Indian Journal of Forensic Medicine and Pathology
Volume 3 Number 1, January - March 2010

# Pattern and frequency of Throat-Skeleton injuries in Hanging and Strangulation

**Joshi Rajiv***

**Bhardwaj Monika****

ABSTRACT

Study of frequency of fractures of neck structures in hanging and strangulation cases were done in the department of Forensic Medicine and Toxicology, Govt. Medical College, Amritsar. 45 (2.26%) cases of Hanging & Strangulation were studied out of total 1983 autopsy cases. In this paper various aspects have been discussed in relation to the presence or absence of fractures of bony structure of neck in hanging and strangulation cases.

**Key words:** Hyoid Bone, Hanging, Strangulation, Fracture

## INTRODUCTION

Hanging is one of the most common methods to commit suicide; whereas strangulation is used in homicide. Investigation of a person found hanging raises a single question-whether it is homicide or suicide?

When performing forensic autopsy, the careful examination of neck structures, Hyoid-laryngeal complex injuries play a decisive role in diagnosis of asphyxial death.

Many authors have given importance to presence or absence of fractures of neck structure in hanging and strangulation cases especially whenever opinion about accidental or homicidal or suicidal death has to be given in suspected cases. Different authors have different observation for the same.

## MATERIAL AND METHODS

After collecting preliminary data as written in police paper, external findings in hanging and strangulation cases were noted down. Neck structures were inspected; careful neck dissection was conducted for presence or absence of fractures of bony structures of neck. The tongue, larynx and trachea were removed carefully. Then the findings were confirmed by meticulous dissection to observe hemorrhage in and around the fractured area. Fractured piece of bone was taken and preserved in 10% formalin solution before subjecting them to histopathological examination as per procedure (Culling *et al.*, 1985).

**Author's Affiliations:** *Associate Professor, Department of Forensic Medicine, G.G.S,Medical College, Faridkot, **Lecturer, Dept. of Zoology, B.B.K, D.A.V, College, Amritsar.

**Reprints requests to: Dr. Rajiv Joshi,** Associate Professor, Deptt. Of Forensic Medicine, G.G.S,Medical College, Faridkot, Phone: 09501687369, E-mail: drrajivjoshi2006@yahoo.co.in

## OBSERVATIONS

Total number of 1983 cases were brought for postmortem examination , out of which 45 cases of hanging and strangulation were studied.

**Table 1. Incidence and distribution of deaths due to hanging and strangulation**

| Total no. of autopsy cases | Hanging cases | | Strangulation cases | | Total | |
|---|---|---|---|---|---|---|
| | No. | % age | No. | % age | No. | % age |
| 1983 | 25 | 1.26 | 18 | 0.90 | 43 | 2. 16 |

Two cases were those in which cause of death as per autopsy report was other than hanging and strangulation. There was one case of manual strangulation. Total number of cases of hanging and ligature strangulation were 42.

**Table II. Age wise and sex wise distribution of hanging and strangulation deaths**

| Age in years | Hanging | | | | Strangulation | | | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Male | | Female | | | |
| | No. | % age | No. | % age | No. | % age | No. | % age | No. | % age |
| 0-10 | - | - | - | - | - | - | - | - | - | - |
| 11-20 | 1 | 4.0 | 4 | 16 | 1 | 5.5 | 1 | 5.5 | 7 | 16.27 |
| 21-30 | 8 | 32.0 | 4 | 16 | 2 | 11 | 5 | 27.7 | 19 | 44.18 |
| 31-40 | 6 | 24.0 | - | - | 3 | 16.7 | 1 | 5.5 | 10 | 23.25 |
| 41-50 | 1 | 4.0 | - | - | 2 | 11 | - | - | 3 | 6.97 |
| 51-60 | - | - | 1 | 4.0 | - | - | 1 | 5.5 | 2 | 4.65 |
| > 60 | - | - | - | - | 1 | 5.5 | 1 | 5.5 | 2 | 4.65 |
| Total | 16 | 64.0 | 9 | 36 | 9 | 50 | 9 | 50 | 43 | 100 |

