Outcome of Patients with Subdural Hemmorage based on Glasgow Coma Score - Mild, Moderate and Severe Head Injured Patients

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ABSTRACT

Introduction: Subdural haematoma is the most common focal intracranial lesion and occurred in 24% of patients in the TBI with severe closed head injury. Despite major advances in modern head injury management, patients in whom acute SDH develops have a worse prognosis than any other group of head-injured patients. Study aimed to record traumatic brain injury patients sex incidence, age distribution, pupillary abnormalities, management, mortality, Glasgow Outcome Score, duration of hospital stay and follow up among traumatic brain injury patients with Acute Subdural Haematoma into mild (GCS 13-15), moderate (GCS 9-12) and severe injuries (GCS 3-8).

Material and methods: It is a prospective study conducted in Department of Neurosurgery, Andhra Medical College, Visakhapatnam over a period of two years from December 2013 to December 2015. The patients who presented to the Casualty with head injury and on CT scan showing Acute Subdural Haematoma were taken into the study.

Results: Out of 302 patients, 228 patients are male and 74 are female. More number of patients are reported in the age group of 31-40 years. RTA is the most common aetiology and Maximum in the age group of 31-40 years. More number of cases under RTA are in the age group of 21-60 in both rural and urban areas. Maximum number of cases are identified under CON in all head injury cases. Less number is reported under ICU in all three head injury cases. Maximum number (i.e., 27%) of death cases are reported in the age group of 31-40 years. Maximum number (i.e., 27%) of recovery cases are reported in the age group of 31-40 years. Maximum and equal number of death and discharge cases are reported in the same age group of 31-40 years of age group. In both the cases, less number (i.e., 4%) of cases are reported in the age group of >70 years.

Conclusion: It is worth to use of GCS as an instrument to estimate prognosis on the part of researchers and professionals involved in care provided to trauma victims.

Keywords: Glasgow Coma Score, Mild, Moderate, Severe Head Injured Patients

INTRODUCTION

India is passing through rapid industrialization, urbanization, motorization, economic liberalization and changing social milieu, and is facing a myriad of health, social, economic and technological problems at the beginning of the new millennium. The demographic and epidemiological transition has brought a combination of communicable and emerging noncommunicable diseases to the forefront of health care delivery system. While signifcant decline in morbidity and mortality due to communicable diseases have been recorded across the country, noncommunicable diseases are increasing signifcantly, thus placing a heavy burden on the meager health care resources.[1]

An emerging problem due to this demographic, epidemiological and social transition has been an increase of injuries and consequent effects. The complex interaction of human, vehicle and environmental factors along with lack of sustainable preventive programs has contributed to this 'silent epidemic' of injuries. The mortality due to injuries at the global level is estimated to be 97/100,000 population per year with male to female rates of 128 and 66, respectively. In India, injuries are the seventh leading cause of mortality contributing 11% of total deaths, 78% due to road accidents alone.[2] Road traffic injuries are the leading cause of mortality in the age group of 5–44 years and a leading cause of burden of disease across all age groups.[3,6] It is also widely acknowledged that for every reported death, several more are injured requiring hospitalisation and long term rehabilitation.

Among the different types of injuries, traumatic brain injuries (TBIs) occupy a signifcant place due to high morbidity, mortality, disability and socioeconomic impact in developing countries like India. With severe paucity of trained manpower, investigative facilities and rehabilitative services, TBIs place considerable burden on care givers in different situations. Epidemiological information is vital for planning activities and developing interventions towards neurotrauma prevention, management and rehabilitation.

