

Non-Compressive Mechanical Injuries to the Neck: An Autopsy based Study

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Abstract

Study of non-compressive mechanical injury to neck determines the causes of deaths by these injuries and preventive measures to be taken. The study was conducted in the department of forensic medicine, Government Medical College Srikakulam. Postmortem examination of each case was carried out various types of non-compressive mechanical neck injuries were recorded, and analyzed over a period of 6 months. Total number of 354 postmortems were conducted among these 41 cases had non-compressive mechanical injuries to neck. Injuries were most common in male gender (82.92%) and in age group between 20-40 years. Improving proper traffic rules may reduce mortality due to these injuries.

Key Words: Non-Compressive Mechanical Injury; Neck; Autopsy.

Introduction

An injury is any harm, whatever illegally caused to any person in body, mind, reputation or property. Mechanical injuries are injuries produced by physical violence¹. The neck is protected by head above and chest below respectively. Usually head and chest are involved in injury, but with extensive force for a considerable duration, neck is also involved.² Many vital structures are placed in the neck to carry blood, impulses, and air in both directions and food downwards to the rest of gastro-intestinal tract. In cases where there are multiple injuries not confined to the neck, more obvious lesions thus overlooking or delaying the diagnosis of significant injuries to this region.³

The incidence of neck injuries has in the past been generally underestimated⁴. One injury that frequently overlooked at autopsy in Road traffic accident cases is the atlanto-occipital dislocation.⁵ Blunt carotid artery injuries commonly occur in road traffic accidents, direct

blow and fall from height.⁶ Blunt impact injuries to the posterior compartment of neck involve injury to cervical vertebrae, spinal cord, vertebral arteries and other structures behind the pre vertebral fascia¹. In the middle cervical injury, the common carotid artery is the most vulnerable vessel, although other large vessels such as the external and internal carotid arteries as well as the internal jugular vein may be involved.⁷

Stab injuries can damage one or more of the major organ systems of the neck including great vessels, nerves, larynx, trachea, esophagus and spinal column. Most reported cases of spinal cord injury following a stab in the neck are homicidal, and injury site is either back or lateral side of the neck¹.

Choking is produced as a result of mechanical obstruction to the airways. It is commonly accidental in nature.¹ The neck region is frequently subjected to a number of procedures by healthcare management, including airway, esophageal instrumentation, invasive vascular maneuvers such as angiography, intravenous cannulation, tracheostomy etc.³ Nasogastric tubes insertion may cause trophic ulcers in the larynx followed by perichondritis of the cricoids leading to chondritis, collapse and stenosis of larynx.⁸ The introduction of I.V. cannulae into veins in the neck may cause large

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hematoma and more diffuse bleeding into the tissues along-side the larynx. These resuscitation injuries may be mistaken for those due to assault or from steering wheel impact injuries.⁹

A compressive injury to neck includes manual strangulation, ligature strangulation, and hanging. A Non-compressive mechanical injury to neck defined as injuries which are produced by physical violence like blunt/sharp/firearm/thermal/chemical/physical to neck.¹ Study of non-compressive mechanical injury to neck determines the causes of deaths by these injuries and preventive measures to be taken.

Materials and Methods

The present study was conducted for a period of 6 months from October 2019 to March 2020, in the mortuary, department of Forensic Medicine, Government Medical College Srikakulam. During the study period, 354 autopsies were conducted of which 41 (11.58%) cases have non-compressive mechanical injuries to the neck. Age, Gender, Manner, Types of major external injuries to the neck, Internal structures involved, Type of force involved, Severity of these injuries to cause death, Number of cases with only cervical vertebra and spinal cord involved are examined, data gathered from police and relatives were recorded in this study. The non-compressive mechanical injuries to neck in persons who admitted to casualty or ward and survived were not included in this study.

Observations and Discussion

A total number of 354 postmortems were conducted for a period of 6 months in the department of Forensic medicine, Government Medical College, Srikakulam. During the study period majority of cases were Road Traffic Accidents, Railway injuries and fall from height. Out of 354 cases 41 cases had non-compressive mechanical injuries to neck. The involvement of neck with non-Compressive mechanical injuries were common in all cases of Drowning (100%) followed by Thermal injuries (40.00%), Assault (28.57%), Railway injuries (28.20%), Road traffic accidents (11.02%). This can be explained by Striking the head on the bottom of the water after miscalculation of the water depth may be the cause for more number of neck injuries in drowning. This study correlates with Sahoo et al.¹⁰ least number of

neck injuries in Road traffic accidents can be explained by head and body relatively broad areas and may have direct contact with road comparatively neck.

More number of non-compressive mechanical injuries to neck observed in age group between 20-40 years (68.29%) followed by 41-59 years (19.51%) and Males(82.92%) were more in number than females(17.07%). The incidence is high among Males and 20-40 years age groups may be because they are more actively involved in outdoor occupation, driving etc. more preventive measures to be taken to prevent these types of deaths in these age group males. This study correlates with Jani CB et al.² and Bener et al.¹¹

The highest number of these type of cases were accidental (73.17%) followed by suicides (19.51%). This can be explained by most accidental cases were due to Road traffic accidents, Railway injuries, Fall from height, Drowning, and in suicides are due to Railway injuries, Thermal injuries etc, where neck is more prone to be involved. Neck involvement was least in homicidal cases (7.5%) as the head, chest and abdomen are commonly targeted. This study correlates with Sahoo et al.¹⁰ Mohanthy et al.¹² Contrasts with Hugar BS.¹³

