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Original Article

A Comprehensive Study on Post Traumatic Temporal Contusion in Adults

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Abstract

Introduction: The brain undergoes various types of strain during injury. The strain may be in the form of compression, tensile strain or shear strain. More than one type of mechanics and more than one type of strain are involved in most head injuries.

Aim: To study the epidemiology, clinical features, radiological findings, management and outcome of traumatic temporal contusion in brain injury.

Methods: Patients admitted in the head injury ward and diagnosed as having temporal lobe contusion were included. 106 patients were enrolled for this study.

Results: The overall mortality is 18.9% in traumatic temporal contusion. This study shows that 62.2% of the patients survived and 30.8% of the patients expired with surgical management. Seizure, abnormal pupillary response to light, oculocephalic reflex abnormality and the status of the basal cistern, midline shift and volume of the lesion are the significant factors, in this study.

Conclusion: Patients with a head injury in motor vehicle accidents, presenting with seizure, abnormal pupillary response to light, abnormal oculocephalic reflex, and bradycardia must have intensive neurosurgical care. Temporal contusion quickly contributes to mortality because of its adjacent location to the brain stem.

Key words: Brain injury, Oculocephalic reflex, Traumatic temporal contusion

INTRODUCTION

Motor vehicle accidents (MVA) are the major cause of head injuries, and most commonly head injuries occur in adult population.[1] Primary head injuries are classified as diffuse brain injuries, focal brain injuries, and skull fractures. Contact injuries and head motion injuries are the basic mechanistic types of head injuries. The mechanical loading may be static or dynamic. The dynamic loading may be impulsive or impact type. Injuries occur when the tissue is not able to withstand the strain.[2] The capacity to resist the strain varies from tissues to tissues. Depending on that, different tissues have varying degree of injury.

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In head injuries following trauma, cerebral contusion is the most frequently encountered lesion. The classic and primary hallmark of brain trauma is contusion. Contusions are defined as bruise of the brain surface with intact arachnoid and pia. If it is torn, it is called as laceration.[3] When the intraparenchymal contusion is in continuity with an acute subdural hemorrhage, it is called as burst lobe. The contusions are classified as fracture contusion, herniation contusion, gliding contusion, coup, intermediate coup, and contrecoup contusion. Fracture contusions are contusion that arises from direct injuries and lies adjacent to the fracture site. Coup contusions are those that lie near the site of impact without any fracture. Contrecoup contusions are contusion that is not exactly below the impact site.[4] Due to complex anatomy of the skull, it may not be exactly opposite the site of impact. Most contusion in closed head injuries in MVA is due to the acceleration-deceleration injuries. Among the cerebral contusion temporal contusion is found in most fatal head injuries. The location of the temporal lobe near the tentorial hiatus leads to rapid herniation in severe temporal lobe contusion.[5]

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Aim

To study the epidemiology, clinical features, radiological findings, management, and outcome of traumatic temporal contusion in brain injury.

MATERIALS AND METHODS

This study is a prospective observational study. In this study, the epidemiological features, clinical findings and radiological findings that are routinely used to assess and to decide about the management of patients with post traumatic temporal contusion patients are analyzed. This study was conducted on the patients admitted in the head injury ward and diagnosed as having temporal lobe contusion at the Institute of Neurology, Rajiv Gandhi Government General Hospital, Chennai, Tamil Nadu, India.

Inclusion Criteria

Adults with unilateral temporal contusion following trauma.

Exclusion Criteria

Patients treated and referred from other hospitals, patients with history of any previous intracranial procedures, patients with other associated parenchymal injuries, patients with bleeding diathesis, patients taking anticoagulant drugs, patients with any comorbid medical illness (diabetes mellitus, hypertension, renal failure, and chronic alcoholism), patients with other system injuries, and patients under the influence of alcohol. About 131 patients were enrolled for the study. 25 patients were excluded from this study based on the exclusion criteria mentioned above. The remaining 106 patients were enrolled for this study.

A detailed history about the patients diagnosed to have temporal contusion following head injury. The variable factors such as age, sex, mode of injury, time interval between injury and admission, loss of consciousness (LOC), seizures, vomiting, and ear, nose, throat (ENT) bleed were noted. Then, a detailed clinical examination was done and the status of the pupils reaction to light, size, extraocular movements/doll s eye movement, and glasgow coma scale (GCS) were noted. Speech assessment was not included in this observational study. All the patients underwent routine investigations that include complete blood count, blood sugar, urea, creatinine, electrolytes, bleeding time, clotting time, blood grouping typing, urine albumin, sugar, deposits, X-ray chest posteroanterior view, and computed tomography (CT) scan brain plain with bone window. The CT scan brain images were analyzed to know the side, size, site of contusion, midline shift, and status of the basal cistern. The volume is calculated by the ellipsoid method, 1/2 x abc. (a) Greatest diameter in the CT scan slice, (b) diameter measured 90° to a, and (c) vertical height measured by the number of the slice. Patients with temporal contusion >20 ml, with midline shift more than 5 mm, with basal cistern effaced, with GCS <8 and progressive neurological deterioration referable to the lesion as per the brain trauma foundation surgical guidelines were operated and others are managed conservatively.[4]

