International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Study On Changes in Neck Structures in Cases of Death by Constriction of Neck by External Compression.

Sanjay Bandyopadhyay[1], Baishakhi Koley[2], Tanay Mohanta[3]

[1] Assistant Professor, Department of FMT, Medical College, Kolkata, West Bengal.
[2]Assistant Professor, Department of FMT, SCCGMCH, Uluberia, West Bengal.
[3] Associate Professor, Department of FMT, IPGME&R and SSKM Hospital, Kolkata, West Bengal.

OPEN ACCESS

Corresponding Author:

Dr. Tanay Mohanta

Received: 03-02-2026
Accepted: 20-02-2026
Available online: 28-02-2026

ABSTRACT

Background: In this modern era even with advancement of technology and development of sophisticated weapons, death due to compression of neck by ligature is still in vogue. Death due to compression of neck constitutes a major portion of unnatural deaths in day-to-day medico legal practice. In such cases the manner of death is mostly suicidal or homicidal & very rarely accidental in nature. But in all cases cause of death is violent asphyxia irrespective of its manner.
Aims & Objectives: To analyze the demographic characteristics of victims and detailed external and internal injury patterns in cases of death by constriction of neck by external compression
Material & Method: Present study was conducted at Mortuary under Department of FMT of RGK Government Medical College of Kolkata, West Bengal over 100 cases of death due to external compression of neck, came for autopsy at the Morgue for one year period i. e. 01.04.2015 to 31.03.2016. Collected data were presented using SPSS for statistical analysis.
Result: The study showed people from age group of (31 -40) years were the commonest among the victims. The incidence of suicidal compression 82 (82%) is more than homicidal compression 18 (18%) of the neck. Among the suicidal incidence most common method was adapted is hanging by ligature.
Conclusion: The novelty of this study is not only to incorporate a wide array of variables starting from the age, sex, religion, occupation of the victims during profile analysis but also to look into the detail findings of internal and external neck injuries found in cases of suicidal hanging or strangulation by ligature that would may able to add further data as scientific evidence.

Keywords: Neck Compression, Autopsy, ligature mark.

INTRODUCTION

The term Mechanical asphyxia is coined where enough external pressure is applied to neck, chest or other areas of body or position of the body is in such a way that respiration is impossible.[1] Asphyxia is defined as lack of oxygen in blood and tissue due to impaired or absence of oxygen leading to death[2].Death due to fatal neck compression falls in the category of mechanical Asphyxia – which includes suicidal hanging, strangulation, throttling, Mugging, Bansdola etc. and failure to expand chest by any obstruction leading impossible to breathe is also mechanical asphyxia, namely traumatic asphyxia. In all such cases hypoxia in the brain occurs rapidly leading to death. WHO mortality data found that hanging was the most common method used for committing suicide in most of the countries.[3] Literature study suggests that the suicidal hanging is the most common method used in India. Hanging is a type of mechanical asphyxia where complete or partial suspension results weight of the body to act as force for compression of neck tied by a ligature around the neck.[4] Whereas Strangulation is another form of violent asphyxia result from constriction of neck by other means except the force of constriction due to victim's own body.[5]Hanging is the preferred method of suicide because it is easy to carry out and only a ligature material is required in the form of a rope saree, dopatta, dhuti, lungi etc. which are easily available. On the other hand, Strangulation noticed as the most common form of suffocation as per expert opinion of forensic specialist[6]. According to position of body

Hanging may be classified as Complete and Incomplete. For complete hanging, body is completely suspended from the ligature, with no part of the body touching the ground where in Incomplete hanging body is partially suspended, person may be in sitting, kneeling or toes or feet touching the ground.[7] But according to position of knot Hanging may be Typical & Atypical. Typical hanging where ligature runs from the midline of the neck, above the thyroid cartilage, and ends at the occipital region and knot is in the middle of the back of the neck. In case of Incomplete hanging position of knot is located anywhere other than the middle of the back of the neck, such as near the mastoid process, angle of the mandible, or under the chin etc.[6,7] Knot may be slip or fixed knot, by which hanging may be typed another way. Examination of knot abrasion along with patterns of bruising over tissue layers of neck, underneath the ligature may help to find out exact nature of force applied during compression of neck.[2] The term 'Laryngo-hyoid Complex' is coined frequently referring hyoid bone and thyroid cartilage as together. In case of violent compression neck these two structures are found the most susceptible to be fractured and/or injured. Longer and wider hyoid bone is comparatively more damaged than shorter and smaller one[8].Thus detailed analysis of the victim's injury pattern along with finding out the cause or manner of death can be utilized for medico legal investigation in future for similar type of cases.