TBIs accounted for 24% of total injuries among hospital registered subjects. The only hospital-based epidemiological study in Bangalore revealed that the incidence and mortality from TBIs is 160 and 20 respectively per 100,000 population per year.[3] The prevalence of TBIs from a community based survey of neurological disorders in Bangalore was found to be 97/100,000 population. Case fatality rate was 9% among hospital registered individuals.[3]

Based on these observations, it is estimated that every year nearly 1.6 million individuals will sustain a TBI and seek

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How to cite this article: K Sivaramakrishna, B. Harshavardhan. Outcome of patients with subdural hemmorage based on glasgow coma score - mild, moderate and severe head injured patients. International Journal of Contemporary Medical Research 2018;5(3):C1-C6.

hospital care. Among them, nearly 200,000 lives would be lost due to TBIs. Further, nearly 1 million persons would require rehabilitation services at any given time. However, these could be the lowest possible estimates and should be interpreted with caution as national level data is not available for the country. Also, there would be significant urban–rural disparities accounting for variation in TBIs.[3]

By far, the most important complication of TBI is the development of an intracranial haematoma, which complicates 25 to 45% of severe TBI cases, 3 to 12% of moderate TBI cases, and approximately 1 in 500 patients with mild TBI.[10] Without effective surgical management, an intracranial haematoma may transform an otherwise benign clinical course with the expectation of recovery to a situation in which death or permanent vegetative survival will occur. Moreover, prolonged delay in the diagnosis or evacuation of an intracranial hematoma may produce a similar result.

Subdural haematoma is the most common focal intracranial lesion and occurred in 24% of patients in the TBI with severe closed head injury. Despite major advances in modern head injury management, patients in whom acute SDH develops have a worse prognosis than any other group of head-injured patients. Mortality has been reported to be between 50% and 60% in various series and between 57% and 68% in patients initially seen in coma. aSDHs are found in 21% of patients with severe TBI and in 11% of those with any degree of TBI.

We prospectively studied the clinical and epidemiological features of acute subdural haematoma in 302 head injured patients over a period of two years. The outcome of these patients is studied by dividing them into three groups based on Glasgow coma score i.e mild, moderate and severe head injured patients.

MATERIAL AND METHODS

It was a prospective study conducted in Department of Neurosurgery, Andhra Medical College, Visakhapatnam over a period of two years from December 2013 to December 2015. The patients who presented to the Casualty with head injury and on CT scan showing Acute Subdural Haematoma were taken into the study.

About 302 (n=302) cases were taken into the study taking into consideration their sex, age, area of injury, mode of injury, GCS at admission, pupillary abnormalities which were recorded at the time of admission. Patients with Chronic and Subacute Subdural haematoma and who absconded and those with incomplete data were excluded from the study.

Based on GCS, pupillary abnormalities and CT scan findings they were managed conservatively either in ward or in ICU or surgically. They were divided into three groups based on GCS into mild, moderate and severe head injury. Mild head injury with GCS 13-15, moderate with GCS 9-12, severe head injury with GCS 3-8 were studied about sex incidence, age distribution, pupillary abnormalities, management, mortality, Glasgow Outcome Score, duration of hospital stay and follow up. All the patients were followed up for a period of 3 - 6 month.

RESULTS

Out of 302 patients, 228 patients are male and 74 are female. More number of patients are reported in the age group of 31-40 years (i.e., 27.15 per cent).

Among the rural population 50 percent of patients are reported in the age group of 21-40 years. With regard to rural population 30 per cent of people are in the age group of 31-40 and 25 per cent of people in the same age group got injured and developed acute subdural haematomas in the urban areas.

RTA is the most common aetiolgoy. Maximum RTA cases are in the age group of 31-40 years followed by 21-30 years of age. Self fall is the second common cause of SDH followed by assault and fall from height (table-1).

It is reported that more number of cases under RTA are in the age group of 21-60 in both rural and urban areas. With regard to mode of injury, the order of the injury is RTA, self fall, fall from height, assault, other types and electric shock in rural areas whereas in urban areas the order of the injury is RTA, self fall, assault, fall from height, other types and electric shock (table-2).

majority of cases (69, 54 and 69) are reported under RTA in all head injury cases. Number of cases reported is same under RTA in both the severe head injury and mild head injury. Cases of SEL are occupying the second place in all head injury and less number is reported in ASS in all cases (table-3).