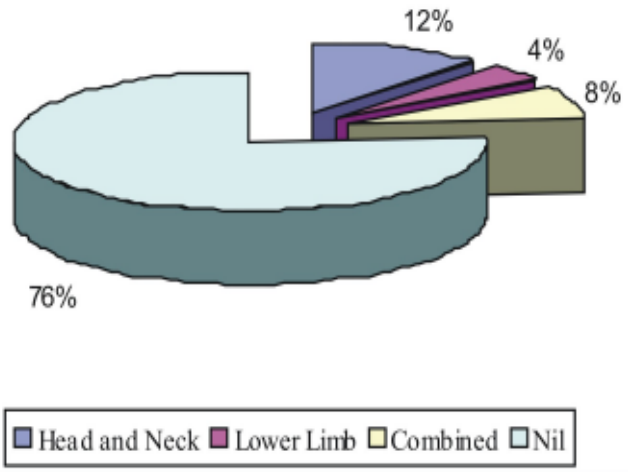
As per table II maximum i.e. 19 (44.2%) cases of hanging and strangulation deaths were reported in age group 21-30 years. Out of 25 cases, 16 (64%) males and 9 (34%) female died due to hanging. Out of 18 case of strangulation equal (50%) cases were reported both in male and female. No case of hanging and strangulation death was reported in 0-10 years of age groups.

**Table III. Incidence and distribution of associated trauma in hanging and strangulation deaths**

| Region of the body | Type of asphyxial death | | | | | |
|---|---|---|---|---|---|---|
| | Hanging | | Strangulation | | Total | |
| | No. | % age | No. | % age | No. | % age |
| Head and Neck | 3 | 12.0 | 8 | 44.4 | 11 | 25.58 |
| Chest | - | - | - | - | - | - |
| Abdomen | - | - | - | - | - | - |
| Upper Limb | - | - | 2 | 11.1 | 2 | 4.65 |
| Lower Limb | 1 | 4.0 | - | - | 1 | 2.32 |
| Combined | 2 | 8.0 | 7 | 38.8 | 9 | 20.92 |
| Nil | 19 | 76.0 | 1 | 5.5 | 20 | 46.5 |
| Total | 25 | 100 | 18 | 100 | 43 | 100 |

As per Table III, out of 25 case of hanging death, the associated trauma was found maximum in on head and neck in 3 (12%) cases (Fig 1). In 18 cases of strangulation, maximum trauma was found on head and neck in 8 (44.4%) case (Fig 2). No associated trauma was found in 19 (76%) cases of hanging and 1 (55.5%) cases of strangulation.

