H27 Ballistics-Induced Depressed Skull Fractures

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The goal of this presentation is to educate forensic scientists about the association of depressed skull fractures and a particular type of ballistic trauma.

This presentation will impact the forensic community and/or humanity through knowledge gained regarding another etiology for depressed skull fractures.

Ballistic trauma of the skull most commonly results in an interiorly beveled entrance wound and, if applicable, an exteriorly beveled exit wound. As will be discussed, certain types of firearm trauma can result in atypical bone injuries. The authors will present the case of a 28-year-old white female who died approximately 12 hours after presentation to the hospital for a reported perforating gunshot wound of the head. In support of this case and its findings, further corroborative case examples will be discussed.

The autopsy of the primary case revealed a thin white female with a bandaged head. Under the bandage, the hair was completely matted with blood, through which an irregular sutured wound on the top of the head was visible. Removal of the sutures revealed an irregular 1-1/2 inch abraded laceration on the left parietal scalp. An additional curvilinear 1/2 inch partial thickness laceration was just posterior and medial to the sutured wound. An oval skull depression was directly under and visible through the laceration. No obvious projectiles or lead wipe were present on the cranial radiograph.

Reflection of the scalp revealed hemorrhage encompassing the left frontal and parietal subscalpular tissue and a large subgaleal hemorrhage overlying both parietal bones. Removal of the subgaleal hemorrhage revealed a 1 x 7/16 inch oval depression fracture of the left parietal bone just posterior to the coronal suture. The concavity depth was approximately 3/16 inch. An “X”-like fracture pattern was in the depressed portion of bone and the lateral fracture margin had a ‘stacked’ appearance. The underlying brain had corresponding fracture contusions.

Given the depressed skull fracture, the lack of typical entrance and exit wounds on the skin, and the semi-circular laceration on the skin, it was initially felt that this injury was due to blunt impact trauma, possibly from the grip or butt of a gun. However, closer inspection revealed grey residue on the ‘stacked’ edge of the fracture. No firearm residue was grossly visible on or under the skin. Since the edges of the wound could not be re-approximated, the possibility of a tangential or graze gunshot wound was considered.

Police detectives brought the weapon in question to the Medical Examiner’s Office the next day and the wounds were re-examined. The weapon was placed against the skin and the pattern of the semi-circular laceration fit the gun’s muzzle end exactly. The initial report stated that two projectile casings, possibly felt to be ‘old’ were at the scene, but no bullets were recovered. Upon request, the scene was re-examined and two bullets were located, one of which had hair, blood and tissue on it. One edge of this bullet was flattened. Based on these findings, a tangential gunshot wound was confirmed.

Depressed skull fractures typically pose no significant dilemma for forensic anthropologists and pathologists with regards to the type of trauma involved, as they are typically associated with blunt force impacts. This case illustrates that ballistic trauma may also cause depressed skull fractures when the trajectory of the projectile is tangential to the bone. Typically, tangential or graze gunshot wounds result in a keyhole type fracture with interior beveling on the entrance side and exterior beveling on the exit side. While unusual, if a bullet’s path is extremely tangential, it can graze the skull without complete penetration, causing a depression fracture.

It is important for forensic anthropologists and pathologists to keep firearm trauma in mind when dealing with depressed skull fractures. Should only skeletal elements be available for examination (unlike the presented case), different conclusions could be drawn with regards to the source and type of the trauma, thereby potentially altering the investigation of potential suspects.

Depressed Skull Fracture, Tangential Gunshot Wound, Ballistic Trauma

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