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CLINICAL CHARACTERISTICS OF TRAUMATIC BASAL SKULL FRACTURE IN ROAD TRAFFIC ACCIDENTS

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ABSTRACT

Road traffic accidents (RTAs) have emerged into the list of top 10 causes of mortality in the world. Basal skull fractures (BSF) are alarming injuries resulting from fractures in the bones of the skull base and these fractures are often associated with dural tears. These results in cerebrospinal fluid (CSF) fistula. The pattern and cause of BSF and pattern of CSF leak is also different in various parts. **Material and Methods:** History of patients admitted to the neurosurgery department who were diagnosed of TBI was taken thoroughly. Demographic variables like age, sex, place of residence were taken. Glasgow Coma Scale (GCS) score was recorded. Patients were evaluated with repeated clinical examinations during the course of the hospital stay. Clinical features in the form of ear bleed or nose bleed at the time of admission, postauricular ecchymosis, raccoon eyes, and CSF leak if any were recorded. **Results:** 1413 patients with TBI were admitted to the neurosurgery department. Out of which only 64 patients had BSF. According to severity of head injury Mild, moderate and severe were 20(31.25%), 28(43.75%), 16(25.00%) respectively. Maximum mortality was observed in severe injuries 3 (4.69%). Clinically 28(43.75%) had Subconjunctival hemorrage, 41(64.06%) had Raccon eye and 12(18.75%) had post auricular ecchymosis. Most of the BSF were observed in the 17-30 age groups. **Conclusion:** BSF was mostly observed in the young male population. Clinical signs of BSF are supportive. CSF leak can be managed conservatively. Mortality was 7.81% with the majority of deaths occurring among young age group.

KEYWORDS: TBI, Basal Skull Injury (BSI), CSF, CT.

INTRODUCTION

Economic development in India has resulted in rapid urbanization, motorization, and population migration from rural to urban area which has altered the traditional methods of living and working.[1] Road traffic accidents (RTAs) have emerged into the list of top 10 causes of mortality in the world. As per WHO data of 2015 and is expected to become sixth major cause of death by 2020 globally. Also is that it is the most common cause of death among young people (15–29 years) globally.[2,3] In developing countries like India this condition may be more critical because of lack of data and head injury (HI) appears to be the single most common cause of mortality, morbidity.[4] There are several studies from India that described the epidemiology of TBI and also discussed the related issues, which includes the need for public awareness campaigns and enforcement of legislation to reduce the number of injuries.[5] Also most of these studies have been conducted in large urban trauma centres so there is a lack of data regarding TBI in rural settings.[6,7]

Basal skull fractures (BSF) are alarming injuries resulting from fractures in the bones of the skull base and these fractures are often associated with dural tears. These results in cerebrospinal fluid (CSF) fistula commonly presenting as rhinorrhea and otorrhea and meningitis is a known complication.[8,9] The pattern and cause of BSF and pattern of CSF leak is also different in various parts.[10] In the developed world incidence of basal skull fracture from non-penetrating head trauma ranges between 7% and 15.8% of all skull fractures, and cerebrospinal Fluid (CSF) leakage in 2% to 20.8% of patients.[11] Sometimes, fistula formation may be delayed and may get missed initially.[12] Sometimes basal skull fracture (BSF) may go unnoticed due to suboptimal computed tomography (CT) brain as some of the patients are alcoholic, irritable and are not cooperative during the study. There is heavy work load in emergency setup for the radiologist, trauma team and neurosurgeon so sometimes BSF may go unnoticed.[13]

The present study is aimed to describe epidemiological characteristics of TBI in a CCM Medical College and hospital Kachandur, Durg.

MATERIAL AND METHODS

Setting

Present study was carried out in the Dept. of Surgery at CCM Medical College and Hospital Kachandur, Durg from Feb 2016 to May 2018.

Design

We conducted a prospective study of all patients having head injury admitted to trouma Centre and surgery ward. The present study was approved by institutional ethical committee. Written informed consent was obtained from all the patients/ relatives who were included in the study.

Study variables

History of patients admitted to the neurosurgery department who were diagnosed of TBI was taken thoroughly. Demographic variables like age, sex, place of residence were taken. Glasgow Coma Scale (GCS) score[14] was recorded. Severity of head injury was classified as mild (GCS- 13-15), moderate (GCS- 9-12) and severe (GCS-3-8). Computed tomography (CT) results, management, surgical intervention and Glosgow outcome scale (GOS) scale was recorded.

Patients were evaluated with repeated clinical examinations during the course of the hospital stay. Clinical features in the form of ear bleed or nose bleed at the time of admission, post auricular ecchymosis, raccoon eyes, and CSF leak if any were recorded. If any CSF leak, detailed CSF studies, Biochemistry, Microscopy, culture and sensitivity were done and patients with meningitis were treated with appropriate antibiotics.

Statistical analysis

All data was entered in the Microsoft excel Windows 2013 software. Data were analysed using Statistical Package for the Social Sciences (SPSS) software.

RESULTS

During the study period, 1413 patients with TBI were admitted to the Surgery department. Out of which only 64 patients had BSF which was diagnosed by CT scan.

Table I: Showing patients distribution.

	MALE (%)	FEMALE (%)	TOTAL
TOTAL PATIENTS WITH TBI	1101(77.92)	312(22.08)	1413
PATIENTS WITH BSF	51(79.69)	13(20.31)	64

Of the total patients with TBI 1101(77.92) were male while 312(22.08) were female. Out of 64 patients diagnosed as BSF 51(79.69) were male and 13(20.31) were female.

Table 2: Severity of Head injury and association with skull base fracture.

