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FRACTURE OF HYOID BONE IN CASES OF ASPHYXIAL DEATHS RESULTING FROM CONSTRICTING FORCE ROUND THE NECK.

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ABSTRACT

When any case of hanging, strangulation or throttling comes to the Department of Forensic Medicine for Post-mortem examination, the hyoid bone becomes the most integral part of internal examination at the autopsy table. Many authors and workers in this field have seriously highlighted fracture of hyoid bone. Some have claimed hyoid bone fracture in about 20% cases of hanging. Some have claimed hyoid bone fracture in about 68% cases of hanging. They also claimed that hyoid bone fracture increases with age above 40 years due to calcification and immobilization of joints. Some also claimed that hyoid bone fracture increases with using hard ligature for hanging and strangulation. Fracture of hyoid bone has been ascribed to many factors like manners of constriction, level of application of ligature or force of constriction, long drop or short drop suspension, age of victim, sex of victim etc.

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 artifact. For this difficulty some have even advised pre-autopsy X-ray of the neck structures to detect ante-mortem hyoid bone fracture. 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 in 257 cases of hanging, 7 cases of ligature strangulation and 5 cases of throttling to notice that hyoid bone fracture is nil or very rare in hanging where as it is very common in both forms of strangulation.

Key words: 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 hanging1-12 and the incidence of hyoid bone fracture in hanging said to be increased with age after 40 years2, 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 artifact 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. 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 in 257 cases of hanging, 7 cases of ligature strangulation and 5 cases of throttling to notice actual percentage of hyoid bone fracture in these type of asphyxial deaths taking all the factors responsible for hyoid bone fracture into consideration.

The present study has been carried out over 257 cases of hanging, 7 cases of ligature strangulation and 5 cases of throttling referred to the Department to the Departments of Forensic Medicine of S.C.B.Medical College, Cuttack and

Lady Hardinge Medical College, New Delhi over the period of August 1995 to May 2003. It can be mentioned here that 1 case of homicidal hanging with throttling has been included under throttling only for convenience.

MATERIALS & METHODS

A series of medico-legal autopsies were conducted over 269 deceased died due to hanging, ligature strangulation and throttling which were referred to the Department of Forensic Medicine of S.C.B.Medical College, Cuttack and Lady Hardinge Medical College, New Delhi over the period of August 1995 to May 2003.

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.

Irrespective of the information gathered 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 artifact 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 & ANALYSIS

During detail observation and analysis the following things came out.

Table- 1
Nos. and types of cases:

Hanging	:	257
Strangulation	:	7
Throttling	:	5
Total	:	269

Strangulation = Ligature strangulation

Table-2
Sex distribution among the victims:

	Male	Female	Total
Hanging	97	160	257
Strangulation	2	5	7
Throttling	0	5	5
Total	99	170	269

Table-3
Age distribution among the victims :

Age group (in years)	Hanging			Strangulation			Throttling			
	M	F	T	M	F	T	M	F	T	Total
Upto 10	0	0	0	1	0	1	0	0	0	1
11-20	16	48	64	0	0	0	0	1	1	65
21-30	48	88	136	0	5	5	0	4	4	145
31-40	21	18	39	1	0	1	0	0	0	40
41-50	4	3	7	0	0	0	0	0	0	7
51-60	4	0	4	0	0	0	0	0	0	4
61-70	3	2	5	0	0	0	0	0	0	5
71-80	0	0	0	0	0	0	0	0	0	0
81-90	1	1	2	0	0	0	0	0	0	2
Total	97	160	257	2	5	7	0	5	5	269

Table-4
Level of Constricting Force / Ligature :

Level	Hanging	Strangulation	Throttling	Total
Above LP	159	1	1	161
On LP	53	0	0	53
On & Above LP	33	3	4	40
Below LP	12	3	0	15
Total	257	7	5	269

* LP = Laryngeal prominence

Out of 269 cases, in most cases of hanging (159) the level of constriction was found above the

laryngeal prominence where as in most cases of strangulation and throttling the level of constriction found on and above the laryngeal prominence.

Table-5
Nature of Ligature material used

Ligature used	Hanging	Strangulation	Total
Soft Ligature	127	2	129
Hard Ligature	105	5	110
Total	232	7	239

Considering the information gathered from the police records and from the relatives of the deceased and taking the examination findings of the ligature material where ever it has been sent along with the dead body, it is observed that soft ligature like scarf, napkin, sari, bed sheet etc. were used in 127 cases of hanging and hard ligature like jute rope, plastic or nylon rope, electric wire etc. were used in 105 cases of hanging where as hard ligature were used in most cases of strangulation.

Table-6
Ligature Material in-situ:

Hanging	:	32
Strangulation	:	6
Total	:	38

Out of 257 cases of hanging, ligature materials were found in-situ i.e., around the neck only in 32 (12.45%) cases whereas ligature in-situ found in 6 (85.7%) cases of ligature strangulation.

Table - 7
Height of Suspension of Dead Bodies in Hanging :

	Partial Hanging	Complete Hanging	Total
Nos. of victims	15	217	232

Out of data available on 232 cases of hanging, 15 victims died due to partial hanging where some parts of victims were touching the ground where as 217 victims died due to complete hanging.

Table -8

Long drop Vs. Short drop suspension in hanging cases :

	Long drop suspension	Short drop suspension	Total
Nos. of victims	58	174	232

Out of data available on 232 cases of hanging, 58 (25%) victims had used long drop suspension i.e., greater than their body heights where as 174 (75%) victims had used short drop suspension.