AIMS & OBJECTIVES:

A. To determine changes in neck structures
B. To determine cause of compression, and manner of death
C. To determine characteristic changes in particular type of compression
D. To determine influence of ligature material used
E. To evaluate the incidence of hanging and strangulation
F. To evaluate the common victims of hanging and strangulation as regards to their age, sex, religion, position of knot etc.

MATERIALS AND METHODS

This Observational, Descriptive and Analytical study was carried out in the Mortuary of Department of Forensic Medicine & Toxicology of RGK Govt. Medical College of Kolkata, West Bengal for one year period i. e. 01.04.2015 to 31.03.2016. Post mortem study was carried out in 100 cases of death due to compression of neck.

Method of sampling technique -Sample size was decided applying statistical formula –
$N= z^2 \times p (1-p)/e^2$, [N= Sample size, z= z score for 95% confidence level, p= population proportion & e= margin of error].
Applying the above formula, taking margin of error as 5%, population proportion as 7.2 %, and z score for 95% confidence level as 1.96, sample size is calculated as:
$N= 1.96^2 \times 0.072 (1- 0.072) / 0.05^2 = 102.67$.
Two (2) Dead bodies in highly decomposed condition with loss of neck tissue were excluded from the study.
For convenience total 100 cases in that period ware selected as study subject
A thorough history from police and family members of the deceased related to the unfortunate incidence ware taken. Information from Inquest report regarding scene of crime, position of body, material used, etc. were taken Ligature marks in different cases where available, ware observed meticulously for different parameters like length, width, shape, position in neck, continuity, change of skin color underneath etc. Any fracture of neck bones or cartilages also tried to detect carefully not only by palpatory method but applying special tests. All data were collected, compiled and subjected to suitable statistical analysis using appropriate methods. The obtained data were displayed as frequency and percentage in figures and tables.

RESULTS

Among the victims, majority (52) of them belonged in the age space of 21-40 yrs, with 15 of them being in between 10-20 yrs and 24 of them being in between 41-60 yrs.
According to position of knot most cases comes under Atypical hanging (82), whether Typical Hanging in only 12 cases. Partial Hanging is noted in 6 cases only.
The position of Ligature mark situated above thyroid cartilage in maximum case, where 14 cases it found just at the level of thyroid cartilage. Only 4 cases it situated below thyroid cartilage.
Patterned bruise underneath the ligature mark present in only in 11 cases.
In majority of cases the tissue underneath the ligature mark noted as pale, white, glistening, whereas only mild congestion underneath the ligature mark found in 13 cases.
Rupture of Sternomastoid mostly absent, only in case rupture or tear of sternomstoid noted.

No fracture of hyoid and thyroid bone seen in maximum case (82) but 6 cases fracture of hyoid and 12 cases of fracture of thyroid in noted.

As per manner of neck compression mostly suicidal (82) where in 18 case it was found to be homicidal

Table 1: Age wise distribution of cases:

AGE GROUP	CASES	PERCENTAGE

10– 20 YRS	**15**	**15%**
21– 30 YRS	**25**	**25%**
31– 40 YRS	**27**	**27%**
41– 60 YRS	**24**	**24%**
>61 YRS	**9**	**9%**

