|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||
International Journal of Medical and Biomedical Studies
Available Online at www.ijmbs.info
PubMed (National Library of Medicine ID: 101738825)
Index Copernicus Value 2018: 75.71
Original Research Article
Volume 4, Issue 4; April: 2020; Page No. 169-173

EVALUATION OF DIFFERENT TYPES OF INTRA-CRANIAL HEMORRHAGES IN FATAL ROAD TRAFFIC ACCIDENTS IN CASES FROM BIHAR REGION

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Article Info: Received 06 March 2020; Accepted 06 April 2020
DOI: https://doi.org/10.32553/ijmbs.v4i4.1240
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Conflict of interest: No conflict of interest.

Abstract

Among all the regional injuries, the injury to the head and neck are the most important in forensic practice. The external injury on the head and face may or may not be representative of the extent of the internal injury. A sound practical understanding of the neuro pathological trauma is more essential for forensic pathologist because head injuries provide the major contribution of the death due to assaults, falls and transportation accidents. Hence based on above findings the present study was planned for Evaluation of Different Types of Intra-Cranial Haemorrhages in Fatal Road Traffic Accidents in Cases from Bihar Region.

The present study was planned in Department of Forensic Medicine, Government Medical College, Bettiah, West Champaran, Bihar, India from nov 2018 to oct 2019. Total 50 cases of the road traffic accident victims were evaluated in the present study identified with the intracranial haemorrhages. A pretested pro-forma specially designed for this purpose was needed to extract information by interrogating police personnel accompanying the victim as well as friends, relatives and neighbours, eye witness of accident, and other who accompanied victim and had first-hand knowledge about the event.

The data generated from the present study concludes that RTAs were more common in the younger age groups and in male sex. Head injury was the major cause of death in majority cases of RTAs mostly due to Subdural and Subarachnoid Haemorrhages. This further shows the need of strict implementations of rules for controlling the speed of vehicle. Government and public should identify local safety problems. Apart from measure to improve the road environment, increase the traffic awareness among the public and use of available safety measure, a realistic mechanism to move the victims to well-equipped trauma centre as soon as possible may help towards curbing the incidence of road traffic fatalities.

Keywords: Intra-Cranial Haemorrhages, Fatal, Road Traffic Accidents, RTA, Bihar Region, etc.

Introduction

A road traffic accident (RTA) is any injury due to crashes originating from, terminating with or involving a vehicle partially or fully on a public road. It is projected that road traffic injuries will move up to the third position by the year 2020 among leading causes of the global disease burden. They are considerable economic losses to victims, their families, and to countries as a whole.

The Global status report on road safety 2013 indicates that worldwide the total number of road traffic deaths remain unacceptably high at 1.24 million per year. Road traffic injuries are the leading cause of death among young people, aged 15–29 years. Children, pedestrians, cyclists and older people are among the most vulnerable of road users constituting half of those dying on the world's roads. Majority of the world's fatalities on the roads occur in low-income and middle-income countries, even though these countries have approximately half of the world's vehicles.

India is no exception and data showed that more than 1.3 lakh people died on Indian roads, giving India the dubious honour of topping the global list of fatalities from road crashes. Rapid urbanization, motorization, lack of appropriate road engineering, poor awareness levels, nonexistent injury prevention programmes, and poor enforcement of traffic laws has exacerbated the situation.

Rather than mechanical, its human factor that contribute significantly to increasing number of road accidents in India. Drunken driving, over speeding, refusal to follow traffic rules, and reckless driving are main reasons for road accidents.

Drunken driving is one of the major causes of road traffic accidents especially among commercial vehicle drivers on highways. Data shows drunken driving to be responsible

for 70% of road fatalities in Delhi and Mumbai. The risk of being involved in a crash increases significantly above a blood alcohol concentration (BAC) of 0.04 g/dl.

Over speeding increases the probability of fatal injuries for car occupants from near zero to almost 100% as the change of speed during the impact increases from 20 kilometers per hour to 100 kilometers per hour. Pedestrians have a 90% chance of surviving car crashes at 30 kilometers per hour or below, but a less than 50% chance of surviving impacts at 45 kilometers per hour or above.

