

## Delayed Deaths in Hanging: An Autopsy Review

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### Abstract

Hanging is one of the most common methods of suicide in India in which death of the individual occurs almost immediately. It is a widely practiced suicidal method in all cultures and has a very effective killing potential with a mortality of 80 percent. Death in hanging occurs immediately, however, a few cases have been reported in literature in which death has occurred after a certain period of time or the patient has survived after prolonged resuscitative measures. We report those cases of delayed death in hanging, for its rarity, for the discussion of the possible delayed causes of death in case of hanging and to emphasize the complications associated with delayed hanging. Present study is conducted on 76 cases of hanging deaths brought to mortuary of RRMC & hospital, Bangalore for postmortem examination from Jan 2013 to Dec 2013. The present study is conducted to analyze the cause of death in immediate & delayed cases of hanging.

**Keywords:** Hanging; Asphyxia; Delayed deaths; Encephalopathy; Pulmonary edema.

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### Introduction

Hanging is a form of asphyxia death due to constriction of the air passage at the neck, as a result of suspension of the body by a ligature in the form of a noose, applied in such a manner, when weight of the body acts as a constricting force.[1] Weight of the head (5kg-6kg) is enough to act as constricting force. Hanging is one of the commonest methods of suicide especially amongst the Asian countries. The incidence of hanging in India is approximately 25% of total cases of suicide. Hanging is known as a painless mode of death with a very narrow failure rate. Hanging is seen at all age groups. Hanging is always suicidal in nature until proved otherwise. Hanging usually ends in death, and about 80%

of victims are found dead at the scene of the hanging. However, sometimes the hanging victims over live for some time, and sometimes even survive the hanging. A person can be saved by aggressive resuscitative measures if rescued within a few minutes of suicidal hanging. Only few persons survive this episode, if rescued promptly and usually die at a later stage, which more precisely can be called delayed hanging death. Here we report 3 cases of delayed deaths out of 76 cases of suicidal hanging with the victims eventually succumbing to one or more of the fatal complications after surviving for different time duration.

### Results

In 76 cases, death occurred immediately in 73 cases after hanging, in remaining 3 cases death occurred after few days of hanging. The post mortem examination and histopathological reports confirmed the causes of death in these cases.

### Case 1

Deceased was a 22 year old male who

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survived for 3 days following hanging with mechanical ventilator support. He was clinically diagnosed to have suffered hypoxic ischemic encephalopathy and aspiration pneumonia due to hanging. The patient was on a mechanical ventilator for 3 days. On postmortem examination the external features were unremarkable except the presence of faint ligature mark over the neck. On internal examination brain was edematous, the lungs were edematous, features of consolidation were noted, and on cut section of lung pus mixed froth was noted. Histopathology of brain showed features of hypoxic encephalopathy with pulmonary edema. Death is due to hypoxic encephalopathy and pulmonary edema consequent upon hanging.

#### *Case 2*

Deceased was a 30yr old female who survived for 6 days following hanging. She was on mechanical ventilator. After 5 days of intubation, she developed seizures & died of cardiac arrest. On postmortem examination external features were unremarkable except for the presence of ligature mark over the neck which was partially healed. On internal examination blood stained froth present in the larynx & trachea. Both the lungs were edematous & features of consolidation present. Brain was edematous. On cut section blood mixed pus present. Stomach showed presence of 50ml of blood. Histopathology confirmed the pulmonary edema of lungs with hemorrhage. Death is due to pulmonary edema and hemorrhage consequent to hanging.

#### *Case 3*

Deceased was a 53yr old male who survived for 36hrs following hanging. He was intubated & finally died due to Hypoxic encephalopathy & aspiration Pneumonia. On postmortem examination ligature mark was present over the neck. Both lungs were edematous and had consolidation features. On internal examination fracture of superior horn of thyroid cartilage & greater cornu of thyroid

cartilage was noted. Death is due to complications consequent upon hanging.

### **Discussion**

Hanging is a form of asphyxia death due to constriction of the air passage at the neck, as a result of suspension of the body by a ligature in the form of a noose, applied in such a manner when weight of the body acts as a constricting force.[2] Death occurs within 2-3 minutes in majority of hanging cases. In our study, instantaneous death occurred in 73 cases, most commonly due to asphyxia and venous congestion. Death usually occurred immediately after constriction of neck due to obstruction of the airway either through compression of the trachea or displacement posterior of the tongue and floor of the mouth resulting in asphyxia and associated venous congestion in most of the cases. Ischemic cerebral damage due to neck compression caused by compression of the blood vessels of the neck resulting in insufficient amount of oxygenated blood reaching the brain is seen in most of the cases.[3] While the remaining 3 cases showed delayed death following hanging. Prinsloo and Gordon, Sapiro and Meritz described late causes of death in hanging a few decades ago and Narayan Reddy has thrown some light on the same.[2]

In the present study delayed death is mainly seen in male which is consistent with existing literature on delayed hanging deaths which is predominantly seen in male, with an average age of 40 years.[4,5] The clinical features of a patient of hanging involve respiratory and central nervous system signs and symptoms.[6] The common respiratory signs are respiratory distress, hypoxia, pulmonary edema etc; and signs related to CNS are like restlessness, unconsciousness, muscular rigidity, convulsions, amnesia, hemiplegia etc.[7]

Delayed death for several days is usually rare. Delayed death occurs due to aspiration pneumonia, infection, edema of lungs, edema of larynx, hypoxic encephalopathy, infarction

in the brain, abscess of brain, & cerebral softening.[2] Delayed death can occur after any number of days. Most of the studies show that delayed death is most commonly due to hypoxic encephalopathy and pulmonary edema which is consistent with our study.