Lacerations (39.02%) were the commonest type of mechanical injury observed in non Compressive mechanical injury to the neck followed by abrasions. It can be explained on basis of more number of accidental cases are involved in neck injuries, where lacerations and abrasions are more common. Stab and chop wounds were the least observed injuries because these types of injuries may be common in homicidal deaths where head, chest and abdomen are commonly targeted. This study correlates with Hu et al.¹⁴

Most commonly involved Internal Structure was trachea (53.65%) followed by vertebra and spinal cord (43.90%). This may be due to trachea is situated superficially and in decapitation injuries, drowning, and whiplash injuries in road traffic accidents, vertebra and spinal cord are more prone to be involved. In 31.7% cases major vessels like carotid arteries are involved. This study correlates with Moar's study.⁶

Highest number of these type of injuries were due to blunt force (65.85%) followed by Obstructive force (31.70%). This may be due to the majority of these cases

were road traffic accidents and railway injuries, which had resulted injuries in the form of lacerations, contusions and abrasions due to blunt force and in drowning, burns, trachea was obstructed due to Obstructive force. Sharp force was the least (2.43%) among these types of injuries because sharp injuries are common in homicides which are very less cases (7.31%) in this study. This study correlates with Bener et al.¹¹ and contrasts with Hugar BS.¹³

More number (68.29%) of non-compressive mechanical injuries to the neck were non-fatal and in (7.31%) of deaths these injuries contributed to the death. This may be because these non-compressive mechanical injuries were mostly lacerations and abrasions which are

nonfatal. In (24.39 %) cases injuries to structures of the neck were solely sufficient to cause death where trachea, vertebra may be involved which causes respiratory failure and death.

In 19.51% of deaths by Non-compressive mechanical injuries no obvious external injuries on the neck were observed but internal neck structures like cervical Vertebra and spinal cord were damaged. This can be explained by an indirect force transmitted along the spine as in cases of fall from height and due to acceleration or deceleration force in cases of road traffic accidents. This study correlates with Tonge et al.⁴and contrasts with N T Satish.¹⁵

Table No. 1: Total Number of cases and various causes for Non-Compressive Mechanical Injury to the Neck.

S. no	Cause Of Death	Total no of cases	No of cases with Non-Compressive Mechanical Injury To The Neck	Percentage
1	Road Traffic Accidents	127	14	11.02%
2	Railway injuries	39	11	28.20%
3	Fall from Height	16	02	12.50%
4	Thermal injuries	10	04	40.00%
5	Assault	07	02	28.57%
6	Drowning	06	06	100.00%
7	Others	149	02	1.34%
8	Total	354	41	11.58%

Table No. 2: Age distribution In Non-Compressive Mechanical Injury to the Neck

S.No	Age in years	No of cases	Percentage
1	<20	04	9.75%
2	20-40	28	68.29%
3	41-59	08	19.51%
4	>60	01	2.43%

Table No. 3: Types of major external injuries In Non-Compressive Mechanical Injury to the Neck

S. No	Type of injury	No of cases	Percentage
1	Laceration	16	39.02%
2	Abrasion	11	26.82%
3	Contusion	6	14.63%
4	Thermal	5	12.19%
5	Incised wound	2	04.87%
6	Stab/Chop wound	1	2.43%

Table No. 4: Internal structures involved in Non-Compressive Mechanical Injury to the Neck

S. No	Internal Structures Involved	No of cases	Percentage
1	Trachea	22	53.65%
2	Vertebra& Spinal cord	18	43.90%
3	Strap muscles	17	41.46%
4	Major vessels	13	31.70%
5	Thyroid gland and cartilage	12	29.26%
6	Esophagus	11	26.82%
7	Hyoid bone	10	24.39%

Table No. 5: Severity of death due to Non-Compressive Mechanical Injury to the Neck

S. No	Severity	No of cases	Percentage
1	Fatal	10	24.39%
2	Contributory	03	07.31%
3	Non-fatal	28	68.29%

Table No. 6: Number of Cases with Only Cervical Vertebra and Spinal Cord Involved

S. No	Type of Cases	No of cases	Percentage
1	RTA	5	12.19%
2	Railway Injuries	1	2.43%
3	Fall from Height	1	2.43%
4	Others	1	2.43%
5	Total	8	19.51%

Conclusions

1. Males aged between 20-40 years were more vulnerable for non compressive mechanical injuries to neck.
2. Road traffic accidents and railway injuries were the major causes of these injuries.
3. This type of injuries to neck was involved in all deaths due to drowning.
4. Blunt and obstructive force was the commonest type for these types of injuries.
5. The common types of injuries in non-compressive mechanical injuries to neck were lacerations, abrasions and contusions.
6. Most of these injuries were nonfatal.
7. In 19.51% of cases most commonly injured internal neck structures like trachea, cervical vertebra and spinal cord were only injured with no external injuries.
8. Commonest manner of death is accidental.

Suggestions And Recommendations

1. Higher mortality among males aged 20-40, will retard economic growth rates. So there should be strong health policy for preventive as well as curative health services.
2. Government should initiate better health awareness campaigns for healthy life styles, environment modifications, and safety measures to avoid accidental deaths.

3. Proper punishments should be implemented to maintain Personal responsibility when driving and avoid alcohol before driving will reduce many road traffic accidents.

4. Headrests which are properly fitted and intelligent seat design play a major role in preventing or reducing the severity of whiplash injuries.

5. In suspected cases of neck injuries, before shifting the patient to hospital immobilize the head, neck and shoulder area. Cervical collar should be applied as soon as possible.

6. In all suspected cases of blunt injury to the neck where there were no obvious external neck injuries, examination of deep structures of the neck like vertebra, spinal cord and vertebral vessels should be carried out carefully.

7. During autopsy in road traffic accident cases atlanto-occipital dislocation should be observed carefully to avoid wrong opinion of post mortem report.

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