

A Study of Hyoid Bone Fractures in Mechanical Asphyxial Deaths

P. Chandrasekhararao¹, V. Krishnamurthy², T.T.K. Reddy³, V. Sivakameswara Rao²

ABSTRACT

Introduction: Observation of hyoid bone, which is unique structure in the body situated in the neck, in mechanical asphyxial deaths has a lot of medico legal importance. Most of the studies regarding hyoid bone are related to fractures of bone in cases of hanging, strangulation and throttling, but only very few of them have thrown light over incidence of ante mortem fractures and obscure fractures of hyoid bone. As there is much importance medico legally regarding the fractures of hyoid bone in cases of mechanical asphyxial deaths. Aim of the present study was to see the fractures of hyoid bone in mechanical asphyxia deaths related to pressure over neck.

Material and methods: A total of 90 hyoid bones in cases of mechanical asphyxia deaths were examined in the present study to detect fractures.

Results: 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.

Conclusions: Most of the cases of fractured bones were noted in throttling and none were reported in ligature strangulation

Keywords: Hyoid bone, Asphyxial deaths, Ante mortem fractures, Throttling.

Exclusion criteria: Hyoid bone in mechanical asphyxia deaths of drowning, smothering, burking.

A total of 90 hyoid bones in cases of mechanical asphyxial deaths due to hanging or strangulation were studied. The hyoid bones were examined after the dissection of the soft tissues, with the help of magnifying method, whether the hyoid bone is fractured or not and if fractured whether the fracture was antemortem or postmortem in nature. The examined hyoid bones were photographed and were subjected to radiological examination (example photographs 1-3) for detection of obscure fractures.

STATISTICAL ANALYSIS

Microsoft excel 2007 was used for statistical analysis and making graphs. Descriptive statistics like mean and percentages were used for interpretation of data.

RESULTS

A total of 90 hyoid bones were examined in cases of mechanical asphyxial deaths in this study. Out of this 90 cases, 75 cases were due to hanging amounting to 83.2% of total number of asphyxial deaths, 9 cases were due to ligature strangulation which amounts to 10% of total of asphyxial deaths, and 6 cases were due to throttling amounting to 7.7% of total number of asphyxial deaths of the study (figures 1,2).

Out of 90 cases of Mechanical Asphyxial deaths, 39 deaths were of males (43.3%) and 51 were of females (56.7%) (figure-3,4).

Out of 90 cases of Mechanical asphyxial deaths studied, 11 cases of fracture of hyoid bone were noted amounting to 12.2% of incidence of fractures. Out of which ante mortem were of 7 (63.7%) and post mortem were 4(36.4%). The postmortem fractures were of artifactual in nature and all of those post mortem fractures were noted in hyoid bones that were sent for expert opinion from peripheral hospitals to the department of forensic medicine, GMC, Guntur.

Further analysis of the ante mortem fractures of hyoid bones revealed that throttling accounted for highest incidence of ante mortem fractures that is 5 out of 7 (71.4%) of total ante mortem fractures followed by hanging accounting for 2 out of 7 28.6% (figure 5-7)

The age and sex distribution in the study population of mechanical asphyxial deaths are shown in the table-8 (figure 8,9). The incidence of Mechanical Asphyxial death is highest in the second decade (20-29 years of age) in both sexes. The incidence was lowest in 6th decade of life (age group 60-69 years).

INTRODUCTION

The hyoid bone is horse shoe shaped unique structure in the body, situated in the upper part of the neck, above the thyroid cartilage and not directly associated with any other bone. It is suspended in the neck by the ligaments attached to skull by stylohyoid ligament. So observation of hyoid bone becomes one of the most important part of examination during autopsy of mechanical asphyxial deaths due to pressure over the neck.

Many studies on fractures of hyoid bone in cases of hanging, strangulation and throttling have observations of hyoid bone fractures ranging from 0% to 68%.¹⁻⁴ It is mandatory to differentiate whether the fracture of hyoid bone is ante mortem or postmortem and to exclude the artifacts also.^{5,6} So the present study was carried out for the detailed examination of the hyoid bones in the mechanical asphyxia deaths of various types.