RESULTS

A total of 106 patients with traumatic temporal contusion are included in this study. Among the 106 patients, most of them were in the age group of 21-30, followed by 31-40 then 41-50 and 51-60 age. 90 patients were between 21 and 60 years of age. Among the 106 patients, there are 101 males and 5 females. Males met with maximum head injuries. Temporal contusion caused by MVA predominantly occurs in 90 patients followed by fall (11) and assault (5) (Table 1).

In this study, there is a history of LOC in 83 patients, vomiting in 73, and ENT bleed in 24, and seizure in 32 patients. All the above clinical history is analyzed by Chi-square test individually for the outcome (Table 2).

Majority of the patients in our study were admitted with GCS 9-12 followed by patients with GCS 13-15. 7 patients presented with GCS 3-8 (Table 3).

GCS score for 39 patients deteriorated on the day of admission, and 67 patients remain stable (Table 4).

The pupillary response was normal in 60 patients, 31 show sluggish reaction (A) and 15 patients have no pupillary response (B) to light. Among the operated group 21 survived and 2 expired. 111 patients operated under Group B survived and 1 expired (Figure 1).

Asymmetry of the pupils is noticed in 39 patients. Oculocephalic reflex is absent in 6 and impaired in 48 cases. Out of 38 patients with asymmetry operated, 26 survived, and 12 expired, the 1 patient conservatively managed expired (Figure 2).

A total of 68 patients had pulse rate in the normal range, and bradycardia was noted in about 38 patients.

Right sided temporal contusion was present in 62 cases and left side contusion in 44 patients (Table 5).

By applying the ellipsoid method, the size of the contusion was measured. The volume >20 ml was presented in 15 patients, between 11 and 20 in 38 patients and <10 ml in 53 patients (Table 6).

In the CT scan brain, there is no midline shift in 52 patients.

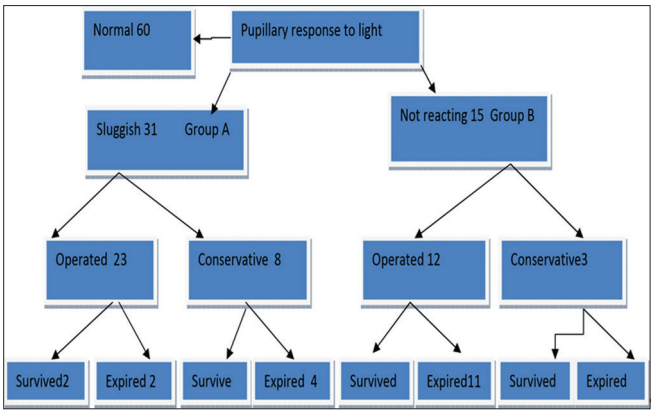

Figure 1: Pupillary response to light

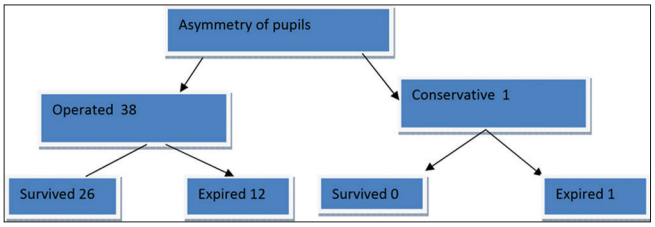

Figure 2: Asymmetry of pupils

A total of 39 patients has midline shift more than 5 mm (Table 7).

The CT scan brain shows fully effaced cistern in 32 patients, partially effaced in 24 patients and open cistern in 50 patients (Table 8).

A total of 39 patients are managed by surgical procedures and 67 patients are managed conservatively (Table 9).

Out of 106 patients treated for traumatic temporal contusion, 86 survived, and 20 expired. Among the 20 patients, expired 8 are treated conservatively, and 12 have undergone decompressive craniectomy and evacuation of the contusion (Table 10).

