HEAD INJURIES IN ROAD TRAFFIC ACCIDENTS WITH CONTRECOUP DOMINATES

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ABSTRACT

BACKGROUND

The bruising of the brain at the site of application of force is known as coup injury and injury on the side opposite to the application of force is contrecoup injury.

MATERIALS AND METHODS

Observing the internal injuries, which have no corresponding external injuries alone noted and documented of the traffic accident autopsies.

Study Tools- Proforma-

1. Postmortem detailed note.
2. Well-lighted autopsy theatre.

RESULTS

The data will be entered in Microsoft excel spreadsheet and the collected data will be analysed using Statistical Packages for Social Sciences (SPSS). Out of 30 cases of road traffic accidents brought by police, all showed features of road traffic occurrences.

CONCLUSION

15 cases showed contrecoup injuries (50%). 100% cases showed coup injuries, so external or internal coup injuries are always present in this study, so head injuries without any external injuries are not significantly noted in this study.

KEYWORDS

Contrecoup Injuries and Traffic Accidents of All Age and Sex Groups.

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BACKGROUND

The bruising of the brain at the site of application of force is known as coup injury and injury on the side opposite to the application of force in contrecoup injury. Contrecoup injury is the indirect injury. Contrecoup injuries maybe due to vacuum suction effect in fall. Coup lesions maybe absent or minimal in spite of severe contrecoup lesions. But, a blow to an immovable head, contrecoup lesions are rare. Without a noticeable coup injury, more marked contrecoup lesions are possible. The space between the vessel and pail sheath is known as Virchow-Robin space. This space is continuous with subarachnoid haemorrhage elsewhere. This space is vulnerable for slight trauma.

Lindenburg and Frey tag introduced new names for the continuous in the brain, which do not fit into coup or contrecoup. Continuously found in deeper structures of the brain along the line of impact are called intermediary coup contusions sustained to an organ especially when the organ is freely floated or movable in a close cage like skull and chest wall.[1]

Head injuries are caused by direct and indirect trauma. The injuries may involve soft tissues of the scalp, the skull and the brain. These may be injury to the skull and the brain without any evidence of injury to soft tissues of the scalp. When a moving head strikes a solid stationary object, the skull comes to a stop suddenly, but the brain continues to move in the direction of force for a brief period and the moving brain strikes against the skull (deceleration injury). Any injury which leads to rotational movements of the skull causes the brain to slide or glide against fixed structures within the skull called shear strain injury.

The driver and front seat passengers may split the head or face on a shattering wind shield frame or may sustain a fracture dislocation of the cervical spine due to hyperflexion of the head or being thrown up as well as forward. Dislocation of the atlanto-occipital joint is found in about one third of all fatal motor vehicle accidents, whiplash injury is due to a violent acceleration or declaration force applied to the passenger, usually front seat occupant. In this case, no external injury always present.[2]

Injury to brain can occur due to distortion of the skull or movements of the brain within the skull. Inside the skull, the falx cerebri and tentorium cerebelli divide the cranial cavity into compartments and exert a restraining effect on the brain.

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MATERIALS AND METHODS

The study was a retrospective, data searching study and doesn't require the clearance from the institutional ethical review committee and consents are not essential The materials include the dead bodies brought by Kerala police for medicolegal autopsies at Department of Forensic Medicine, Government Medical College, Kottayam, and the respective postmortem examinations conducted by the author itself and the data utilised for the above study including the injuries and their pattern.

The preliminary data like name, age, sex, weight and religion were studied. The essential data like postmortem number, crime number and nature of victims were studied.

Study Tools

1. Proforma.
2. Postmortem detailed note.
3. Well-lighted autopsy theatre.

Inclusion Criteria

Three-month period study on autopsied bodies of road traffic accident cases.

Exclusion Criteria

Autopsies other than traffic accidents during the period.

Study Procedure

Observing the internal injuries, which have no corresponding external injuries alone noted and documented of the traffic accident autopsies.

RESULTS

The data will be entered in Microsoft excel spreadsheet and the collected data will be analysed using Statistical Packages for Social Sciences (SPSS).

History of RTA %	Contrecoup Injuries %	Coup Injuries %	Type of Victims	Type of Injury
30/30 (100%)	15/30 (50%)	30/30 (100%)	Pedestrian (10)	Primary impact (5)
			Driver (10)	Secondary impact nil (1)
			Front seat passenger (1)	Secondary injury (24)
			Other occupant (9)	Tertiary injury nil (0)
				Tertiary impact injury nil (0)

