

Case Report

Knotless Noose in Hanging: A Case Report and Review of Literature

Rajesh Kumar¹, Karthik Krishna¹, C Behera^{2*}

¹Junior Resident, ²Assistant Professor, Department of Forensic Medicine, All India Institute of Forensic Medicine and Toxicology, New Delhi-110068, India

*Email id: drchitta75@yahoo.co.in

ABSTRACT

Knot in a noose encircling the neck has its own forensic significance in cases of hanging. The pattern of ligature mark and the mechanism of death in hanging with different knot positions are found in literature. However, when such knots are absent in noose, the post-mortem findings are different, which needs to be discussed. We report one such case of hanging, where neck compression had occurred by a ligature material with a loop that did not encircle the neck and did not bear a knot. The findings are discussed along with the mechanism of death in such cases along with a review of literature.

Keywords: Knot, Ligature, Hanging, Mechanism of death, Autopsy

INTRODUCTION

Hanging is that form of asphyxia that is caused by suspension of the body by a ligature which encircles the neck, the constriction force being the weight of the body or part of it¹. In a case of typical hanging, the ligature runs from midline above the thyroid cartilage symmetrically upwards on both sides of the neck to the occipital region, this pattern occurs due to the typical position of knot at the occipital region. However, in practice, atypical hanging with the knot at any position other than the occipital is more commonly observed². When the ligature compresses the neck, the vital structures, namely, jugular veins, carotid arteries, vagus nerve, spinal cord or the airway may individually or in combination get compressed depending on the weight of the constricting force. The pattern of ligature mark on neck, cause of death and fatal period alters accordingly to the structure damaged, which could be demonstrated at autopsy. Ligature material, method of tying, knot position, weight of the body, time of suspension, etc., are responsible for the varied post-mortem findings in a case of hanging. Knot in a ligature material is used for forming a loop, which may be of various types. A simple slip-knot produces a running noose, whereas a reef-knot or granny-knot produces a fixed loop¹. The presence of knot and its

position in a ligature material determines the compressive force exerted by the ligature on the neck and the depth of ligature mark will be more on the side of the neck opposite the knot³. We hereby report a rare case of hanging with a ligature without any knot as a point of suspension on the noose and discuss the mechanism of death with review of literature.

CASE REPORT

Alleged history of a 45-year-old male, found hanging from a ceiling fan at his residence on the afternoon hours. He was working as a security guard and was a known alcoholic. According to his wife, he was suffering from some mental illness and was at home without attending duty for the past 5 days. He was consuming alcohol and remained solitary in his room for most part of the day. On the fateful afternoon, when his wife had gone out, the victim hanged from the hook above the ceiling fan of his room using an electric wire (Figure 1). He was discovered after 2–3 h when his wife returned home, who immediately called her neighbours. The foot of the victim was found touching the bed and floor, beneath the point off suspension (Figure 2). Police was called who inspected the scene of occurrence and shifted the body to mortuary for autopsy. The ligature material used was a blue coloured electric wire, which was removed by slipping it through the head.



Figure 1: Hanging from the hook with a knotless loop

It was sealed by the investigating officer and brought along with the body.

AUTOPSY FINDINGS

The body of the male adult aged about 45 years, average built was brought into the mortuary in a state of full rigor mortis. Post-mortem lividity was present faintly over the dependent parts except at pressure areas. Bluish discoloration of nails, lips were present. Tongue was dark brown in colour, dry in appearance and seen to be protruding out of oral cavity between the teeth. Neck examination revealed a dark brown parchmented ligature mark present over the upper one-third of the neck, just below the chin region extending upwards and backwards crossing the face anterior to both the ears on either side. Ligature mark was 6 cm below the mentum and 10 cm above the supra-sternal notch on the anterior midline of the neck. The width of the ligature mark was 0.5 cm. On the facial region, the ligature mark was seen 1 cm and 1.5 cm anterior to right and left tragus of ear, respectively. On dissection of neck, subcutaneous tissues beneath the ligature mark were dry and glistening. There



Figure 2: Partial hanging: Legs touching bed and floor

was no extravasation of blood or hematoma onto the soft tissues of the neck. Neck muscles, vessels and thyroid complex were intact. There was no knot mark present over neck. The photographs of scene of occurrence did not bear any knot in the noose of ligature. The ligature was not found encircling the neck; instead it was across the chin region and over the face.