Hypoxic ischemic encephalopathy is an important complication in a patient who survives an attempt of hanging. Hypoxic brain injury or global cerebral ischemia occurs due to reduced cerebral blood flow over the entire brain. At the time of hanging, oxygen supply is decreased to brain because of pressure on carotid, severe enough to damage brain cells. This hypoxia ultimately leads to encephalopathy which is consistent with our case. Necrosis of brain cells leads to inflammatory reactions, which ultimately causes swelling and edema. Brain edema together with postural lung congestion and infection leads to respiratory failure.[8] Decreased perfusion of the brain occurs when blood flow to it is partially or completely restricted, when blood pressure is very low, or when circulation ceases entirely. These conditions deprive the brain not only of oxygen but also glucose and all other nutrients as well as the nutrient/waste exchange process required to support brain metabolism, resulting in the development of a hypoxic-ischemic state and resulting in death of the individual.[6] Most often it is the inadequate oxygenation and cerebral perfusion that result in the death of the patient.[9]

Next common cause in delayed hanging death is development of pulmonary oedema. Development of pulmonary edema has played a major role as one of the causes of death in delayed hanging. The pathophysiology of type I post-obstructive pulmonary edema as in post hanging is thought to be influenced by both hydrostatic forces and increased permeability of alveolar epithelium following sudden upper airway obstruction.[10] Pulmonary capillary membrane damage leads to increased capillary permeability, hyperemia in the lungs due to abrupt fall in intrapulmonary pressure following sudden removal of airway obstruction and pulmonary vasoconstriction mediated by vasoactive substances like

histamine, serotonin and kinins; the release of which is triggered by cerebral hypoxia.[11] If patient is rescued within few minutes of hanging, may be saved from pulmonary edema by applying specific resuscitative measurements.[12]

The other rare causes for death in delayed hanging are aspiration pneumonia, brain abscess, septicemia.

Victims of hanging usually die within period of three to five minutes.[13] In our study 3 cases succumbed to delayed death, after variable durations ranging from 3 days to 6 days. Pulmonary edema and hypoxic encephalopathy are the most common complications. If patients rescued within few minutes of hanging, may be saved by applying specific resuscitative measurements and usually die at a later stage. In our study all the 3 cases were in unconscious state till the death which is consistent with study by Maxeiner where he reported delayed hanging death in six cases of suicides who were all unconscious throughout till death.[14] In another study from Delhi, an uncommon accidental hanging of an adult male was reported who got trapped in the lift of a building and was accidentally hanged. He also survived for 39 days in the hospital and died.[15] Aggarwal *et al* from Delhi (India) reported a similar case where a 20 year old female survived for nine days in the hospital being unconscious throughout, after a hanging episode and died ultimately due to cerebral anoxia.[6] So delayed death can occur after any number of days following hanging.

## Conclusion

Hanging is a painless method of committing suicide and death is instantaneous. Only few persons survive this episode and usually die at a later stage. Most of the delayed death is due to hypoxic encephalopathy and pulmonary edema which is consistent with our study. If above complications are promptly treated patient may be saved from delayed deaths due to hanging.

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### References

1. I. Gordon, HA Sapiro and SD Berson. Forensic Medicine - A guide to principles, 3rd edition. Edinburgh London Melbourne and New York: Churchill Livingstone; 1988, 95-127.
2. KS Narayan Reddy. The Essentials of Forensic Medicine and Toxicology. 29th edition. K Suguna Devi; 2010: 314-322.
3. Mukherjee's JB. Text book of forensic medicine & toxicology, 4th edition, 7th chapter. 287-289.
4. Penney DJ, Stewart AH, Parr MJ. Prognostic outcome indicator following hanging injuries. *Resuscitation*. 2002; 54: 27-29.
5. Willms D, Shure D. Pulmonary edema due to upper airway obstruction in adults. *Chest*. 1988; 94: 1090-1092.
6. Aggarwal NK, Kishore U, Agarwal BB. Hanging-delayed death (a rare Phenomenon). *Med Sci Law*. 2000; 40: 270-2.
7. Pradeep KG, Kanthaswamy V. Survival in hanging. *American Journal of Forensic Medicine and Pathology*. 1993; 14: 80-81.
8. J Venkatesaprasanna, P Parmar, R Baaraman. Delayed death after survival period of 28 days in case of hanging – a rare case report. *Int J Med Pharm Sci*. 2012; 3(4): 23-26.
9. Nithin MD, Manjunatha B, PramodKumar GN, Sasidharan. Delayed death in hanging. *J Forensic Res*. 2011; SI: 001. Doi: <http://dx.dot.org/10.4172/2157-7145>.
10. Fremont RD, Kallet RH, Matthay MA, Ware LB. Post obstructive pulmonary edema: A case for hydrostatic mechanisms. *Chest*. 2007; 131: 1742-1746.
11. Oswalt CE, Gates GA, Holmstrom MG. Pulmonary edema as a complication of acute air way obstruction. *JAMA*. 1977; 238: 1833–1835.
12. M Kumar, R Mandhyan, U Shukla, A Kumar and RS Rautela. Delayed Pulmonary Oedema Following Attempted Suicidal Hanging–A Case Report. *Indian J Anaesth*. 2009; 53(3): 355–357. PMID: PMC2900131
13. Subrahamanyam BV. Modi's Medical jurisprudence and toxicology. 22nd edition, New Delhi: Butterworths; 1999, sec II, 251-272.
14. Maxeiner H. Delayed death following strangulation (hanging). *Arch Kriminol*. 1987; 180: 161-71.
15. Verma SK, Agarwal BB. Accidental hanging with delayed death in a lift. *Med Sci Law*. 1999; 39: 342-4.