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EPIDEMIOLOGY, TREATMENT STRATEGY & OUTCOME IN PATIENTS WITH TRAUMATIC BASIFRONTAL CONTUSION- A RETROSPECTIVE STUDY IN A TERTIARY CARE HOSPITAL IN SOUTH INDIA

Neurosurgery

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ABSTRACT

Background: Frontal contusions especially basifrontal region is quite common brain injury following road traffic accidents. The management of these basifrontal contusions depends upon various factors and appropriate management is important as these patients can deteriorate anytime during the hospital stay. **Objective:** The aim of this study is to analyze the epidemiology of basifrontal contusions in head injury and assess the outcome following conservative vs. surgical treatment and to identify risk factors involving poor outcome in patients with traumatic basifrontal contusions. **Material & methods:** This study is a retrospective study from January 2022 to December 2022 conducted in institute of neurosurgery , madras medical college. Total 310 patients with CT findings of basifrontal contusion admitted between jan 2022- dec 2022 were studied. **Results:** Initial surgical decompression was done in 50 patients of which 10 patients having contusion volume >50cm3 and 40 patients having contusion volume > 35cm3< 50cm3 . 10 patients were seen having increase in contusion volume & were undergone delayed surgical intervention after 48 hours. Of 310 patients treated , 74 patients died of which 38 deaths were in post operative period and 10 death in patients who were managed conservatively , 26 deaths in those patients whose admission GCS was 3. Seven patients died due to rapid deterioration within 24 hours of admission having GCS 9 to 13 with contusion volume 20cm3 – 35cm3. Three patients died after 7 days with GCS 13-15 who were conservatively managed with contusion volume < 20 cm3. Both sudden & delayed deterioration complicated the clinical course of this disease with both increased mortality & morbidity in bilateral lesions. **Conclusion:** Basifrontal contusion remains a challenge for the treating neurosurgeon when compared to contusions of other areas of brain as the basifrontal region is a silent area of brain and it is difficult to interrupt the quantum of injury and to elicit the features of increased intracranial pressure. Early surgical intervention might be appropriate in patients with contusion volume >35cm3 with GCS <9. Close observation with hourly GCS monitoring is essential in patients who are managed conservatively.

KEYWORDS

Trauma , basifrontal contusions, Glasgow coma scale, decompressive craniotomy

INTRODUCTION :

Intracerebral hemorrhage constitutes 15%of the patients with traumatic brain injury (TBI)[19] . Of them, bifrontal contusions are common and frequently seen[20]. Inferior frontal lobes are commonly involved in cerebral contusions due to the irregular bony anterior cranial fossa upon which the brain tissue comes in contact due to relative motion in road traffic accidents. Sudden deterioration might happen in this region as these are dynamic lesions which evolve over time especially when lesions are bilateral. Patients with basifrontal contusion are managed either conservatively or surgical intervention based on size of the contusion, presenting GCS , radiological signs of mass effect. This study focuses on the epidemiology and outcomes of traumatic basifrontal contusion in a tertiary care hospital.

MATERIAL & METHODS

The clinical records of all patients with traumatic brain injury(TBI) having basifrontal contusion confirmed by Computed Tomography (CT) scan admitted between January 2022-december 2022 to our hospital, were retrospectively analysed. Surgical intervention(unilateral or bifrontal decompressive craniotomy) was done in patients with contusion volume > 50 cm^3 regardless of GCS or frontal contusion greater than 20cm^3 with a midline shift of 5mm or cisternal compression in CT scan with GCS 4-9. Rest of the patients were observed with conservative treatment. The patients with age > 80 yrs, penetrating injury, hemodynamic instability, other associated injuries and history of prior neurologic disease or disability were excluded. Repeat CT scan was done in patients showing neurological deterioration (Decrease2 points in GCS) or not showing neurological improvement within 48 hrs.Delayed surgery was done in patients whose repeat CT showed increased in contusion volume.

The clinical parameters studied includes – demographic data, admission GCS, unilateral/bilateral lesion, mechanism of injury, contusion volume and mode of treatment .