**Fig. 1: Incidence of Association trauma in Hanging**



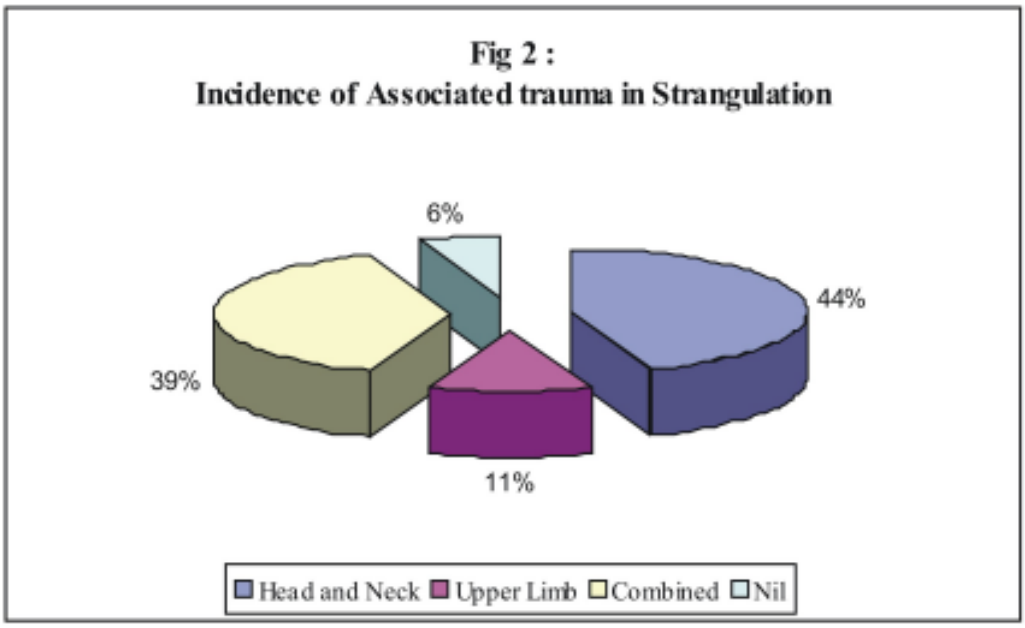
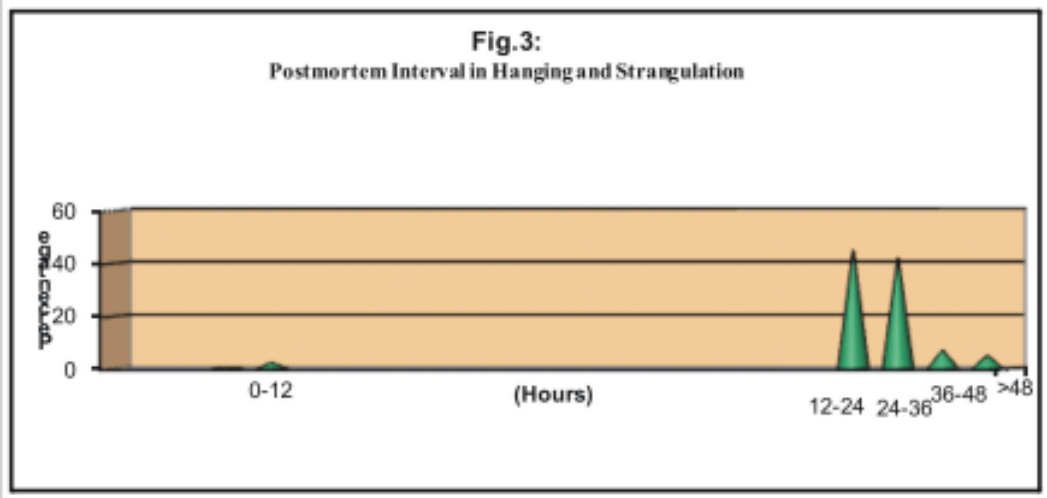



**Table IV. Postmortem interval in hanging and strangulation deaths**

| Postmortem Interval ( Hours) | Type of asphyxial death | | | | | |
|---|---|---|---|---|---|---|
| | Hanging | | Strangulation | | Total | |
| | No. | % age | No. | % age | No. | % age |
| 0-12 | -1-1------2-111-125-21-11125 | - | 1 | 5.5 | 1 | 2.3 |
| 12-24 | 12 | 48 | 7 | 38.8 | 19 | 44.8 |
| 24-36 | 11 | 44 | 7 | 38.8 | 18 | 41.9 |
| 36-48 | 1 | 4 | 2 | 11.1 | 3 | 6.97 |
| >48 | 1 | 4 | 1 | 5.5 | 2 | 4.95 |
| Total | 25 | 100 | 18 | 100 | 43 | 100 |



As per table IV, 86.08% cases were autopsied in post-mortem interval of 12-36 hours which shown the normal time lag due to the procedure followed in this part of country for fulfilling the legal requirement for conducting an autopsy (fig3).

**Table V. Sex wise incidence and distribution of hyoid bone fracture and thyroid cartilage fracture (individually) in hanging and strangulation deaths**

| Types of asphyxia | Hyoid fracture present | | | | Thyroid fracture present | | | |
|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Male | | Female | |
| | No. | % age | No. | % age | No. | % age | No. | % age |
| Hanging (n=25) | - | - | - | - | - | - | - | - |
| Ligature strangulation (n=17) | - | - | 1 | 5.5 | 2 | 11.1 | 1 | 5.5 |
| Manual strangulation (n=1) | - | - | - | - | - | - | - | - |

As per Table V, out of 17 case of ligature strangulation, hyoid bone fracture was observed in 1 (5.5%) female case only and no bone fracture was observed in hanging cases. No hyoid bone fracture was observed in 1 (5.5%) case of manual strangulation. Thyroid cartilage fracture was observed in 2 (11.1%) in male and 1 (5.5%) in female cases of ligature strangulation No case of thyroid cartilage fracture was observed in hanging death.

