

## H130 Ballistic Analysis of an Attempted Murder Using a Porcine Model

Michael Freeman, MD, PhD\*, Forensic Research & Analysis, 425 NW 10th Avenue, Ste 306, Portland, OR 97209; Karl E. Williams, MD, Allegheny County OME, 1520 Penn Avenue, Pittsburgh, PA 15222; and Anders Eriksson, MD, PhD, Umea University, Dept Forensic Medicine, PO Box 7616, Umea SE-907 12, SWEDEN

The goal of this presentation is to describe an experimental analysis of two competing theories for the circumstances of a gunshot wound, in which a porcine model was used as a proxy for a human thigh.

This presentation will impact the forensic science community by describing a porcine model experiment for the purpose of assessing the plausibility of two competing scenarios in the investigation of an attempted murder.

This presentation will provide the description of the investigation of competing explanations for the circumstances of a close-range gunshot wound from a hunting rifle and the associated prosecution of an attempted murder charge, including an ad hoc experiment to test the victim's explanation for the circumstances of a gunshot wound to the proximal thigh.

The case involves a gunshot wound to the proximal thigh from a jacketed .243 Winchester<sup>®</sup> round. The victim, a 21-year-old male, had described the injury as resulting from a point-blank (<2 feet) shot into the thigh from a hunting rifle. He claimed to have been held at gunpoint, with the rifle leveled at his chest while standing, and to have slapped the muzzle of the rifle downward, at which point the weapon was fired. The bullet entered at the upper thigh, resulting in a comminuted fracture of the proximal femoral metaphysis, with the bullet fragment remaining largely intact and retained in the soft tissues near the fracture. The injuries included a transected femoral artery and lacerated femoral vein. The round that was fired was a 100-grain (6.5gm), copper-jacketed, tapered, solid lead-core bullet, with a 2,960fps (902m/s) muzzle velocity, and 1,945 ft-lbs (2,637Nm) of energy. The defendant claimed that the rifle discharged while pointed at a concrete floor, and that the injury resulted from a ricochet from the floor. The defendant was charged based on the victim's account of how the events transpired.

An initial review indicated there was no physical evidence supporting either scenario. In the plain radiograph of the femur fracture, the bullet and fragments were in a superior position to the fracture. The entry wound was described as 2cm in diameter. An initial review of the evidence cast doubt on the victim's account, as (1) the size of the entry wound was inconsistently large for a direct shot; and, (2) the fragments from the bullet were above the fracture, indicating an inferior-to-superior travel path rather than the opposite. As there were no reference materials to consult regarding the specific circumstances of the case, it was determined that an experiment would be conducted to test the plausibility of the victim's account of the shooting.

Pig models have been previously described as a relatively close proxy for a human anatomical/pathological response to gunshot; thus, a fresh pig hind leg was selected as the closest proxy for a human thigh.<sup>1</sup> A jig was constructed to hold the pig leg, which was first radiographed, then marked to identify the location of the femoral metaphysis. Damp newspaper was used as a backstop to retain and retrieve any bullet fragments that might penetrate the specimen. High-speed video was used to capture the bullet entering and exiting the specimen. Once the pig leg was secured, a sharp probe was used to further ascertain the underlying bony anatomy of the femur. Using ammunition from the same box used in the shooting, a shot was fired from a distance of 17 inches (43cm) from muzzle to specimen and recorded at 10,000 frames per second. The shot resulted in an entry wound that was approximately 0.6cm in diameter, which struck the femur and exited the rear aspect of the specimen, and subsequently penetrated ~2cm of the damp newspapers. The exit wound was approximately 8cm in diameter, and palpation and radiograph of the femur indicated it was shattered, and fragments of bone were missing (projected into the backstop).

Based on the results of the experiment, it was determined that the scenario of the shooting claimed by the victim was implausible. The explanation for the shooting provided by the defendant was deemed much more probable (i.e., that the bullet struck the defendant as the result of a ricochet).

## **Reference**(s):

 Jussila J., Kjellström B.T., Leppäniemi A. Ballistic variables and tissue devitalisation in penetrating injury — Establishing relationship through metaanalysis of a number of pig tests. *Injury*. 36, No. 2 (2005): 282-92. Review.

## **Gunshot Wound, Porcine Model, Ballistic**

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