

Ligature Marks in Hanging Cases- An Autopsy Based Study

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Abstract: Hanging is one of the most common methods of suicidal death in India.. Most of the cases of hanging are suicidal unless proved otherwise. The ligature mark in hanging plays a very important role in investigation. Hence a proper examination of ligature mark which is the characteristic hallmark of hanging, needs greater emphasis. The ligature mark is a form of pressure abrasion around the neck placed obliquely high up, non continuous, parchmented, & grooved. This prospective study was conducted among victims of hanging brought to Rampurhat Govt. Medical College morgue, Rampurhat, Birbhum during the period November 2018 to October 2019. Of all the cases brought to the department for medico-legal autopsy, cases in which death had resulted from hanging were identified and selected for this study. A sum total of 264 cases were selected for this prospective study. The hanging deaths are of different types in their execution as typical/atypical and complete/partial. Atypical ligature marks with partial hanging outnumbered than typical ligature mark with complete hanging. Single ligature mark above the level of thyroid cartilage with a breadth of 1 to 2cms is observed in the maximum number of cases. Majority of the ligature marks were prominent in their appearance. The colour of ligature mark was dark brown in one third of cases. Atypical ligature marks with partial hanging outnumbered typical ligature mark with complete hanging.

Key Words: Hanging, ligature mark, suicide, thyroid cartilage

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I. Introduction

Death is certain for all living beings, but only humans end their lives prematurely by committing suicide^[1]. History of suicides goes back at least to the earliest human records. Human suicidal behaviour has always been a source of threat to mankind. There are a number of methods for committing suicide like poisoning, hanging, drowning etc. Hanging is one of the common methods of committing suicide in rural area as it causes painless form of death with minimum cost. Sometimes ligature material can be obtained from household substances like –Rope, Saree, Dupatta, Belt etc. Sometimes, hanging is adopted when other forms of suicide (poisoning, cut throat injury, etc.) have failed to produce the desired effect. The thought to hang one-self may come progressively or on an impulse. Hanging is a form of violent asphyxial death produced by suspension of the body by a ligature around the neck, the constricting force being the weight of the body. Depending upon degree of suspension- a) Complete Hanging-body is completely suspended without any part touching the ground, b)Partial Hanging-the body is suspended partially, toes or feet touching the ground. The weight of the head, leg, chest & arms act as constricting force. Depending on the position of knot- a) Typical Hanging-the ligature runs from the midline above the thyroid cartilage symmetrically upward on both sides of the neck to the occipital region & the knot is over the central part of back of neck, b) Atypical Hanging-the knot is anywhere other than on the occiput i.e. on the right or left side or front of the neck. In hanging the appreciation of external signs particularly ligature mark plays a vital role. Hence a proper observation and study of ligature mark which is the characteristic hallmark of hanging needs greater emphasis. The ligature mark is a pressure abrasion on the neck at the site of the ligature which appears as a groove which is pale initially then turns yellow or yellowish

brown & becomes dry. With time progression the furrow becomes dry & become brownish grey. The mark is directed upward, backward parallel to the line of mandible & incomplete with an ill defined impression at the point of suspension. In typical hanging, the ligature mark is situated above the level of thyroid cartilage between the larynx and the chin. It is directed obliquely upwards along the line of the mandible and reaches the mastoid processes behind the ears. However variations in the ligature marks like faint/absent ligature mark, ligature mark artefacts as ant bite marks are encountered in day to day autopsies. Sometimes there may be double ligature marks due to multiple turns or upward displacement of material after application due to fall. Character of the ligature mark depends on various factors like the nature of the ligature, body weight, length of time the body has remained suspended and the number of turns of the ligature round the neck. The course of the ligature mark depends on whether a fixed or running noose has been used. A fixed noose is one in which the rope is knotted (grany or reef knot). A running noose is one in which the end of rope is passed through the loop made from other end (slip knot).