MATERIAL AND METHODS

The hyoid bones for this study were collected from the bodies whose postmortem examination was conducted at mortuary of Government General hospital, Guntur as well as cases referred to the department of forensic medicine, Guntur Medical College, Guntur for expert opinion from the peripheral hospitals of Guntur and Prakasam districts from August 2004 to June 2006.

Inclusion criteria: Hyoid bones in cases of mechanical asphyxia deaths due to hanging and strangulation.

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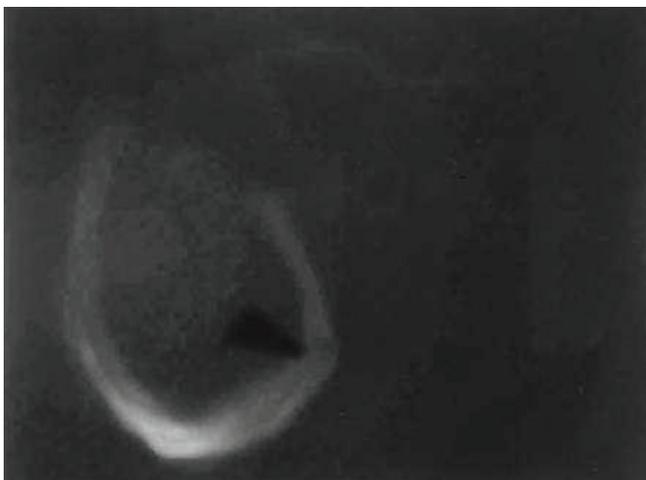
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Photograph-1: Antemortem fracture of distal fragment of left greater corneu



Photograph-2: Antemortem fracture of distal fragment of right greater corneu



Photograph-3: Fracture of left greater corneu

DISCUSSION

Out of 90 cases studied who died due to mechanical asphyxia, peak age incidence falls in the second decade (20-29 years) in both the sexes, the lowest incidence being in sixth decade of life. Major deaths were of females being 51 out of total 90 cases amounting to 56.5% with peak incidence in age group of 10-29 years, with 3 fold increased death rate as to compared to males.

Incidence of fractures of hyoid bone varies in different studies from 0% to 68%, which also varies with types of mechanical

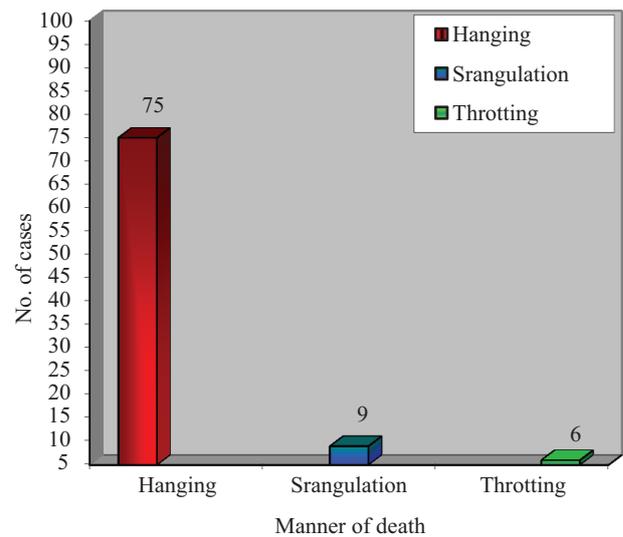


Figure-1 Graph showing the manner of death due to Mechanical Asphyxia

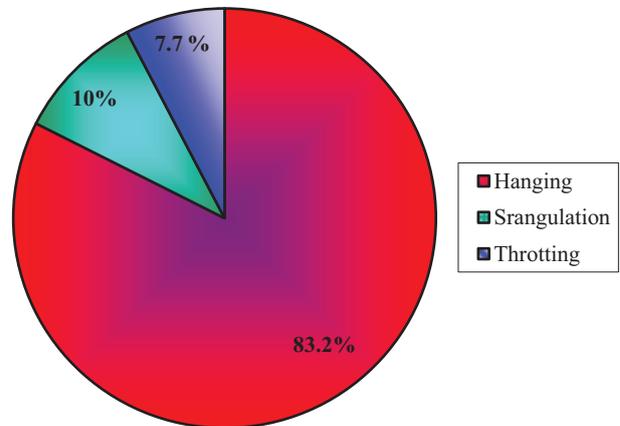


Figure-2: Graph showing the % of manner of death due to mechanical asphyxial deaths