Table 1. Master Chart

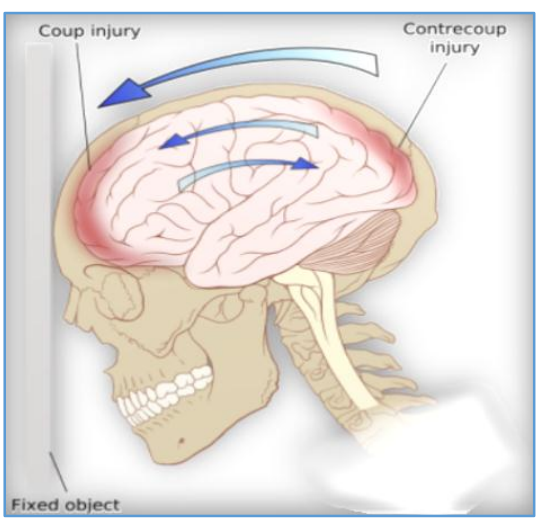

Figure 1. Scheme of Contrecoup Injury

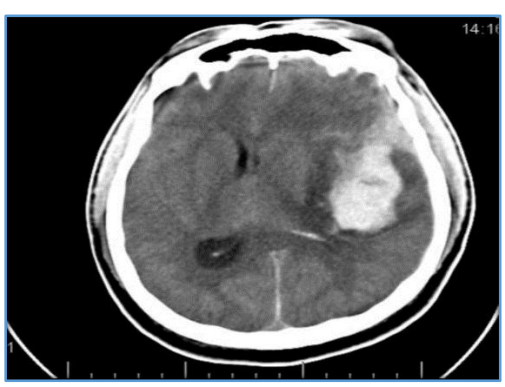

Figure 2. Extradural Clot

Out of 30 cases of road traffic accidents brought by police, all showed features of road traffic occurrences. 15 cases showed contrecoup injuries (50%). 100% cases showed coup injuries, so external or internal coup injuries are always present in this study, so head injuries without any external injuries are not significantly noted in this study.

The type of victims are pedestrians are 10 numbers (33%), drivers 10 numbers (33%), front seat passenger only one (4%) and other occupants 9 numbers (30%).

The type of injuries noted in this study include primary impact injuries 5 numbers (17%), secondary impact injuries 1 number (4%), secondary injuries 24 numbers (80%) and tertiary injuries nil and tertiary impact injuries nil. Above data indicates that significant/most of the deaths occur due to secondary injuries (80%) as compared to the primary impact injuries (5%).

DISCUSSION

History- In the 17th century, Jean Louis Petit described contrecoup injuries. In 1766, the French surgeon Antoine Louis coordinated a meeting of the Academie Royale de Chirurgie on contrecoup injuries at which papers were to be presented, one of which would be chosen to receive the respected prize, the Prix de l'Academie Royale de Chirurgie. The presenter of the chosen paper was not awarded the prize because he failed to make recommended changes. In 1768, the group met again on the topic and Louis Sebastian Saucerotte won the prize for his paper describing contrecoup injuries in humans and experiments on animals and recommending treatments such as bloodletting and application of herbs to patients' heads.

Head Injuries without Any External Injuries- Contrecoup Injury

A coup-contrecoup injury is a term applied to head injuries and most often cerebral contusions. It refers to the common pattern of injury whereby damage is located both at the site of impact (often less marked) and on the opposite side of the head of the point of maximum external trauma.[3,4]

The impact accelerates first the skull (at this point the brain immediately subjacent to the point of impact may be damaged - so called coup injury) and then it's content away from it. As the skull stops, the brain then impacts on the internal surface of the skull resulting in damage.

Areas most frequently affected are the inferior surface of the frontal lobes and temporal poles.[3] An unusual form of contrecoup injury is traumatic lens dislocation.

The term is also less widely used to denote a pattern of injury in the knee.

When the head strikes a fixed object, the coup injury occurs at the site of impact and the contrecoup injury occurs at the opposite side. In head injury, a coup injury occurs under the site of impact with an object and a contrecoup injury occurs on the side opposite the area that was hit. Coup and contrecoup injuries are associated with cerebral contusions, a type of traumatic brain injury in which the brain is bruised. Coup and contrecoup injuries can occur individually or together. When a moving object impacts the stationary head, coup injuries are typical, while contrecoup injuries are produced when the moving head strikes a stationary object.

Coup and contrecoup injuries are considered focal brain injuries, those that occur in a particular spot in the brain, as opposed to diffuse injuries, which occur over a more widespread area.

The exact mechanism for the injuries, especially contrecoup injuries, is a subject of much debate. In general, they involve an abrupt deceleration of the head causing the brain to collide with the inside of the skull. It is likely that inertia is involved in the injuries, e.g. when the brain keeps moving after the skull is stopped by a fixed object or when the brain remains still after the skull is accelerated by an impact with a moving object. Additionally, movement of cerebrospinal fluid following a trauma may play a role in the injury.

Mechanisms

Coup injury maybe caused when, during an impact, the skull may set the brain into motion causing it to collide with the opposite side of the skull, this will result in a contrecoup injury. The injuries can also be caused solely by acceleration or deceleration in the absence of an impact. In injuries associated with acceleration or deceleration, but with no impact, the brain is thought to bounce off inside of the skull and hit the opposite side potentially resulting in both coup and contrecoup injuries. In addition to the skull, the brain may also impact the tentorium causing a coup injury. Contrecoup injury may be produced by tensile forces. Cerebrospinal Fluid (CSF) is also implicated in the mechanism of coup and contrecoup injuries. One explanation for the contrecoup phenomenon is that CSF, which is less denser than the brain rushes to the area of impact during the injury, forcing the brain back into the other side of the skull. If this is the case, the contrecoup impact happens first.[5]

Features- Contrecoup, which may occur in shaken baby syndrome and vehicle accidents can cause diffuse axonal injury. On very rare occasions, contrecoup injury can cause epidural haematoma.

Contrecoup contusions are particularly common in the lower part of the frontal lobes and the front part of the temporal lobes. A 1978 study found that the contrecoup mechanism was responsible for most of the brain lesions such as contusions and haematomas occurring in the temporal lobes of injured individuals. Injuries that occur in body parts other than the brain such as the lens of the eye, the lung and the skull and other bones may also be labeled "contrecoup." The contrecoup mechanism can play a role in pulmonary contusion.[6]

CONCLUSION

Out of 60 cases of road traffic accidents brought by police, all cases showed features of road traffic accidents. Out of them 30 cases showed contrecoup injuries (50%). All the cases (100%) had coup injuries, so external or internal coup injuries are always present in a case of head injury as seen in this study. so one can conclude the contrecoup injuries always predominates in head injuries and significant head injury without any external injury was not seen in this study.

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