Age-group	Male						Female					
	Mode of Injury						Mode of Injury					
	RTA	Self Fall	Fall from height	Electric shock	Assault	others	RTA	Self Fall	Fall from height	Electric shock	Assault	Others
0-10	2	2	1	-	-	-	7	-	2	-	-	-
11-20	7		4	1	1	1	1	-	-	-	-	-
21-30	39	7	3	1	8	2	6	-	-	-	-	-
31-40	41	15	6	-	6	-	10	2	1	-	1	-
41-50	19	5	2	-	4	3	12	3	-	-	1	-
51-60	15	6	1	-	1	-	11	3	-	-	-	-
61-70	13	4	-	-	-	2	5	3	1	-	-	1
≥71	2	4	-	-	-	-	2	2	-	-	-	-
Total	138	43	17	2	20	8	54	13	4	-	2	1

Table-1: Distribution of Patients according to sex and mode of injury during the period 2013-2015

Age-group	Mode of Injury											
	Rural						Urban					
	RTA	Self Fall	Fall from height	Electric shock	Assault	others	RTA	Self Fall	Fall from height	Electric shock	Assault	others
0-10	7	2	2	-	-	-	2	-	1	-	-	-
11-20	3	-	2	1	1	-	5	-	2	-	-	1
21-30	28	4	2	-	4	-	17	3	1	1	4	2
31-40	40	10	4	-	3	-	11	7	3	-	4	-
41-50	20	6	1	-	4	3	11	2	1	-	1	-
51-60	15	5	1	-	1	-	11	4	-	-	-	-
61-70	11	3	1	-	-	3	7	4	-	-	-	-
≥71	1	2	-	-	-	-	3	4	-	-	-	-
Total	125	32	13	1	13	6	67	24	8	1	9	3

Table-2: Distribution of Patients according to place of origin and mode of injury during the period 2013-2015.

	Severe Head Injury GCS (3-8)					Moderate Head Injury GCS (9-12)					Mild Head Injury (13-15)				
Age group	Mode of Injury					Mode of Injury					Mode of Injury				
	RTA	ASS	SEL	HEIG	OTH	RTA	ASS	SEL	HEIG	OTH	RTA	ASS	SEL	HEIG	OTH
0-10	2								1		7		2	2	
11-20	2	1			1	2			3		4		1	1	
21-30	16	5	2	1	1	19	1	3	1	1	10	2	2	1	1
31-40	18		6	5		13	2	4	2		20	5	7		
41-50	9	2	3		2	8		1	2	1	14	3	4		
51-60	9		4	1		10		3			9	1	2		
61-70	10		3		2	2		2			4		2	1	1
>70	3		1					2			1		3		
Total	69	8	19	7	6	54	3	15	9	2	69	11	23	5	2

SEF-Self fall; RTA- Road traffic accident; ASS-Assult; HEIG - Fall from height; OTH - Others

Table-3: Comparative study on the basis of mode of injury at various age groups

Age group	Severe head injury GCS (3-8)			Moderate Head Injury GCS (9-12)			Mild Head Injury (13-15)			Total Head Injury GCS (3-15)	% of Total Head Injury GCS (3-15)
	Treatment			Treatment			Treatment			Total Treat-ment Cases	Treatment
	CON	OPER	ICU	CON	OPER	ICU	CON	OPER	ICU		
0-10	2			1			10	1		14	4.64
11-20	2	1	1	3	1	1	5	1		15	4.97
21-30	12	7	6	14	8	3	15	1		66	21.85
31-40	7	15	7	14	5	2	30	2		82	27.15
41-50	4	10	2	8	4		19	1	1	49	16.23
51-60	8	3	3	10	3		8	3	1	39	12.91
61-70	6	7	2	4			5	3		27	8.94
>70	2	1	1	2			4			10	3.31
Total	43	44	22	56	21	6	96	12	2	302	100.00

Table-4: Cases of treatment according to the age group under severe, moderate and mild head injury.

maximum number of cases are identified under CON in all head injury cases. Less number is reported under ICU in all three head injury cases. The cases of OPER are occupying the second place in moderate and mild injury (table-4).

