



## FRACTURE OF HYOID BONE IN CASE OF ASPHYXIAL DEATHS RESULTING FROM CONSTRICTING FORCE ROUND THE NECK

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### ABSTRACT

The Hyoid Bone (& its fractures) has enormous clinical and forensic significance. The present study was taken up to retrospectively investigate the fractures of hyoid bone due to mechanical forces around the neck. In the present study a total of 50 cases were retrospectively investigated; 22 cases were belongs to 21 to 30 year age group followed by 18 cases belongs to 31- 40 year age group. Among patients studied, 54% were males and 46 % were females. In 80% of the cases manner of death was hanging and in 8% of cases were by strangulation and 12% of cases was throttling. Out of 40 cases of hanging, hyoid bone fracture (Anteroposterior compression fracture) was seen in 4 cases; and out of 4 cases of strangulation, hyoid bone fracture was not found; and out of 6 cases of throttling, hyoid bone fracture (Inward compression fracture) was found in all cases.

**KEYWORDS :** Hyoid bone fracture, Hanging, Strangulation, Throttling.

### INTRODUCTION

The hyoid bone (hyoid) is a small U-shaped (horseshoe-shaped) solitary bone, situated in the midline of the neck anteriorly at the base of the mandible and posteriorly at the fourth cervical vertebra. Its anatomical position is just superior to the thyroid cartilage. It is closely linked with an extended tendon-muscular complex but not specifically interconnected to any adjacent bones and hence is considered by many anatomists and anthropologists to be an unconventional bone. It is anchored in the anterior triangle of the neck by muscles from the larynx, pharynx, tongue, and the floor of the mouth. The name hyoid derives from the Greek word "hyodeides," which means "shaped like the letter Upsilon." Although dubbed as an unconventional bone, the hyoid being a part of the hyoid-larynx complex is indeed a bone of clinical and forensic significance.<sup>1</sup>

Fractures of the Hyoid Bone (H.B) as a consequence of fatal strangulation show a considerable polymorphism both concerning the external conditions under which they are produced that are extensively discussed in the forensic literature, as well as the topography and configuration of the fractures themselves.<sup>2</sup>

Trauma to the hyoid and laryngeal cartilages (thyroid cartilage and cricoid cartilage), is one of the significant signs of manual strangulation or throttling discovered during a forensic autopsy. Fractures of the hyoid-laryngeal complex are present in cases of death due to a constricting force around the neck. Forensic pathologists have intensively studied traumatic lesions of the hyoid-laryngeal complex in strangulation, including manual strangulation and ligature strangulation, and hanging. Other forms of blunt force impact to the neck can also cause fracture of the hyoid.<sup>2</sup>

The damage commonly affects the greater horns or the region between the body of the hyoid and the horns. Injuries are mainly in the form of vertical or oblique fractures. Displacements of the fracture segments are also observed. Bilateral fractures of the hyoid and double fractures of one of the greater horns are not uncommon. The frequency of a fractured hyoid is more in cases of strangulation in comparison to cases of hanging. However, a hyoid fracture is present in only about a third of all homicides from strangulation. Therefore, it merits noting that an intact hyoid does not always rule out strangulation as the underlying cause of death. The hyoid is fractured more commonly in the

older victims of strangulation and is less likely to occur in younger victims of strangulation in the age group 20 to 40. The differences in the age-related frequency of hyoid fracture are dependent on the degree of ankyloses of the hyoid that progresses with age. The mobility in the region of the junction between the greater horns and the body of the hyoid should not be mistaken for a fracture.<sup>2</sup>

### Classification<sup>3</sup>

Hyoid bone fractures are classified into three different types:

- Inward compression fractures with outside periosteal tears
- Antero-posterior compression fractures with inside periosteal tears
- Avulsion fractures

### OBJECTIVES:

1. To study of hyoid bone fractures in mechanical asphyxial death.
2. To observe the pattern of injuries due to mechanical asphyxia death.

### METHODOLOGY:

#### Method of collection of data:

This is a retrospective study, wherein records were retrieved from a series of medico-legal autopsies which were conducted over deceased; died due to hanging, ligature strangulation and throttling; which were referred to the department of Forensic Medicine of Bidar Institute of Medical Sciences, Bidar over a period of April 2022 to March 2023.

Information relating to cause of death, manner of death etc. and other associated information particularly in cases of deaths due to hanging was gathered from the police records. After observing all the associated findings in relation to hanging, ligature strangulation or throttling, whatever the case may be, the archived records of various photography regarding hyoid bone which was dissected out for its fracture and ante-mortem characteristics was analyzed maintaining all the necessary precaution.

**Inclusion criteria:** Death due to mechanical asphyxia by hanging, strangulation & throttling.

**Exclusion criteria:** Death due to mechanical asphyxia by drowning, smothering, burking, road traffic accident.

The results were tabulated and expressed in terms of percentage.

