ORIGINAL RESEARCH PAPER

Forensic Medicine

# NECK STRUCTURE INJURIES IN HANGING CASES BROUGHT FOR AUTOPSY AT A.M.C.H. MORTUARY, DIBRUGARH : TWO YEARS RETROSPECTIVE STUDY

**KEY WORDS:** Hanging, asphyxia, injury, carotid artery, ligature

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ABSTRACT

**Introduction:** The present study was conducted to see various neck injuries in hanging cases brought for medicolegal autopsy to find out the association of multiple factors responsible for Cause of death along with asphyxia.
**Material and method:** This retrospective study was conducted for two years period from January 2015 to December 2016 at the Mortuary of Department of Forensic Medicine, Assam Medical College, Dibrugarh. A total of 210 hanging cases studied.
**Result:** Injury to neck muscle seen in 29% cases where in most of the cases type of hanging was complete hanging. Carotid artery injury in the adventitial layer was found in 16.19% cases where maximum number of cases used hard material as ligature.
**Conclusion:** In cases of hanging though only asphyxia is commonly mentioned as cause of death but it is seen that other contributing factors like venous congestion, cerebral anoxia, vasovagal attack, spinal injuries etc. are associated with. Thus while performing medicolegal autopsy of hanging cases it is always important to consider these associated factors before giving opinion as to the cause of death.

## INTRODUCTION:

The neck is an important part of the body housing vital structures which are important for sustaining life. Though it seems asphyxia to be the main cause of death in hanging cases, injury to many of the vital organs/ parts in the neck plays a major role in the process of death. In compression around the neck, cause of death may be in various ways, like venous congestion, airway obstruction, cerebral anoxia, cardiac arrest( following vaso-vagal arrest) and injury to spinal cord. In hanging cases depending on the type of hanging, ligature material and various factors, injury to neck muscles, vessels, cartilage, bone and spinal cord may be seen. The present study was undertaken to study various neck structure injuries in hanging cases brought for autopsy in A.M.C.H. Mortuary, Dibrugarh, Assam, for two years period. During the study period 210 (7.64%) cases were found to die due to hanging. The present study tires to find out the injuries of neck structures which may singly or associated with asphyxia responsible for the cause of death.

## MATERIALS AND METHOD:

The present study was conducted in the Mortuary, Department of Forensic Medicine, Assam Medical College & Hospital, Dibrugarh, Assam for a period of two years from January 2015 to December 2016.

A total of 2747 autopsies were done in the said period. 210 cases were found to be died from hanging. All hanging cases were included for this study. The various data were collected as follows:

1. Documents and materials supplied by the investigating officer
2. Thorough postmortem examination findings
3. Histopathological investigations

The data obtained were put in proforma and various findings were observed and analysed. The findings were discussed and compared with other similar studies.

## RESULT AND OBSERVATION:

210 (7.67%) cases died from hanging and incidences of hanging found to be more in male, a total 155 (73.8%) cases compared to female which was 55(26.2%) case.

The death were found to be more in the age group of 21-30 years group (71 cases, 33.8%) [Table 1]

**Table 1: Age wish distribution of cases:**

| AGE | MALE | FEMALE | TOTAL | % |
|---|---|---|---|---|
| 0-10 | 0 | 0 | 0 | 0 |
| 11-20 | 35 | 9 | 44 | 21 |
| 21-30 | 53 | 18 | 71 | 33.8 |
| 31-40 | 25 | 15 | 40 | 19 |
| 41-50 | 22 | 8 | 30 | 14.3 |
| 51-60 | 11 | 4 | 15 | 7.5 |
| 61-70 | 5 | 1 | 6 | 2.9 |
| 71-80 | 4 | 0 | 4 | 1.9 |
| 81-90 | 0 | 0 | 0 | 0 |

Depending on the suspension type complete hanging was found in more number of case compared to partial hanging, 61.4% and 38.5% respectively. [Table 2]

**Table 2: Type of hanging**

| Suspension type | No.of case | % |
|---|---|---|
| Complete | 129 | 61.4 |
| Partial | 81 | 38.5 |

Majority of the victims seen to use soft material as ligature, 133 cases (63.3%).

Level of ligature was found above the level of thyroid cartilage in maximum number of cases 157, (74.7%) and in 53 (25.2%) cases it was found at level of thyroid cartilage.

Atypical hanging seen in 136 (64.8%) cases whereas rest of the cases were found to be typical hanging.

In 98% cases ligature mark found to be distinct whereas in 2% case the ligature mark were faint.

Palpebral and conjunctival haemorrhage was seen in 98( 46.67%) cases.