Table-9
Types of hanging depending on the probable positions of the Knots :

	Typical Hanging	Atypical Hanging	Total
Nos. of victims	19	238	257

Out of total 257 cases of hanging, the typical hangings were 19 (7.39%) where the probable knot positions were on the occiputs where as there were 238 (92.6%) victims died due to atypical hanging where the knot positions were other than over the occiputs.

As the maximum constricting force acts diagonally just opposite the site of knot, the neck structures on the front of neck are compressed maximally in typical hanging than atypical hanging2.

Table-10
Incidence of Hyoid Bone Fracture :

	Hanging	Strangulation	Throttling
Fractured hyoid bone	0	3	4
Intact hyoid bone	257	4	1
Total	257	7	5

Out of 257 cases of hanging, there was not found a single victim having fracture of hyoid bone where as out of 7 cases of ligature strangulation, hyoid bone fracture found in 3 (42.87%) cases and out of 5 cases of throttling, hyoid bone fracture seen 4 (80%) cases.

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. There fore, it is only the internal tissue damage as well as damage to the laryngeal cartilages and hyoid bone decides the actual manner of death. Similarly,, in case of grossly decomposed dead bodies where the neck skin are grossly discolored or lost, it is the internal damage to neck tissue and hyoid bone, which tells the actual

cause of death even months and years after death. So importance given to hyoid bone fracture is justifiable and will remain there where mechanical asphyxia is the mode of deaths.

Though percentage of hyoid bone fracture in manual or ligature strangulation cited by many authors are more or less equal and non-controversial, the percentage of hyoid bone fracture in hanging deaths vary greatly from 0% to 68% from author to author when we look into different text as:

1. Reutor (1901) - 60% in typical hanging, 30% in atypical hanging10.
2. Smith and Fiddes (1955) - Practically never fractured in hanging 11.
3. Wintraub (1961) - Seen in 27% cases of hanging 12.
4. Modi J.P. (1988) - Fracture is rare in hanging 3.
5. Mukherjee J.B. (1994) - Not found in 500 cases of hanging 4.
6. Betz, P. and Eisenmenger, W.(1996)-Throat skeleton fracture seen in 67% hanging1.
7. Apurba Nandi (2000) - Does not occur in more than 5-10% cases of hanging 5.
8. Reddy K.S.N.(2000) -Seen in15-20% cases of hanging but rare below 40 years of age 9.
9. Nikolic, S., Micic, J., Antanasijevic, T., Djokic, V. and Djonic, D.(2003)- Throat skeleton fracture seen in 68% hanging7.

The present author on his serial study of 257 cases of hanging, 7 cases of ligature strangulation and 5 cases of throttling which were directly dealt by him in a span of more than 7 years, efforts have been made to evaluate the actual percentage of hyoid bone fracture in those types of deaths taking all the factors responsible for it like age, sex, mode and manner of constriction, level of constriction, nature of constricting force or material etc.

Out of total 257 cases of different types of hanging including 4 cases of homicidal hanging, the present author did not found hyoid bone fracture in a single case. Though many authors claim that hyoid bone fracture increases with increasing age above 40 years, the present author did not get any hyoid bone fracture in the 18 cases of hanging victims over the age of 40 years. So incidence of hyoid bone in hanging can be taken as rare or very few as observed by authors like Smith, Sydney and Fiddes 11 , J.P.Modi 3 and J.B.Mukherjee 4. High incidence of hyoid bone fracture in hanging as claimed by some authors in this field are definitely due carrying forward the forensic mythology from time to time as a result of non-meticulous examination during autopsy and assigning joint mobility between body and greater cornu of hyoid as fracture in addition to improper handling and poor differentiation of post-mortem fracture.

On the other side, out of total 7 cases of ligature strangulation, the present author detected hyoid bone fracture in 3 (42%) cases where as out of total 5 cases of throttling, the present author detected hyoid bone fracture in almost all i.e., 4 (80%) cases, which is more or less same as noticed by most of the previous authors2-12 .

CONCLUSION

Taking the present study of ``Hyoid bone fracture in cases of asphyxial deaths resulting from constricting force round the neck`` it is concluded that incidence of hyoid bone fracture is almost nil or rare in cases of hanging where the constricting force act on the neck in a sliding or tangential manner. However,, increasing incidence of hyoid bone fracture after the age of 40 years can be concluded only after taking larger numbers of such cases, which need further continuous study in this regard.

Whenever a fracture of hyoid bone is observed in case of death due to hanging, then it is important to look for its ante-mortem character and site and at the same time he has to consider all the factors responsible for it otherwise should not give an opinion in haste other than hanging.

In cases of ligature strangulation, in some cases the hyoid bone got fracture as the constricting force applied here is greater in magnitude usually using hard ligature and acts in a vertical manner to the neck structures.

In cases of throttling, the hyoid bone is usually fractured, as the constricting force is greater in magnitude over a larger area mostly directly acting upon the hyoid bone itself

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 JP. (1988) Modi's Medical Jurisprudence and Toxicology, 21st ed. by Franklin, C.A.,p.192
4. Mukherjee JB. (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, 19thed.,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.London: Churchi1
12. Weintraub CM. (1961) Med-leg.J. (Camb.), 21, 209-16