound ballistics

The wound patterns of near shotgun injuries depend on the complex interplay of primer, powder, wadding, pellets, crimp, casing, and reloading pressures that varies among different makes, actions, and chokes of shotguns [1-4]. This multiplicity of variables necessitates test firing equivalent "shotshells" with the shotgun in question to obtain reliable ballistics data applicable to the wound being studied [5,6]. Breiteneker and Senior [6,7] have demonstrated the tendency of a bolus of shot to disperse as it strikes an intermediary interface. This effect has been attributed to the collision of energized pellets within the bolus upon primary impact [1]. There is no evidence that a similar dispersion occurs after an individual shot has separated from that bolus [6]. Our cases with numerous parallel pellet tracts are in agreement with the latter contention.

The cases to be presented graphically demonstrate that precise information may be obtained from distant wounds by using multiple probes and considering shielding effects to determine the position of the decedent at the time of injury. These methods of analyzing distant wounds have not heretofore been described.

In the past, distant wounds have not been evaluated with the same degree of enthusiasm as near wounds because they did not allow extrapolation of ballistics data such as stippling patterns, soot patterns, and wound size for precise range determination. Mattoo and Nabar [8] have estimated ranges based on "effective dispersion" of 000 buckshot in a single weapon. Most forensic pathologists will agree that precise range estimations in

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distant wounds are impractical because of the number of variables introduced with different shotshells and weapons coupled with differences based on which part of the pellet pattern strikes the individual. The present cases illustrate how valuable information unrelated to range determinations may be obtained in distant shotgun wounds.

### Case 1

A 26-year-old white male reportedly drank liquor with two friends for almost an entire afternoon. The friends reportedly went to a house trailer to pick up a truck at which time an argument ensued that resulted in a scuffle. The deceased then reportedly threatened one friend, stating that he was going back to his house to get a rifle. When the friend saw the deceased return, he stated that he thought the deceased had a rifle at which time he stepped out of the trailer with a 12-gauge shotgun and fired a shot from a range of approximately 32 m (35 yards). When the ambulance and police arrived, the decedent was still alive although he died en route to a local hospital.

Autopsy revealed a well-developed white male wearing only a pair of cutoff blue jeans and a pair of white brief underpants. No pellet wounds, powder stippling, or soot was noted on the clothing although drops of red staining material consistent with blood were present on the lower, anterior aspects of the trouser legs. No X-rays were taken. Toxicological examination revealed a negative drug screen on the urine. A blood ethanol concentration of 96 mg/dL was present.

External examination showed numerous pellet wounds extending across the arms, chest, and face. Initial examination revealed the absence of pellet wounds on the right side of the face, right side of the chest, and right side of the neck. In stark contrast, dense pellet wound distributions were noted on the left side of the chest and on the right arm and forearm. The latter findings suggest that the areas spared of injury resulted from shielding of these areas by an intermediate object or objects.

Each pellet wound was then probed with the blunt end of a conventional toothpick to determine the angle of pellet entry. Particular care was taken during probing to assure that the toothpick probed only the tract of the pellet, thereby ensuring correct determination of the angle of pellet entry. Longer probes were then inserted into the pellet wounds at the same angles as the toothpicks for illustrative purposes (Fig. 1). The body was then positioned so that all of the probes were roughly parallel.

Such positioning indicated that the deceased was in a posture similar to that of an individual aiming a rifle or shotgun in the standard standing position. "Sparing" of the right side of the chest was attributed to shielding by the right arm and forearm. Sparing of the neck and right side of the face was consistent with shielding by a suspect weapon. Further history from police investigators revealed that a .22 rifle with telescopic sight had been found at the scene marred by pellets similar to the ones removed from the deceased.

Death was attributed to cardiac tamponade resulting from pellet wounds of the heart. Ballistics examination revealed that the pellets inflicting the wounds were #6 shot.

### Case 2

A 44-year-old black male was found in a field lying on his left side on top of a shotgun. The police investigation revealed that several witnesses had heard two shotgun blasts shortly before the deceased was found. The decedent was rushed to a local emergency room where resuscitative measures including 4 h of open chest cardiac massage and multiple blood transfusions proved futile.