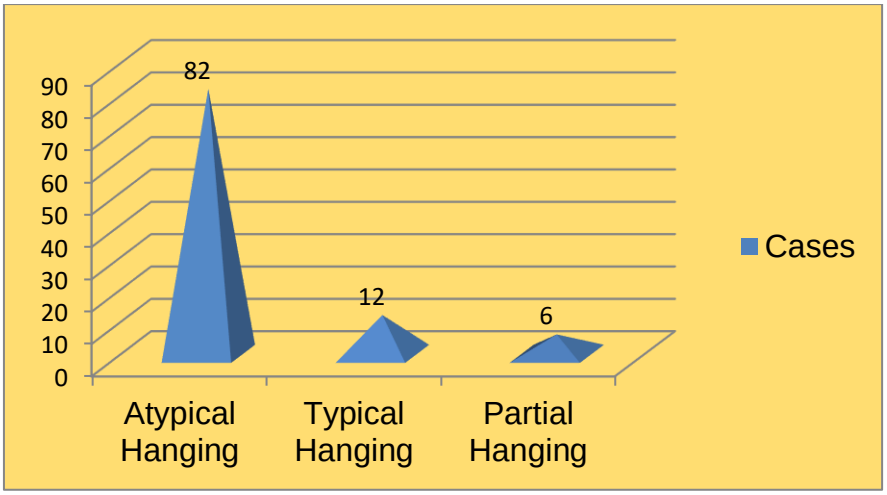


Figure 1: Cases According To Type of Hanging

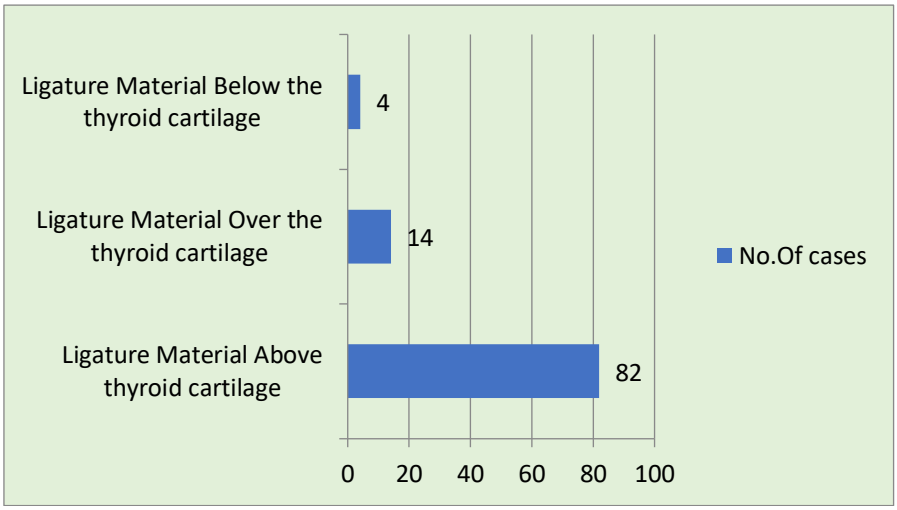


Figure 2: Position of ligature mark

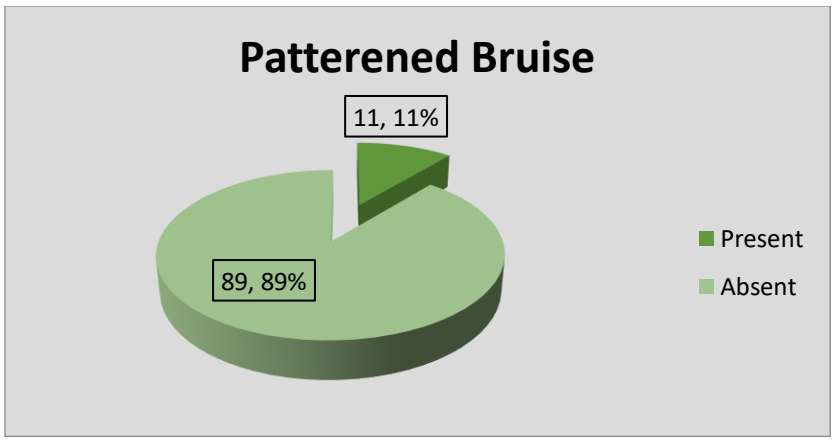


Figure 3: Cases according to patterned bruise at the ligature mark

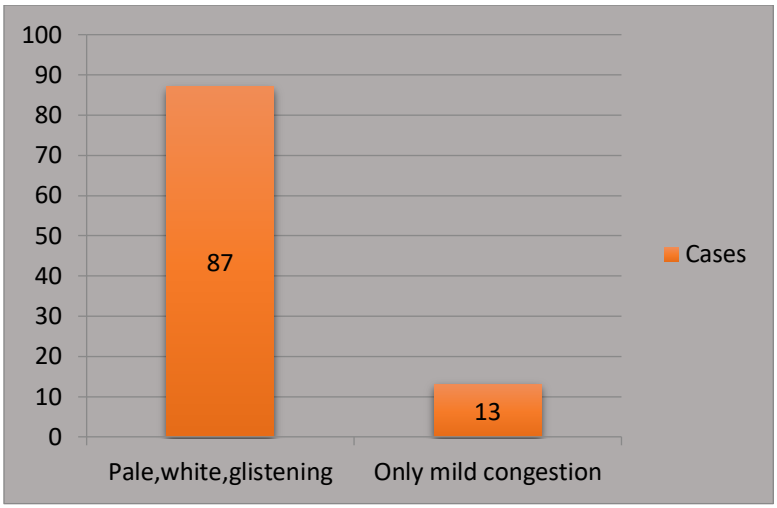


Figure 4: Cases according to condition of the underneath tissues of the Ligature Mark