DISCUSSION

In a case of hanging, the noose usually encircles the neck, which is secured by the knot. Knot position and pattern in the ligature material is not only important for understanding the mechanism of death, but also the manner of death in some cases⁴. In judiciary hanging, the knot is positioned below the chin so as to create sudden hyperextension, which causes fracture of the cervical vertebrae, damaging the brain stem or spinal cord and, hence, immediate death. In some cases, decapitation might also be seen. In cases of hanging with a slip-knot, the ligature mark on the neck may produce full encirclement, whereas when the knot is fixed, the ligature mark would be incomplete at the area where the loop rises towards

the knot. This pattern is usually seen at the sides of the neck or on the nape of neck depending on the position of the knot. Badkur *et al.* conducted a study on 200 hanging cases where they gave nomenclature for knot position in hanging based on anatomical landmarks⁵. Polson observed that the lateral aspects of the neck, i.e., right or left side are the common sites for the knot in a case of hanging, whereas suspension of a knot below the chin is rare⁶. Nikolic *et al.* conducted a study to determine the frequency of hyoid-laryngeal fractures in hanging in relation to the position of the ligature knot and found that fracture frequencies of the thyroid cartilage show a statistically significant difference in relation to the ligature knot position among persons older than 30 years, which also indicated the ipsilateral and posterior position of the knot⁷. Knight described about deciding the manner of death based on knot position and pattern, in a case of self-strangulation, where there were multiple loops of ligature secured with a complex knot⁴. Behera *et al.* reported a case where a 20-year-old female committed suicide by hanging with a nylon rope around her neck without a knot and the body was found in reclining position, hanging from a low-lying tree in a remote corner of a park with dense vegetation, giving the impression of homicide disguised as a suicidal hanging⁸.

Behera *et al.* reported another case of hanging where in they found ligature tied to two point of suspension without any knot in the loop⁹. However, in this case, the ligature loop was found to be held by the deceased in a cadaveric spasm instead of a knot, for constricting the neck. Kumar reported a case of hanging without knot in the noose¹⁰. The ligature mark in that case was found to be encircling the neck extending up and backwards behind both ears. Face was congested and bluish discoloration of nails suggested asphyxia to be the cause of death. It was a case of complete hanging and the tongue of the deceased was seen to be protruded between the teeth as described by the author as a finding. However, in our case, the victim had used an electric wire, which had not encircled the neck, instead had crossed under the chin in a U-shaped manner, extending to front of the ears onto the facial region with right ear pinna seen to be entrapped within the ligature. There was no knot to constrict the ligature. The legs were touching the bed and the ground, which was suggestive of partial hanging. In our case also, we observed the tongue of victim being protruded out and

bluish discoloration of nails and lips, which suggested asphyxia to be the cause of death. The mechanism in these kinds of cases are due to the constricting force of the ligature due to weight of body or part of it onto the neck, which causes narrowing of the laryngeal and tracheal lumina, forcing the root of the tongue against the posterior wall of pharynx, blocking the airway¹. There was no congestion of head and neck region, as the venous drainage was not obstructed in the neck. A tension of about 15 kg needed to block the trachea, could have been possibly contributed by the weight of the part of the body. We report this case due to its rare occurrence and also to highlight the importance of its mechanism that may be useful in cases where the ligature has been removed from the body, when discovered soon after hanging or where the noose is unavailable for the autopsy surgeon due to prior removal by relatives or the police.

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