RESULTS

Total 310 patients with basifrontal contusion following head injury were admitted from january 2022 to December 2022. Of which 250 were male and 60 were female with M:F ratio of 4:1 (table-1) . Majority of the patients were in the age group of 40 – 49 yrs followed by 20 -29 yrs(table-2) . Road traffic accident was found to be the cause in 224 patients(72%) followed by pedestrian hit by moving vehicle in 53(17%) patients, fall from height in 21(7%) patients & assault in 12(4%) patients(table 3) . In this study bilateral basifrontal contusion was seen in 175 patients whereas unilateral lesion in 135 patients(table 4) .Admission GCS was 3 in 26 patients, GCS 4-8 in 40 patients , GCS 9-13 in 150 patients and GCS 14-15 in 94 patients(table 5) denoting majority fall under GCS 9-15. On CT brain contusion volume was >50 cc in 28 patients, 35-50 cc in 48 patients , 20-35cc in 135 patients and <20 cc in 99 patients(table 6). Out of 310 patients admitted with traumatic basifrontal contusion , early surgical intervention done in 50 cases and delayed surgical intervention done in 10 patients either due to drop in GCS after admission or increase in contusion volume, rest 250 patients were managed conservatively (table 7). Among 310 patients admitted , there was 74 death which includes 26 patients with brainstem contusion on admission , 38 patients in post operative period and 10 patients who were subjected to conservative line of management. Out of 38 deaths in post operarative period, 8 patients had contusion volume >50cc and GCS of 3 , 27 patients had contusion volume of 35cc-50cc and GCS 4-8, 3 patients with contusion volume of 20-35cc and GCS 9-13. The average hospital stay was 10 days in patients with unilateral lesions and 14 days in patients having bilateral lesions.

Table1 And Graph 1:
Sex Distribution In Traumatic Basifrontal Contusion

Male	Female
250	60

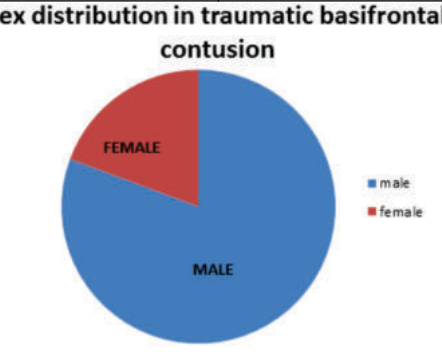


Table 2 And Graph 2:
Age Wise Distribution In Patients With Traumatic Basifrontal Contusion

Age	Incidence
<20 yrs	3
20-29 yrs	97
30-39yrs	42
40-49yrs	120
50-59yrs	26
>60 yrs	22

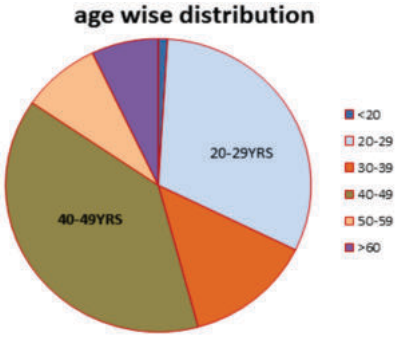


Table 3 And Graph 3:
Cause Of Basifrontal Contusion

Cause	Incidence	Percentage
Road traffic accident	224	72%
Pedestrian hit by running vehicle	53	17%
Fall from height	21	7%
Assault	12	4%