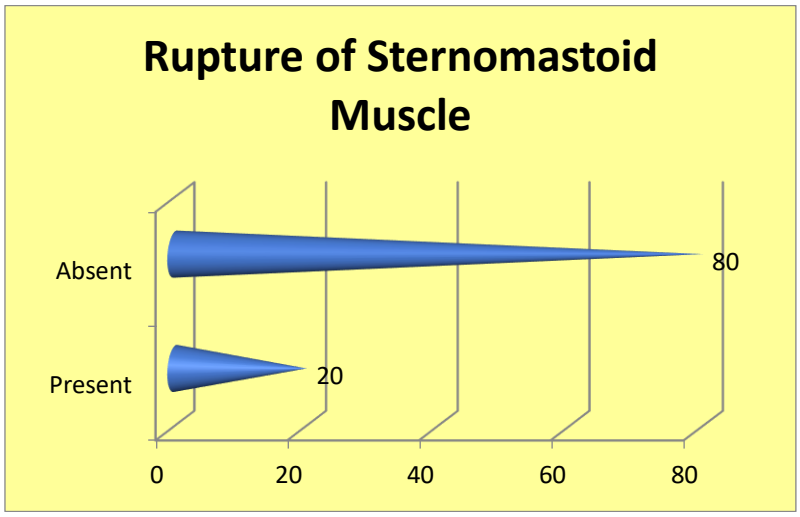


Figure 5: Cases according to rupture of Sternomastoid muscle

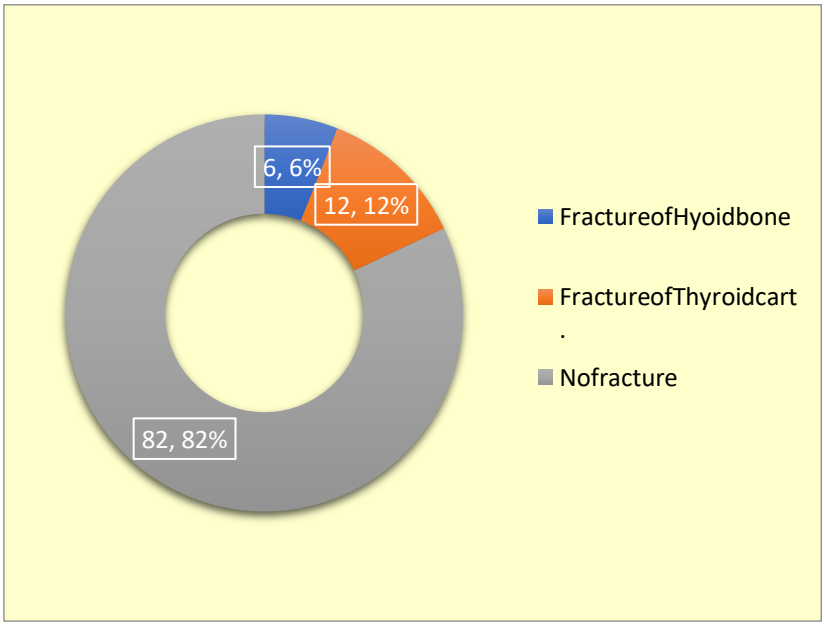


Figure 6: Cases according to Fracture of Hyoid &Thyroid

Table 2: Case distribution according to manner of neck compression

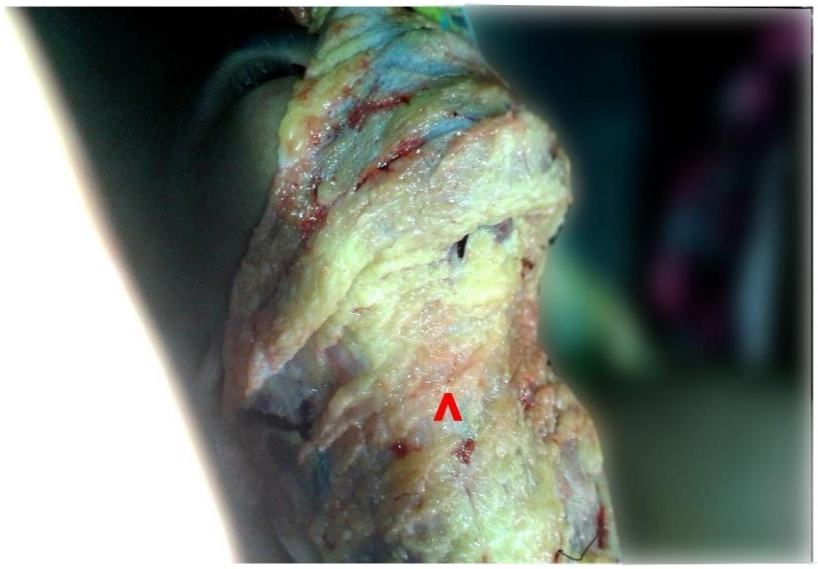
Manner of neck compression	Cases
Suicidal	82
Homicidal	18

Picture - 1A

Picture - 1B

P. M. No. 764 dated 02.05.2015

Case of hanging showing ligature mark at the neck



Above subject showing congestion of the tissue under ligature mark

, 793 dated 06.05.2015

Case of hanging showing ligature material at the neck

Picture 5A

P. M. No. 962 dated 29.05.2015

case of throttling showing extensive bruising of the underlying tissue

Picture - 5B

Above subject showing fracture of greater cornu of hyoid bone

DISCUSSION

Study conducted by Meera Th [9] showed similar findings about age group (31-40) yrs which found to be mostly affected in present study.

Our study showed atypical hanging is the commonest (82%) followed by typical and partial hanging. This finding was corroborated in study done by Saisudheer T[10]

Regarding level of ligature mark, in most of the cases the ligature mark presents high up in the neck above thyroid (82%), placed obliquely and non-continuous whereas study Ma J[11] found it 88% in his study. During suicidal hanging the working body weight is the main constricting force which leads the noose high up. Reddy [1] mentioned about ligature mark in hanging mostly (80%) situated above the level of thyroid cartilage, between larynx and chin. 15% cases may be situated at the level of thyroid cartilage and 5% cases, specifically in partial hanging ligature mark situated below the level of thyroid cartilage.

Non continuous along the course of the ligature mark is crucial character differentiating between the ligature marks of hanging verses strangulation by ligature.

The internal appearance of underlying soft tissues of neck was found mostly pale, white and glistening among cases of hanging while few cases showed extravasations of blood. Most victims (87%) did not exhibit "classic signs of neck compression" [12]ie congestion associated with petechial hemorrhages. Classic signs are purely mechanical vascular phenomena arise from obstructed venous return. Increasing pressure in venules and capillaries leads to rupture in areas of minimal connective tissue support, like the conjunctivae and eyelids result formation petechiae.[13, 14]

Rupture of muscle fibers of sternomastoid was found in 20% of cases of total victims which corroborate with the study conducted by Jaya prakash S[15]with little difference.

