

## CASE REPORT

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### Toolmarks and Peculiar Blunt Force Injuries Related to an Adjustable Wrench

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**REFERENCE:** Takizawa, H., Nakamura, I., Hashimoto, M., Maekawa, N., and Yamamura, M., "Toolmarks and Peculiar Blunt Force Injuries Related to an Adjustable Wrench," *Journal of Forensic Sciences*, JFSCA, Vol. 34, No. 1, Jan. 1989, pp. 258-262.

**ABSTRACT:** A factory hand troubled a housewife with a money matter, and in the end he beat her to death with an adjustable wrench. The toolmarks found at the crime scene and the patterned injuries on the victim are shown in this article.

**KEYWORDS:** criminalistics, injuries, toolmarks, bloodstains, patterned injury, wrench

Identification of the type of instrument actually used in a brutal homicide of a 55-year-old woman was accomplished by 2 collaborative works: (1) critical studies of the toolmarks left on the quiltcover and the nightdress, which led the examiner to allege the murder weapon as an adjustable wrench and (2) the matching of the shapes of blunt force injuries on the scalp of the victim to specific parts of the wrench.

#### Case History

A 55-year-old woman was found murdered on the bed of her room. The woman had been brutally beaten over the head, face, neck, breast, and upper extremities. Her head and face had bled profusely. Blood was also found to have soaked through the bed and formed a pool on the subjacent floor. There were many bloodstains around the victim including two kinds of intricate imprints which implied the murder weapon. One was printed on the upper center of the quiltcover (Fig. 1) and the other on the left breast and right shoulder of the nightdress (Fig. 2).

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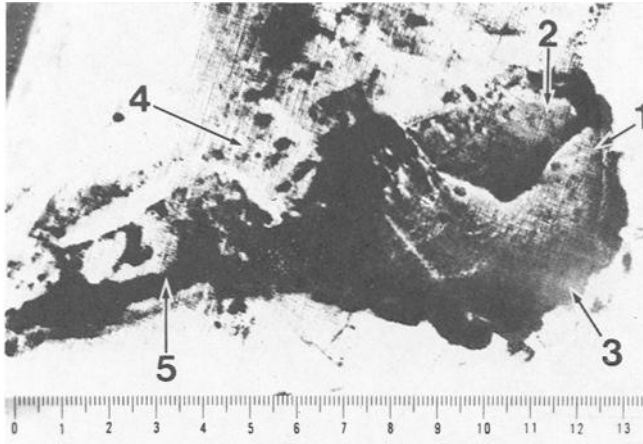


FIG. 1—Part of the bloodstains on the quiltcover. 1-5: Imprint of the respective parts of an adjustable wrench shown in Fig. 5.

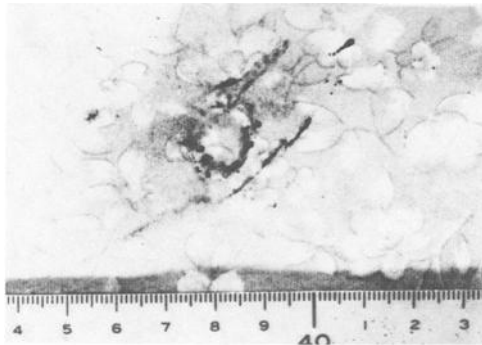


FIG. 2—Bloodstain on nightdress. Imprint of the perimeter of "circular margin" indicated as B in Fig. 5.

### Autopsy Findings

Twenty-one gaping lacerations, the size of which ranged from 0.7 to 2.4 cm, were scattered on the head (Fig. 3) and the face (Fig. 4a) of the deceased. Though there was variation in the sizes and shapes of the lacerations present, we noted the similarity of the wounds in almost all of the lacerations. The typical laceration was comprised of a main contused wound about 1.5 cm in width, the shape of which was characterized by a pair of small holes with an intervening residual tissue between them, and two to three accessory tearings (Fig. 3). The skin adjacent to the lacerations was abraded. The small holes that were the equal composite of all lacerations penetrated into the scalp and reached the surface of the skull or penetrated into the cutaneous and subcutaneous tissues of the face and reached the subjacent bones or the oral cavity. Many fractures, such as a linear fracture of the right temporal bone, fractures of teeth and alveolar bone, and a comminuted fracture of the center of the mandible, were observed beneath the appropriate wounds. The blood from the oral wounds filled the oral cavity and was aspirated into the airways.

