



## Physical Anthropology Section – 2010

### H14 Common Household Rope and an Outdoor Hanging: An Investigation Sparked by a Skeletal Case Exhibiting Cervical Vertebra Entrapment

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After attending this presentation, attendees will appreciate the limitations imposed by the type of rope used in outdoor hanging contexts.

This presentation will impact the forensic science community by providing data on the limitations of the type of rope used in outdoor hanging contexts, and insight into the clues important in determining whether skeletal remains decomposed on the surface or while being suspended.

Despite the fact that most suicidal hangings occur indoors, outdoor suicidal hangings are a relatively common occurrence (Komar et al., 1999; Spitz and Fisher, 2004). The purpose of this study was to recreate a skeletal forensic case involving an outdoor suicidal hanging that presented with a cervical vertebra entrapped in a cotton and belt makeshift noose (Berryman, 2008). In this type of case the presence of the entrapped cervical vertebra is thought to provide clear evidence of hanging as the cause of death (Ledford et al., 2009); however, it is unclear what conditions are required for this to occur. In the absence of a feature of this type, especially in anthropological cases where the bones and associated cultural items have been scattered, it would be difficult to attribute hanging as a cause of death as the pattern of skeletal deposition of a hanging individual is virtually unknown.

This preliminary investigation attempted to recreate a skeletal forensic case that presented with an entrapped cervical vertebra in an outdoor context. In order to do so, a 10-foot high wooden device was built to bear a maximum load of over 600 pounds with a pulley/crank system to ease the force required to lift an individual into the hanging position (1 to 2 feet above the ground surface). This study was designed to test whether a cotton rope, commonly used in indoor hanging contexts, can be used to recreate a “true hanging” where both feet are off the ground. Although a cotton rope was not used in the case that precipitated this research, it is thought to be an adequate substitute for the actual cotton material (rolled to form a cord approx. 3/8 inch in diameter) that appears to be the point of failure, having been broken or cut. This research was conducted at the Anthropological Research Facility at the University of Tennessee using cadavers from the Forensic Anthropology Center body donation program.

Results indicate that a cotton rope 3/8 inch in diameter is unable to sustain the full weight of a hanging, adult individual. In most circumstances the tensile strength of a particular rope is made available by manufacturers and can be used to assess whether an individual was fully suspended, or suggest a positional asphyxiation scenario, where feet remain on the ground. It is impossible to determine how a rope will respond to an outdoor hanging situation based solely on its tensile properties, especially in situations where common household items have been strung together to form makeshift asphyxiation devices. The cotton clothesline rope used in this study is common in indoor hanging scenarios, but it seems that it does not possess the tensile strength to withstand a fully suspended load.

As forensic practitioners—particularly in anthropological cases in an outdoor setting—the possibility of hanging as a potential cause of death is not considered without the presence of obvious features such as a noose. An understanding of the decomposition process and subsequent skeletal deposition in hanging cases is essential in order to differentiate between remains originally decomposing on the surface from those that decomposed while being suspended. Expanding our understanding of the decomposition process and subsequent skeletal deposition in situations other than an individual lying on the ground is necessary. Investigations of this nature may enable the discovery of other tell tale markers to differentiate situations where an individual decomposed on the surface as opposed to a hanging situation, and vice-versa. Identifying tell tale markers indicative of decomposition while suspended, and understanding the variables that the hanging condition presents (e.g., distance from the ground, positioning of the body in relation to the asphyxiation device, the type of noose used, and how these affect the decomposition process) may allow a more accurate evaluation of these types of cases.

#### **Outdoor Hanging, Cause of Death, Forensic Anthropology**