G60 An Unusual Case of Crossbow Homicide

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The goals of this paper are to present a case of homicide due to a cranial encephalic wound provoked by an unusual lethal means identified also through experimental investigation.

A homicide is presented. A male is first rendered defenseless, blinded by a caustic substance and suffered head and chest wounds by a penetrating weapon missing from the scene of the crime. The peculiarity of the wounds and the scarcity of circumstantial evidence made additional investigation necessary in order to identify the weapon, including firing tests on experimental cranial models, for comparison.

A 52-year-old Caucasian male, a farmer missing from his home for two days, was found in a comatose state by the police in a forest in the Tuscan countryside. No weapon was found at the scene of the crime. The subject was revived in intensive care where wounds from a caustic substance were revealed on the face, eyes, shoulders, and back. In the left occipital region there was a round wound 1 cm in diameter and on the left hemithorax an oval wound 0.8 x 0.3 cm in diameter. The CT cranium revealed a large area of hemorrhage (25-30 cm) in the left temporal-mesial capsular nucleus, with hemo ventricle and shift to the right of the median line, the encephalic trunk appeared compressed with an obliteration of the pons mesencephalic cistern; the CT chest revealed integrity of the pulmonary and cardial structures. The subject died 98 hours after he was found. The autoptic macroscopic exam confirmed the presence of wounds due to liquid burns on the face, eyes, shoulders, and back. The chest revealed, on the cutaneous level, an oval shaped wound, with the dimensions of 0.8x 0.3 cm. On the skull, in the left occipital region, the scalp revealed an oval shaped wound, 0.8x 0.3 cm in diameter that continued into the soft tissues provoking a small semicircular sternal bone erosion, 0.3 cm in diameter. On the cranium, in the left occipital region, the scalp presented an oval shaped wound, on the main traversal axis, 1x 0.3 cm in diameter, surrounded by traces of reddish color; in correspondence to this wound the left occipital bone revealed a round wound with clean cut outlines, 1 cm in diameter. The frontal left bone presented, on its external surface, an area of irregularly shaped estrous flexions of the bone 1.3 x 1 cm in diameter and, on the internal surface, a round wound with clean cut outlines, not along the entire depth, 0.5 cm in diameter. The brain was sectioned with coronal cuts according to the Pitres technique. The left occipital pole presented a round wound 1cm in diameter along all of the encephalic lining, from the base upwards, crossing the hypothalamic region, the anterior horn of the lateral left ventricle until reaching the left frontal pole, where a round wound, 0.8 cm in diameter, was present. The entire distance from the left occipital region to the frontal left bone measures 23 cm. The histological findings of the brain revealed subarachnoid and intraparenchymatous hemorrhage, “red neurons,” diffuses axonal damage, confirmed by the positive results to the immunohistochemical dye for amyloid precursor protein (BAPP). According to the findings from the sectioning table it was possible to conclude that judging from the position and extension of the caustic wounds, acid was used to render the subject defenseless and successively strike him with greater ease. The chest wound was attributed to the use of a weapon with a pointed apex and scarce penetrating potential (2-3cm). In the cranium, the penetrating weapon once perforating the left occipital bone completely penetrated the brain and terminated in correspondence with the frontal bone, where it did not have the necessary force to completely perforate it. These findings permitted the authors to direct the investigation towards identifying a long penetrating object, 1cm in diameter and not less than 15 cm in length. It must have been animated by a weapon supplying the necessary force to penetrate the bone surface in such a clean cut manner and the cerebral substance so deeply; also it must allow a manual extraction of the arrow or dart, or one via automatic mechanisms of return, incorporated in the weapon utilized. The hypothetical weapon compatible with similar penetrating means must be capable of firing a manually extractable dart (crossbow, bow, spear gun, etc) similar to the pistols used for animal slaughtering with captive bolt. In order to establish the lethal weapon, firing tests were effected utilizing both mechanisms and, in particular, a Bernet “Wildcat II” model crossbow with a 150 pound bow, loaded with a 38 cm long, 1cm in diameter aluminum arrow with a conical head of the same diameter and a captive bolt pistol with a 20 cm long, 1 cm in diameter stylus loaded with caliber 22 ammunition, a model conventionally utilized in many Italian slaughterhouses. Experimental models of human craniums were constructed using plaster to simulate the bone structure and filled with a synthetic spongy material, easily penetrable, but minimally resistant, in order to reproduce the brain. The test with the crossbow, from a distance of 12 cm, produced a wound perfectly compatible with the postmortem data. The test with a captive bolt pistol resulted compatible with the wounds observed in the postmortem examination only if a modified weapon was utilized (a. with a prolonged external stylus, b. removal of the blocks that limit the internal path of the stylus) producing a 23cm wound, much longer than the 7-9 cm normally produced by common pistols used for slaughtering animals. The wounds produced in the experimental models with both types of weapon have characteristics compatible with those observed in

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the cranium of the subject, however the captive bolt pistol created a wound superior to 21 cm only when subject to difficult handmade modifications of the weapon, possible but extremely complicated. These data led the authors to consider as feasible the hypothesis of a manually extracted dart. Thanks to this technical support and to testimonial evidence some months after the homicide, the investigation led to the arrest of an individual. A search of his property produced a crossbow and modified metal crossbow arrows (removal of the head and filing of the penetrating extremity, positioning of the distal extremity of a device that facilitates manual extraction of the arrow). According to the postmortem findings and observation of experimental data, the sequestered crossbow and arrows proved to be the most probable scientific hypothesis of the weapon utilized for the crime. Only few cases of wounds due to crossbow mostly accidental or suicidal and rarely homicidal are reported, therefore, this rare case of homicide due to crossbow seems even more unique if the combined use of caustic substances to render the victim defenseless and the penetrating device (arrow) was not found on the scene of the crime was considered.

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