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Case Report

Typical external skull beveling wound unlinked with a gunshot

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ABSTRACT

Lesions of the cranial vault resulting from firearms are traditionally described in forensic medical literature with many reports illustrating atypical bone lesions carried out to the skull by gunshot wounds. The authors present this report which illustrates an external beveled skull wound, associated with internal beveling damage, caused by a stabbing injury.

A partially buried human skeleton was found in a forest. The examining of the skull revealed a hole resembling the exit wound caused by a bullet and two other smaller stab wounds. No typical entering bullet wound and no other bone lesions were found. During the course of the investigation, one of the perpetrators admitted to hitting the victim, using a sickle, and to hiding the body. For this purpose, he dragged the corpse with the sickle still implanted in the skull, using it as a hook. Upon retrieving the sickle, a piece of cranial vault was removed, thus creating an external beveled wound.

In order to identify the mechanism which brought about this kind of lesion, experimental work was carried out on a human skull. In this particular case, the tip of the sickle penetrated into the bone, creating a lesion that would typically be produced with a stabbing instrument when applied with vertical force. When the body was dragged, using the sickle as a hook, this was a hand-produced vertical force, which was applied in the opposite direction. It caused the tearing of a piece of bone and the creation of an outer bevel. This atypical lesion should be made known to medical examiners and pathologists in order to help investigating and understanding of the circumstances of injuries.

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1. Introduction

Lesions of the cranial vault resulting from firearms wounds are traditionally described in forensic medical publications [1–3] even though many descriptions of atypical skull lesions resulting from gunshot wounds can be found in the literature. Entrance wounds are typically small, with internal beveling in the direction of the projectile [1–7] and exit wounds are typically larger with external beveling [1–3,5–8].

However, this classical description can, in the absence of wounds caused by a firearm, be employed to describe other mechanisms of injury. The authors propose this case report which describes an external beveled skull wound, resulting from the extraction of a piece of bone, together with an internal beveled wound caused by a stabbing event. In order to identify the mechanism of injury, an experimental study was carried out on a human head in our laboratory and examined macroscopically.

2. Case report

A partially buried human skeleton was found by a hunter in a forest. The body was hidden under various debris with the victim facing the ground. An autopsy was carried out according to conventional anthropological methods [9–11], and it allowed to determine the subject's gender, its height (about 1 m 75.2 with SE 4.05) and its age (between 21 and 46 years of age).

The examination of the skull showed up an egg-shaped hole in the parietal area of the skull that looked like an exit bullet wound (Fig. 1). This orifice measured 2.8 cm in maximum length and 1.7 cm in maximum width. The anterior end of the hole was situated on the temporo-parietal suture, the posterior end of the hole had an external beveled shape with a tangential exit path. Two other smaller stab wounds were found on the temporo-parietal suture and on the right mastoid area, respectively. No typical entrance bullet wound and no other bone lesions were found. Four months after the discovery of the body, two men were taken into custody. They admitted to beating a homeless man, in an attempt to rob him. As the victim was resisting, one of the suspected offenders grabbed a sickle and hit the victim over the head. Following an interview of the suspects, the crime scene investigators carried out a dig of the area where the corpse had been buried. A fragment of the skull vault was found in the soil: it

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Fig. 1. Egg-shaped parieto-occipital hole.

easily fitted the egg-shaped hole showing up on the victim's skull. The typical triangular shape caused by the sickle was now clearly visible (Fig. 2) and it was obvious that the victim had been stabbed three times in the head, prior to being dragged on the ground, which caused the fragment of skull to be pulled out.

During the investigation, one of the culprits admitted to hitting the victim with the sickle. In an attempt to hide the body, he had dragged the corpse with the sickle still implanted into the skull, using it as a hook. He added that, while removing the sickle, he had heard a cracking sound.

The hypothesis that the dome of the skull had shed a small part was confirmed, explaining the autopsy findings.

3. Materials and methods

This experimental study was carried out on a human head. In order to comply with the ethical issue, the head was taken from an individual (a 72-year-old woman) who had "given her body away to science" according to a specific French law, which allows for anatomical dissections and research. After embalming the skull, the latter was prepared by dissecting the soft tissues. The weapon was a standard sickle used for cutting grass. The tip was triangular like that of the sickle found by the investigators, with a maximum width of 3.5 cm (Fig. 3).

The head was hit twice by the sickle: a first time before dissecting the soft tissues, in order to observe the skin lesion inflicted, and the internal skull beveling; a second time after dissecting the soft tissues, in order to identify the mechanism that brings about an external skull beveling. For this second blow, after performing the bone penetration by the sickle, two kinds of manual traction forces were applied in order to create this external skull beveling: a tangential one and a vertical one.

After performing both blows, bone samples were taken from the vault with the help of a vibrating saw and they were then macroscopically evaluated.

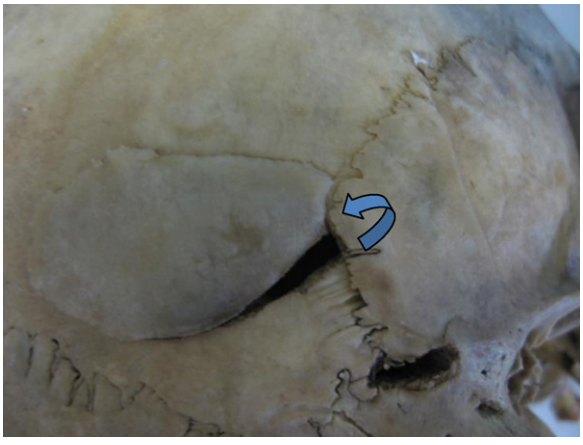

Fig. 2. Fragment of the skull vault replaced in the egg-shaped hole.

Fig. 3. The sickle used in the experimental study.

4. Results

This experimental study showed up a first thing: the manual force applied for perforating and penetrating the skull bone would need to be very strong with such a stabbing weapon. Indeed, a trial run, hand-inflicted by the sickle, did not penetrate the cranial vault, but merely created a lesion of the external table without reaching the internal table.

After this trial blow, the first trauma inflicted showed up a triangular skin lesion in the same shape as that of the tip of the sickle. After sawing the bone sample, an examination of the internal cranial dome showed up a typical beveled shape (Fig. 4).

The tangential hand traction carried out after the second trauma caused the depression of the sickle in the head by widening the entrance hole (Fig. 5). Indeed, the tangential force applied, caused the horizontalization of the sickle by rotational movement of the back of the weapon (base of the triangular portion of the blade). This was not the feature of our case report (size of the inlet perfectly in relation to the dimensions of the sickle). Indeed, the tangential hand traction was not the true mechanism.

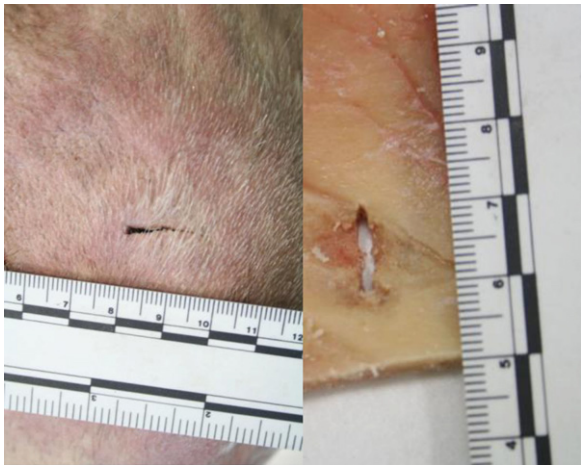

Fig. 4. Experimental study: first trauma: skin lesion (left); internal beveling (right).

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