Penetrating Crossbow injury to the Head: A Case of Suicide

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Case summary

We present here the case of a 42-year-old male with a history of mental illness. There had been a previous attempt at suicide by similar means, using a firearm. He currently resided with family and was confined to bed for most of the day due to complications of abdominal injuries sustained during the previous suicide attempt, however mobility was still possible. On the day of his demise his mother looked in on him and found him dead on his bed with a bolt in his head and a crossbow in close proximity – next to his bed.

The case was referred for medicolegal autopsy in accordance with the provisions of the Inquests Act (Act 58 of 1959). The medicolegal autopsy was performed one day after death occurred.

External examination showed an obese adult male (body mass index = 45.7). On the right parietal aspect of the head was an arrow/bolt penetrating the cranium with the nock, fletching and part of the shaft protruding. Upon removal of the bolt, there was a nearly circular punched out scalp defect with a diameter 0.6 cm and a concentric collar of abrasion of 0.1 cm. The skin defect was situated 6 cm proximal to the superior edge of the ear and in line with the tragus of the ear. No further injuries were present on the body and there were features of medical intervention (Figs. 1 and 2).

Figure 1. Bolt of a crossbow penetrating the right parietal region of the skull.

Figure 2. Circular punched out scalp defect with surrounding collar of abrasion.

Upon opening of the skull, a bolt penetrated the cranium from right to left in a slightly posterior direction through the right parietal skull bone to involve the right and left parietal lobes of the brain with subdural and subarachnoid hemorrhage (Fig. 3).

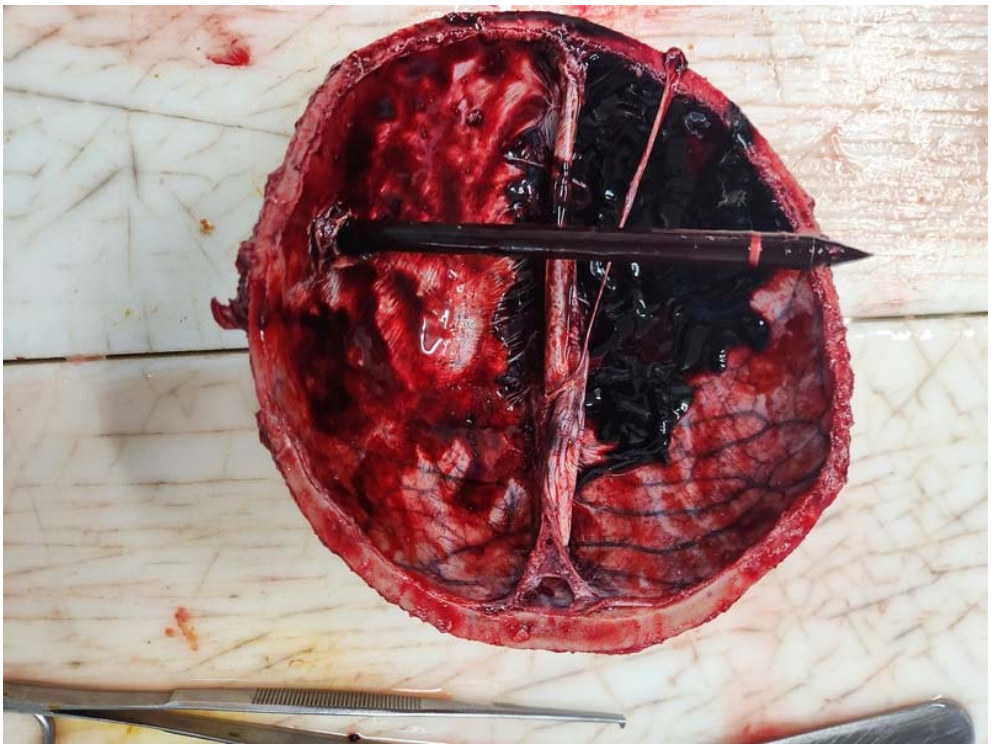

Figure 3. Shaft and tip of the bolt with its trajectory within the cranium.

Upon removal of the bolt, there was a circular defect with a diameter of 0.8 cm of the right parietal skull bone, with clear internal beveling and a ring of dirt surrounding the defect on the external aspect of the skull. There was a linear penetrating wound through the parietal lobes with moderate parenchymal destruction in the region where the bolt was removed (Figs. 4–6).

Figure 4. Wound tract through and destruction of the parenchyma of the right hemisphere.

