

The Relationship between Menstrual Cycle Phases and Suicide Attempts: Autopsy and Histopathological Analysis of 28 Cases of Traumatic Brainstem Haemorrhages

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ABSTRACT

Background: Brainstem hemorrhage was first described by Cheyne in 1812 in a pathological study of patients presenting with lethargy and coma. In 1877 Bode reviewed the findings of 67 patients reported in the literature (1).

In the United States, the incidence of closed head injury is estimated to be approximately 200 cases per 100,000 persons per year. The financial burden of head injuries in the United States is estimated to be \$75-100 billion annually (4).

Materials and Methods: This cross-sectional study, the brainstem was studied by both gross and histopathological examinations.

Results: During a period between July 1, 2010 and June 31, 2011, a total of 71 head injury cases were autopsied and brainstem hemorrhage was seen in 28 of them.

Discussion: Out of the 28 cases, most of the hemorrhages occurred in the midbrain (68%) and least in medulla oblongata (11%), while four cases had pontomedullary junction tearing and one of them presented cervicomedullary junction tearing.

Conclusion: Hemorrhages are usually the only evidence of injury to the brain-stem in those dying immediately or within a few hours. Failure to realize this has led to underestimation of the frequency of brain-stem hemorrhage after injury, and, indeed, to the frequency of brain-stem lesions of all kinds.

Keywords: Autopsy, Brainstem Hemorrhage, Head Injury.

INTRODUCTION

Brainstem hemorrhage was first described by Cheyne in 1812 in a pathological study of patients presenting with lethargy and coma. In 1877, Bode reviewed the findings of 67 patients reported in the literature (1).

Traumatic injuries remain the leading cause of death in children and in adults aged 45 or younger. Head injuries cause immediate death in 25% of acute traumatic injuries (2). Traumatic brainstem injury results in more deaths than does trauma to other specific body regions (3).

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Alcohol and drug use contribute to as much as 38% of the cases of severe head trauma in younger patients (5, 6).

MATERIAL AND METHODS

In this cross-sectional study, all the head injury cases brought for post-mortem examination at mortuary of Adichunchinagiri Institute of Medical Sciences, Mandya District, Karnataka, India, between July 1, 2010 and June 31, 2011 were studied. The brainstem was studied by both gross and histopathological examinations.

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Autopsy method

Coronial skin cuts were made on the parietal region and the dome of calvarias was separated with an axial cut. The whole brain was taken out from calvarium and the brainstem was analyzed. The brain stem was cut in eight levels according to anatomical standards: two cuts in midbrain, two cuts in pons, and four cuts in medulla.

Consent: We took consent from the first degree relatives after explaining the methods and the goals of the study.

RESULTS

During the period between July 1, 2010 and June 31, 2011, a total of 71 head injury cases were autopsied and brainstem hemorrhage was observed in 28 cases. The maximum number of cases belonged to the age group of 35 to 40 years. In terms of gender, 55 out of the 71 patients were male and the rest 16 were female.

Table1-Rate of Hemorrhage based on Location

Total number of head injury cases	Total number of brainstem Haemorrhages seen	Haemorrhages in midbrain	Haemorrhages in pons	Haemorrhages in medulla oblongata
71 cases	28 cases	19 cases (68%)	6 cases (21%)	3 cases (11%)

DISCUSSION

Out of the 28 cases, the most hemorrhages occurred in the midbrain (68%) and the least in medulla oblongata (11%), while four cases had pontomedullary junction tearing and one of them had cervicomedullary junction tearing.

On histopathological examination, the tegmentum of the midbrain, tegmentum and basis pontis, and medulla oblongata were almost completely devoid of neurons and replaced by a mass of fatty macrophages and proliferating astrocytes.

Meyer CA et al. reported that the most frequent site of hemorrhage, in 31 (69%) of the 45 patients, was the ventral rostral midbrain adjacent to the interpeduncular cistern (7). Ropper and Miller proposed three mechanisms causing traumatic brainstem hemorrhage. Brainstem hemorrhage can be caused by primary lesion resulting from either rotational forces or transient acceleration-deceleration forces that cause contusion against the tentorium or secondary to the brainstem compression (8).