Reckless driving like use of mobile phones during driving, non-use of helmets, non-use of seat-belts are significant contributing factors for road traffic accidents and should be avoided. Driver fatigue and sleepiness also contribute to crashes. Improper designing of roads and lack of pedestrian pavement are other contributing factors. Only 28 countries have comprehensive road safety laws on major key risk factors like drunken driving, speeding, and failing to use helmets, seat-belts, and child restraints. This is a major cause of concern and both society and government should work together to reduce this preventable cause of death.

Intracranial hemorrhage means bleeding in the brain tissue (intracerebral) or bleeding between the surrounding membranes and bone (subarachnoid, subdural, epidural). All of these hemorrhages may occur either after trauma that means after head impact exposure due to any cause or as a result of hypertension and any other systemic disease.

It occurs when the walls of blood vessels, especially small vessels in specific regions, which feed the brain, rupture and bleed into the brain and damage the brain tissue. Approximately 12-15 cases are seen in 100,000 people each year and this rate increases over the age of 40 years. The rate of male to female is 1\1,67. The risk factors are hypertension, amyloid angiopathy, trauma, alcohol and nicotine. In addition, aspirin, non-steroidal anti-inflammatory agents and thrombolytic agents used for therapeutic purposes may also cause that. Cerebral blood vessels wear out with advancing age and lose their elasticity. As a result of diseases such as hypertension and amyloid angiopathy, the walls of these vessels, which have lost their elasticity, rupture and the blood leaks into the brain tissue. This blood causes a mass effect and destroys the brain tissue, accumulating in the brain tissue Meanwhile, this mass effect causes ischaemia by damaging the circulatory system of the brain.

Clinically, it shows up with unilateral loss of strength, headache and changes in consciousness. Besides that, speech disorder, seizure, nausea and vomiting may also occur. A detailed anamnesis should be gained for pre-diagnosis. Computed tomography and magnetic resonance imaging techniques are used for the diagnosis. Computed tomography is preferred because of its short duration and better diagnostic accuracy.

The initial step in treatment is to maintain the respiratory and circulatory system to protect the vital functions of a patient. By evaluating the volume, localization of the hemorrhage and the neurological condition of the patient, it is decided whether the treatment will be surgical or medical. The surgical treatment is the removal of the hemorrhage that has accumulated and causes mass effect in the brain tissue. The medical treatment are the use of drugs that will lower the intracranial pressure and reduce the edema around the hemorrhage. Antiepileptic drugs that prevent the patient from having a seizure are also started for preventive purposes.

They are hemorrhages that occur below the arachnoid membrane surrounding the brain. The incidence is 10-16\100000. Risk factors are genetic factors, smoking, alcohol, hypertension and drug habits such as oral contraceptives, cocaine, amphetamine. The most common causes are aneurysm, as well as hypertension, atherosclerosis, arteriovenous malformations, brain tumours, bleeding disorders, encephalitis, meningitis, meningoencephalitis, anticoagulant treatment complications, head trauma and unknown causes.

The most common symptoms are severe headache and neck stiffness. In addition, there may be signs of nausea, vomiting, dizziness, diplopia (double vision), seizures, clouding of consciousness and other intracerebral hemorrhage findings that may accompany. At first, the diagnosis is to detect hemorrhage with computed tomography that provides fast results. The next thing to do after the hemorrhage is identified is angiography to visualize the blood vessels of the brain.

If an aneurysm is detected as a result of angiography, the aneurysm should be removed circulation by surgical or endovascular techniques according to its localization and configuration. Despite all advancements, 25-30% of these patients are deceased before arriving at a hospital and 30-50% of the remaining patients cannot saved.

