



Case Report

Gunshot wound trajectory analysis using forensic animation to establish relative positions of shooter and victim



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ABSTRACT

Forensic pathologists who autopsy the victims of gun violence are often called upon to answer questions in both criminal and civil proceedings about the relative position of the shooter and the victim. In this case report of an officer-involved shooting incident, the statement of the police officer appeared to be in direct contradiction to the statements of other eyewitnesses, the evidence at the scene, and the final resting position of the decedent's body. Trajectory analysis of two gunshot wound pathways (only one of which was instantaneously incapacitating) was performed to assess the veracity of the officer's statement and forensic animation was used to create a court exhibit. A discussion of the current peer-reviewed literature is included.

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1. Introduction

Forensic pathologists who perform autopsies in gunshot cases may be asked to determine the bullet trajectories in the body in order to elucidate the circumstances of a homicide and answer questions about range of fire, the order of shots fired, and the relative positions of the shooter and victim at the scene. However, there are few peer-reviewed articles or case reports detailing how trajectory analysis is performed in complex cases with conflicting testimony. The following case report documents an instance when the testimony of a police officer who shot a suspect was at odds with the evidence at the scene and the trajectory findings upon autopsy. In cases with conflicting evidence and testimony, it is necessary for the forensic pathologist to objectively analyze the pattern of injury in order to testify if the witnesses' testimonies are consistent with the scene, evidence, and autopsy findings.

2. Case report

A 911 call made by a neighbor reported a man brandishing a handgun outside a bar at 1:42 AM. A police officer arrived at the scene

and saw the man waving the gun around. The officer exited his patrol car, drew his weapon, and verbally commanded the man to drop his gun. The man began running away from the officer and the officer ran in pursuit, maintaining a distance of between 5 to 15 ft. between himself and the suspect. According to the police officer's statement, while running, the suspect tripped or fell near a pine tree. He then began to raise himself up and turn toward the officer raising his right arm as if holding a weapon (Fig. 1). The officer feared that the man was going to shoot at him and the officer fired two shots at the man, while the suspect was in this position. The officer stated that he transitioned from running to a stationary position prior to shooting and was stationary when he fired upon the suspect, who was approximately 15–45 ft. away. He fired two rounds from his department issued Glock 22 .40 caliber handgun.

Two witnesses were present at the shooting, one approximately 160 ft. east and the other approximately 70 ft. south of the scene. The witness 160 ft. east saw the pursuit and heard multiple gunshots fired in quick succession. He stated that the suspect was swinging his arms while running and appeared to throw something during the pursuit. This witness testified that the suspect was upright and running when the first shot occurred. The witness 70 ft. south of the shooting location initially stated he saw the decedent move behind the tree, but did not see the victim's body position during the shooting. However, this witness later testified that the victim was facing away from the officer at the time of the shooting and the witness never saw a gun in the

