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CONTRECOUP HEAD INJURY : A TWO-YEAR EXPERIENCE.

Neurosurgery

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ABSTRACT

Contrecoup head injuries can be defined as a group of focal head injuries that occur at a site opposite to the site of impact. It is predicted that the outcome of this type of injuries is worse than other focal injuries due to the transmission of the impact across the brain. At Nilratan Sircar Medical College, Kolkata, 105 patients presenting with contrecoup injuries over a period of 2 years were prospectively analyzed. Site of primary impact was determined clinically and by CT scan. Age, mode of injury, Glasgow coma scale (GCS), site and pattern of injury, and mortality were analyzed in our study. Our study supports the hypothesis that the presence of contrecoup contusions is associated with a poor prognosis across all GCS and age categories.

KEYWORDS

Contrecoup, head injury, traumatic brain injury

INTRODUCTION

Traumatic brain injury is one of the most leading cause of morbidity and mortality across the world. Focal brain injuries are found in approximately one-half of all the patients with severe brain injuries and are responsible for nearly two-thirds of the deaths.[1-3] Contrecoup injuries comprise a group of focal brain injuries that occur at areas distant from the point of impact as a result of shock waves traveling across the brain causing stress/cavitation effects.[4] It is increasingly evident that the pattern of structural brain injury as visualized by imaging and the depth and duration of ischemia are also important factors in prediction of outcome.[5-6]

The presence of a contrecoup injury implies a more severe primary impact, and therefore an injury more diffuse than focal. It has been hypothesized that patients with contrecoup injuries would have a worse outcome because of the diffuse nature of injury.[7] With computed tomographic (CT) scan, it is possible to localize and delineate the type and severity of injury in the majority of head-injured patients and determine whether injuries are coup or contrecoup. Literature search reveals very few studies showing various presentations, modes of injury, and outcome of contrecoup injuries till date.

The present study was undertaken to evaluate the modes of injury and various presentations in contrecoup brain injuries. We believe that data from the present study will be a useful additional reference in head trauma cases and will increase awareness of contrecoup injuries during imaging review. Earlier detection of contrecoup injuries can minimize the complications of head trauma.

MATERIALS AND METHODS

A prospective study of 1,950 patients with blunt head trauma admitted to Nilratan Sircar medical college, Kolkata, within a 2-year period was performed. The case records were studied regarding age, sex, mode of injury, Glasgow coma score (GCS), and focal neurologic deficits at admission and at discharge. CT of the brain was performed in all the cases at the time of admission and after 72 hours or anytime as and when required.

- **Inclusion criteria:**

1. Definite history of head trauma.
2. Unequivocal evidence of a localized area of impact either in the form of fracture, scalp laceration, or galeal hematoma.
3. Presence of contrecoup injury opposite to the site of impact or fracture, as detected in initial CT scan.

- **Exclusion criteria:**

1. Patients with nonhemorrhagic contusions.
2. Patients with other systemic injuries and polytrauma.
3. Patients with associated coup injuries.

Outcomes measured in this study were the incidence of modes of injury, the various types of injury, and the mortality rate among this group.

RESULTS

A total of 105 patients out of 1,950 had only contrecoup injury.

- Age: The patients' age ranged from 8 to 85 years with an average age of 43.8 years. 45 patients were younger than 40 years.
- Modes of injury: The most common mode of injury was road traffic accident accounting for 54.29% (n=57) followed by fall 23.8% (n=25) and assault 11.43% (n=11). However, the cause was undetermined in 10.5% (n=11) cases.
- GCS on admission: The GCS of the patients on admission ranged from 4 to 15 (mean 9.40). 48 patients had GCS≤8.
- Site of contrecoup injury: The most common site of contrecoup injury was the temporal region accounting for 40% (n=42), followed by frontal region 30.4% (n=32), parietal region 20.9% (n=24), and occipital region 6.6% (n=7). Five patients had hematoma in the posterior fossa.
- Patterns of injury: Based on the criteria, acute hemorrhagic contusion ([Fig. 1]) was the most common pattern, followed by acute subdural hematoma (SDH), SDH with contusion, SDH with subarachnoid hemorrhage (SAH) ([Fig. 3]), and acute extradural hematoma (EDH) ([Fig. 2]) ([Table 1]).

Table 1 Patterns of head injuries

Type of lesion	No. of patients	Percentage
Contusion	49	46.7
Acute SDH	29	27.6
Acute SDH with contusion	20	19
Acute SDH with SAH	05	4.7
Acute EDH	02	1.9

Abbreviations: EDH, extradural hematoma; SAH, subarachnoid hemorrhage; SDH, subdural hematoma.

Fig. 1 Acute hemorrhagic contusion.

Fig. 2 Extradural hematoma with contusion.

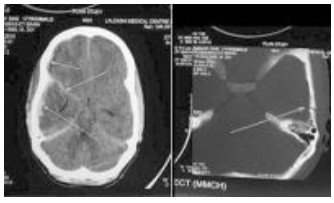

Fig. 3 Subdural hematoma with subarachnoid hemorrage

- **Management:** All patients were clinically assessed and operated depending on the lesion size and mass effect as demonstrated in the CT scan. Patients in good neurologic condition with small lesion were managed conservatively. Some patients with significant injuries but with very poor GCS and absent brainstem reflexes were not operated ([Table 2]).

