

CASE REPORT

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Exit Keyhole Lesion and Direction of Fire in a Gunshot Wound of the Skull

REFERENCE: Dixon, D. S., "Exit Keyhole Lesion and Direction of Fire in a Gunshot Wound of the Skull," *Journal of Forensic Sciences*, JFSCA, Vol. 29, No. 1, Jan. 1984, pp. 336-339.

ABSTRACT: An exit keyhole lesion of the skull is presented. A defect with keyhole configuration has been previously described only at the site of entrance. This case documents that such a lesion should not be interpreted as an indicator of entrance in all cases.

KEYWORDS: pathology and biology, wound ballistics, ballistics, direction of fire

Keyhole lesions of the skull at the site of a gunshot entrance wound have been previously described [1,2]; common to the lesions are a circular or ovoid component with internal bevelling and a triangular portion with external bevelling. The circular portion is, in fact, the point of initial impact or entrance, and the triangular portion is the exit. The lesion usually indicates a tangential shot, often with a portion of projectile being shaved off and exiting.

Adelson [3] depicts photographically two keyhole defects in exit wounds, but case analysis of wound configuration and interpretation of direction of fire are not emphasized. Elucidation of these questions awaits the accumulation of a series of cases with this rare finding.

The subject of the current case report demonstrates an exit keyhole in a skull which, because of its location, could present interpretive difficulties. This is especially true if overlying skin indicators were absent, such as might be true in a decomposed body or in one with confounding fire, animal, or insect damage.

Case Report

A 45-year-old male was found in a wooded area; there were three gunshot wounds. One wound involved the head and is reported in this paper. The other wounds were located in the neck posteriorly and in the right hand.

An ovoid entrance wound was present on the right temporal scalp (Fig. 1), measuring 0.3 cm ($\frac{1}{8}$ in.) in diameter. Surrounding the wound was a uniform region of dark gray-black fouling that measured 3.8 cm ($1\frac{1}{2}$ in.) in diameter. Powder stippling was also present around the entrance defect in an area having a maximum diameter of 6.4 cm ($2\frac{1}{2}$ in.). There was, however, a horizontally oriented band of nonstippled skin inferior to the entrance defect; in this area, the right earpiece of the deceased's eyeglass frame eclipsed the spray of powder

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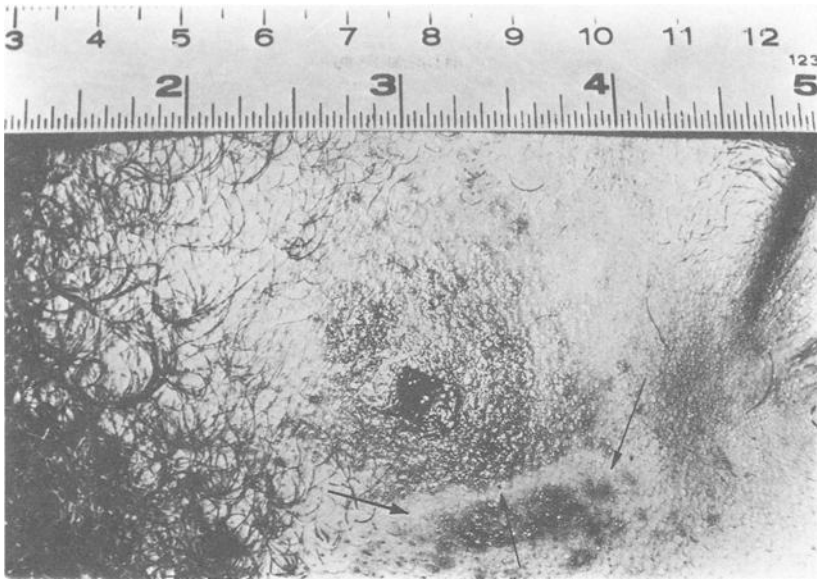


FIG. 1—Close range entrance wound of right temple with fouling and powder stippling. Note eclipse of powder stippling (arrows) caused by the earpiece of a pair of eyeglasses. (Case courtesy of James L. Luke, M.D.)

from the muzzle. The underlying defect of the right temporal bone was ovoid and measured 1.0 cm ($\frac{3}{8}$ in.); there was minimal internal bevelling, a finding not infrequent or unexpected in defects of thin temporal and parietal bone where the lack of substantial diploë is encountered.

