



STUDY OF HYOID – LARYNX COMPLEX IN VIOLENT ASPHYXIAL DEATHS

M N Siddiqui	Associate Professor, Department of Forensic Medicine ,IIMS&R Integral University
Ausaf Ahmad	Statistician cum Assistant Professor, Department of Community Medicine ,IIMS&R Integral University
Nadeem Ahmad*	Professor & HOD, Department of Community Medicine ,IIMS&R Integral University *Corresponding Author

ABSTRACT This prospective study aimed at examining various injuries to the neck structures in deaths due to constriction of neck. Neck dissection technique, as advocated by Prinsloo and Gordon was undertaken to study the injuries to the thyro-hyoid complex, strap muscles, carotid vessels, etc. Post-mortems conducted in King Georges Medical College, Lucknow from 1 January to 13th August, 1981. During this period 763 autopsies were done, out of which 35 cases were related to hyoid-larynx complex in violent (hanging and strangulation) deaths. Percentage of violent asphyxial deaths: - in series of 763 cases 35 cases were caused by violent asphyxia that is only 4.72% deaths were due to this cause. Maximum deaths occur due to hanging, out of 35.19 deaths (54.3) were due to hanging. This was followed by strangulation, which constituted 12 (34.32%) deaths. The purpose of the study was to register fractures of the bony structures of the neck. The frequency of such fractures ranges from rare to frequent in the literature. Prospective studies give the highest incidence of fractures. Careful dissection and an X-ray cabinet with ready-made film in envelopes were used to register all fractures. Asphyxial deaths due to constriction of neck being common in all parts of the world, prospective studies in different setups to examine the profile of neck structure injuries are needed so as to differentiate the suicidal or homicidal nature of such deaths with a greater certainty.

KEYWORDS : Hanging, Strangulation, Throttling, Hyoid bone, Fracture

Introduction:

Observation of hyoid bone fracture is one of the most integral parts of internal examination during autopsy of hanging, ligature strangulation or throttling case. This fact has been highlighted by many workers where the observation of hyoid bone fracture ranges from 0% to 68% in hanging 1- 12 and the incidence of hyoid bone fracture in hanging said to be increased with age after 40 years 2, 11. Some workers also claimed a hard ligature material can cause fracture of hyoid bone depending upon the factors like level of constriction, force of constriction, distant of drop from suspension, age and sex of victims. Besides getting hyoid bone fracture at autopsy table, it is also very important to check whether it is ante-mortem or post-mortem in nature or just an artefact of joint mobility between greater cornu and body of hyoid bone. For this difficulty some have even advised pre-autopsy X-ray of the neck structures to detect ante-mortem hyoid bone fracture².

Autopsy examination in cases of fatal strangulation is a procedure that has probably not changed very much in the last few decades. In fact, perhaps the best medical scientific paper ever written about examination of strangulation victims was published by Gonzales in 1933, relying on European references from the 19th century¹³.

Immediate death from hanging or strangulation can progress from one of four mechanisms: 1. cardiac arrhythmia may be provoked by pressure on the carotid artery nerve ganglion (carotid body reflex) causing cardiac arrest 2. pressure obstruction of the carotid arteries prevents blood flow to the brain 3. pressure on the jugular veins prevents venous blood return from the brain, gradually backing up blood in the brain resulting in unconsciousness, depressed respiration, and asphyxia 4. Pressure obstruction of the larynx cuts off air flow to the lungs, producing asphyxia 14. Observing the importance given to hyoid bone fracture in hanging, ligature strangulation and throttling cases by many authors at the past and present days, the present authors have taken up the study of study of hyoid-larynx complex in violent (hanging and strangulation) deaths.

Materials & Methods:

A series of medico-legal autopsies were conducted over 763 autopsies were done, out of which 35 cases were related to hyoid-larynx complex in violent (hanging and strangulation) deaths deceased died due to hanging, ligature strangulation and throttling which were referred to the Department of Forensic Medicine, post-mortems conducted in King Georges Medical College, Lucknow over the period of 1 January to 13th August, 1981.

Information relating to cause of death, manner of death etc. and other associated information particularly in cases of deaths due to hanging were gathered from the police records and accompanying relatives of the deceased. Notwithstanding of the information collected from the police records and accompanying relatives of the deceased, in all such deaths (hanging, ligature strangulation and throttling), both external and internal findings were observed meticulously during postmortem examination to include or exclude hanging, ligature strangulation and throttling. Care has also been taken not to confuse a post-mortem artefact with that of ante-mortem autopsy findings both externally by adopting standard autopsy technique in all such death cases. After observing all the associated findings in relation to hanging, ligature strangulation or throttling whatever the case may be, the hyoid bone was dissected out for its fracture and ante-mortem characteristics maintaining all the precaution not create to any post-mortem fracture. The data/ findings thus obtained in individual cases have been put in tabular form in relation to all the factors responsible for causing fracture of hyoid bone.