Epidural Hematoma are hemorrhages that occur between the tough outer membrane of the brain (dura mater) and the skull. They occur as a result of damaged vessels on the dura after trauma, usually accompanied by a fracture in the skull bone. They are seen in 0.2-0.6% of all head traumas. The clinical signs comes up in three forms: the first one is lucid interval (loss and regain of consciousness), the second one is the total loss of consciousness and never regained, the third one is in form of clouding of consciousness. It can be diagnosed by computed tomography and also magnetic resonance imaging can be

used, but computed tomography is preferred since it provides results much earlier and the time plays a vital role.

The treatment is follow-up and surgery according to the amount of accumulated blood between the dura and the skull and the degree of the compression on the brain. If the amount of the accumulated blood is very little, the patient can be monitored closely, keeping under observation. If the decision is surgery, it should be carried out very quickly. The blood between the dura and the skull is removed surgically and the bleeding focus is found and stopped. The results are gratifying after the surgical treatment. Success rates after the treatment are between 55-89% and mortality rates are between 5-29%.

Subdural hematoma is seen in 8-57% of patients who have head trauma. It is a blood accumulation due to the damage of vessels between the dura and the brain tissue. In 50% of the subdural hematoma cases, there are also other additional pathologies in the brain. Usually, patients are admitted with very serious neurological disorders and 50% of the patients are unconscious. The best diagnosis technique is computed tomography, and magnetic resonance imaging may also be used to diagnose it.

The treatment of hematomas with mass effect and neurological disorders is surgery. The accumulated blood between the brain and the dura is removed surgically and the bleeding focus is found and taken under control. Mortality rates range between 42-90%, this rate much higher than epidural hematomas.

Among all the regional injuries, the injury to the head and neck are the most important in forensic practice. The external injury on the head and face may or may not be representative of the extent of the internal injury. A sound practical understanding of the neuro pathological trauma is more essential for forensic pathologist because head injuries provide the major contribution of the death due to assaults, falls and transportation accidents. Hence based on above findings the present study was planned for Evaluation of Different Types of Intra-Cranial Haemorrhages in Fatal Road Traffic Accidents in Cases from Bihar Region.

Methodology:

The present study was planned in Department of Forensic Medicine, Government Medical College, Bettiah, West Champaran, Bihar, India from Nov 2018 to Oct 2019. Total 50 cases of the road traffic accident victims were evaluated in the present study identified with the intracranial haemorrhages. A pretested pro-forma specially designed for this purpose was needed to extract information by interrogating police personnel accompanying the victim as well as friends, relatives and neighbours, eye witness of accident, and other who accompanied victim and had first-hand knowledge about the event.

Following was the inclusion and exclusion criteria for the present study.

Inclusion criteria: All cases of fatal head injuries due to road traffic accidents subjected for medico – legal autopsy.

Exclusion Criteria: 1. Those patients who died in RTAs with cause of death other than head injury were excluded. 2. Decomposed cases with fatal head injuries, where the interpretation of injuries was not possible due to extensive decomposition were excluded. 3 Coexisting antemortem or postmortem burn injury to head.

Results & Discussion:

Head injury has been defined as “a morbid state, resulting from gross or subtle structural changes in the scalp, skull, and/or the contents of skull, produced by mechanical forces". [3] It has also been defined as physical damage to the scalp, skull or brain produced by an external force. However, such force/impact, responsible for the injury needs not be applied directly to the head.

Extradural hemorrhage: Bleeding between inner surface of skull and duramater is least common of three types of brain membrane haemorrhage. The dura is closely applied to the interior of the skull except in the posterior fossa, that extradural bleeding does not occur over the skull floor. Most extradural haemorrhage is associated with fractures of the skull. The usual site is unilateral in a parietotemporal area caused by the rupture of middle meningeal artery that run between the dura and the skull. [4]

Subdural Haemorrhage: Bleeding into relatively wide space between the dura and arachnoid membrane is much more common than extradural haemorrhage. It results from the rupture of the bridging veins that connect the venous system of the brain to the large intradural venous sinuses. [4]

Subarachnoid haemorrhage: The third type of brain haemorrhage bleeding is even more common than subdural haemorrhage. It is usually associated with extradural or subdural haemorrhage. The subdural haemorrhage caused by trauma varies greatly according to the nature and extent of injury. When it is secondary to laceration of the brain or extensive cortical contusions then its localization and severity depends upon primary injury. [3]