The wound track extended from the anterior right temporal lobe through the left temporal lobe with an exit in that area. No projectile was recovered.

The exit wound was located 1.3 cm ($\frac{1}{2}$ in.) above the superior insertion of the left ear and consisted of a horizontally oriented slit-like defect measuring 1.9 cm ($\frac{3}{4}$ in.) in length (Fig. 2).

The bony exit defect underlying the skin exit wound was located in a thin portion of the left parietal bone superior to the squamosal suture; it is shown in Fig. 3. It consisted of a typical keyhole lesion measuring 1.9 cm ($\frac{3}{4}$ in.) at its greatest width. The circular portion was located anterosuperiorly and demonstrated slight external bevelling, while the triangular portion was located postero-inferiorly with prominent external bevelling.

The direction of the gunshot wound was from right to left, slightly upward and slightly from front to back. The bullet struck the left parietal bone at an angle of approximately 10° from the perpendicular at the exit surface. This exit keyhole defect, therefore, does not result from a markedly tangential shot.

Summary

A case demonstrating an exit keyhole defect of bone in a nontangential gunshot track is presented. In the absence of definitive skin indicators of direction of fire, such a lesion could easily be misinterpreted as an entrance defect. One might account for the absence of expected internal bevelling in the circular portion by emphasizing the thin nature of the bone where the projectile perforated. The slight external bevelling of the circular portion can be explained on the basis of Coe's observations [4] of occasional external bevelling of entrance

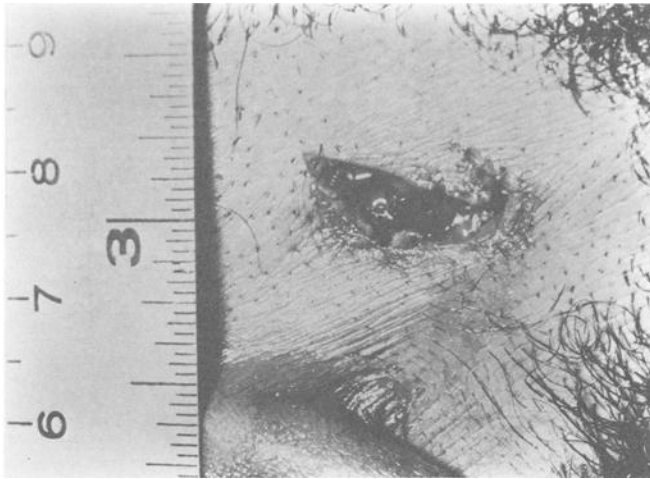


FIG. 2—Exit wound of skin in left temporo-parietal region.

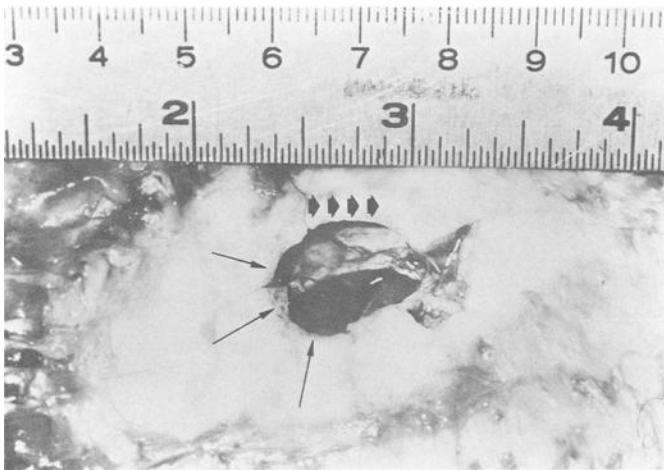


FIG. 3—Exit keyhole defect of left parietal bone, measuring 1.9 cm at greatest width. The direction of fire (large arrows) is from left to right (photo as reference). Note slight external bevelling (small arrows).

wounds. The configuration of the triangular portion is compatible with an entrance keyhole defect.

Interpretation of keyhole defects, therefore, may be difficult; they are not strictly limited to entrance wounds, but may occur in exit wounds as well. Further evaluation of exit keyhole defects and direction of fire awaits a series of cases demonstrating this unusual entity.

Acknowledgments

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References

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