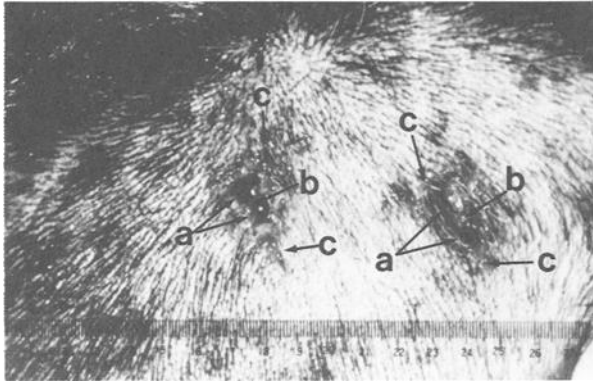


FIG. 3—Contused wounds on the scalp of the victim. Typical lacerations are shown in a closeup photograph: (a) a pair of small holes, (b) an intervening residual tissue, and (c) accessory tearings.

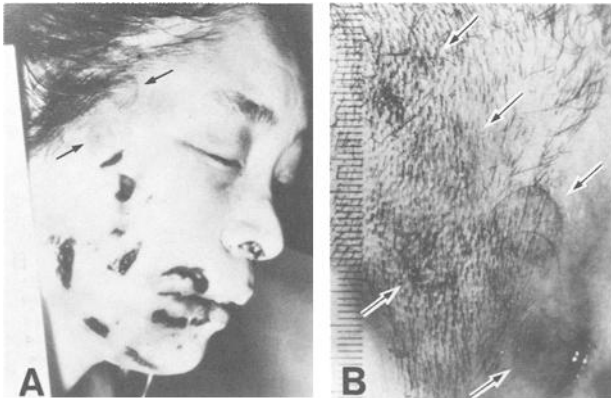


FIG. 4—Contused wounds on the face and right temporomaxillary area of the victim. Lacerations and circular patterned injuries can be seen in Fig. 4a. Figure 4b is a closeup photograph of the right temporomaxillary area (hair was clipped short). Arrows show circular patterned injuries.

There were also present several contusions with a vague circular pattern, each approximately 1.1 cm in diameter on the right temporomaxillary area (Fig. 4 [arrows]). The bleeding into the right temporal muscles and the comminuted fracture of the right maxillary arc were observed.

Other than the patterned injuries described above, multiple bruises on the neck, shoulders, breast, and upper extremities were found. The brain was markedly contused and surrounded by superficial bleeding. Some segments of the scalp containing the patterned injuries were removed and stored for future comparison.

#### Identification of the Murder Weapon

Critical studies of the intricate bloodstains on the quiltcover (Fig. 1) and the nightdress (Fig. 2) led the examiner to assume that the shapes of the bloodstains are partial imprints of an adjustable wrench (Fig. 5). The features of the stains on the quiltcover (Fig. 1) matched

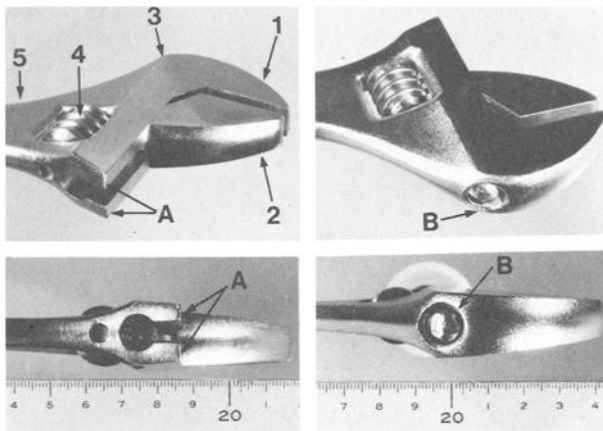


FIG. 5—The alleged adjustable wrench: (1) upper jaw, (2) lower jaw, (3) head, (4) worm, and (5) neck. (A) double edges and (B) circular margin.

with those of the upper jaw (1), the lower jaw (2), the head (3), the worm (4), and neck (5) of the tool (Fig. 5). The wrench has a hole to fit the support rod for the lower jaw. One end of this hole is the neighboring two edges (*a*) and the other is the circular perimeter (*b*) shown in Fig. 5, respectively. The feature of the stain on the nightdress in Fig. 2 also matched with the feature of the circular perimeter (*b*) in Fig. 5.

