



A51 A Comparison of Bullet Type on Cranial Gunshot Exit Wounds

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After attending this presentation, attendees will better understand that bullet type (full metal jacket vs. jacketed hollow point) has the potential to have a significant effect on the amount of resultant damage to human skulls.

This presentation will impact the forensic science community by discussing the importance of experimental research in trauma analysis, especially regarding gunshot trauma, while demonstrating that such research using human remains can be conducted respectfully and in a manner designed to obtain the maximum amount of data.

Gunshot wound interpretation, especially of the skull, has been extensively studied in forensic anthropology. Most studies have taken a retrospective approach, whereby information from autopsy reports or forensic anthropology reports are mined for data regarding predictive patterns. This approach is problematic due to the number of extrinsic variables present. These variables include factors such as velocity of the projectile, distance of the weapon to the victim, type of firearm, bullet caliber, and bullet construction. In retrospective studies, there is no way to know what many of these variables were, rendering the results less reliable. Further, while research attempts have been made at elucidating these variables for existing cranial gunshot wound cases, current recommendations advise against determining or estimating anything about weapon type, caliber, or distance when analyzing skeletonized remains with gunshot trauma due to the number of confounding variables.¹ An experimental approach is therefore recommended as such variables can be controlled for, with the goal of eventually enabling variable estimation.

Therefore, this project experimentally tested the effect that bullets of two different constructions (jacketed hollow point vs. full metal jacket) have on human skulls in terms of fracture pattern and amount of damage, as assessed by centimeters of total fracture and exit wound morphology. These different bullet types are designed to either fully penetrate with no fragmentation (full metal jacket) or penetrate and expand upon contact (hollow point). The hypothesis was that damage caused by hollow point ammunition will be greater, which has implications for fracture interpretation.

Forty-five donated human heads were obtained from an anatomical tissue supply company, specifically for the purpose of trauma research. A specialized shooting stand was designed to support each head at the height of an average adult male, and each head was shot once either in the frontal or temporal bone, using a revolver with a 1⁷/₈-inch barrel loaded with 0.38 caliber bullets. Bullet type (jacketed hollow point vs. full metal jacket) was distributed randomly yet evenly between individuals. Following the experiment, heads were autopsied and macerated using standard procedures.

The interaction between bullet type and exit wound for those individuals with entrance wounds in the frontal bone was tested using a chi-square analysis. Preliminary results reveal that there is a significant difference between impacts with jacketed hollow point bullets vs. full metal jacket bullets in that the former do not cause exit wounds, while the latter do ($p=0.21$).

This has implications for gunshot wound fracture analysis, in that these results reveal bullet construction can significantly affect exit wound morphology. Future research will include analysis of fracture pattern differences by bullet type and the interaction between bullet type and entrance wound location.

Reference(s):

1. Berryman, Hugh E., Lanfear, Alicia K., and Natalie R. Shirley. The biomechanics of gunshot trauma to bone: Research considerations within the present judicial climate. In: *A Companion to Forensic Anthropology*. Edited by Dennis C. Dirkmaat.

Gunshot Wounds, Fracture Analysis, Forensic Anthropology