II. Material And Methods

This prospective study was conducted among victims of hanging brought to Rampurhat Govt. Medical College morgue, Rampurhat during the period November 2018 to October 2019. Of all the cases brought to the department for medico-legal autopsy, cases in which death had resulted from hanging were identified and selected for this study. A sum total of 264 cases were selected for this prospective study. Detailed information regarding the deceased and the circumstances of death was collected from the police and relatives. In some cases, this information was supplemented by either, visit to scene of occurrence or from the photographs of scene of occurrence.

III. Result & discussion

The hanging deaths are different types in their execution as typical/atypical and complete/partial. In this study, typical hangings were seen in 58 cases and atypical hangings in 206 cases. (Table 1) The position of the knot or any intervening object like clothing, bony projections (angle of the jaw), long plaits in Indian women and also the beard accounted for the majority of the mark being atypical. Similar findings were observed in the studies conducted by other authors'.^[2, 3] In the present study complete hanging was seen in 96 deaths. Partial hanging was taking lives mostly, accounted for 168 deaths. Among these feet touching the ground was seen in 89 deaths, kneeling in 67, sitting and lying down prone in 12 each. The partial type of hanging which was common in our study was also seen in other studies.^[2-4] but, in studies conducted by M Ahmad^[5] and T. Saisudheer^[6] complete hanging outnumbered partial hanging cases. In our study, it was observed that in 206 cases, the level of ligature mark was above the thyroid cartilage, below the thyroid cartilage in 22 cases and overriding the thyroid cartilage in 36 cases. (Table 2) This was also observed in various other authors' studies.^[2, 6-12] In this study, ligature mark was dark brown in 90(34.09%) cases; yellowish brown in 75(28.41%) cases; red colour in 53(20.08%) cases and pale in 46(17.42%) cases. (Fig. 1) In present study the breadth of the ligature mark was between 1-2cms in 186(70.45%) cases, 2-3cms in 61(23.41%) cases, < 1 cm in 11(4.17%) cases & >3 cm in 6 (2.27%) cases (Fig. 2) Similar findings are reported by others.^[8, 9, 13-15] The breadth of ligature mark depends on the width of the ligature material and also the multiplicity of the ligature material. The ligature mark was prominent in 196 cases and faint in 68 cases. (Table 3) Our findings were consistent with the findings observed in other studies.^[16-19] The prominent mark is due to the type of the material being strong and also increased period of suspension. The colour of ligature mark was dark brown in 90 cases (fig. 1) which is consistent with other author findings.^[17, 18] The reason being the colour of ligature mark depends on the duration of suspension and the complexion of the person. In our study it was observed that in 246 cases ligature material don't present in situ (Table 4). Authors don't find any supportive study in relation to this data even after as much as possible search. On dissection hemorrhage in strap muscle is seen in 64(24.24%) cases & fracture of Hyoid bone 5(1.89%) cases & Fracture of Thyroid bone 6(2.27%) cases (Table 5). Similar finding is also seen by other^[20], but in studies conducted by Nantana Charoonnate et al it is seen that fracture of hyoid bone & /or thyroid cartilage were found in 25% cases.^[21]

IV. Conclusion

Atypical ligature marks with partial hanging is more in number than typical ligature mark with complete hanging. From the medico-legal point of view, following measures and recommendations in cases of deaths due to hanging are very essential.^[1]

1. Photograph of the scene of occurrence should include point of suspension.
2. In fatal cases not to disturb the ligature material and release only the suspension point or cut the ligature material away from the site of knot.
3. To always bring the ligature material along with the body for correlation with the mark.
4. Radiograph of the neck plays a vital role to appreciate the fractures of hyoid bone and thyroid cartilage.

