



Physical Anthropology Section – 2006

H60 Nail or Bullet? A Comparison of Typical Cranial Gunshot Wounds to a Defect Resulting From a Nail Gun

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After attending this presentation, attendees will be able to distinguish between typical gunshot wound entrances and a defect resulting from a nail gun utilizing the morphology of the cranial defect and patterns of secondary fractures. This can assist investigators and anthropologists in assessing the type of projectile producing circular cranial vault defects in rare cases when the projectile is not recovered, contextual evidence is missing, or only skeletonized remains are present.

This presentation will impact the forensic community and/or humanity by presenting both the bony morphological characteristics for a nail and typical bullet wounds, aiding in the identification of the projectile used, and by elucidating factors contributing to the difference in mortality between contact wounds involving nails versus bullets.

The medical literature on nail guns revealed numerous construction site accidents but relatively few incidences of their use in suicides or homicides. The preponderance of on-the-job cranio-cerebral injuries occurred as a result of accidental discharge or ricochet; fatalities from these injuries were uncommon. The intentional use of a nail gun to commit suicide is rare. Based on published cases of cranial nail gun injuries, most wounds were survivable with prompt medical attention. Deaths resulting from accidental and suicidal nail gun wounds were typically prolonged and attributed to sequelae.

A male, who had committed suicide by shooting himself in the head with a nail gun, was drawn from the Maxwell Museum of Anthropology documented collection to illustrate the bony morphology of a nail entrance wound. This defect was directly compared to .22 caliber bullet entrance wounds in the crania of four individuals drawn from the Museum's various skeletal collections. This caliber was specifically chosen to ensure comparability, as .22 caliber bullets are nearly equal in diameter to the nail's head (1/4 inch) and are likely to produce defects similar in size to the nail gun wound.

An examination of the cranial defect in the suicide victim revealed an entrance wound located roughly 8 millimeters posterior to the coronal suture, just superior to the frontal angle of the right parietal and inferior to the temporal line. The nail removed a plug of bone as it entered the cranium, leaving a sharp-margined circular defect approximately 8 millimeters (1/3 inches) in diameter. Spalling produced irregular beveled edges internally, with a wider beveled area along the anterior and superior aspects. No exit wound or radiating fractures were present, and no secondary fractures of the orbital plates resulted.

The typical .22 caliber bullet entrance wounds were round or oval in shape, with sharp edges and internal bevelling. Uniform bevelling was typical for right angle gunshots, whereas irregular bevelling indicated oblique strikes. Orbital fractures were often present; these thin plates of bone were particularly susceptible to fracture because of the sudden increase in intracranial pressure produced when the bullet entered the cranium. Differences in gunshot wound morphology were noted between

short and long cartridges, as well as among various ranges of fire. With the exception of the orbital plates, short cartridges rarely produced secondary fractures in the cranium. In contrast, long cartridges usually produced orbital plate fractures as well as linear fractures of the cranial vault. These fractures resulted from temporary cavity formation and, in the case of contact wounds, the additional pressure produced by the expansion of gases entering the neurocranium. Distant .22 caliber gunshot wounds often lacked sufficient energy to produce exit defects, whereas contact wounds resulted in perforating injuries.

Although they share some similarities, the nail gun wound described is distinct from .22 caliber bullet wounds. Differences in the defect morphology and variation in secondary fracturing serve to distinguish between nail and bullet wounds. Perhaps more interesting is the dramatic difference in lethality recorded in the literature between contact gunshot and nail gun wounds, even when comparing roughly equivalent projectile diameters. Factors influencing the survivability of intracranial injuries following gunshot and nail gun contact wounds will be discussed.

Nail Gun, Penetrating Cranial Defect, Lethality