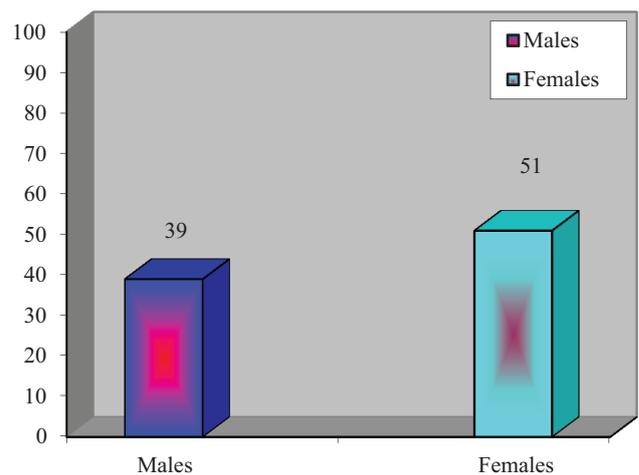


Figure-3: Graph showing sex wise distribution of Mechanical Asphyxial deaths

asphyxia like hanging, strangulation and throttling.¹⁻⁴ In the present study most of the cases of fractured hyoid bones were noted in throttling. Out of 6 cases of throttling, fracture of hyoid bone were noticed in 5 cases amounting to 83.3%. No fractures were seen in cases of ligature strangulation with zero fractures out of 9 cases of ligature strangulation and very few fractures

