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Neurosurgery

AN ANALYSIS OF POST TRAUMATIC TEMPORAL CONTUSIONS IN CHENNAI-A SINGLE CENTER EXPERIENCE

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KEYWORDS :

INTRODUCTION

Traumatic brain injury (TBI) is considered the most disabling of traumatic phenomena , almost always encompassing lifelong emotional, behavioral, and permanent physical impairment.(1,2) Long term disabilities are noted in more than half of the survivors. TBI is a broad term encompassing a multitude of injuries occurring to the brain. One of the most dangerous and dreaded varieties include temporal contusion.

Cerebral contusion is a injury of the brain tissue. (3) The main pathophysiology includes the relative difference in the deceleration times of bony and parenchymal tissue of the skull as the head suddenly slows (eg. Road traffic accidents) and the subsequent damage to the brain as it collides with the hard unyielding calvarium leading to the shearing of blood vessels and collection of blood within the parenchyma of the brain.

Cerebral contusions cause permanent damage to tissues of the cerebrum. The severity of the damage is related to the primary injury that is started by the kinetic energy absorbed by the collision and the cascade of secondary injury responses that exacerbate the primary damage. The hemorrhagic lesion is produced in the immediate moments after the head impact. (4) The injury can cause a reduced consciousness and in the emergency setting may result in brain herniation.(5)

The most common cause of TBI and temporal contusions worldwide remain to be Road traffic accidents and with the increased availability of vehicles to the common man in recent times, this trend is unfortunately not going to reduce anytime soon. In this study, we aim to profile the cases of temporal contusions in our population and study the outcome of these cases at our hospital.

MATERIALS AND METHODS

Study Site:
This study was conducted at Institute of neurosurgery, Madras Medical College

Study Population:
A total number of eligible patients admitted in Institute of neurosurgery, Madras Medical College and Research Institute, during the study period of 2 years (January 2021–January 2023) were included in the study.

Sample Size: The sample size was 200 patients

Rationale For Sample Size:
The sample size was calculated using the Leslie-Kish formula with expected proportion of 0.066, precision percentage of 5% and desired confidence interval of 95%.

Study Design:
1. Explorative/descriptive study
2. Purposive sampling

Study Duration:
The study duration from January 2021 to January 2023 was taken. Initial data of cases of traumatic temporal contusions that presented to Institute of neurosurgery, Madras Medical College during this time period was recorded and followed up over a period of 6 months to yield useful data.

Inclusion Criteria:
All the patients admitted in Institute of neurosurgery, Madras Medical College, in the study duration and clinically diagnosed with temporal contusions were included in the study.

Exclusion Criteria:
Patients refusing to be a part of this study were excluded from the study.

Methodology And Procedure
Data of cases admitted with traumatic temporal contusions at Institute of neurosurgery, Madras Medical College during the time period were recorded and followed up over a period of 6 months to evaluate outcome of they fit into the inclusion criteria. After 6-month interval, necessary information was collected over a telephonic conversation. The data thus obtained was analayzed to yield useful information.

End Points of the Study:
The end points of the study measured age and sex distributions of the disease, the GCS at time of presentation, mode of presentation, type of management and outcome (both at discharge and at 6 months). Additional variables such as duration of hospital stay and comorbidities were documented and analyzed to yield useful data.

Analysis Of Data:
Collected data were analyzed and presented in the form of tables, figures, graphs, and diagrams wherever necessary.

Statistical Methods:
Descriptive Statistics
1. Mean
2. Standard deviation
3. Frequency
4. Percentage.

Inferential Statistics
1. Chi-square test (nonparametric data)
2. Cramer's *V* test (nonparametric data)
3. One-way ANOVA (parametric data).

Results
This retrospective observational study was carried out in Institute of neurosurgery, Madras Medical College, an apex tertiary care health center, in Chennai, Tamil Nadu. Cases from January 1, 2021, to January 31, 2023, were studied. A total of 207 patients were obtained, but 7 patients had to be dropped due to lack of data.

The cases ranged from 18-60 years in age. Maximum patients presenting with temporal contusions were within 20-30 years age group (61%) (Figure 1). 154 patients were male (77%) as to the 46 females (23%) (Figure 2), bringing the male-to-female ratio to 2.98:1. This is in concert with the study done by Oertel et al [6]. The most common occupations associated with the disease included salesmen (43%), engineers (32%), and students (18%) (Figure 3).

