

■ REVIEW ARTICLE

## Death due to Asphyxia: A Forensic Prognosis

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### ABSTRACT

From ancient times, hanging, strangulation, and ligature marks have been the topic of interest in forensic science, psychology, forensic medicine, and other branches of science. Hanging is a courageous act for committing suicide; people kill themselves by hanging with the means of ligature. Nowadays, the cases of committing suicide by the standards of hanging are tremendously rising; adults perform this act, but teenagers find it easy to commit suicide and hang themselves. In comparison, strangulation causes death by strangulating the surface of the throat or neck. Hence the essential responsibility of the forensic investigator and the forensic medicine practitioner is to determine the mode of death. Significant and minor findings are located at the time of death, differentiating whether the end is due to hanging or strangulation. Hence, the study aims to detail the hanging, strangulation, the ligature marks, and the post-mortem findings of the major and minor findings during investigation in the cases of hanging and strangulation, which would help the attentive soliloquist to differentiate among these two modes of death and attempts to discuss the scientific grounds, techniques, and methods used to study the cases of hanging and strangulation, along with the type of ligature used and the methods used for the strangulation with their post-mortem findings while performing an autopsy.

**KEY MESSAGE:** Role of Death due to Asphyxia: A Forensic Prognosis in Forensic investigation

**KEYWORDS** | Hanging, Strangulation, Bansdola, Ligature marks, Hyoid bones, Mugging, Neck compressions

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### INTRODUCTION

**S**UICIDES, HOMICIDES, OR MURDERS THE ACTS which are pernicious in our society. Mechanical asphyxia causes death in case of hanging and strangulation. The pressure is exerted upon the neck, or the body is placed in the position, which creates a ferocious condition in which it becomes knotty to breathe or respire. These acts are performed to kill oneself or to kill someone else. People perform these acts ensuring the ultimate fatal of own-self in the case of suicide.<sup>2</sup> In contrast, in homicides or murders, the of-

fender kills the victim for personal reasons, greed, retribution, marital reasons, or other reasons. Nowadays, the cases of suicides are rising vigorously, which is not only a fraught but also this act perpetrated by the teenager and adults of our country has some dark number. The death through hanging is serene and painless compared to the other suicidal deaths like deliberately putting fire oneself, poisoning, or any other form of an act that results in the ultimate painful fatal. Suicidal death in India is defined under the three sections of the Indian penal code (IPC, 1860), section 305, section 306,

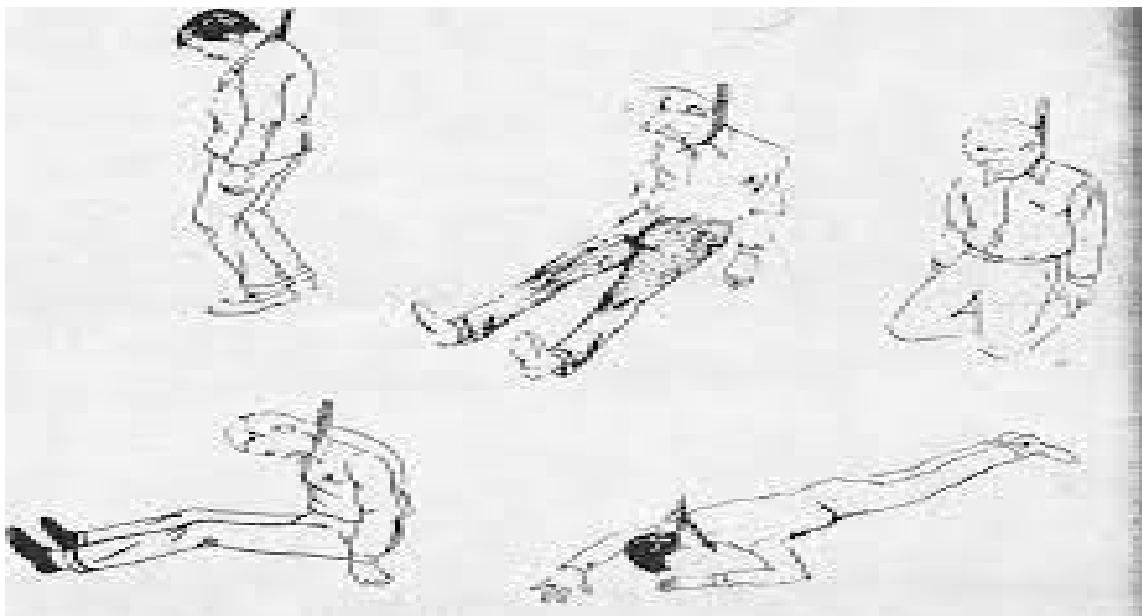
and section 309.<sup>12</sup> Hanging also plays a pivotal role in our judicial system, as in India, the verdict taken by the judiciary for some criminal cases is prone to the death penalty. The judicial Hanging in India is also known as justifiable homicide as the death penalty is given to the offender to do justice for the victim, to maintain discipline along with rules and regulations of the country, and to keep fear of the death penalty among people of the country so that they would think about the judicial system before committing the crime and know the consequences of their wrongdoing. The death-sentenced in India is legally known as capital punishment, and for hanging the offender, the jail rules and regulations are followed.<sup>9</sup>