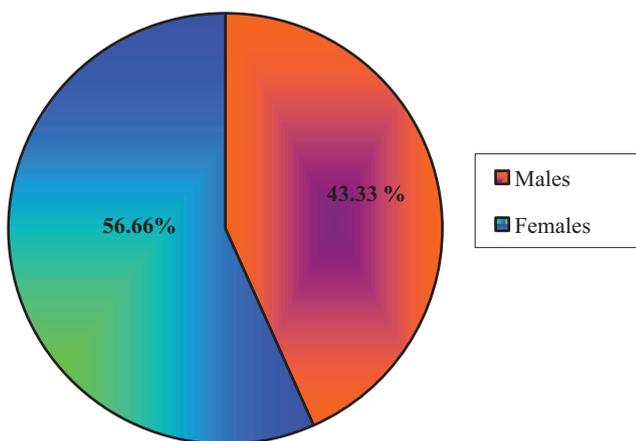


Figure-4: Graph showing sex wise % of Mechanical Asphyxial deaths

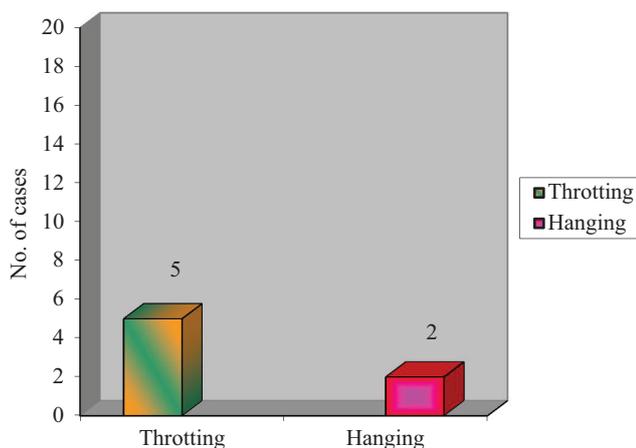


Figure-5: Graph showing manner wise distribution of antemortem fractures

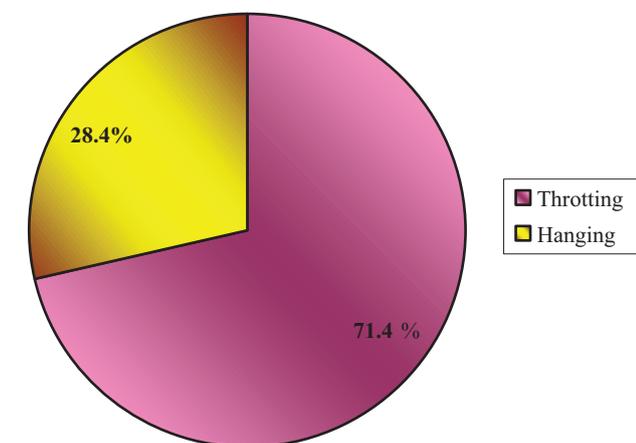


Figure-6: Graph showing the manner wise distribution of antemortem fractures

were noticed in cases of hanging that is 2 hyoid bone fractures in total of 75 hanging cases. The results were comparable to other Indian study Dr.Naik et al with fractures of hyoid bones 4 out of 5 in throttling.

In cases of throttling, as the constricting force is more in magnitude involving larger area and directly acting upon the hyoid bone itself, hyoid bone is most vulnerable to fracture⁷⁻¹⁰

In hanging cases, hyoid bone fracture may not be seen frequently as the constricting force is above the level of hyoid

| Type of mechanical asphyxia | Total cases | No fracture of hyoid bone | % |
|-----------------------------|-------------|---------------------------|-------|
| Throttling | 6 | 5 | 83.33 |
| Hanging | 75 | 2 | 2.67 |
| Strangulation | 9 | 0 | 0 |

Figure-7: Provide legend

| Age in years | Male | Females | Total | Percentage |
|--------------|------|---------|-------|------------|
| 10-19 yrs | 2 | 12 | 14 | 15.55 |
| 20-29 yrs | 12 | 24 | 36 | 40 |
| 30-39 yrs | 10 | 5 | 15 | 16.66 |
| 40-49 yrs | 11 | 4 | 15 | 16.66 |
| 50-59 yrs | 3 | 5 | 8 | 8.88 |
| 60-69 | 1 | 1 | 2 | 2.22 |
| Total | 39 | 51 | 90 | 99.97 |

Figure-8: Total number of Asphyxial deaths – age group distribution.

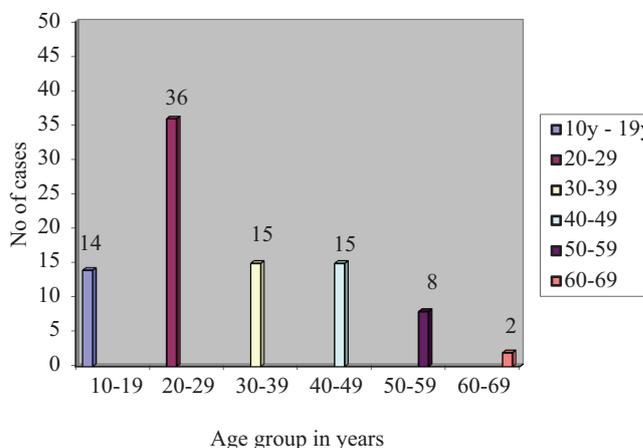


Figure-9: Total number of Asphyxial deaths - age group wise distribution

bone. But, sometimes hyoid bone may be fractured in hanging cases whenever the magnitude of constricting force is much greater.⁷⁻¹⁰

In ligature strangulation, usually the level of constricting force is at the level of or below the level of thyroid cartilage, hence hyoid bone fracture does not occur commonly.¹⁰

CONCLUSION

Finally it is concluded that the detailed examination of hyoid bone is must in cases of mechanical asphyxial deaths because of its anatomical position. Most of the hyoid bone fractures were associated with throttling and none were reported in ligature strangulation.

If fracture is detected, it is to be confirmed whether it is antemortem fracture or an artifact of post mortem fracture, as it has medico legal importance while giving the opinion regarding the cause of death. As all the artifacts of post mortem fractures of hyoid bone were noted in hyoid bones sent from peripheral hospitals, there is necessity of special training programs to the doctors doing autopsy at peripheral hospitals regarding precautions to be taken while dissecting out the hyoid bone and packing them for sending to expert opinion.

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