Out of 302 sample population, 221 patients are discharged from the hospital whereas 81 patients are dead in all head injury cases. More deaths are reported in the age group of 21-40 and 61-70 years under severe head injury. Maximum number of patients is discharged with mild injury followed by moderate and severe head injury. It is reported that more number of death rate is there in severe head injury an all age groups. Under severe head injury cases, it is reported that 50 per cent of survival in the age groups of 51-60 and >71 years. The survival rate is 44.03 per cent and death rate is 55.96 per cent as a whole under severe head injury cases. But the survival rate is 84.33 per cent and death rate is 15.66 per cent as a whole under moderate head injury cases. Under minor head injury cases, the survival rate is 93.64 per cent whereas

Age group	Severe head injury GCS (3-8)		Moderate Head Injury GCS (9-12)		Mild Head Injury (13-15)		Total Severe, Moderate and Mild head injury cases (GCS 3-15)			
	Outcome		Outcome		Outcome		Total outcome			
	Death	Recovery	Death	Recovery	Death	Recovery	Total Death	% of total death	Total Discharge	% of total recovery
0-10		2		1		11			14	6.33
11-20	3	1	1	4		6	4	4.93	11	4.98
21-30	13	12	6	19		16	19	23.45	47	21.27
31-40	18	11	3	18	1	31	22	27.16	60	27.15
41-50	7	9		12	3	18	10	12.35	39	17.65
51-60	7	7	2	11	1	11	10	12.35	29	13.12
61-70	11	4	1	3	2	6	14	17.28	13	5.88
>70	2	2		2		4	2	2.46	8	3.61
Total	61	48	13	70	7	103	81	100.00	221	100.00

Table-5: Outcome according to the age group of sample population.

the death rate is negligible i.e., 6.36 per cent (table-5).

DISCUSSION

Acute subdural haematoma (ASDH) is still a condition with a high mortality and morbidity. The reported incidence of ASDH is as high as 5% in patients with head trauma and some retrospective studies report increased incidence with age.[4] The mean age was 40.2 years and median age of 40 years with a range from 3 to 80 years. Seventy five percent of the patients are men (228 patients) and 74 (24.5%) were women. Majority (65.23%) of the patients are aged between 21 and 50 years while 9.61% and 25.16% were aged below 20 years and older than 50 years respectively. More number of cases are in the age group of 31-40 years among male persons (29.82%) whereas the more number is reported in the age group of 41-50 years among female persons (21.62%). More than 50 per cent of cases are in the age group of 21-50 years among males while the same is in the age group of 31-60 among females. Males are commonly affected among all age groups but in children less than 10 years, 9 (64%) out of 14 patients are females.

The rural population (62.91%) are more commonly victims of head injuries with acute subdural haemaotmas compared to people from urban areas (37.09%). Gabela B, et al., used a state surveillance system to identify cases of TBI.[5] The study showed higher rates of severe TBI in rural as compared to urban areas. In our study predominant (63%) cases were from the rural areas and rest 37% cases were from urban areas. Development of trauma services is a challenge in rural areas. The number and distribution of these facilities are not proportionate to the injured patient.[6]

In this study mortality among rural areas (59.2%) was more compared to urban areas (40.8%). Most of the patients from the rural areas are in the age group of 21-40 years (50%). A symposium by Manisha Ruikar[7] shows that in 2011, the total number of accidents that occurred in rural areas (53.5%) was more than that in the urban areas (46.5%). Rural areas showed more fatalities (63.4%) than urban areas (36.6%). The number of persons injured was also more in rural areas (59.4%), as compared to urban areas (40.6%).

The most common cause of injury was road traffic accident (63.58%) followed by self fall (18.55%) with assault and fall from height accounting for 7.29% and 6.96% respectively. Hatashita et al[8] had a 40% incidence of falls and road traffic accident forming only 23% of the cases of Acute SDH. Koc RK et al[9] showed an increased frequency of head injuries due to assault (44.8%) with road traffic accidents and falls accounting for 24.7% and 30.5% respectively. The mode of injury causing Acute subdural haematoma varied among different studies without any uniformity.