Head injury grading	Total BSF (%)			Mortality		
N=64	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Mild	17(26.56)	3(4.69)	20(31.25)	0	0	0
Moderate	22(34.38)	6(9.38)	28(43.75)	1(1.56)	1(1.56)	2(3.13)
Severe	12(18.75)	4(6.25)	16(25.00)	2(3.13)	1(1.56)	3(4.69)
Total	51(79.69)	13(20.31)	64(100)	3(4.69)	2(3.13)	5(7.81)

According to severity of head injury Mild, moderate and severe were 20(31.25%), 28(43.75%), 16(25.00%) respectively. Most of the patients were classified under moderate type (43.75%). In mild injuries male were 17(26.56%) and females were 3(4.69%). In moderate and severe types male and female were 22(34.38%), 6(9.38%) and 12(18.75%), 4(6.25%) respectively. Total mortality was 5(7.81%) of which 3 (4.69%) were male and 2 (3.13%) were female. Maximum mortality was observed in severe injuries 3 (4.69%) while in mild injuries mortality was nil.

Table 3: Clinical findings in BSF.

Clinical findings	No. (%)
Subconjunctival hemorrage	28(43.75)
Raccon eye	41(64.06)
Post auricular ecchymosis	12(18.75)

In clinical findings 28(43.75%) had Subconjunctival hemorrage, 41(64.06%) had Raccon eye and 12(18.75%) had post auricular ecchymosis.

Table 4: Site of Cerebrospinal fluid (CSF) leak.

Route	No. of patients (%) n=17
CSF otorrhea	6 (35.29)
CSF rhinorrhea	11(64.70)
Total	17(100)

17 (26.56%) patients had clinical evidence of CSF leak at some time during the course of stay. Of these 17patients, 11 (64.70%) had CSF rhinorrhea and 6(35.29%) had CSF otorrhea. out of 17 CSF leak cases 6 (35.29%) were suggestive of meningitis biochemically and 2 (11.76%) were microbiologically confirmed by culture report.

Of the total 64 patients 48 (75%) patients were managed conservatively and 16 (25%) patients surgically treated.

Table 5: Basal skull injury according to age group.

Age group	Number	%
17-30	38	59.38
31-40	11	17.19
41-50	9	14.06
>50	6	9.38
Total	64	100.00

Most of the BSF were observed in the 17-30 age group (38, 59.38%), followed by 30-40 age group (11, 17.19%). In 41 – 50 age group it was 9 (14.06%) and in >50 age group it was 6 (9.38%).

DISCUSSION AND CONCLUSION

Basal skull fractures are serious injuries resulting from a break in the bones of the skull base. These fractures are often associated with dural tears. Uncomplicated skull fractures rarely produce neurologic deficit, but the associated intracranial hematoma may raise the intracranial pressure and have serious neurologic sequelae. Low Glasgow coma score at admission was significantly associated with mortality as an outcome. In our study mortality was 5(7.81%) is similar to many other reports from urban India, and other parts of the world.[15,16,17]

According to various studies and researches, BSF has been reported to occur in 3.5%–45.4% of all head injury patients but most of the published data is from the western counties.[18,19,20] In our study male preponderance (51,79.69%) was found in accordance with the study by Sivanandapanicker J et al.[13] the reason may be due to males are associated with the outdoor work and alcoholism, rendering them prone to road traffic accidents. Most of the patients of BSF in our study were from the age group 17-30 (59.38%). This high prevalence may be due to risk taking nature and alcoholism in the group.

Several studies have suggested multislice CT scan and other advanced methodology forimaging in diagnosis of BSF.[21,22] Periorbital ecchymosis and battle sign had 100% positive predictive value for detecting BSF while bilateral periorbital ecchymosis and otorrhagia had 70% positive predictive value.[23] So clinical signs also play a vital role in the diagnosis of the BSF. Also Goh et al.[24] found statistically significant association between clinical signs of BSF and CT findings. In our study 17 (26.56%) patients had CSF leak of which 11 (64.70%) had CSF rhinorrhea and 6(35.29%) had CSF otorrhea. out of 17 CSF leak cases 6 (35.29%) were suggestive of meningitis biochemically and 2 (11.76%) were microbiologically confirmed by culture report. In our study there was higher prevalence of raccoon eyes and rhinorrhea because most of the fractures were anterior cranial fractures.

Vehicular injuries in in India are different from that of the developed world. Most vehicles are low speed like tractors and two wheelers. Also highways pass through most of the areas and heavy vehicles are running at high speed. Residential areas and highways are not segregated, and safety laws are not universally applied.[4] In developed country like United States, the rate of motor vehicle-related TBI fatalities decreased substantially from 11.4/100,000 in 1979 to 6.6/100,000 in 1992.[25] This decrease was attributed to the increase use of safety belt and helmets.

In India there is a need to improve pre-hospital care to reduce morbidity and mortality.[26] In most of the trauma centres there are untrained emergency medical services personnel and unequipped ambulances.[7]

In CSF ottorrhea and rhinorhea, lumber puncture was done and CSF was sent to Biochemistry and Microbiology laboratory for investigations for evaluation of cells, glucose, protein content, Gram's staining, and culture studies. In our study out of 17 CSF leak cases 6 (35.29%) were suggestive of meningitis biochemically and 2 (11.76%) were microbiologically confirmed by culture report. As recommended my some authors prophylactic antibiotics were given to all the patients with clinical evidence of CSF leak.[27] Most of the CSF leaks were resolved within the first 24–48 hours and no further treatment was needed.

In our study overall mortality was 5(7.81%) which was in accordance with the study by Agrawal A et al. who observed mortality as 6.7%.[4]

To conclude BSF was mostly observed in the young male population. Clinical signs of BSF are supportive. CSF leak can be managed conservatively in most of the cases. Mortality was 7.81% with the majority of deaths occurring among young age groups. More studies need to be carried out to focus more light on BSF injuries.

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