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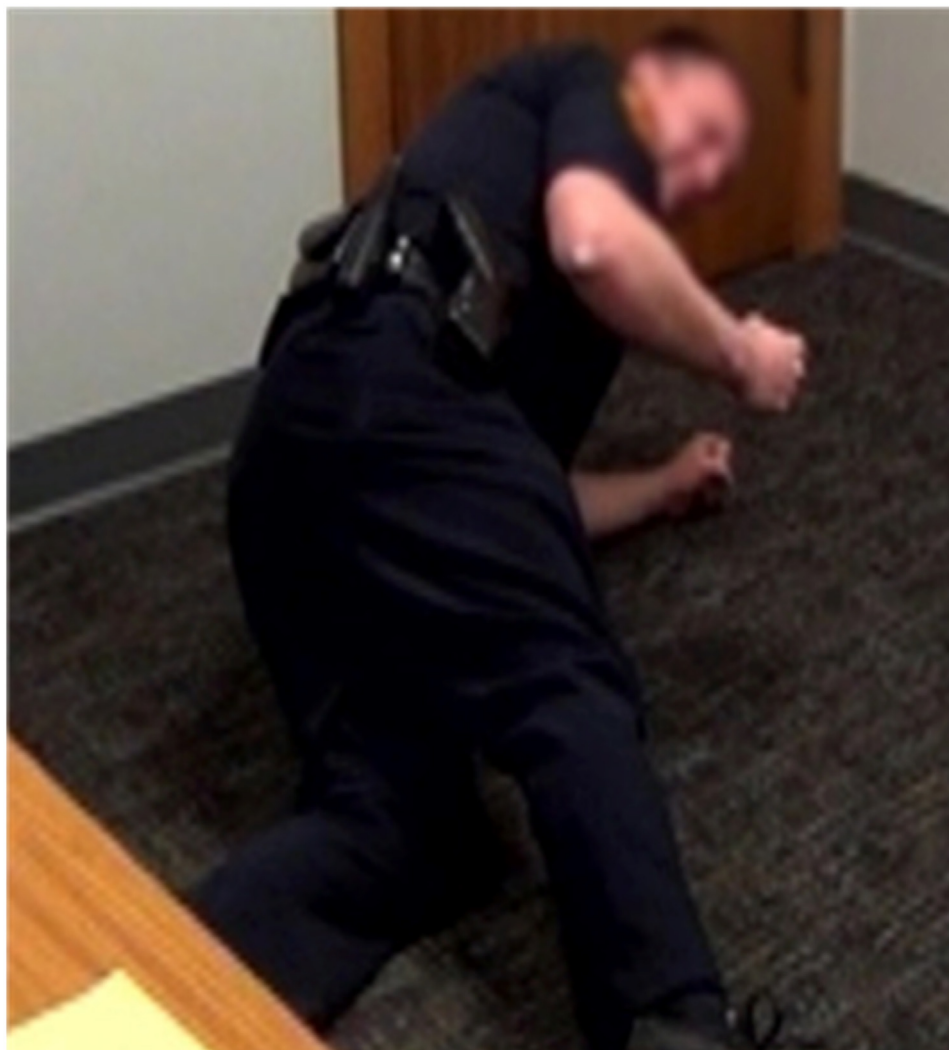


Fig. 1. In his videotaped deposition the officer demonstrates the position of the victim prior to being shot.

victim's hand. Two cartridge casings matching the officer's weapon were found 39 ft. and 44 ft. from the victim's point of rest. The distance between where the foot pursuit began and the deceased suspect's point of rest was measured at approximately 315 ft. Witnesses estimated that from the beginning of the pursuit to when the shots were fired, approximately 15–20 s elapsed. The 911 call from the neighbor recorded the two shots approximately 0.30 s apart. A gun was found in a front yard on the other side of the fence, approximately mid-way between the start of the foot pursuit and the final resting position of the victim.

Scene photos documented the location of the casings, the gun, and the position of the suspect's body at the scene. The decedent was face down against the grass with his left leg externally rotated and extended and his right leg flexed at a 90° angle at the knee, with his right foot resting up against an adjacent tree. His left hand was palm-up, down by the hip, a few inches from a baseball cap, which was in front of his body at the waist. His right hand was not visible in the facedown position, and was below his body (Fig. 2). First responders and witnesses testified that his body had not been moved from its final resting position after the shots were fired. An officer, however, said he had slightly rolled the decedent away from the tree towards the street to determine that he was dead and then rolled him back to his original position.

Following a complete autopsy, the cause of death was determined by the autopsy pathologist to be multiple gunshot

wounds and the manner was certified by the coroner as a homicide. Two gunshot wounds were identified: one to the head and one to the right lower leg. The gunshot to the head entered in the inferior right occipital scalp and exited at the left forehead. The entrance wound at the back of the head was a roughly oval defect with an eccentric pink abrasion collar. A small piece of black cloth, consistent with the black jacket of the decedent, was present in the abrasion. There was no soot or stippling surrounding the entrance wound and powder was not noted on his jacket or the hood of the sweatshirt. The wound path continued through the right occipital bone, right occipital brain, right cerebellar hemisphere, midbrain, left frontal lobe, exiting at the left forehead. The exit wound at the left frontal bone had an associated comminuted fracture involving the left anterior cranial fossa. Radiating from this fracture was an 8 cm linear, nondisplaced fracture extending to the left middle cranial fossa and a 20 cm fracture extending through the ethmoid bone, the sella turcica, and the right posterior cranial fossa. The ethmoid bone and the sella turcica had a 5 × 2 cm comminuted fracture. Diffuse subarachnoid hemorrhage covered the cerebrum and cerebellum. The brain stem was completely transected at the pontomedullary junction and was partially transected at the junction of the midbrain and pons. The right cerebellar hemisphere was markedly lacerated. The direction of the fire was back to front, right to left and upward.

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