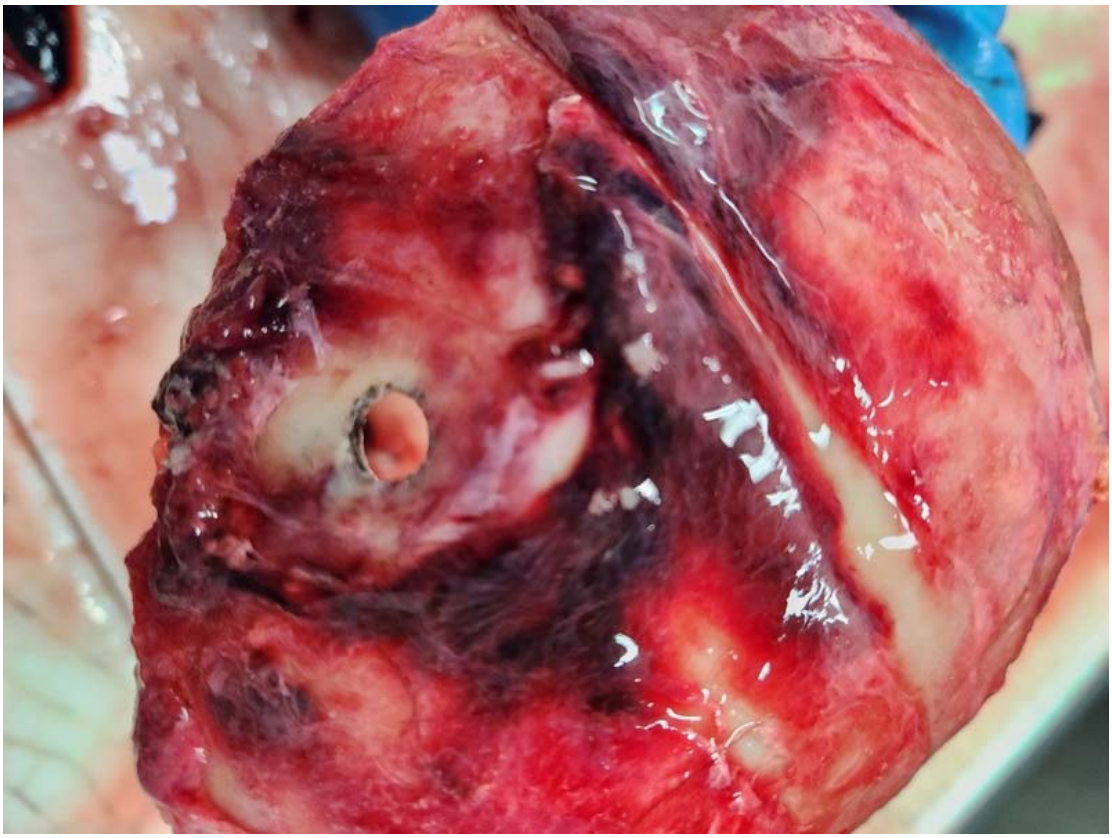

Figure 5. Circular defect with a diameter of 0.8 cm of the right parietal skull bone and a ring of dirt surrounding the defect on the external aspect of the skull.

Figure 6. Circular defect of the internal aspect of the skull with clear internal beveling.

Figure 7. Crossbow bolt with shaft, intact fletching and a conical field tip.

The bolt had a length of 20 cm and a diameter of 0.7 cm with intact fletching and a conical field tip. It was retained as evidence. The crossbow was not available to the author for inspection; however, the investigating officer showed the author a photograph of the weapon, located in the room the body was discovered, next to the bed (Fig. 7).

The scalp and skull defects could easily have been construed as that of a gunshot entrance wound, especially if the bold had been removed prior to arrival at the mortuary.

Blood ethanol concentration measured 0.00 grams per 100 milliliters.

Discussion

The crossbow is a ranged weapon that was widely used in ancient times for combat and war until it was gradually replaced by firearms. At present, it is used mainly for hunting, sport, and recreation.[1–7] They basically consist of bowstrings, mounted on a shaft. There is a stock (butt) at the end of the shaft, which is used to stabilize the weapon upon the shoulder which shoots the arrow when a gunlike trigger is depressed.[1,2] The arrow, referred to as a bolt, consists of shaft with a head/tip, fletching at the distal aspect of the shaft and a nock at the opposite side of the tip.[2] Two main types of arrowheads exist: the conical field tips (similar to bullets), used for sport, and the multiple-bladed broad heads (containing two to five blades), used for hunting.[1–6] The shaft is cylindrical usually consists of carbon, aluminum, fiberglass, or wood, and the fletching is used to stabilize the bolt during flight.[3].

Injuries and deaths caused by crossbows are a rare occurrence today and can be suicidal, homicidal, or accidental.[1–9] The morphology of the wounds on the body depends mainly on the type of tip of the bolt involved rather than the weapon,[1,3–8] The wound made by conical field tips may resemble gunshot wounds from a distance, and the wounds made by broad heads may resemble sharp force injuries, representing a challenge from a forensic point of view, especially if the bolt has been removed prior to the postmortem examination.[1–9] The former may even have a collar of abrasion (due to friction) and a contact wipe of dirt.[3–8].

The bolt achieves little kinetic energy and do not create a temporary wound cavity; however, they have a high sectional density resulting in a considerable penetration capacity,[3,5–9] They cause injury by direct passage of the bolt through the tissue.[2,5,9]

The areas of predilection seen in crossbow injuries from suicides, homicides, and accidental deaths are as follows: suicides—chest and head; homicides—chest, head, abdomen, and extremities; accidental—brain and chest; and not fatal—lower extremities,[5,6,8] Most deaths described in literature involve males between the ages of 31 and 58 years.[1–7,9]

After sustaining a crossbow injury, in most instances, there is still an ability to act with many victims surviving for some time even after vital organs have been injured. Immediate incapacitation after arrow penetration could be expected only if central regulatory organs are injured. The reason for this lies in the fact that no relevant energy is transferred from the bolt to surrounding tissue and in the effect of an incomplete tamponade of the shaft in the wound track, preventing hemorrhage.[2–6,8,9]

Issues highlighted in the literature pertaining to crossbows are how easy it is to purchase these weapons despite their obvious injury ability, poor restrictions in obtaining such a silent weapon,

suitability and accuracy for inexperienced people, and ease of operation not requiring much practice.[1–8]

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