Table 1: Basic Details

Parameters:	No. of Cases
Age:	
10 – 20 years	0
21 – 30 years	2
31 – 40 years	9
41 – 50 years	14
51 – 60 years	10
61 – 70 years	9
Above 70 years	6
Sex:	
Males	36
Females	14
Mode of Accident:	
2 Wheeler	13
4 Wheeler	22
Heavy vehicle	10
Self fall	5
Total	50

Table 2: Type of Intracranial haemorrhages in fatal head injury cases of RTA

Type of Intracranial haemorrhages	Observed in No. of Cases
Subdural hemorrhage	48
Subarachnoid hemorrhage	42
Extradural hemorrhage	7
Intra cerebral hemorrhage	5
Intra ventricular hemorrhage	6
Brain stem hemorrhage	3

Table 3: Combination of intracranial hemorrhage in head injury

Type of Intracranial haemorrhages	Observed in No. of Cases
Subdural hemorrhage+ subarachnoid hemorrhage	40
Extradural hemorrhage + subdural hemorrhage+ subarachnoid hemorrhage	6
Subdural hemorrhage + intra cerebral hemorrhage	5
Subdural hemorrhage + intra ventricular hemorrhage	6
Intra ventricular hemorrhage + intra cerebral hemorrhage	1
Extradural hemorrhage +intra cerebral hemorrhage	2
Subdural hemorrhage+ intra cerebral hemorrhage	5
Extradural hemorrhage + subarachnoid hemorrhage	6

According to WHO [5] estimates, young adults aged between 15 and 44 years account for 59% of global road traffic deaths and 77% of the victims are men.

In a study done by Kanchan et al [15] in Manipal, 89.8% of the victims was 38.7 years. In another study done by Goyal et al [7] in Jaipur, maximum number of cases was in the age group of 21 – 40 years and 87.1% of the victims were males. Janine jagger et al45 in a study found that maximum occurrence of head injury occurred in the age group of 20-29 years. The age and gender distribution in our study match well with that of all the other studies.

Recently there has been a marked increase around the world in the use of mobile phones by drivers that is becoming a growing concern for road safety. But in our study, no data was available regarding the use of mobile phones by the accident victims. Other risk factors like bad illumination, rain, pet or domestic animals and natural diseases contributed very less to the occurrence of RTAs in our study A national level registry must be established for registering all road traffic accidents all over the country. It will give insight about the epidemiological correlates and risk factors of RTAs, which will help in taking appropriate preventive measures.

Modifiable risk factors contributing to the occurrence of RTAs should be brought under control. Use of helmets for two-wheeler riders should be strictly enforced by law. Drunken driving and use of mobile phones while driving should be strictly prohibited. Use of seat belts should be made compulsory. Traffic rules including the lane discipline should be enforced strictly. Bad roads should be repaired and adequate lighting should be provided in all the roads.

Emergency contact numbers should be provided in all the roads. Health care facilities should be improved to provide timely interventions to RTA victims. Adequate ambulance facilities should be made available.

High standard emergency management and surgical care and an organized team work by many disciplines such as traffic police, law and enforcement officers, mobile ambulance service, civil engineers, use of safety measures like helmet, seatbelt, airbag, verification of fitness standards of vehicle etc., can arrest the rise in incidence as well as prevent fatalities. Road conditions are important aetiological factors in RTA and have become death traps with potholes, uncompleted road project, fewer road traffic sign boards.

Conclusion:

The data generated from the present study concludes that RTAs were more common in the younger age groups and in male sex. Head injury was the major cause of death in majority cases of RTAs mostly due to Subdural and Subarachnoid Haemorrhages. This further shows the need of strict implementations of rules for controlling the speed of vehicle. Government and public should identify local safety problems. Apart from measure to improve the road environment, increase the traffic awareness among the public and use of available safety measure, a realistic mechanism to move the victims to well-equipped trauma centre as soon as possible may help towards curbing the incidence of road traffic fatalities.

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