



G25 Agonal Sequences in Four Filmed Hangings: Analysis of Respiratory and Movement Responses to Asphyxia by Hanging

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The goal of this presentation is to first review the literature on physiological responses to asphyxia by hanging in human and animal literature, and then to compare such data to four cases of filmed hanging. In the conducting of investigations and trials, forensic pathologists are often asked to discuss the body's responses to hypoxia/anoxia and their temporal relationship to the timing of asphyxial deaths. However, those questions are difficult to answer considering the actual paucity of research literature.

This presentation will impact the forensic community and/or humanity by providing new insight into the physiopathology of human asphyxia.

Introduction: The human pathophysiology of asphyxia by hanging is still poorly understood, despite great advances in forensic science. Even though some studies have been conducted on animals, the extent to which those results can be applied to human is uncertain. Since experimental protocols are, of course, out of the question, filmed hangings hold the key element to answer questions regarding the sequence of events leading to death in the context of human asphyxia.

Methods: A total of four filmed hangings were analyzed: one suicide filmed by a video camera, two autoerotic deaths and one suicide in custody filmed by a surveillance camera. Those filmed hangings were compared in terms of loss of consciousness, convulsions, decortication, and decerebration rigidity, loss of muscle tone, last muscle movement, and respiratory responses. Two independent judges scored the time frame at which each of these responses occurred.

Results: With the time 0 representing the onset of hanging, rapid loss of consciousness was observed (at 13-18s), closely followed by appearance of convulsions (at 15-19s) in all cases. Within the first minute (19-21s in most cases, 46s in one case), decerebration rigidity was observed. Two phases of decortication rigidity was also noted, the first one being relatively sudden and quick (onset at around 1min00s -1min 08s in most cases, 21s in one case) while the second one (onset between 1min04s - 1min32s) extended for about one minute, with an observed climax of rigidity about 20 seconds after its onset. Appearance of loss of muscle tone varied between 1min 38s and 2min 47s, with last isolated muscle movement occurring between 2min 15s and 4min 10s. Similar patterns between cases was observed for respiratory responses: onset of very deep respiratory attempts between 20 and 22 seconds, last attempt between 2min 00s and 2min 04s for an average interval of 1min 40s to 1min 42s. Overall, total hanging time before apparent death was between 2min 47s - 4min 10s.

Conclusion: Despite differences in the types of hanging, similarities could be revealed regarding rapid loss of consciousness and onset of convulsions, pattern of decortication rigidity and respiratory responses. To date, this is a unique study of agonal movements in asphyxia by hanging. The importance of inter-laboratory collaboration in extending this project by adding other available filmed hangings is discussed and the importance of a Working Group of Human Asphyxia (WGHA) is further emphasized.

Asphyxia, Hanging, Forensic Pathology