**RESULTS**

**TABLE 1: AGE WISE DISTRIBUTION OF CASES:**

Age in years	No. of patients	%
21-30	22	44
31-40	18	36
41-50	06	12
>50	04	08
Total	50	100

In the present study, 22 cases were belongs to 21 to 30 year age group followed by 18 cases belongs to 31-40 year age group. Among patients studied, 54% were males and 46 % were females.

**TABLE 2: DISTRIBUTION OF CASES BASED ON MANNER OF DEATH:**

MANNER OF DEATH	No. of patients	%
HANGING	40	80
STRANGULATION	04	08
THROTTLING	06	12
Total	50	100

In the present study, in 80% of the cases manner of death was hanging; and in 4% of cases was strangulation; and 6% of cases was throttling.

**TABLE 3: INCIDENCE OF HYOID BONE FRACTURE:**

MANNER OF DEATH	No. of patients	Fracture	%
HANGING	40	04	10
STRANGULATION	04	00	00
THROTTLING	06	06	100

In the present study, out of 40 cases of hanging hyoid bone fracture (Anteroposterior compression fracture) was seen in 4 cases; and out of 4 cases of strangulation hyoid bone fracture was not found; and out of 6 cases of throttling hyoid bone fracture (Inward compression fracture) was found in all cases.

**DISCUSSION**

Mechanical asphyxia can produce different injuries to neck structures. Death arises due to vascular, nervous and asphyxial mechanisms. Furthermore, different injuries may occur to the structures of the neck, especially in cases of hanging and strangulation. Most frequently, asphyxia affects the horns of the thyroid cartilage and the hyoid bone.<sup>4</sup>

In the present study, 22 cases were belongs to 21 to 30 year age group followed by 18 cases belongs to 31-40 year age group. Among patients studied, 54% were males and 46% were females, in 80% of the cases manner of death was hanging and in 4% of cases was strangulation and 6% of cases was throttling, out of 40 cases of hanging, hyoid bone fracture (Anteroposterior compression fracture) was seen in 4 cases; and out of 4 cases of strangulation hyoid bone fracture was not found; and out of 6 cases of throttling, hyoid bone fracture (Inward compression fracture) was found in all cases. These findings are similar to a study done by Shivaramu MG<sup>5</sup> it was found that 11 cases were belonging to the age group of 21 to 30 year followed by 9 cases belongs to 31- 40 year age group. Among patients studied, 54% were males and 46 % were females, in 80% of the cases manner of death was hanging and in 4% of cases was strangulation and 6% of cases was throttling, out of 20 cases of hanging hyoid bone fracture (Anteroposterior compression fracture) was seen in 2 cases and out of 2 cases of strangulation hyoid bone fracture was not found and out of 3 cases of throttling, hyoid bone fracture (Inward compression fracture) was found in all cases.<sup>5</sup>

(46.03%) male cases out of which 20 (69.0%) had hyoid bone fused while 9 (31%) unfused hyoid there were 34 (53.97%) female cases 15 (44.1%) out of which had hyoid bone fused and 19 (55.88%) had their hyoid bones unfused(p-value0.003). Fractures of hyoid bones were seen in 30 (47.65%) cases and 33 (52.4%) cases had no hyoids bones fractures. Hyoid bones were symmetric in 26 cases while asymmetric were found in 37 cases (p value 0.0002). Hanging cases were 25 (39.68%), garroting cases were 08 (12.70%), throttling cases were 9 (14.29%) while ligature strangulation cases were 21 (33.33%) the difference between fractured and non-fractured cases was significant (p- value 0.01).<sup>6</sup>

Kaushik V. et al<sup>7</sup> concluded that; out of 100 cases of asphyxial deaths which were examined, 95% of hanging and 5% of strangulation. The youngest victim in present study was 4 year male and the eldest was 82 year male. Majority of the cases 37(37%) fall in to the age group 21 to 30 years, followed by 31 to 40 years 24(24%); 11 to 20 years 18(18%); 41 to 50 years 14(14%); 51-60 years 3(3%); Less than 10 years and seventh decade incidence came down to 1 case (1%); and one case (1%) is in eighth decade.<sup>7</sup>

According to a study by Chandrashekar rao, after analysis it was found that out of 90 cases of mechanical asphyxial deaths, fracture of hyoid bone is noted in 11 cases out of which 7 were of ante mortem in nature. Out of these 7 ante mortem fractures, 5 were noted in the throttling, and 2 were associated with hanging.<sup>8</sup>

**CONCLUSION**

Laryngo-hyoid fractures in hanging victims are one of the most studied and paradoxically contradictory topics in forensic pathology. To verify the diagnostic significance of these injuries in hanging, we retrospectively and consecutively analyzed the occurrence of laryngo-hyoid fractures. Further prospective studies are needed to substantiate the results.

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**Conflict of Interest:** NIL

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In a similar study done by Kumar P. et al.<sup>6</sup> there were 29