In contrast, strangulation is a violent crime in which the offender strangulates the neck of the victim, which leads to blunt trauma on the neck leading to asphyxia death. Strangulation by ligature: the act of killing someone by strangulating the neck through a ligature. It is not necessary that in the case of strangulation, the victim's death occurs with any intention of the offender. Sometimes accidental strangulation also leads to the death of the victim. Hence it set off a task for the forensic investigator and forensic medicine practitioner to differentiate between intentional strangulation and accidental strangulation. Moreover, the ligature

mark and post mortem findings play a crucial role in leading the investigation. It assists the investigation in differentiating the mode of the death, whether it is suicidal, homicidal, or accidental death due to hanging or strangulation.

### Suicidal Hanging

Suicidal hanging is expounded as an asphyxia death in which the person tries to self-suspense themselves through ligature from the fan, tree, poles, or any possible object or thing that supports the heavy object's suspension. It is a frequent type of hanging that is comprehensively used to commit suicide in India and worldwide. The majority of the death in the case of suicidal hanging transpire death due to asphyxia<sup>5</sup>. The ligature used for the suspension are ropes, scarfs, bedsheets, wires, leather straps, belts, sarees, turban, sacred thread, or any other means that suspend the body. In a forensic investigation, the hanging cases are investigated at the crime scene based on two aspects, which also classify the hanging. The first aspect to look for the hanging is the degree of suspension. In the degree of suspension, the investigator looks for the type of suspension. There are two ways of ligature suspension in which the body is recovered from a crime scene.



**Figure 1:** Partial hanging (Source: Image Courtesy Internet Source Jaypee Digital| eBook Reader)

- **Complete Hanging:** When the person hangs themselves at a height more than their height so that the victim's body or any part of the body does not touch the ground is known as complete hanging.<sup>11</sup>
- **Incomplete Hanging:** This type of hanging is also known as partial hanging. In this type of hanging, when the body is suspended, the body or its part is in contact with the ground or any object. In incomplete hanging, the head, chest, and hands apply the pressure on the neck, and these body organs work as the constricting force, which ultimately leads to the fatal<sup>7</sup> as shown in figure 1.

Another facet that plays a pivotal role in forensic investigation is the tying of ligature or any

suspending mean, hence based on the position of the knot, hanging is classified further into two types:

- **Typical Hanging:** In this, the investigator looks for the running of the ligature and the knot's location, if the knot is tied at the center back of the neck and the ligature passes from the side of the neck to the occipital region.
- **Atypical Hanging:** In this, the knot and ligature are irregular, and the ligature does not run from the occipital region. In the atypical hanging, it is noted that a knot is present either on the right side or left side or in front. The binding of the knot depends upon the feasibility of the person<sup>11</sup> as shown in figure 2.