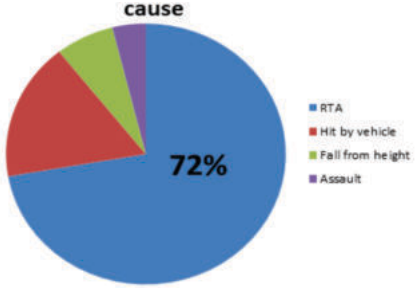


Table 4 And Graph 4:
Unilateral Vs Bilateral Basifrontal Involvement

Unilateral	Bilateral
135	175

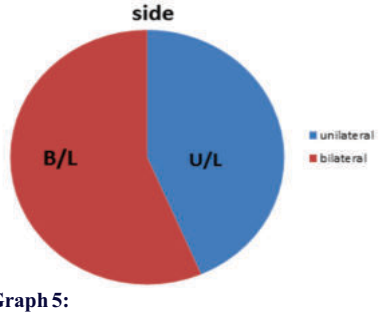


Table 5 And Graph 5:
Admission Gcs

Admission GCS	Incidence
3	26
4-8	40
9-13	150
14-15	94

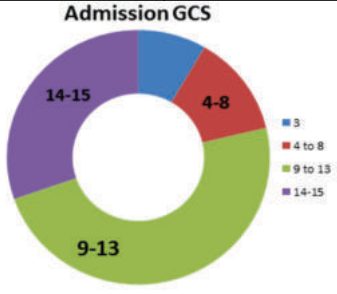


Table 6 And Graph 6:
Volume Of Basifrontal Contusion

Volume of contusion	Number of patients
<20 cc	99
20-35cc	135
35-50cc	48
>50cc	28

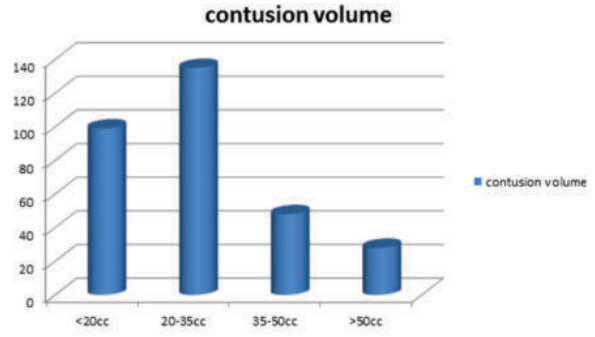
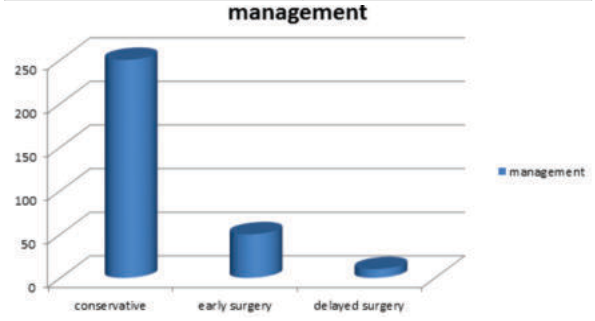


Table 7 And Graph 7:
Management Of Patients With Basifrontal Contusion

Conservative	250
Early surgery	50
Delayed surgery	10



DISCUSSION

Cerebral contusion occurs due to the disruption of cerebral microvasculature creating a zone of cellular injury . These contused ares becomes a amalgam of blood with necrotic brain tissue , called as hemorrhagic[2]. Following head injury , most common finding in CT brain is cerebral cortical contusions but surgical intervention is required in quite few patients[3]. But cerebral contusion was the only finding during autopsy in 2% of fatal head injuries[4]. Most of the cerebral contusions are managed conservatively owing to their small size but larger contusions with mass effect require surgical intervention as these may lead to secondary brain injury and neurological deterioration.A common site following head injury is anterior skull base causing frontal contusions at this area. These are dynamic lesions which may evolve with time and may have sudden deterioration. Sudden deterioration is frequently seen in basifrontal region and the lesions are bilateral[1]. In this study three patients died due to sudden deterioration who was admitted with GCS 14/15.

The reason could be antero-posterior progression rather than lateral, so that the classical "warning" lateralising signs develop very much later[3].Surgical intervention is recommended in patients with contusion volume >50 cc or with contusion volume 35cc-50cc with GCS 4-8 and in patients with midline shift of 5mm or more in CT brain[5,6]. In this study 50 patients were subjected to early surgical intervention and 10 patients were operated after 48 hours of admission either due to drop in GCS or follow up CT brain showed increase in contusion volume. Out of 60 patients operated , 38 patients died during post operative period. 8 patients had contusion volume >50cc and GCS of 3 on admission , 27 patients had contusion volume of 35cc-50cc and GCS 4-8 , 3 patients who underwent delayed surgical intervention with contusion volume of 20-35cc and GCS 9-13. Thus we emphasize by our study that early surgical intervention required in basifrontal contusion of volume >35cc and GCS <9 and close monitoring of the patients who are conservatively managed . Some authors have described a less invasive predictor of the patient's clinical course by testing quantitative blood flow by Xenon enhanced CT in GCS greater than eight in order to prevent clinically undetected deterioration from central herniation[7].

In the study conducted by Yadav YR et al [8] , the incidence of expanding hematoma was found to be 16.4% and the incidence of expanding hematoma was 42.3% in Oertel series[9] and 68.2% in Lobato[7] series. In our study the incidence of expanding contusion was seen in 55 patients(17.7%) of which only 10 patients had significant increase in contusion volume along with drop in GCS. Coagulopathy, patients with pre-existing intracerebral hematoma, traumatic vessel injury, subdural hematoma are attributed as risk factors for delayed hematoma[11,12].

Death in patients with cerebral contusion is due to brain swelling that cause neurological deterioration . There are three phases of brain swelling due to contusion. The ultra-early phase occurs within first 24 h and is often the cause of clinical deterioration or death. The second phase occurs after 24-72 hrs and progresses for 7-10 days[13].Decompressive craniotomy with evacuation of contusion remains as the standard surgical modality for traumatic cerebral contusions . But when brain injury is diffuse along with raised intracranial pressure and brain oedema, this procedure is less effective[14,15]. Decompressive craniotomy is a better option in comparison to limited craniotomy with lesion evacuation to reduce raised intracranial pressure in these patients[16,17]. Patients with bilateral fontal contusion deteriorate more often than unilateral ones[1]. Similarly, in our series 8 patients with bilateral lesions deteriorated and had to undergo delayed surgical intervention in comparison to 2 patients with unilateral lesion.The average period of hospital stays was10 days in patients having unilateral lesions & 14 days in patients having bilateral lesions.

CONCLUSION

Early surgical intervention should be done in patients with unilateral basifrontal contusion of volume >35 cc and GCS <9. In case of bilateral basifrontal contusion , early surgical intervention should be done if volume is 20-35cc irrespective of GCS as bilateral cases are more prone for clinical deterioration and poor outcome than unilateral lesions. Close observation is required for all patients managed conservatively by monitoring hourly GCS and taking periodic CT brain .

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