



Pathology Biology Section – 2009

G108 Agonal Sequences in Eight Filmed Hangings: Analysis of Respiratory and Movement Responses to Asphyxia by Hanging

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After attending this presentation, attendees will have a better understanding of the pathophysiology of human asphyxia by hanging.

This presentation will impact the forensic community by providing new insights into the body responses to asphyxia by hanging, based on results from the Working Group on Human Asphyxia.

Introduction: In the conducting of investigations and trials, forensic pathologists are often asked questions related to body responses in human asphyxia. Those questions are very difficult to answer considering the paucity of literature. Animal studies have been conducted, but the extent to which those results can be applied to human is doubtful. As for direct human experimentation, it is of course out of question for obvious ethical concerns. To palliate these limitations, the Working Group on Human Asphyxia was formed in 2006 at the 58th Meeting of the AAFS in Seattle. This working group has for main objective to regroup filmed hangings in order to give new insights into the pathophysiology of human hanging.

Methods: A total of eight filmed hangings from three different countries (Canada, Switzerland, and United-States) were analyzed: two filmed suicides and six autoerotic deaths. Hangings were of different types: free hanging, hangings with feet on the ground, hanging kneeling and hanging almost lying face-down. The hanging ligatures also varied widely, from cloth band to ropes with or without padding and electric cords. All victims were adult males. Those filmed hangings were compared in terms of loss of consciousness, convulsions, decortication and decerebration rigidities, loss of muscle tone, last muscle movement, and respiratory responses. The time frame at which each of these responses occurred was taken by two judges.

Results: With the time 0 representing the onset of hanging, rapid loss of consciousness was observed (at 8 – 18 seconds), closely followed by appearance of convulsions (at 10 – 19 seconds) in all cases. A complex pattern of decerebration and decortication rigidity was then observed in all cases. Last isolated muscle movement occurred between 1 minute-2 seconds and 7 minutes-31 seconds. High similitude was observed for respiratory responses: onset of very deep respiratory attempts between 13 and 24 seconds, last attempt between 1 minute-02 seconds and 2 minutes-05 seconds.
nd : no data/– not observed

	Case #1	Case #2	Case #3	Case #4	Case #5	Case #6	Case #7	Case #8
Movement Responses								
Loss of consciousness	13s	nd	18s	nd	10s	8s	10s	12s
Convulsions	15s	14s	19s	18s	13s	11s	10s	14s
Decerebration	46s	19s	21s	nd	1min19s	31s	11s	20s
Decortication #1	21s	1min08s	1min00s	nd	59s	33s	26s	31s
Decortication #2	1min11s	1min32s	1min04s	nd	–	–	34s	–
Loss of muscle tone	1min38s	2min47s	2min04s	nd	1min52s	–	–	–
Last muscle movement	4min10s	3min01s	3min01s	nd	7min31s	1min02s	nd	nd
Respiratory Responses – Very Deep Respiratory Attempts								
Start	20s	21s	22s	24s	13s	19s	13s	16s
End	2min00s	2min47s	2min04s	nd	2min5s	1min02s	nd	nd

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 the Working Group of Human Asphyxia (WGHA) is further emphasized.

Asphyxia, Hanging, Physiopathology