Jellinger (1967) reported that only 43.5 % of 415 fatal head injuries showed evidence of brainstem lesions, but extensive histology was done only in the 38 cases dying after

prolonged coma. Tandon and Kristiansen (1966) reported a group of 37 fatal cases with brainstem symptomatology in whom no structural damage was seen at necropsy, yet histological studies had not been apparently done. In cases with brain-stem symptomatology, Zoltan (1966) found no lesions at that level and was prepared to seek the origin of the symptoms in cortical and subcortical damage. By contrast, in a careful histological study, Matsuoka, Sakaki, and Okamoto (1967) found haemorrhagic lesions in the brainstem of 22 out of 25 cases while Mayer (1967) found them in all his 25 cases dying within an hour of injury. Mayer plotted primary brainstem haemorrhages only from such a group (9).

In a study by Gunji and colleagues, the most involved site was known to be medulla and the common reported lesions were respectively pontomedullary tearing, medullary contusion, and cervicomedullary tearing (10).

In Ohshima's study (1998), the most involved site was pontomedullary junction. Moreover, Kondo, et al. (1995) reported similar findings (11). In addition, Simpson *et al.* (1989) reported the most involved site to be pontomedullary lesions (12).

CONCLUSION

Haemorrhages are usually the only evidence of injury to the brain-stem in those dying immediately or within a few hours. Failure to realize this has led to underestimation of the frequency of brain-stem haemorrhage after injury, and, indeed, to the frequency of brain-stem lesions of all kinds.

Intracranial hemorrhage is an important cause of acute neurologic dysfunction and accurate early diagnosis of cortical versus brainstem hemorrhage, with initiation of appropriate therapy, may help minimize morbidity.

Competing Interests: The authors declare that they have no competing interests. Authors have read and approved the final manuscript.

REFERENCES

1. Feliciano DV, Moore EE, Mattox KL. Trauma. McGraw-Hill. 1996 ;(3):267-1065.
2. Kraus JF. Epidemiology of head injury. In: Cooper PR, ed. Head Injury. Baltimore: Lippincott Williams & Wilkins. 1993 ;(3):1-25.
3. Schwartz SI, Shires GT. Principles of Surgery. New York: McGraw-Hill. 1999 ;(7):1880-1881.
4. Frankowski RF, Annegers JF, Whitman S. Epidemiological and descriptive studies, Part 1. The descriptive epidemiology of head trauma in the United States. In: Becker DP, Povlishock JT. Central Nervous System Trauma Status Report. William Byrd Press: Richmond, Va; 1985:33.
5. Foulkes MA, Eisenberg HM, Jane JA, Marmarou A, Marshall LF. The Traumatic Coma Data Bank: design, methods, and baseline characteristics. J Neurosurg. 1991; 75:8-13.
6. Valadka AB, Robertson CS. Surgery of cerebral trauma and associated critical care. Neurosurgery. Supplement 2007; 61(1):203-21.
7. Meyer CA, Mirvis SE, Wolf AL, Thompson RK, Gutierrez MA. Acute traumatic midbrain hemorrhage: experimental and clinical observations with CT. Radiology. 1991; 179:813-818.
8. Ropper AH, Miller DC. Acute traumatic midbrain hemorrhage. Ann Neurol. 1985; 18:80-86.
9. B. E. TOMLINSON. Brain-stem lesions after head injury. J. clin. Path., 23, Suppl. (Roy. Coll. Path.), 4, 154-165.
10. Gunji H, Mizusawa I, Hiraiwa K. The mechanism underlying the occurrence of traumatic brainstem lesions in victims of traffic accidents. Leg Med (Tokyo) 2002; 4(2):84-9.
11. Ohshima T, Kondo T. Forensic pathological observations on fatal injuries to the brain stem and/or upper cervical spinal cord in traffic accidents. J Clin Forensic Med 1998; 5(3):129-34.
12. Simpson DA, Blumbergs PC, Cooter RD, Kilminster M, McLean AJ, Cott G. Pontomedullary tears and other gross brainstem injuries after vehicular accidents. J Trauma 1989; 29(11):1519-25.