We see that the most common presenting GCS was that of a mild head injury variety (41%) followed by GCS 15 (38%) (Figure 4). A severe head injury GCS score was only noted in 9% patients. All cases of temporal contusion were of road traffic accidents of which the 2 wheeler related injuries ranged maximum (94%). Of these, 2 wheeler

vs 2 wheeler injuries were maximum (76%) (Figure 5).

A conservative mode of management was followed for 83% of patients while only 17% underwent decompressive craniectomy (Figure 6). Of the total number of cases that came, 114 were discharged home with varying degrees of neurological deficit while 43 (43%) succumbed to the injury (Figure 7). Most of these cases were from the low GCS category and all mortalities occurred within the initial admission. This is in concert with the study conducted by White et al. [7]

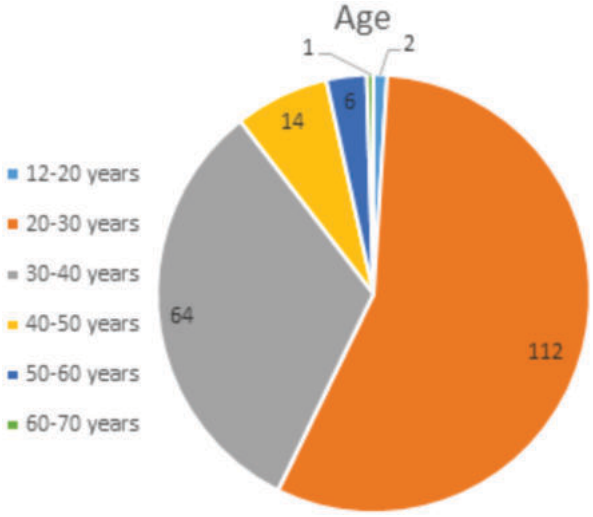

Figure 1: Age

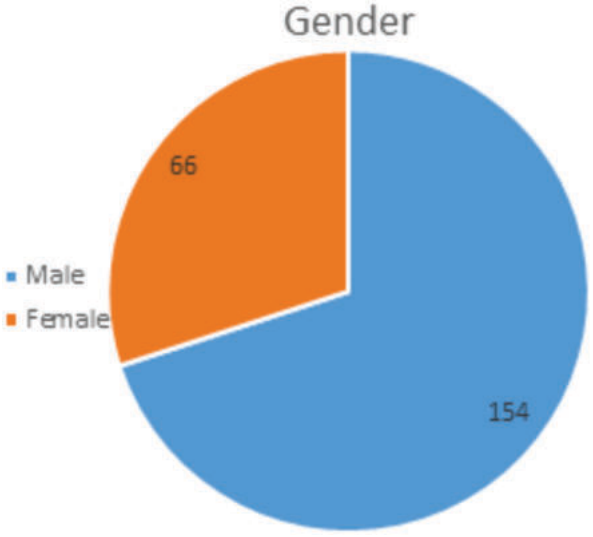

Figure 2: Gender

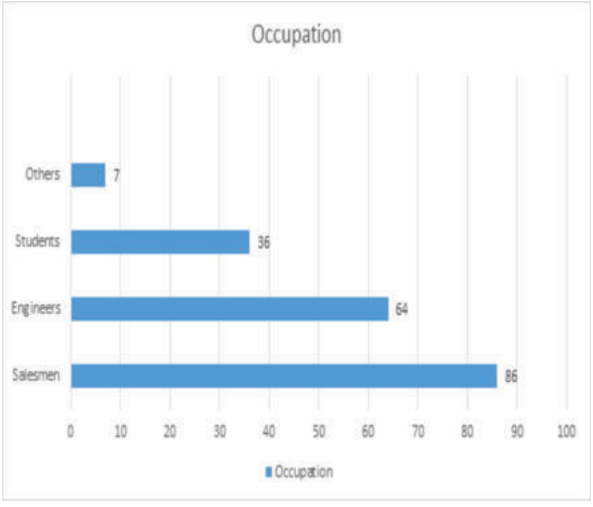

Figure 3: Occupation

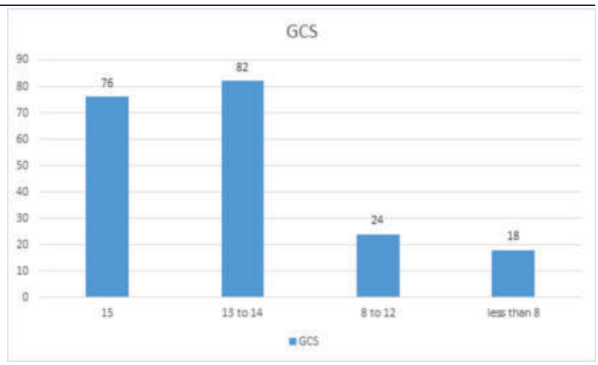

Figure 4: Presenting GCS

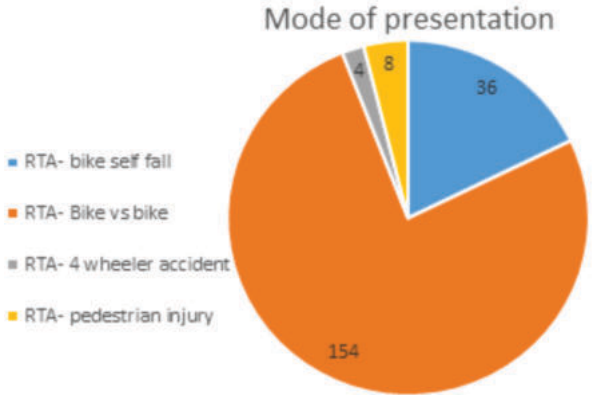

Figure 5: Mode of Presentation

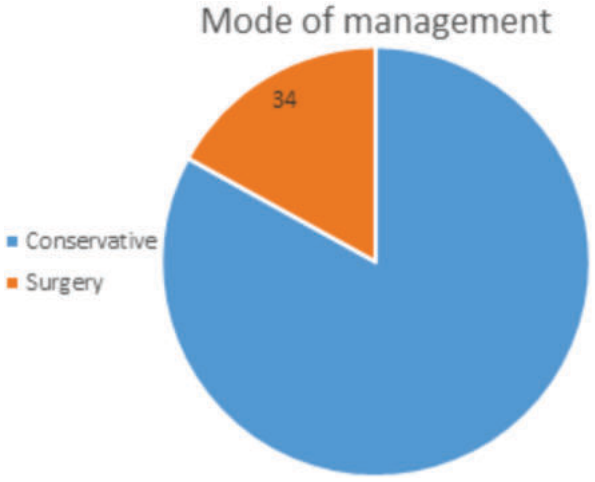

Figure 6: Mode of management

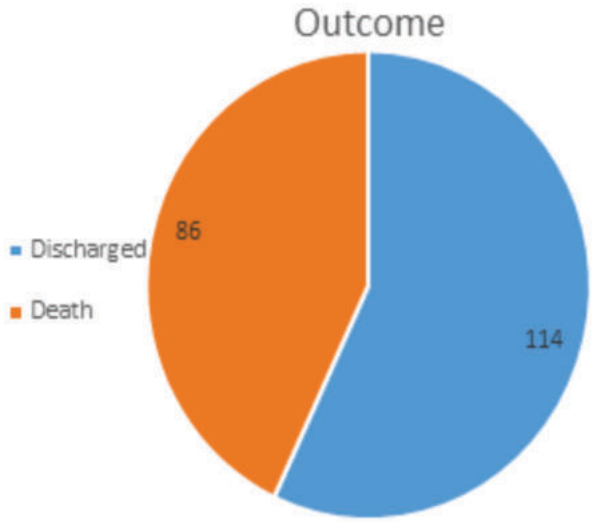

Figure 7: Outcome

DISCUSSION

Traumatic brain injury encompasses a spectrum of pathological features from axonal to hemorrhagic injuries. Of these, temporal contusions are a significant contributor to disability. [8,9] As a result of ongoing pathophysiological mechanisms initiated at the time of initial injury, the injury tends to exacerbate. Traumatic contusions are notorious to exacerbate leading to subsequent clinical deterioration and requirement for surgical intervention. [9,10]