Table 2 Management of head injury

Management	Surgical	Conservative
Number	25	80
Improved	5	24
Remained same/deteriorated	12	17
Death	8	39

DISCUSSION

Head injury is one of the most important public health problems today. The incidence of head injuries is steadily increasing all over the world and our country has the dubious distinction of having the highest incidence of head injuries in the world due to road traffic accidents per 1,000 vehicles or deaths per 1,000 accidents. The management of severe head injury is a major challenge to neurosurgeons and basic neuroscientists, as the consequent mortality and morbidity is depressingly high. There is a need for an extensive multidimensional effort to improve the prognosis of head-injured patients and provide them a better quality of life. To achieve these aims, the epidemiology of head injury needs to be known, especially the incidence and its burden on society.[8]

Brain damage in non-missile head injury is classified as “focal” or “diffuse.” The focal damage includes contusion and lacerations on the surface of the brain or intracranial hematoma and raised intracranial pressure (ICP) as a secondary phenomenon. Focal injuries result from localized damage, found in nearly 58% of patients with severe head injuries and 66% of deaths associated with head trauma.[9] Contrecoup injuries, a form of focal injuries, are well known. There are very few studies on contrecoup injuries, and their clinical significance and the outcome in this subgroup of head-injured patients are largely unknown. The biomechanics of contrecoup injuries is explained to some extent by the shock wave theory. The shock waves that begin from the point of impact and spread through the brain may get reflected from the opposite side of the skull and reverberate within the brain. The presence of contrecoup injury implies that the traumatic forces have dissipated into the brain, and from the biomechanisms explained, the brain is likely to have suffered greater damage than the case in coup injury alone. This is reflected in the poor outcome in this subgroup of head-injured patients.[7] Four patients out of the 105 in this group had normal CT scan at presentation. These patients deteriorated over a period of next 24 hours, and a repeat scan showed contrecoup hematoma in the new scan.

In our study 105 (5.4%) patients had contrecoup injury. Jayakumar et al[10] found contrecoup injuries in 9.6% of their 650 patients. The mean age was 43.8 years with 45 patients being younger than 40 years. Kraus[11] also reported the most common group affected by head injuries to be young people aged between 20 and 40 years and the incidence to be lowest at extremes of age, that is, below 5 years and above 60 years. The most common mode of injury was road traffic accident in our study accounting for more than 50%, which was similar to the study by Bhateja et al.[7] The most common injury was acute hemorrhagic contusions followed by SDH, SDH with contusion, SDH with SAH, and acute EDH. However, Bhateja et al.[7] reported acute SDH to be the most common injury pattern followed by hemorrhagic contusions; the most common presentation was hemorrhagic contusion in patients with contrecoup injury by temporal bone fracture.[12]

We observed a mortality rate of 45% among this group. According to the study by Bhateja et al.[7] and Jayakumar et al,[10] the mortality rates were 44% and 53%, respectively. The factors affecting mortality in our study included age of the patient and GCS at presentation. 45 patients were younger than 40 years and the mortality was 40% in this group. The mortality was 63% in patients older than 40 years. Mortality rate was higher in patients with GCS score of 8 or less, accounting for 65% compared with those with GCS score of more than 8, which accounted for 43%.

CONCLUSION

Contrecoup injuries are focal brain injuries that have poor prognosis. The presence of contrecoup injury implies that the traumatic forces have dissipated into the brain, and from the biomechanisms explained, the brain is likely to have suffered greater damage than the case in coup injury alone.

The present study shows that the presence of contrecoup contusions is associated with a poor prognosis across all GCS and age categories. Also, we stress that patients with poor GCS at the time of admission with minimal or no abnormality in imaging should have a repeat imaging done within the first 72 hours as they may later present with contrecoup injury.

REFERENCES

1 Adams JH, Gennarelli TA, Graham DI. Brain damage in nonmissile head injury: observations in man and subhuman primates. Smith WT, Cavangh JB. Recent Advances in Neuropathology, No. 2. Edinburgh, UK: Churchill Livingstone; 1982: 165-190
2 Gennarelli TA, Spielman GM, Langfitt TW. , et al. Influence of the type of intracranial lesion on outcome from severe head injury. J Neurosurg 1982; 56 (01) 26-32
3 Gennarelli TA. Head injury in man and experimental animals: clinical aspects. Acta Neurochir Suppl (Wien) 1983; 32 (Suppl): 1-13
4 Gennarelli TA, Meaney DF. Mechanisms of primary head injury. Wilkins RH, Rengachary SS. Neurosurgery. 2nd ed. New York, NY: McGraw-Hill; 1996: 2611-2621
5 Marshall LF, Marshall SB, Klauber MR. , et al. A new classification of head injury based on computerized tomography. J Neurosurg 1991; 75: 14-20
6 Lobato RD, Cordobes F, Rivas JJ. , et al. Outcome from severe head injury related to the type of intracranial lesion. A computerized tomography study. J Neurosurg 1983; 59 (05) 762-774
7 Bhateja A, Shukla D, Devi BI, Sastry KV. Coup and contrecoup head injuries: predictors of outcome. Indian J Neurotrauma 2009; 6 (02) 115-118
8 Mahapatra AK, Jaiswal A. Epidemiology of head injury. Neurosci Today 2003; 7: 29-32
9 Graham DI, Maxwell WL, Nicoll JA. Neurotrauma. Brain Pathol 1997; 7: 1285
10 Jayakumar PN, Sastry Kolluri VR, Basavakumar DG. , et al. Prognosis in contre-coup intracranial haematomas—a clinical and radiological study of 63 patients. Acta Neurochir (Wien) 1991; 108 (1–2): 30-33
11 Kraus JF. Epidemiology. Elizabeth F. NINS. Head Injury Clinical Management and Research. Geneva, Switzerland: AIREN; 1990: 113-124
12 Asha'Ari ZA, Ahmad R, Rahman J, Kamarudin N, Ishlah LW. Contrecoup injury in patients with traumatic temporal bone fracture. J Laryngol Otol 2011; 125 (08) 781-785