Various types of neck structure injuries were found which are tabulated below.[Table 3]

**Table 3: Neck tissue injury**

| NECK STRUCURE | NUMBER OF CASES | % |
|---|---|---|
| Sternocleidomastoid muscle haemorrhage | 61 | 29 |

| | | |
|---|---|---|
| Carotid artery injury | 51 | 24 |
| Hyoid bone fracture | 10 | 4.8 |
| Thyroid cartilage fracture alone | 0 | 0 |
| Hyoid and thyroid fracture | 2 | 1 |
| Cervical vertebra fracture | 0 | 0 |
| Spinal cord injury | 0 | 0 |

Injury to various layers of carotid artery on histopathological examination was found as follows.[Table 4]

**Table 4: carotid artery injury on histopathological examination**

| Carotid artery layer | No. of cases | % |
|---|---|---|
| Whole thickness | 1 | 0.5 |
| Adventitial layer | 34 | 16.19 |
| Intimal layer | 16 | 7.6 |

Carotid artery injury seen in relation to type of ligature material uses was as follows:[Table 5]

**Table 5: Carotid artery injury seen in relation to type of ligature**

| Ligature material used | No. of cases | Carotid artery injury | % |
|---|---|---|---|
| Soft material | 133 | 14 | 10.5 |
| Hard material | 77 | 37 | 48 |

Fracture of the hyoid bone alone was seen in 4.8% cases and hyoid and thyroid cartilage fracture together was detected in 1% case. Maximum number of hyoid bone fracture seen in 51-60 years of age group.

## DISCUSSON:

Our study showed that 7.64% cases were died from hanging with a majority of the victims were male comprising 73.8% cases. In a prospective study by Rawat V et al observed that 101(7.75%) cases were found to be suicidal hanging out of 1303 case. [1] A study conducted by Ali E et al found 69.2%case of male preponderance.[2] We found higher incidences of hanging in the age group of 21-30 years(71 case, 33.8%). Similar finding were recorded by Sharma BR, Harish et al (27%) [3] , Udaybhanu R et all (32.25%)[4] . In our study we found that in 129(61.64%) cases type of hanging was complete hanging and 81 (38.5%) cases it was partial hanging. In a study done by Singh KHP et al , they found68.57 % cases to be complete hanging.[5] Suarez Penaranda JM et al in their study also found similar finding, complete suspension in 62.4% cases. [6] The present study showed 63.3% cases used soft material as ligature which is similar to other studies done by Meera TH & Singh MBK who found 57.14% cases used soft matrial (cloth) and 42.86% cases used hard material (rope) as ligature. [7] Naik SK, Patil DY found soft material used in 54.74% cases and hard material 45.26%. [8] We found 64.8% cases of atypical hanging which is similar to other study by Talukdar MA et al who found atypical hanging in 78% cases . [9]when examined for level of ligature we found 74.7% cases above thyroid cartilage. Dekal V and Shruthi P found 84.95% cases where ligature mark was above thyroid cartilage. [10]Karmakar RN also found 80% cases where ligature mark were above thyroid cartilage level.[11] The ligature mark was distinctly visible in 98% cases and were faint in 2% cases . Similar study by Vinita VE, Pradhan P et al found presence of ligature mark in 95% and absent in 5% cases. [12]Sharija S and Sreekumari K et al found ligature mark present in 97% cases. [13] On external examination we found palpebral and conjuctival petechial haemorrhage , which is a feature of venous congestion in 98(46.67%) cases. Renaud Clement , Jean-Pierre Guay et al also found petechiae in 46 % of the cases. [14] In our study we found haemorrhage in the Sternocleidomastoid muscle in 61(29%) cases where in most of the cases type of hanging was complete hanging. In a prospective study in pattern of neck injury in hanging by Vinita VE et al found focal tear of Sternocleidomastoid muscle in 32.5% cases.[12] injury to the carotid artery found in 51 (24%) cases and higher number of cases found in older age group which may be attributed to pregression of atherosclerotic degenerative changes. Suarez Penaranda JM et al had made a similar finding of injury to carotid artery intimal layer in 91% cases and rupture of the carotid adventitial layer in 21.7%. [6]

Hejna P also found similar correlation of occurrence of tear in the intimal layer of carotid artery and victims age. [15] Occurrence of higher number of carotid artery injury in our study (48%) may be attributed to use of hard ligature material . Vinay kumar MS noted that 60% injury was found ion rope user and 13.1% injury occurred in case of using cloth as ligature material.[16]Fracture of the hyoid bone alone was seen in 4.8% cases and hyoid bone and thyroid cartilage together was detected in 1% cases. Meera TH and Singh MBK found hyoid bone fracture and thyroid cartilage fracture detected in 3.57% and 2.38% cases respectively.[7]Cause of hyoid bone fracture may be attributed to factors such as calcification and more brittleness with increasing age and also on width of the ligature material. Similar findings were also noted by other authors. [7,8]

## CONCLUSION:

Cause of death from hanging occurs not only from compression of trachea but also depends on various factors. From our study it is reconfirmed that in cases of hanging though only asphyxia is commonly mentioned as cause of death but it is most of the times is associated with other contributing factors like venous congestion, cerebral anoxia, vasovagal attack, spinal injuries etc. Hence during dealing with autopsy of hanging cases it is always important to look for these aspects to avoid any erroneous interpretation.

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