TABLE 1:- According to the type of hanging:

Type of hanging	Cases	Percentage
Typical	58	21.97%
Atypical	206	78.03%
Total	264	100%

Type of hanging	Cases	Percentage
Complete	96	36.36%
Partial	168	63.64%
Total	264	100%

TABLE 2:- According to the level of ligature mark:

Level of ligature mark	Cases	Percentage
Above the thyroid cartilage	206	78.03%
Overriding the thyroid cartilage	36	13.64%
Below the thyroid cartilage	22	8.33%
Total	264	100%

TABLE 3:- According to the characteristics of ligature mark:

Characteristic of the ligature mark	Cases	Percentage
Prominent	196	74.24%
Faint	68	25.76%
Total	264	100%

TABLE 4:- According to the presence of ligature material in situ or not:

Presence of ligature material	Case	Percentage
Present	247	93.56%
Absent	18	6.44%
Total	264	100%

TABLE 5:-Internal finding on dissection:

Findings	Present in no of cases	Percentage
Haemorrhage in strap muscle	64	24.24%
Fracture of Hyoid bone	5	1.89%
Fracture of thyroid bone	6	2.27%

FIGURE 1:- According to the colour of the ligature mark :

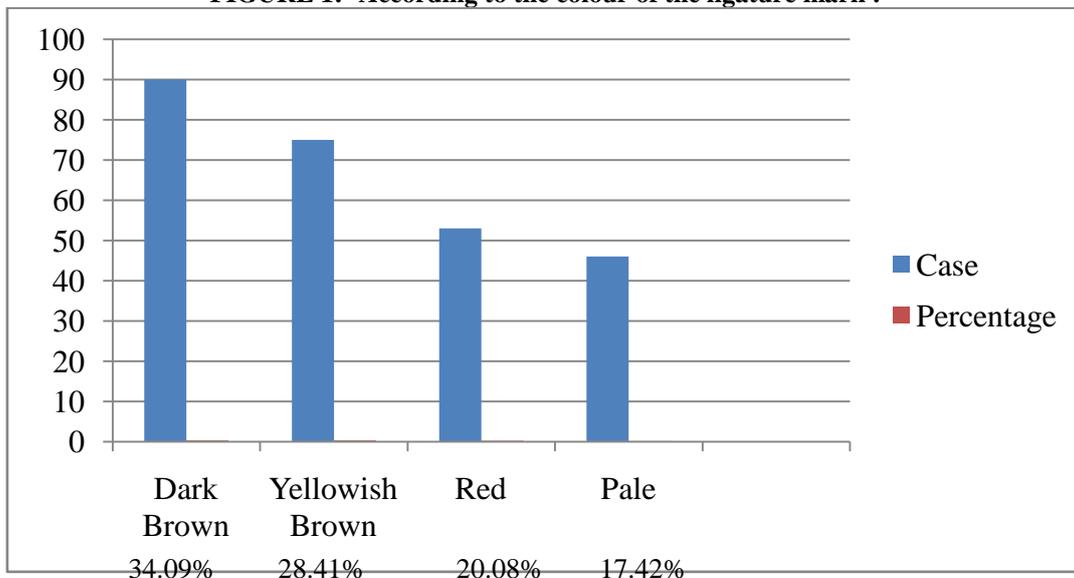
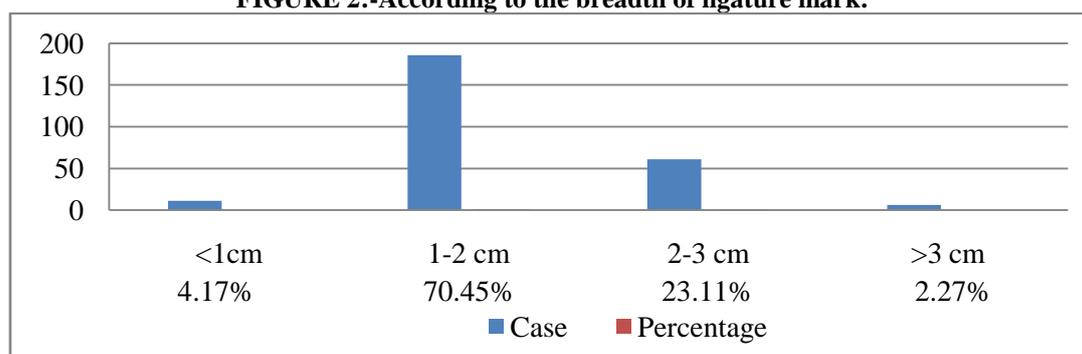


FIGURE 2:-According to the breadth of ligature mark:



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