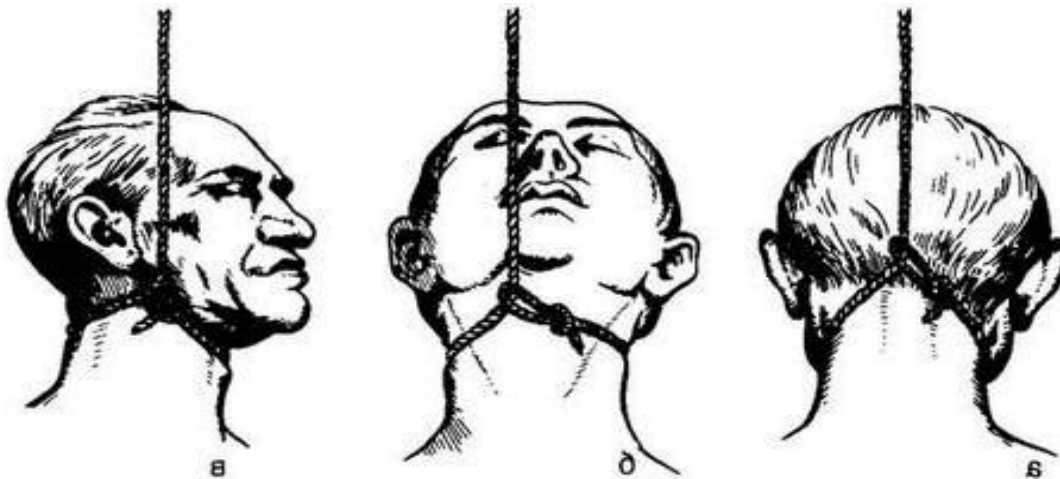


Figure 2: Ligature position around the neck [Source: Image Courtesy "Mechanic Asphyxia Prof. Givasov Z.A.]

Furthermore, homicidal hanging is a rare type of hanging. It is generally spotted in the cases where the person is under the influence of drugs, alcohol, or heavily injured, which leads to numbness of the body. The person is in deep sleep so that in those cases, the offender hangs the victim with the criminal intent of causing fatality to the victim.<sup>13</sup> The deaths in homicidal hangings are caused due to Asphyxia.<sup>3</sup> The significant symptoms of homicidal hanging and suicidal hanging are similar, and the offender tries to imitate the appearance of suicidal death. The word "Lynching" came into existence from the United States of America

and was given the name of "William Lynch," the one who used to pass the order of hanging instantly. He used to hang people based on racism, where he targets the black people who were offenders of rape or rapes. The white mob used to play a significant role in hanging the offender. Hence this type of homicidal hanging is also known as mob lynching because of the indulgence of the mob causing fatal.<sup>11</sup>

Accidental hanging is expounded as the hanging in which a person or kid fortuitously hangs themselves, leading to their death. This type of hanging is usually seen in the cases of children where they suspend themselves while

playing, climbing trees, mimicking the action performed in the wrestling, or following their action superstar. In adults, the cases of accidental hanging are more miniature than almost negligible.<sup>12</sup>

**Autoerotic Hanging:** This type of hanging is bizarre and is shared among the groups of gays or in abnormal sexual behavior when a person obtains sexual pleasure by choking the neck through ligature of the partner for a wild sexual activity, which results in the diminished supply of blood and oxygen to the brain. The person becomes unconscious, and the death is unanticipated; the participation of the males is more in autoerotic hanging which are younger than 30 years of age and more than 11 years of age.<sup>14</sup> In India, the incident of mob lynching raised vigorously from the year 2010 to 2017.<sup>6</sup> As per the study of the web portal, it asserts that among 60 incidents of cow beef exportation cases, 25 people were mob lynched.<sup>1</sup>

### Strangulation

In strangulation, death occurs due to constriction of the neck employing any substance or usually ligature without suspending the body. It is generally classified based on the act followed by the offender against the victim; it includes mugging, garrotting, bansdola, and throttling.