Incidence of fracture of hyoid bone and laryngeal cartilages varies from 2% to 40% in different studies. Greater cornu was mainly damaged in neck compression. Md. Musaibet [16] and Jaya prakash S [14] observed these incidences of fracture of hyoid and thyroid cartilage 4.5% & 8.6% and 2.7% & 5.3% respectively, which ware different from present study. Fracture of cricoids cartilage, tracheal rings and cervical vertebrae were not seen in any cases, similar to observation of study by Meera Th[9]. Fracture of hyoid bone and laryngeal cartilage is of practical interest because it can be correlated with radiological findings.[17]

Majority of cases of hanging, on the basis of circumstances of death and postmortem findings the manner of death was suicidal, similar to the findings found by Taktak S[18] in his study.

CONCLUSION

In the scenario of alarming increase in number of Suicidal hanging due to the effects of unemployment, poverty, family issue, addiction etc., thorough screening of vulnerable persons and timely intervention by psychological counseling and behavioral therapy for prevention of suicide may be the appropriate approach. The uniqueness of this study is that providing specific Post mortem findings in different types of cases of fatal neck compression forensic experts may help in clarification on dilemma in differentiating between cases of Hanging and strangulation by ligature which in turn will be beneficial to the police and justice department.

REFERENCES

1) K.S. Narayan Reddy, Dr. O.P. Murty, The essentials of Forensic medicine and Toxicology., The Health science Publishers,33rd edition; 2014 pp 338.
2) Maio VJ, Di Maio DJ. Forensic Pathology,2nd edition, CRC press, Newyork; 2001.Chapter 8 Asphyxia
3) World Health Organisation. International suicide statistics, 1999. Available at: http://www. befrienders.org/suicide/statistics.htm
4) Nagesh kumar G Rao, Textbook of Forensic Medicine &Toxicology,2nd edition, Jaypee brothers medical publishers (p) ltd;2010pp195
5) Nagesh kumar G Rao, Textbook of Forensic Medicine &Toxicology, 2nd edition, Jaypee brothers medical publishers (p) ltd;2010pp 206
6) Parikh C K: Parikh's text book of Medical Jurisprudence and toxicology, 6th Ed, CBS publisher, New Delhi,2011
7) J.B.Mukherjee J.B, Parikh C K: Parikh's text book of Medical Jurisprudence and toxicology, 6th Ed, CBS publisher, New Delhi,2011
8) Mukhopadhyay P Predictors of hyoId fracture in hanging: discriminant function analysis of morphometric variables Leg Med (2010)
9) Th. Meera & M.Bapin Kumar Singh- Pattern of Neck findings in suicidal hanging- A study in Manipur, journal Indian Acad. Forensic Med. Oct-Dec 2011 Vol-33: P 126-129
10) T. Saisudheer., A study of ligature mark in cases of hanging deaths, Research drops Pharmainter science Publisher. Int J. Pham Biomed Sci 2011-12, Vol 3(3): P 80-84
11) Ma J Retrospective analysis of 319 hanging and strangulation cases between 2001 and 2014 in Shanghai Journal of Forensic and Legal Medicine (2016)
12) J Simonesn, Patho- anatomic findings in neck structures in asphyxiation due to hanging: a survey of 80 (eighty) cases; Forensic Sci int.1988 Jul-Aug. Vol 38(1-2): P 83-91
13) J.Payne- james, Anthony Bussutil and Willium Smock – Forensic Medicine: clinical and pathological aspects. 23rdEd: p.26
14) Ely SF, Hirsch CS. Asphyxial deaths and petechiae: a review. J Forensic Sci 2000;45(6):1274–1277

15) Jaya Prakash S., Sreekumari K. ―Pattern of injuries to neck structures in hanging- an autopsy study ―– Am. J Forensic Med. Pathol, 2012 Dec., Vol 33(4), P 82-85
16) Md. Musaib, M. Shaikh , A study of gross post-mortem findings in cases of hanging and ligature strangulation, journal Indian Acad. Forensic Med. jan- march 2013 Vol-35: P 72-75
17) Green MA. Morbid anatomical findings in strangulation. Forensic Science 1973; 2:317-323
18) Taktak S Suicidal hanging in Istanbul, Turkey: 1979–2012 autopsy results Journal of Forensic and Legal Medicine (2015).