The alleged wrench, 306 mm in length and 660 g in weight, was submitted to the medical examiner to test the possibility of this being the murder weapon. The wrench possessed certain features causing specific patterned injuries on the head and face of the deceased. The neighboring two edges of the tool, each 5 mm in length at 6-mm intervals (Fig. 5, item A), visually appeared to match with the peculiar two small holes in the contused wounds (Fig. 3) and fitted the wounds in the skin segments that were preserved for comparison (Fig. 6). One-to-one photographic overlays to compare the features of the circular margin (Fig. 5, item B) with the contusions of the right temporomaxillary area (Fig. 4*b*) were made on acetate film. The circular margin of the tool, 11 mm in diameter, matched the circular pattern of the

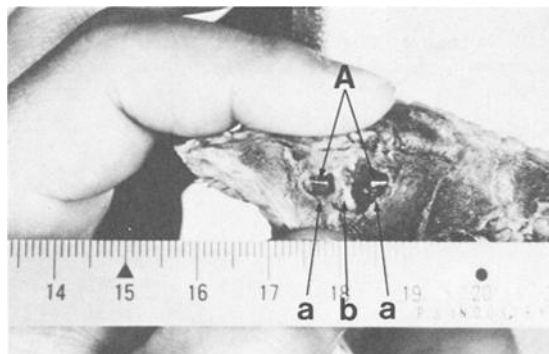


FIG. 6—Fitness of the double edges within the two small holes. Inner surface of the preserved scalp was photographed: (A) double edges of the wrench, (a) two small holes of the contused wound, and (b) an intervening residual tissue.

contusions. It was assumed that the bruise was not confined to the part of the skin where the circular perimeter of the tool compressed under the force of the impact, that is, the affected part was apparently normal, but the bruise extended inward to the midst of adjacent contused skin as a result of the pressure.

### Conclusion

The contused wound with the two small holes and the contusions with the circular pattern were caused by the impacts of specific parts of the adjustable wrench, the neighboring two edges, and the circular perimeter, respectively. During autopsy, the question concerning the coexistence of the two types of patterned injuries was whether there was only one instrument which caused the wounds on the deceased or were there two instruments? The shape of the contusion may mirror the striking object [1], nevertheless it is sometimes difficult to suggest the object used to inflict the wound from the autopsy findings alone. Fortunately, this question was answered by an expert toolmark examiner.

There were no eyewitnesses to this assault and searching for the criminal was a difficult task. In the course of the investigation a clue about the alleged suspect was provided by a factory owner who had employed him. The owner stated that (1) the suspect might have had time to be at the scene of the crime and (2) a recently purchased adjustable wrench had been missing from the factory since the day after this crime. The owner showed a receiving slip in which the origin of the wrench was entered. This confirmed our identification about the murder weapon.

Ten months later, the alleged suspect who had a history of troubling the victim with money matters was arrested. His confession is as follows. He visited the victim on the morning of the crime because of the payment of the debt, but he could not pay the full amount of the debt at that time. She jeered at him for breaking the promise and accused him of being a liar. He flared up and beat her with the outer race of ball bearing, and then with the wrench till she died. After the crime, he threw the wrench away on the route of his escape, and the outer race was burned in acetylene flame at the factory to diminish the bloodstain on it.

Despite an intense search around the location which he gave, the wrench was never found. The outer race, 110 mm in external diameter and weighing 455 g, was submitted to us for the purpose of determining whether a wound inflicted with this object was demonstrable on the victim, but no such wound was found. It was assumed to be responsible for the dullness of the shape of the object.

### Reference

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