- Mugging is expounded as compressing the victim's neck by applying the pressure with a forearm; it is generally known as the choke-hold.
- Garrotting is performed from the victim's back, and the offender strangulates employing ligature followed by tightening it swiftly (Line Jr et al., 1985).
- Bansdola the neck is compressed using complex objects, usually sticks of bamboo; the cases of death by bansdola are usually recorded in north India.
- Throttling causes asphyxia by compression of the neck by applying pressure through the hands. Palm strangulation is one of the most common acts used strangulation. In this, using the palm of one hand offender closes the nostrils and mouth, and by using the heel of another palm, the offender applies pressure to the front neck of the

victim.

It is noted that the cause of death in strangulation is not only asphyxia but also cerebral anoxia, congestion of venous, combined venous congestion and asphyxia, vagal inhibition, and cerebral vertebrae dislocation causes death.

### External and Internal Sign of Post Mortem Findings

The external appearance and internal sign during post-mortem differentiate the cause of death, in case of hanging externally, the neck descent, and saliva dribbling opposite to the ligature knot due to gravitational pull. The facial features include paleness, congested swollen with profuse petechiae at the portion of the head and neck. Cyanosis is observed at the nail and hands. Moreover, the tongue is turgid and protrude due to the pressure of the ligature. Internally in hanging, the hyoid bone is rarely injured; exceptional cases include the aging factor, disease, osteoporosis, brittleness of the bones.<sup>10</sup> The congestion and hemorrhage above and below of the lymph node near the region of ligature, along with the frictional tear of the subintimal carotid arteries, the tissues under the ligature marks get dry and compressed with the formation of a white band of subcutaneous tissues. Hyperaemia of the tracheal and epiglottis region is more common. While in dealing with asphyxia death due to strangulation, external injury is most common, including injury on the face, chest, tongue, specifying the struggle, bleeding from ear, nose, mouth, and raised body temperature along with the clenching of hands. The bruises occur at the front and sides close to the larynx, and the pattern of injury signifies the way of strangulation. In comparison, internally, the laryngeal fracture of hyoid bone fracture is more common. The hyoid bone fractures are based on the force applied and its direction: inward compression fracture, anteroposterior, and avulsions<sup>17</sup> as shown in figure 3 and in table (1).

### Ligature marks

Ligature marks are generally expounded as the marks surrounding the neck due to the pressure of the ligature at the site of its contact. The ligature marks change periodically from

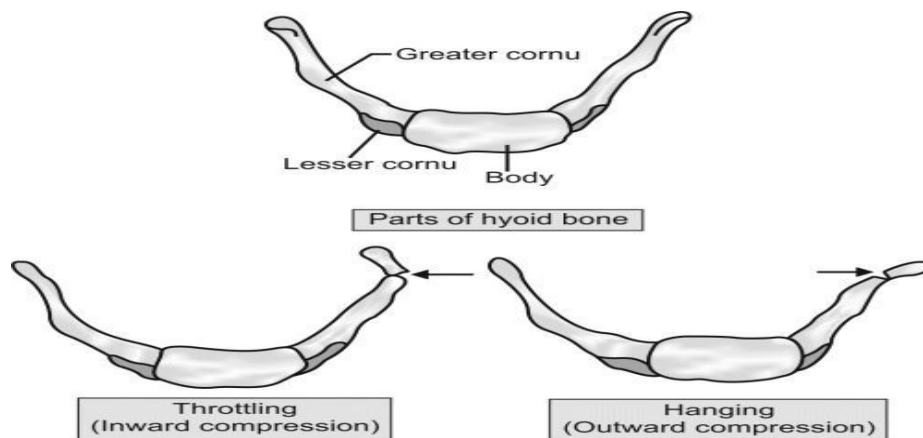


Figure 4: Compression Fractures in Hyoid bone (Image Courtesy)<sup>17</sup>

pale to yellowish-brown, dry hard, and parchment-like. The ligature mark is characterized by the nature of the ligature, bodyweight of the victim, time of suspension, and the number of turns of ligature surrounding the neck site. The ligature and the marks produced by it play the role of distinguisher to justify whether the death was suicidal or homicidal.