The clothing received with the deceased consisted of a pair of dark brown pants, a light tan long-sleeved shirt with vertical dark brown stripes, a one-piece olive drab jumpsuit, and a pair of boots with boot socks. Numerous holes consistent with pellet holes were



**FIG. 1**—Case 1 after insertion of multiple probes. (a) Note upward angles of pellets in forearms, horizontal tracts in the upper right arm, left to right pattern across the left side of the chest, and absence of wounds in the right side of the chest, upper chest, and neck. Shielding of the right side of the chest was attributed to positioning of the right arm. (b) Note the right side of the face and neck was spared. (c) Note angles of numerous pellet wounds involving the left side of the face.

noted in areas that overlay pellet wounds on the deceased. Many of these holes in the garments were surrounded by red staining material consistent with blood. No powder stippling or soot was noted on any of the clothing. Numerous X-rays revealed the presence of four buckshot and approximately 60 “bird shot” pellets. Toxicological examination revealed a negative drug screen on the bile. A blood ethanol concentration of 179 mg/dL and a vitreous humor ethanol concentration of 112 mg/dL were present.

Autopsy revealed the deceased to be a muscular black male with a vertical, sutured laparotomy incision extending from just beneath the xiphoid process to the pubic symphysis and a sutured left thoracotomy incision. Autopsy further revealed eight widely

dispersed pellet wounds most consistent with buckshot that extended across the trunk and upper and lower extremities.

Numerous small pellet wounds extended across the anterolateral aspect of the left thigh and knee and the anterior, medial aspect of the right thigh and shin. The left shin had been spared. The pellet wounds of the right leg extended downward approximately 560 mm (22 in.) whereas the pellet wounds of the left leg extended downward only for about 305 mm (12 in.). The absence of pellet injuries to the left shin area was attributed to shielding by the left thigh or some other intermediate object.

The wounds were carefully probed as described. After the extremities were positioned so that the probes were roughly parallel, it became apparent that the decedent was running in the direction of the assailant at the time the pellet injuries were inflicted (Fig. 2).

Death was attributed to a buckshot wound of the abdomen that transected the right common iliac artery. Ballistics examination revealed the smaller pellet size to be most consistent with #4 shot.

### Discussion

The probing technique described in this report should be undertaken with great care. Some of the wounds may be difficult to probe effectively because of either the superficial location of the pellets or because of dried blood clot at the site of pellet entry. In the latter case, the procedure may be facilitated by scrubbing the wounds with fine steel wool moistened with soap and water. Cases involving wounds inflicted by extremely small pellets would be expected to be proportionately more difficult to probe. When decomposition occurs with softening of subcutaneous tissues and destruction of wound tracts by insects, the technique becomes progressively more difficult and finally impossible. One would also expect thick clothing to make accurate assessment of individual pellet angles more difficult.

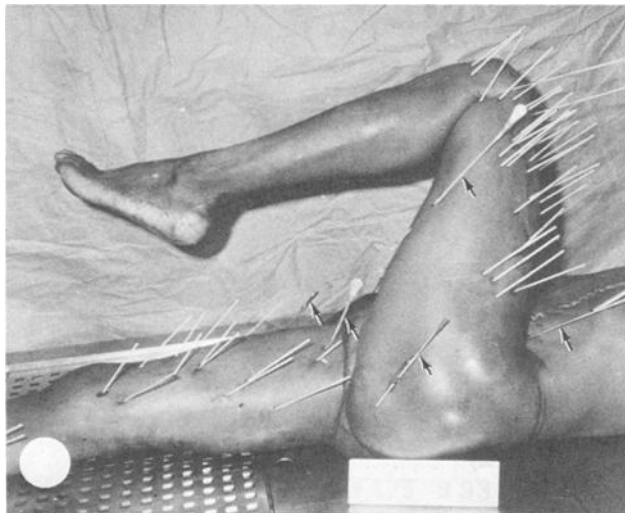


FIG. 2—Case 2 after insertion of multiple probes. Wounds marked by arrows were inflicted by buckshot. Note the upward angle of small pellet wounds in the left thigh and the downward angle of pellets in the left knee, right thigh, and right shin area. Absence of wounds on the left shin was attributed to shielding by the left thigh. The position and angles of the pellets indicate the deceased was running toward the assailant when the shot was fired.

In the past, multiplicity of distant shotgun wounds has been inferred by finding multiple casings or wads, by finding pellets of different sizes, or by finding wounds on different parts of the body that are mutually exclusive and indicative of separate shotgun blasts.

Using the present technique, one would expect the presence of numerous mutually exclusive angles on the same body surface to be indicative of separate shotgun blast injuries. The determination of such mutually exclusive angles may also be important when one attempts to undertake range estimations in cases where multiple pellets seem to indicate that most of the pellet pattern struck the deceased.

### Conclusion

The value of medical evidence collected at autopsy by the forensic pathologist can be weighed by its ability to confirm or deny the testimony of those individuals who become subject to legal proceedings. The posture of a deceased at time of injury may be important as one attempts to assess his role in an encounter. A careful consideration of shielding effects in concert with the use of multiple probes may provide an answer of legal significance that would otherwise be unobtainable. The cases brought forth illustrate how such evidence may be acquired.

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