Temporal contusions are often the result of sufficient inertial loading and acceleration combined with a sudden stop (i.e., head impact or abrupt change in the direction of the head's movement, which is often referred to as deceleration). This causes the brain to come into sudden contact with the internal surfaces of the skull. As the posterior areas within the skull are relatively smooth, primary contusion injuries in the posterior portions of the brain are rare in the absence of direct trauma to the occiput or posterior skull regions. The anterior and inferior portions of the brain (the frontal poles, orbitofrontal cortex, and anterior temporal lobes) become contused against the bony prominences of the skull (e.g., sphenoid wing and temporal fossa). The expansion (or blossoming) of the contusion may result in extensive frontal edema and hemorrhage either early after injury or even days later and may require neurosurgical intervention. [11]

The temporal cortex is involved in a number of vital functions that govern the working of the body including but not limited to processing auditory information with encoding of memory. It iscalso believed to play an important role in processing affect/emotions, language and certain aspects of visual perception. [11,12]

Temporal contusions remain to be a feared entity with high morbidity and mortality. A testament to this fact is that the approach to management of these lesions has not changed much in the past fifty years and mainly includes use of antiedema measures, antiepileptic measures and in case of severe mass effect, decompressive craniectomy, a procedure with its own high morbidity and mortality rate. The fact that there is now increased accessibility of vehicles to the common man has only increased the frequency of encountering this dreaded pathology and that too in extreme debilitated conditions.