Observations & result:

During detail observation and result the following things came out. In series of 763 cases 35 cases were caused by violent asphyxia, that is only 4.72% deaths were due to this cause.

Table No. 1 Distribution of total Autopsy with respect to Deaths due to Violent Asphyxia

Total Autopsy	Deaths due to Violent Asphyxia	Percent
763	35	4.72

The cursory look at the above Table will show that maximum number of violent asphyxia deaths occurred in fourth decade of life; 11 out of 35 death (31.46%) fall into this group. This is closely followed by 3rd and 2nd decade with 25.74% and 20.02% cases respectively. It has been seen that all decades till 7th have some cases in their respective groups. Not a single case was reported to be due to violent asphyxia in 8th and 9th decade of life.

Table No. 2 Distribution of Deaths due to Violent Asphyxia according to Age group.

Age group (Years)	Number of Cases	Percent
<10	3	8.58
11-20	6	17.16
21-30	10	28.6

31-40	11	31.46
41-50	2	5.72
51-60	1	2.86
61-70	2	5.72

Gender Incidence:- Both sex victim were present. Their number is given in the following

Table No. 3: Distribution of Deaths due to Violent Asphyxia according to Gender

Gender	Number of Cases	Percent
Male	22	62.85
Female	13	37.5

This observation clearly shows that males are more exposed to violent asphyxia deaths than females. The percentage of deaths in the present series among males and females is 62.85% and 37.15% respectively.

Incidence Of Age And Gender:- The distribution according to age sex is given in the Table No.4 below.

Table No. 4 Distribution of Deaths according to age Gender

Age group (Years)	Number of Cases		Percent	
	Male	Female	Male	Female
<10	1	2	2.86	5.72
11-20	3	3	8.58	8.58
21-30	7	3	20.02	8.58
31-40	7	4	20.02	11.44
41-50	2	0	5.72	0
51-60	0	1	0	2.86
61-70	2	0	5.72	0
71-80	0	0	0	0

The observation show that in both sex groups maximum cases fall in 4th decade. This is followed by 3rd and 2nd decade.

Incidence Of Illness:- A survey was carried out to find out whether the dead were suffering from any mental illness or major physical disability. This can be seen in Table No. 5

Table No. 5 Distribution of study subject with mental illness or major physical disability.

Illness	Number of Cases	Percent
Mentally disturbed	4	11.44
Major Physical illness	2	5.72
Family and social problem	10	28.60

A brief study at the above table shows that 16 cases were suffering from some physical or mental disease or were having some major family and social problems.

Incidence of various types of violent asphyxial deaths: Different manners of violent asphyxial deaths have been written in the following table.

Table No. 6 Distribution of study subject according to Incidence of various types of violent asphyxial deaths.

Cause of deaths	Number of deaths	Percent
Hanging	19	54.3
Strangulation	12	34.3
Throttling	4	11.4

The table clearly indicates that maximum deaths occur due to hanging, out of 19 deaths (54.3%) were due to hanging. This was followed by Strangulation, which constituted 12 (34.32%) deaths. Only 11.4 deaths were with the throttling.

Gender Incidence:- The incidence of various types of violent asphyxial deaths have be summarized in the following table according to sex distribution.

Table No. 7 Distribution of study subject according to incidence of various types of violent asphyxial deaths with gender.

Cause of death	Number of Cases		Percent	
	Male	Female	Male	Female
Hanging	12	7	34.28	20.00
Strangulation	8	4	22.85	11.42
Throttling	2	2	5.71	5.71

The above table shows that the maximum number of deaths in males, are due to hanging. This is followed by and strangulation. The same is seen in females maximum deaths being due to hanging.

Table No. 8 Distribution of study subject according to different parts of hyoid-larynx complex were found to be fractured.

Cause of death	Hyoid(%)	Thyroid(%)	Cricoid (%)	Tracheal Ring and Other Larynx cartilages
Hanging	0	7.7	0	0
Strangulation	11	44	11	0
Throttling	33	8.33	8.33	8.33

This case also had fracture thyroid cartilage. The above table clearly shows that in strangulation 66% of cases had some or other fracture. Out of total of 9 cases of strangulation 4 (44%) had broken thyroid cartilage, while one case each had fracture of hyoid bone and cricoids cartilage respectively. As against strangulation and as expected in hanging only 1 case (7.7%) out of 14 cases had figure of broken bone bones cartilages ; 6 cases (50%) out of total of 12 had fractures. Throttling also had a very high fi cases (50%) out of total of 12 had fractures. Throttling also had a very high figure of broken bone bones cartilages ; 6 cases (50%) out of total of 12 had fractures. Four (33%) had fracture of hyoid bone while 1 had fracture of cricoids cartilage. One case had both fracture of thyroid cartilage and fracture of tracheal rings.

