

In Strangulation Deaths: Forensic Significance of Hyoid Bone Fracture

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ABSTRACT

This retrospective descriptive study was carried out to observe Forensic significance of hyoid bone fracture in strangulation deaths. The study was carried out at Forensic Medicine Departments of KEMU, Lahore and K.M.C. Peshawar. Hyoid bone fracture was found at and above 40 years of age and predominantly in throttling (73% cases). Hanging was most common method of suicide in females (85.71% cases). The level of constriction of neck was found above the level of thyroid cartilage predominantly in hanging whereas in most of cases of ligature strangulation (52.94%), it was observed at the level of thyroid cartilage.

Keywords: Hyoid bone, strangulation, throttling, hanging etc.

INTRODUCTION

Strangulation is either caused by hands or by means of ligature, in both these cases force to the neck is directly applied, in former case, it is called manual strangulation or throttling and in later case it is labeled as ligature strangulation¹. There is another form of strangulation, i.e., hanging when force to the neck is indirectly applied by weight of the body. In all these three forms, Hyoid bone may be found fractured². It is fractured either by direct pressure on its greater cornue or by indirect pressure on thyrohyoid membrane.³ But this fracture of hyoid bone is dependent on age of the victim as it is ossified at about or after 40 years then it is more prone to fracture as it becomes hard and inelastic and less commonly fractured when it is not ossified as it is elastic and cartilaginous, i.e., at the younger age group^{4,5}.

In view of above brief description, this retrospective descriptive study is carried out in the department of Forensic medicine and Toxicology KEMU, Lahore and K.M.C. Peshawar to observe occurrence of fracture of hyoid bone in relation to age and with type of strangulation and level of constriction of neck. The type of strangulation is also observed in relation to manner of death and gender distribution.

SUBJECTS AND METHOD

The present study was conducted in the Department of Forensic Medicine and Toxicology, King Edward Medical University, Lahore and K.M.C. Peshawar. It

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was retrospective descriptive analytical study. Out of 2494 medico legal autopsies conducted between January 2010 and December 2012, 67 cases of strangulation were reviewed with regard to age, presence or absence of fracture of hyoid bone, the level of constriction of neck where the force was applied, gender distribution and manner of death. Those cases where injuries were though present on the neck, but the cause of death was other than strangulation were excluded from the study. All those cases where neck was constricted by other means like forearm, foot and wood logs (banns) etc. were also excluded from the study.

RESULTS

Sixty seven cases of strangulation, which were reviewed, constituted 2.6% of the total 2494 medico-legal autopsies conducted during these three years. Majority of the victims (77.61%) were strangled by means of either hanging or ligature strangulation. Manual strangulation accounts for only 11(22.38%) cases as depicted in Table 1.

Table 1: Distribution of strangulation cases and its relationship to the incidence of fracture of hyoid bone.

Cause of Death	n	Fracture of Hyoid Bone	%age
Hanging	35(52.23%)	03	9
Ligature strangulation	17(25.37%)	04	24
Throttling	15(22.38%)	11	73
Total	67	18	100

The fracture of the hyoid bone was found to be more common in the age group above 40 years (4/10 or 40%) as compared to the age group below 40 years (14/57 or 25%) as observed in Table-2.

Table: 2: Relationship of the age of the deceased with fracture of hyoid bone.

Age Range	n	Hyoid Bone Fracture	%age
<40 yrs	57	14	25
>40 yrs	10	04	40

Multiple abrasions and contusions caused either by ligature or finger, thumb and nails are characteristics of all cases of strangulation. There anatomical distribution represents the level of application of constricting force in the neck. In majority of the cases of hanging (60%), the level of constriction was found to be above the level of thyroid cartilage, whereas in majority of the cases of ligature strangulation (52.94%), it was at the level of thyroid cartilage. Out of fifteen cases of manual strangulation, level of constriction was above thyroid cartilage in nine cases

and at the level of thyroid cartilage in six cases. In five cases of ligature strangulation, it was found even below thyroid cartilage.

Hyoid bone was fractured in 11 out of 33 (33.33%) cases, where the level of constriction was above thyroid cartilage (due to direct lateral compression) and 4 out of 29(13.79%) cases, where it was at the level of thyroid cartilage (due to indirect traction on thyrohyoid ligament) as viewed from Table-3. It is evident from table 4 that all the cases of hanging were suicidal and females predominantly adopted this method of killing themselves 30 v/s 5 (85.71% v/s 14.29%) whereas all the cases of ligature and manual strangulation were homicidal in nature with male predominance.

Table 3: Level of application of force and its relationship to fracture of hyoid bone.

Cause of death / Level of constricting force	Hanging	Ligature strangulation	Manual strangulation	Fracture of Hyoid bone
Above the level of thyroid cartilage	21	3	9	11 (33.33%)
At the level of thyroid cartilage	14	9	6	4 (13.79%)
Below the level of thyroid cartilage	----	5	----	----
Total	35	17	15	15

Table 4. Type of strangulation, manner of death and gender distribution

Type of Strangulation	Homicide		Suicide	
	Male	Female	Male	Female
Hanging n=35	--	-	5 (14.29%)	30 (85.71%)
Ligature strangulation n=17	11	6	-	-
Throttling	11	4	-	-

DISCUSSION

In the present study, hanging was found to be more common among the strangulation cases, i.e., 35/67 followed by the ligature strangulation 17/67 and throttling 15/67 respectively as evident from table 1. This finding is consistent with that of Sharma et al 2008 who reported 69% of cases of hanging in their study⁵.

The fracture of hyoid bone is most frequently observed in manual strangulation (73%) in the present study as depicted in table 1 followed by ligature strangulation (24%) and hanging (9%). This finding is similar to that of Naik and Patel who reported fracture of hyoid bone in 80% of their cases of throttling⁶. Other studies reported less number of hyoid bone fracture in throttling⁷. This could likely be attributed to number of fracture determining variables like the age of the victim, rigidity of the hyoid bone, magnitude and the precise level of the neck where the force is applied and the nature of the material used to strangle like hands or ligature. Low frequency

of hyoid fracture in hanging in our series of cases (9%) may be related to the position of the ligature and / or other mechanical factors. Naik and Patel found no case of hyoid bone fracture in hanging in their study even in the age group above 50 years.

The overall incidence of fractured hyoid bone in our study turns out to be 26.86% whereas Verma and Lal⁸ in their study reported a slightly lower incidence (20%) whereas Srivastava et al⁹, in the case profiles of 26 cases strangulation conducted in the district of Varanasi, India has reported a higher incidence (25%).

The concurrence of the proportions of the victims with a fractured hyoid bone and age greater than 40 years, as reported by others is also consistent with our data, where fracture of the hyoid bone was found to be more commonly present in the age group above 40 years (40%) rather below 40 years (19%), probably due to the ossification of the hyoid bone which makes it hard and brittle, thus more vulnerable to fracture^{10,11}.

The findings in our study regarding the level of application of constricting force to the neck are comparable to the findings reported by others¹² and their relationship to the fracture of the hyoid bone is consistent with the other studies^{13,14}.

CONCLUSION

The main conclusion of our study is that the fracture of the hyoid bone is more common in the age group above forty years (40%), predominantly in cases of manual strangulation (73%) especially when the level of constriction of neck is above thyroid cartilage.

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