It is to be noted however that though there is a higher likelihood of temporal contusion progression compared to other lesions, many studies prefer to investigate the phenomenon of 'progressive hemorrhagic injury, which represents progression of subarachnoid hemorrhages (SAH), subdural hemorrhages (SDH), and extradural hemorrhages (EDH), in addition to contusions. [6,13,14]. This has led to limited profiling and identification of risk factors of this disease.

CONCLUSION

Despite gargantuan advances in the field of medical science, traumatic brain injuries and temporal contusions continue to remain a bane. This does not seem to be problem that is easily going away with the increasing availability of vehicular transport to the common man. The extreme morbidity and mortality associated with the disease remain largely unchanged. Educating the masses on the dangers remains the only viable option.

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Conflicts of interest
There are no conflicts of interest

REFERENCES

1) Corrigan JD, Selassie AW, Orman JA. The epidemiology of traumatic brain injury. J Head Trauma Rehabil. 2010 Mar-Apr;25(2):72-80.
2) Bullock MR, Chesnut R, Ghajar J, Gordon D, Hartl R, Newell DW, Servadei F, Walters BC, Wilberger JE., Surgical Management of Traumatic Brain Injury Author Group. Surgical management of acute subdural hematomas. Neurosurgery. 2006 Mar;58(3 Suppl):S16-24; discussion Si-iv
3) Hardman JM, Manoukian A (2002). "Pathology of Head Trauma". Neuroimaging Clinics of North America. 12 (2): 175–187, vii
4) McGinn MJ, Povlishock JT. Pathophysiology of Traumatic Brain Injury. Neurosurg Clin N Am. 2016 Oct;27(4):397-407.
5) Khoshyomn S, Tranmer BI (May 2004). "Diagnosis and management of pediatric closed head injury". Seminars in Pediatric Surgery. 13 (2): 80–86.
6) Oertel M, Kelly DF, McArthur D, et al. Progressive hemorrhage after head trauma: predictors and consequences of the evolving injury. J Neurosurg. 2002;96(1):109–116. doi: 10.3171/jns.2002.96.1.0109
7) White CL, Griffith S, Caron J-L. Early progression of traumatic cerebral contusions: characterization and risk factors. J Trauma Inj Infect Crit Care. 2009;67(3):508–515. doi: 10.1097/TA.0b013e3181b2519f
8) Lobato RD, Cordobes F, Rivas JJ, et al. Outcome from severe head injury related to the type of intracranial lesion. J Neurosurg. 1983;59(5):762–774
9) Adatia K, Newcombe VFJ, Menon DK. Contusion Progression Following Traumatic Brain Injury: A Review of Clinical and Radiological Predictors, and Influence on Outcome. Neurocrit Care. 2021 Feb;34(1):312-324
10) Alahmadi H, Vachhrajani S, Cusimano MD. The natural history of brain contusion: an analysis of radiological and clinical progression. J Neurosurg. 2010;112(5):1139–1145. doi: 10.3171/2009.5.JNS081369
11) Zafonte, Ross D. DO; Ricker, Joseph PhD; Yonas, Howard MD; Wagner, Amy MD. Frontal Contusions Imaging and: Behavioral Consequences. American Journal of Physical Medicine & Rehabilitation 84(3):p 197-198, March 2005
12) Hanks RA, Rapport LJ, Millis SR, et al: Measures of executive functioning as predictors of functional ability and social integration in a rehabilitation sample. *Arch Phys Med Rehabil* 1999;80:1030–7
13) McKinlay WW, Watkiss AJ: Cognitive and behavioral effects of brain injury, in Rosenthal M, Griffith ER, Kreutzer JS, et al (eds): *Rehabilitation of the Adult and Child*, ed 3. Philadelphia, FA Davis Company, 1999, pp 74–86
14) Tong W, Zheng P, Xu J, et al. Early CT signs of progressive hemorrhagic injury following acute traumatic brain injury. Neuroradiology. 2011;53(5):305–309. doi: 10.1007/s00234-010-0659-8.