Discussion:

Some times it becomes difficult to differentiate ligature strangulation from hanging especially in case of partial hanging where the ligature mark lies low in the neck, more or less in a horizontal manner. In this study 35 cases of violent asphyxial deaths were taken out of total of 763 postmortems done in this short period of 7 months. In this study a total of 21 cases of a strangulation and throttling were seen. Out of these 9 (42.85%) were of strangulation and 12 (57.15%) were of throttling. According to Polson G.J. (1955), the fractures of the hyoid 'bone in cases of hanging involve the greater horns, which are most likely to "break at about the junction of their outer one third and inner two thirds. He further says that fracture of thyroid cartilage is more common than that of hyoid bone. And fracture of "both hyoid "bone and thyroid cartilage is unusual. The only case of fracture of hyoid bone was from the 4th decade, of the four cases of fracture of thyroid cartilage two were from the 2nd decade while two from 4th decade. My findings of fractures are quite similar to those of other writers. Fracture of hyoid bone is more common in 4th decade and afterwards.

Conclusion:

It is concluded that asphyxial deaths form a big percentage of unnatural death, road accidents having the major share. Violent asphyxial deaths occur by various means like hanging, throttling, strangulation, smothering, drowning etc. It is very important to differentiate, the mode of asphyxia. Work on this field started many years back as early as 1897. It has become comparatively easy to differentiate different modes of asphyxial deaths. Regarding giving a definite opinion whether a particular death has been due to strangulation, hanging or throttling is rather difficult.

References:

1. Betz P and Eisenmenger W. (1996) Frequency of Throat-Skeleton Fracture in Hanging. American Journal of Forensic Medicine & Pathology.17(3):191-193.
2. Knight B. (1996) Forensic Pathology, 2nd ed. p.361-389
3. Modi J.P. (1988) Modi's Medical Jurisprudence and Toxicology, 21st ed. by Franklin, C.A., p.192
4. Mukherjee J.B. (1994) Textbook of Forensic Medicine & Toxicology, 2nd ed. Vol-1

5. Nandi A. (2000) Principle of Forensic Medicine, 2nd ed., p.318
6. Naik SK. (1998) Medicolegal Evaluation of Violent Asphyxial Deaths as a Result of Constricting Force Round the Neck, (M.D.Thesis, Utkal University)
7. Nikolic S, Micic J, Antanasijevic T, Djokic V, Djonic D. (2003) Analysis of Neck Injuries in Hanging. *American Journal of Forensic Medicine & Pathology*. 24(2):179-182
8. Polson CJ, Gee DJ, Knight B. (1985) *The Essentials of Forensic Medicine* 4th ed., p.375-377
9. Reddy KSN. (2000) *The Essential of Forensic Medicine & Toxicology*, 19th ed., p.288
10. Reutor F. (1901) *Ztsch.Heitk.*, 22, 145-112
11. Smith, Sir Sydney and Fiddes FS. (1955) *Forensic Medicine*, 10th ed., p. 252.
12. Weintraub CM. (1961) *Med-leg.J. (Camb.)*, 21, 209-16
13. Gonzales TA (1933) *Manual strangulation. Arch Pathol* 15: 55-65.
14. Hawley D, (2001) *Death by Strangulation Strangulations Part II: Homicides -- Working with the Pathologist*.
15. Anson, B.J. (1966) *Morris Human Anatomy*, 12th Ed. McGraw- Hill Newyork P1414
16. Adjutanties, G: Countslints, A & Dristas (1974) *"Sucidal strangulation"* *J.For.Sei*, Vol.3 P284
17. Balinger, J.J (1977) *"Trauma to the Larynx"- Diseases of the Nose, Throat and ear, 12th Ed., Philadelphir;*
18. Brouarder, P. (1897) *-La strangulation, 1a suffocation, 1a subemersion, Paris; Bailliere.*
19. Camps, f.e. & Hunt, a.c. (1959) *"Pressure on the neck"* *-J.For.Med;*
20. Capstick, Alan (1961) *"Pressure on the neck"* *-J.Med. Leg.vol.29 P33-38.*