**Table VI. Incidence and distribution of combined fracture of hyoid and thyroid cartilage in hanging and strangulation deaths**

| Type of asphyxia | Fracture present | | | | Total | |
|---|---|---|---|---|---|---|
| | Male | | Female | | No. | % age |
| | No. | % age | No. | % age | | |
| Hanging (n=25) | - | - | - | - | - | - |
| Ligature strangulation (n=17) | 1 | 5.5 | 1 | 5.5 | 2 | 11.1 |
| Manual strangulation (n=1) | - | - | - | - | - | - |

As per Table VI, out of 17 case of ligature strangulation, 1 (5.5%) male case and 1(5.5%) female case had both thyroid and hyoid bone fracture. No case of fracture of hyoid and thyroid cartilage was observed in hanging and manual strangulation death. No combined fracture of hyoid and thyroid cartilage was observed in 1 (5.5%) case of manual strangulation.

## SUMMARY & CONCLUSION

1. In the present study 2.16% cases were declared on autopsy of hanging and strangulation deaths .
2. In the present study maximum number of cases i.e. 44.18% were reported in the age group 21-30 years. . The reason for this can be attributed due to increasing aggression and early losing of temper among the person of third decade. In the hanging cases 64% male and 36% female cases were observed in present study.
3. Associated trauma on head and neck was found in 44.4% cases of strangulation in the form of abrasion, bruises and occasionally laceration which indicates that these is great relative movement between the victim and the assailant during the time of crime.
4. 86.08% cases were autopsied in post-mortem interval of 12-36 hours which shown the normal time lag due to the procedure followed in this part of country for fulfilling the legal requirement for conducting an autopsy. Tabata (1998) conducted autopsy in 53.3% cases of compression of neck in 12-24 hours.
5. In the present study, hyoid bone was fractured in 5.5% cases of strangulation. The difference in incidence in various study may be due to multiple factors as mentioned by Pollanen and Chaisson (1996) i.e. magnitude of force applied to neck, rigidity of hyoid bone, age of victim, shape of hyoid.
6. In 25 cases of hanging the present study, hyoid bone was not fractured in any case. This may be due to less age group reported in our study where as fracture is reported more frequent in person over the age of 40 years.
7. In ligature strangulation 17.64% cases had thyroid cartilage fracture according to our study. A fracture of the cervical spine is rare because it requires a drop of some five feet or more.
8. As per our study combine fracture of hyoid and thyroid cartilage was reported in 11.1% cases of ligature strangulation. Davidson and Marshall (1986) reported 16.2% of combine fracture of hyoid and thyroid cartilage.

## REFERENCES

1. Davidson A and Marshall TK. Hanging in Northen Ireland– a survey, Med Science Law, 1986; 26(1): 23-28.
2. Di Maio JM and Dana E Suzana. Hand book of Forensic Pathology, Asphyxia, Elsevier, New York, 1998; 139-144
3. Green MA. Forensic Science, 1973; 2: 317.
4. Knight Bernard. Forensic Pathology, Fatal pressure on neck 1st ed. Edward Arnord London, 1991; 334-359.
5. Nandy A. principle of forensic medicine,Violent asphyxial death.New Central Book Agency (P) Ltd, Calcutta,1998:320-51.
6. Pollanen MS, Chiasson DA. Fracture of hyoid bone in strangulation comparison of fractured and unfractured hyoid from victims of strangulation. Journal of Forensic Science, 1996; 41(1): 110-113.
7. Sheikh MI, Agarwal SS. Journal of Indian Academy of Forensic Medicine 2000-2001; 23 (1-6): 61-63.
8. Tabata N. Morphological changes in traumatized skeletal muscle. Forensic Science international 1998; 28 (2-3) : 197-214.
9. Weintraub CM. Fracture of hyoid bone, Journal of Forensic Medicine, 1961; 21: 209-16.
10. Weintraub CM. Fracture of hyoid bone ,Journal of Forensic Medicine, 1961;21:209-16.
11. Culling CFA, Allison RT, Barist. Cellular Pathology Technique-IV Ed., Butterworth and Co. Publishers Ltd., London, 1985; 93-107.