H141 Experimental Wood Chipper Reduction: Trauma and Distribution Patterns

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After attending this presentation, attendees will understand the expected trauma and distribution patterns of hard and soft tissues associated with the reduction of human remains using a small, commercial, disc-type wood chipper applied to a porcine model.

This presentation will impact the forensic science community by providing basic guidelines for the skeletal and integumentary trauma patterns of tissues subjected to wood chipper trauma. It will provide expected distribution patterns of remains that will help crime scene investigators, law enforcement, and forensic anthropologists recover the maximum amount of hard and soft tissues possible. This study also outlines the possible ease of human-enacted and natural methods of concealment. In addition, this presentation illustrates the different trauma patterns expected for the axial versus appendicular skeleton placed into a wood chipper, including size ranges. The information included in this presentation is important for the search, recovery, analysis, and contextual information associated with traumatic injury wood chipper cases.

Previous studies have focused on fragment size and the differentiation between chipping and shredding mechanisms and the macroscopic trauma characteristics applied to long bones by home-model wood chippers.[1,2] A single 300-pound *Sus scrofa domesticus* carcass was acquired from a local farm and dismembered at the Forensic Anthropology Research Facility at Texas State University. The limbs were dismembered at the joints to avoid creation of confounding trauma characteristics. Ribs were disarticulated from the vertebrae near the rib heads with a pair of loppers. Only lateral and anterior rib fragments were sampled to avoid confounding variables. Following dismemberment and evisceration, the appendicular and axial portions were placed into the machine separately with the chute moved in between chipping of the two groups. Bones were placed into the machine proximal portions first, mimicking a person entering head-first into the wood chipper. The resulting distributions were mapped and measured separately with the appendicular skeleton as distribution “a” and the axial portion as distribution “b.” The distributions were kept separate throughout the warm water maceration process. Forty macerated sample fragments from each distribution were examined for macroscopic and microscopic characteristics of sharp and blunt force trauma. Observed trauma characteristics included kerf marks, longitudinal and transverse fractures, through-cuts, spurs, and notches.

In this study, there were observable differences in the frequency of both microscopic and macroscopic traumatic characteristics of the axial versus appendicular skeletal material. Fragment size ranged from a large 84mm long rib fragment to skeletal debris the size of sand. Many fragments were macroscopically identifiable by skeletal element as well as human versus non-human origins. In addition to skeletal fragments, large swatches of skin as large as 260mm by 170mm were also recovered from the distribution area.

While the use of wood chippers as tools for human remains reduction is uncommon, these machines have been used in the past to conceal homicides. Some cases are still under investigation today. The expansion of knowledge regarding wood chipper reduction as reported in this presentation could expedite the process of remains recovery and analysis by guiding investigators toward a more accurate search area and providing expectations as to fragment size and trauma patterns. This study will present an account of experimental wood chipper trauma and the results regarding expected fragment size in axial versus appendicular bone and skin, the distribution pattern of remains, and microscopic as well as macroscopic skeletal trauma patterns.

References:

1. Williams JA. Bone fragmentation created by a mechanical wood chipper. P Am Acad Forensic Sci 2007.
2. Domenick K. Analysis of experimental wood chipper trauma on bone. PhD Dissertation. George Mason University, Fairfax, VA: 2012.

Skeletal Trauma, Wood Chipper, Bone Fragments

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