The road network in India, the numbers of registered motor vehicles in the country and the country's population have increased at a compound annual growth rate (CAGR) of 3.4%, 9.9% and 1.6% respectively, during the decade 2001 to 2011. During the same period, the number of road accidents in the country increased at a CAGR of 2.1%. Similarly, the number of road accident fatalities and the number of persons injured in road accidents in the country between 2001 and 2011 increased by 5.8% and 2.4% respectively.[3,7]

Even as the CAGR of the number of accidents and the number of road accident injuries has moderated during the decade 2001 to 2011, as compared to the previous decade 1991 to 2001, there has been a spurt in the CAGR of the number of road accident fatalities during the latter period. The number of accidents increased 4.4 times accompanied with 9.8 times increase in fatalities and 7.3 times increase in the number of persons injured, against the backdrop of more than a 100-fold increase in the number of registered motor vehicles and close to a four-fold increase in the road network. Road accident cases in the country have marginally decreased by 0.02% during 2012, while the casualties in road accidents in the country have increased by 1.3% during 2012; as compared to 2011.[10]

Eighty one patients died while hospitalised and the overall mortality was 26.8%. Good functional recovery was attained by 119 (39.44%) while 25.16% and 4.63% of the patients had moderate and severe disability. Twelve patients (3.97%) were in vegetative state with a GOS of 2. In addition, 79% of female patients achieved functional recovery compared to 71% of the male patients.

In spite of advances in neuro-traumatology and aggressive neurosurgical intervention, the mortality rate of traumatic Acute SDH is still high in majority of series ranging between 39% and 75%.[11] Wilberger et al [12,13] reported that the overall mortality from traumatic ASDH is 66% and functional recovery 19%. In our series, the overall mortality was 26.8% and functional recovery 39.44%. This is similar to a hospital mortality rate of 21.75% that was reported by Tian et al[14] in their prospective Chinese series.

Highest mortality rate (27.2%) was observed in the age group of 31-40 years followed by 21-30 and 61-70 with a mortality of 23.5% and 17.3% respectively, while patients aged less than 10 years had good functional outcome without any mortality. Fourteen out of 29 patients (48.2%) died in the age group of 61 to 70 years. Furthermore, fewer patients (51.7%) in the age group of 61 to 70 years had good functional recovery compared to 100% recovery in patients aged <10 years.

It has been established in literature that increasing age is associated with a higher mortality and lower likelihood of functional recovery from traumatic brain injury. Mosenthal et al[15] observed that the mortality from isolated traumatic brain injury for the geriatric population was twice that of younger patients. In the study by Wilberger et al[13,14], the mean age of survivors was 41 years and of non survivors was 59 years.

The mechanism by which age has such an effect on outcome is unknown, but suggestions include a poor regenerative capacity of the older brain and predisposition to develop a more lethal injury. Some of this increased mortality in the elderly may be explained by the intrinsic properties of the ageing brain, pre-existing co-morbidities and complications. Furthermore, the adverse effects of general anaesthesia and surgery may affect the respiratory and circulatory function of the elderly, increasing the severity of brain injury. Therefore, in addition to treating pre-existing diseases to decrease the risk of complications, improved long-term care should be emphasized for elderly surgical patients.

The preoperative GCS score was highly correlated with outcome. Of the 109 patients with preoperative GCS score of 8 or less, 61 (56%) died and 11 (10%) in vegetative state while 11% and 23% had moderate disability and good recovery respectively. By contrast only 7 (6.3%) deaths occurred in the 110 patients with GCS 13 to 15 amongst who moderate disability and good recovery was achieved by 26.4% and 67.3% respectively.

Details of pupillary reaction to light at the time of admission were as follows: 230 patients (76.2%) had symmetrical reactive pupils, 28 (9.3%) had non reactive pupils. Of the remaining 44 patients with asymmetrical pupils, 24 (7.9%) had reaction to light and 20 (6.6%) had no reaction to light. When pupillary characteristics were cross tabulated with outcome, 89% of patients with unreactive pupils died as compared to 12% of patients with bilaterally symmetrical reactive pupils. Further, 84% of patients with bilaterally reactive pupils achieved a functional recovery compared with 29% of patients with anisocoria and reactive pupils. No functional recovery was achieved when patients presented with bilaterally non-reactive pupils or anisocoria with non-reactive pupils. On evaluating the data of the patients with vegetative state, 25% of those with anisocoria and reactive pupils are in vegetative state compared to 15% and 10% of those with anisocoria with non-reactive pupils and bilaterally non-reactive pupils respectively.