Table 1: Distribution of mode of injury

Mode of injury	Patients
RTA	90
Fall	11
Assault	5
Total	106

RTA: Road traffic accident

Table 2: Clinical features

Clinical features	Number of patients (*n*=106)
Seizure	32
Vomiting	73
ENT bleed	24
LOC	83

ENT: Ear, nose, throat and LOC: Loss of consciousness

Table 3: GCS on admission

GCS	Number of patients
3-8	7
9-12	51
13-15	48
Total	106

GCS: Glasgow coma scale

Table 4: GCS on deterioration

GCS	Number of patients
Deterioration	39
No deterioration	67
Total	106

GCS: Glasgow coma scale

Table 5: Side of contusion

Side	Number of patients
Left	44
Right	62
Total	106

Table 6: Size of the contusion

Size (ml)	Number of patients
<10	53
11-20	38
>20	15
Total	106

Table 7: Midline shift-CT scan brain

Shift	Number of patients
No shift	52
<5 mm	15
>5 mm	39
Total	106

CT: Computed tomography

Table 8: Status of the basal cistern

Status	Number of patients
Open	50
Partially effaced	24
Fully effaced	32
Total	106

Table 9: Management

Management	Number of patients
Conservative	67
Surgery	39
Total	106

Table 10: Outcome

Outcome	Total number of patients
Alive	86
Expired	20
Total	106

On analyzing the results of this study, MVA are the main mode of head injury. The males who are in the age group between 21 and 60 years are the main victims. Even though LOC, vomiting, seizure, and ENT bleed are the clinical features with decreasing order of frequency, this study shows, seizure as the significant factor for the outcome in patients with traumatic temporal contusion. This study also shows that low admission GCS and abnormal pupillary response to light, abnormal oculocephalic reflex, and bradycardia are significant factors for the outcome of the patients with traumatic temporal contusion. This study concluded the status of the basal cistern, midline shift more than 5 mm and size of the temporal contusion more than 20 ml have more significance for the outcome of the head injury patients with temporal lobe contusion. The outcome of the patients treated by decompressive craniectomy and evacuation of the contusion shows 30.8% mortality and 69.2% survival.

DISCUSSION

In this study, it was observed that road traffic accidents were the common mode of injury most of the victims in MVA were males in the age group of 21-60 in this study. The National Crimes Records Bureau, accidental deaths and suicides in India, mentioned that most of the victims in MVA were in the age group 25-65 years (51.9%) and males constitute 85% of them.[6]

This study on post traumatic temporal contusion shows contrecoup temporal contusion was on the higher side, in concurrence with. The study by Tandon *et al.*, at All India Institute of Medical Sciences also mentioned that contrecoup contusions were found in most severe head injury patients.[7]

According to Tandon *et al.*, pupillary abnormalities occur in most of the operated cases of temporal contusion, this study also shows pupillary abnormalities were present in most of the patients surgically managed.[7]

Basal cistern effacement was noticed in CT scan brain of most patients with volume more than 30 ml. This observation supports Andrews, about the effect of intracerebral hematoma and the risk of brainstem compression.

GCS deterioration was observed in patients with contusion volume between 11 and 20 ml. Choksey *et al.*, in his retrospective series on the determinants of the outcome in patients with acute intracerebral hematoma mentioned that contusion volume more than 16 ml were more prone for deterioration.[8]

As mentioned by White *et al.*, in his original article on early progression of traumatic cerebral contusion; characterization and risk factors, in this study, significant increase in the volume of the contusion was observed in patients with low GCS score.[9]

All of the patients with basal cistern effaced, conservatively treated, expired and patients who were operated had litter better outcome. This also goes well with the Ross Bullock, who mentioned that outcome in basal cistern effacement was worst and surgery must be done irrespective of the GCS of the patients who have basal cistern effacement.[10,11]

Decompressive craniectomy with evacuation of the contusion is the common surgical procedure performed in patients with temporal contusion. No temporal lobectomy was performed. As mentioned by Motah *et al.* better outcome is noticed in patients who underwent decompressive craniectomy.[12]

CONCLUSION

Temporal lobe contusion occurs usually with MVA. Severe contusions with low GCS score contribute to mortality in such patients. Patients with head injury in MVA, presenting with seizure, abnormal pupillary response to light, abnormal oculocephalic reflex, and bradycardia must have intensive neurosurgical care. CT scan brain should be done at the earliest. The size of the contusion, the status of the basal cistern and midline shift must be noted to find out the patients who need surgical management. All patients with deteriorating GCS must be evaluated by repeating the CT scan brain and reassess the radiological findings. This help to change the management strategy from conservative to surgical, acting as good clinical markers and lifesaving parameters.

GCS of the patients, abnormal pupillary response to light, abnormal oculocephalic reflex, bradycardia, and the radiological findings suggesting size >20 ml, status of the basal cistern and midline shift are really useful prognosticators of temporal lobe contusion. Temporal contusion quickly contributes to mortality because of its adjacent location to the brain stem.

Prevention is better than cure. Hence, civilians should be strictly instructed to follow the traffic regulation rules,

drive with appropriate speed. Strict traffic rules should be implemented to prevent MVA, as well as loss to the young lives.

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