A74 Fatal Shotgun Trauma to the Cranium With Discrimination Between Manners of Death

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Learning Overview: The objective of this research is to better understand the fracture patterns associated with Shotgun Trauma (SST). This presentation will allow attendees to recognize the differences in expression of trauma between suicide and homicide.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by emphasizing the importance of examining SST.

Features of cranial Gunshot Wounds (GWS) have been examined for decades, including beveling, fracture patterns, trajectory, wound size to caliber size, and multiple GSWs.[1-6] These studies focused on handguns with little-to-no mention of SST, yet approximately 1% of the population dies from SST.[7] Medical Examiners (MEs) often use osteological reports to help inform manner of death, thus anthropologists should be able to recognize the patterns associated with SST.

C.A. Pound Human Identification Laboratory (CAPHIL) cases between 1974 and 2018 were examined for SSTs; 17 cases were found with 15 identified individuals and 2 unidentified. Trauma description was taken from the case report; if the report lacked detail, an analysis was performed using case images. Manner of death was determined by the ME. Fracture characteristics and intrinsic characteristics were also noted.[8] Chi-square tests were done to test for significance.

Sixteen individuals were shot peri-mortem and one postmortem. The postmortem case was not considered further. Of the 15 identified individuals, males (n=12) were significantly more represented than females (n=3; p=.00159). White individuals (n=14) were significantly more represented than Blacks (n=1; p=2.56977E-05). Five of the cases were suicides, two were declared undetermined, and nine were homicides. The weapon was present on scene in all of the suicides and one of the homicides (p=.0302). There is no significance between type of pellet and manner of death (P=.699969). All cases had comminution, diastatic fractures, and fracture lines crossing suture borders.

Of the suicides, four had trauma documented. All had intraoral or submental entrances; three with an anterior to posterior trajectory and one with an inferior to superior trajectory. Fracturing was too extensive to determine exit. Most of the buttressing elements of the skull were not recovered in three of the cases.[9] Elements such as the occipital were highly comminuted with destruction of the buttressing area.

All homicides had some trauma documented. All but one case had one GSW; the outlier had two GSWs. Three cases had posterior-anterior trajectories; two had left-right; three had right-left; and one was unknown due to trauma. In cases with damage to the frontal bone, nearly half had symmetrical fracturing of the frontal, two had asymmetrical fracturing, and the rest had comminution or were missing the frontal. Half had fracture lines through the buttressing of the temporals. Six had damage to the buttressing of the occipital. All had damaged or missing orbits. One case had fracturing at the buttresses of the zygomatics and one at the mental eminence. Three cases had a LeFort fracture of some type.

Current practice associates distant and/or multiple shots with homicides and close contact shots with potential suicides.[10,11] Three CAPHIL homicides were found with the wad in the cranium, indicating a close distant shot.[8] Multiple SSTs are also considered homicide only; only one CAPHIL case had multiple shots.[10,11] These factors will not help in these cases. Location of SST may be more helpful. Suicides had intraoral/submandibular entrances with an anterior-posterior or inferior-superior trajectory; this is the most common suicide pattern.[13] Homicides had an occipital or parietal entrance with a posterior-anterior or lateral trajectory. There were no anterior entrances, unlike other studies.[14] Another difference between homicides and suicides is the lack of symmetrical fracturing in suicides. The force of the contact shots destroyed the thicker areas of the skull. The face and frontal were often not recovered, possibly due to the fact that these fragments can be ejected from the body from the force of the projectile.[15] Fractures from homicides were more likely to follow cranial buttressing and exhibit fracture symmetry. Examining entrance wound location, trajectory, and fracture patterns is likely to aid in differentiation between suicide and homicide. A larger sample size, including accidental deaths, would be necessary for confirmation. Undetermined deaths will be included in future studies to examine if manner of death may be determined.

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Gunshot Wounds, Trauma, Shotguns

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