Many authors reported that patients with bilateral fixed pupils at surgery had a mortality rate from 64 to 93%. Kim et al[11] reported that patients with one non-reacting pupil, had a mortality from 48 to 68%. This is in accordance with the findings of our series and is confirmed by other reports. In addition on logistic regression, pupillary abnormalities were strong predictors for mortality of patients with traumatic acute subdural hematomas. It has been postulated that pupillary dilatation is associated with decreased brainstem blood flow and that ishaemia rather than mechanical compression of the third cranial nerve is an important causal factor. In addition, pupillary abnormalities also indicate brain herniation syndromes. Monitoring pupillary changes of trauma patients with coma is crucial to promptly detect any pupil inequality.

Out of 302 patients, 81 (26.8%) underwent surgical drainage of hematomas, while 10.3% of the cases were provided with ventilator support and were given life support and could not be operated. Majority of the cases (62.9%) of the cases are managed conservatively.

Even patients who underwent surgical evacuation of hematomas had a higher mortality rate (49.4%) with 6.2% and 40% of moderate disability and good recovery rates respectively. Of the 31 patients managed in ICU without surgical intervention 27 (87%) died while 4 (13%) remained in vegetative state. Further, a 7.4% mortality is seen among the 190 patients managed conservatively with 4.7% and 85% moderate disability and good recovery rates respectively. In addition, 5 patients (2.6%) of the conservatively managed cases remained in vegetative state.

Most investigators do not specify the type of surgical treatment used for evacuation of the SDH and, if they do, they usually do not address the effectiveness of the procedure. No papers were found looking at the impact of procedure type on outcome. The choice of operative technique is influenced by the surgeon's expertise, training, and evaluation of the particular situation. Some centers treat all SDH with decompressive craniectomies whereas other centers used solely osteoplastic craniotomies. Most studies report a mixture of procedures depending on the clinical and radiographic evaluation, or combined approaches in the same patient, i.e., subtemporal decompression plus subsequent craniotomy or craniotomies with contralateral decompressive craniectomies in some children.[16] One study evaluated decompressive hemicraniectomies for the treatment of selected patients with SDH. Only two investigators addressed the effect of the operative technique on outcome from SDH. Hatashita et al.[8] looked at 3-months GOS in 60 patients with GCS scores between 3 and 15 admitted for SDH evacuation. All patients underwent surgery. The authors performed 24 burr holes, 25 craniotomies, 8 craniotomies with dural grafting, and 3 decompressive craniectomies. In patients with GCS scores between 4 and 6, the authors found a statistically significant increased mortality and reduced functional recovery rate in patients undergoing burr hole trephination versus craniotomy. Koc et al.[9] compared craniotomy, craniotomy with dural grafting, and decompressive craniectomy in 113 patients with GCS scores between 3 and 15 undergoing SDH evacuation. Seventeen patients underwent decompressive craniectomy and all died. No other significant differences were found between treatment groups. The results of all of these studies have to be viewed with caution because groups undergoing different types of surgical treatment were not comparable.

CONCLUSION

In Present study higher GCS score in younger patients. Out of 302 sample population, the survival rate is 73.17 per cent and death rate 26.82 per cent. It is concluded that for every 100 patients in all head injury cases, nearly 27.00 per cent of patients are died. The efforts of Neurosurgery department and the staff, KGH, Visakhapatnam are appreciable to meet the requirements of the patients on time in reducing risk of death.

This study underscores the importance of determining of severity in this group of truma patients based on the GCS score alone. It is worth to use of GCS as an instrument to estimate prognosis on the part of researchers and professionals involved in care provided to trauma victims.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 20-02-2018; **Accepted:** 23-03-2018; **Published:** 04-04-2018