#### Suicidal rate

The act of committing suicide by hanging is prevalent in our society, as fatality is higher than the survival rate. In suicidal deaths due to hanging, the location and surrounding plays a pivotal role for the forensic investigation and helps build up the scene of the crime or reconstruct the scene of the crime. Bhosle et al., 2015 conducted a study for the cause of death in adolescents and how adolescents choose to kill themselves or commit suicide. Their studies found that suicidal deaths employing Hanging are most common among the youth, and about 96.08% opts for this technique to execute the suicidal deaths. The researchers provided the data figures of committing suicidal death employing hanging among the children and teenagers is a matter of concern, as per their study 81% of the teenager within the age of 15-19 years commits suicide employing hanging whereas 19% are of the age group of 11-14 years of the age.<sup>4</sup>

Furthermore, Vijayakumari in 2011 voiced the factors that lead adolescents to perish: a high expectation of the parents, aversion from the

parents, scarcity situations, failing to achieve academic goals, being bullied, and failing to survive within the competition. In the case of adults, depression, inveighing from colleagues, medical illness, failure in love life, penitent, the influence of the drugs or alcohol, and penurious factors create execrable conditions in which they falter and decides to end their life and reported that most of the cases of suicidal hanging occur within the victim's home, whereas 95.50% of the teenagers try to locate the secluded place to execute their set out.<sup>16</sup> Line Jr et al., in 1985, conducted a study on the deaths due to strangulation and discussed deaths that occur in strangulation due to the pressure applied on the neck through rope or ligature any other object<sup>8</sup>. Furthermore, Arya et al., 2019 bring to light National Crime Record Bureau data of suicidal hanging from (2001-2014) based on the sex, age group, and geographical region. The results obtained from their study have some dark numbers; there is a 56% rise in suicidal cases among males and 24% in cases of females, whereas the suicidal death by poisoning decreased by 44% among males and 52% among females. Moreover, considering the suicidal rate by the age of the victims, 30-59 years of age usually opt for suicidal hanging to kill oneself.<sup>2</sup>

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#### CONCLUSION

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In our country, there are numerous reasons or cases in which people are hanged, whether to

do justice, criminal intent, suicidal intent, or abnormality in sexual behavior, and cases are differentiated as per the doer's intention. The post mortem findings in the autopsy and the evidence collected from the crime scene help link the scene of a crime with the offender or with the victim. Nowadays, offenders try to manipulate homicidal death with the means of strangulation as a suicidal death by killing someone in a fierce, or intentionally by constricting the victim's neck through ligature, hard object which cause the person's death due to the mechanical asphyxia. In most cases, the relatives, beauties, or the police personal are unaware of dealing with the hanged dead body.

Furthermore, certain cases are reported where friends, relatives, laypeople, or area police don the body down, which causes the disturbance of the scene; hence, in these situations, post mortem findings play a significant role in differentiating between the mode of death; hence there is a need to impart knowledge about the cases of hanging and their dealing methods.

In the occurrence of death in the case of strangulation, the victim's body is not suspended;

instead, immense pressure is applied over the neck, which causes the cessation of the passage of oxygen through the windpipe. The victim starts losing their sensibility, which ultimately leads to the victim's results in the fatal.

Whereas death in the judicial hanging occurs, the second-third, or third- fourth cervical vertebrae get dislocated or fractured. If a zygomorphic fracture occurs within the pedicle or laminae on the arch of the cerebral vertebrae, then it causes the hangmen's fracture. Hence, as forensic scientists and medical practitioners are hanging, strangulation cases are the mildest and require extra attention and particular measures to follow the investigation. There is a need to know about the particular characteristics of the death occurring to differentiate the type of death.

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The authors declare that there is no commercial or financial links that could be construed as conflict of interests.

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