



Physical Anthropology Section - 2014

H52 Postmortem Damage to Skeletal Elements Due to the Extreme Weather Conditions of Hailstorms

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After attending this presentation, attendees will be familiar with a detailed description and patterning of the postmortem damage to the skeleton caused by extreme weather conditions (e.g., hail). The new information will allow anthropologists to improve the accuracy and specificity of postmortem defects observed on skeletal remains.

This presentation will impact the forensic science community by introducing unexpected postmortem fractures resulting from a weather-related phenomenon. Attendees will be provided a reference for a new interpretation of specific postmortem damage that might have been overlooked. In the future, the attendees will be aware of hailstones as a possible explanation of previously unexplained postmortem damage.

No known documentation of hailstorm damage to the human skeleton exists in the forensic literature. Clinical data indicates that hailstones can cause severe bruises and/or fractures on living people similar to that which is seen in blunt force trauma. Hailstones, which are irregular clumps of ice typically measuring from 5mm to 15cm in diameter, produce damage with a small impact area but with a high velocity. Thus, damage to the human body, including bone, can be severe.

On April 27, 2011, a band of strong storms caused record-setting wind and hail damage across East Tennessee. The Anthropology Research Facility (ARF — an outdoor laboratory for the study of human decomposition) in Knoxville, Tennessee, was hit by a downdraft that brought high winds and a severe hailstorm, causing the uprooting of trees, the topping and felling of trees, significant structural damage to the fencing, and widespread hail-related damage from hailstones observed to be approximately the size of chicken eggs. All body donations at the ARF at the time of the storm, were surveyed to determine the extent of that storm-related damage. Hailstone damage was noted for several of the human remains residing on the surface, which was expected, as it has been estimated that a hailstone with 8cm diameter can fall as fast as 171km/hour.¹

This study examined 19 skeletons, which have now been accessioned into the Bass Donated Skeletal Collection and were at the ARF on April 27, 2011. These individuals had been placed at the ARF mostly in a prone position between May 2010 and February 2011 with a postmortem interval ranging from nearly three months to twelve months. The locations varied throughout the ARF. Nine individuals are males and ten are females with age-at-death ranging from 42 to 82 years. All skeletons were thoroughly examined and any damage was documented.

The most commonly affected elements were thin bones like scapulae and ilia. Fourteen out of nineteen had at least one scapula fractured. Seven ilia and one ischium showed postmortem damage that was likely caused by hail. Three individuals had one of their zygomatic bones broken off as well as the maxilla damaged. One of these three exhibited a circular hole in the temporal bone. One cranium had major portions of the left temporal and parietal broken into multiple pieces. Interestingly, some lower limb long bones exhibited postmortem fractures attributable to hailstone damage. Also, five individuals had postmortem fractures of the spinous processes of thoracic or lumbar vertebrae. Multiple individuals demonstrated postmortem fractures of the ribs, but the damage observed cannot be clearly linked to hail-related damage due to the general fragility of the ribs.

The damage caused by hail can be characteristics as circular or elliptical depression fractures of various sizes. Most of the fractures on the scapulae are complete circular depression fractures with the central piece missing. The fractures in the femora, tibia, fibula, and most of the ilia are incomplete, ovoid-shaped, depressed fractures. On narrow surfaces, like the ribs and spinous processes, the small surface area precludes determination of the shape of the impact site. However, unlike the damage to the ribs, the damage observed on the spinous processes is likely the result of hail.

Hail damage could be confused with other types of postmortem damage but the circular shape of the impact area and complete perforation of the bone indicate a small ovoid-shaped object with high velocity hitting the surface. When unusual postmortem damage is observed in remains recovered from the outdoor context, hailstone damage should be considered.

Reference:

1. <http://www.nssl.noaa.gov/education/svrwx101/hail/>



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Taphonomy, Blunt Force Trauma, Hail