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Prediction of The Outcome in Post Operative Neurosurgical Cases - A Prospective Observational Study

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Abstract

Introduction: Neurosurgical emergencies like Subdural haemorrhage (SDH) , extradural haemorrhage(EDH), depressed skull fractures , intraparenchymal haemorrhage(IPH) , intraventricular haemorrhages (IVH) , cerebral infarcts , Intracranial space occupying lesions (ICSOL) and hydrocephalus are major health issue in the world. Outcome prediction after such emergencies is of great clinical importance especially for developing countries like India for better targeting of limited healthcare resources. This prospective observational study was aimed to evaluate the efficacy of Glasgow coma scale (GCS) in predicting the prognosis after neurosurgical operations/procedures in above mentioned conditions at tertiary healthcare center by using modified rank in scale (MRS).

Material and Methods: Present study was tertiary care hospital-based prospective observational study conducted in patients who undergone neurosurgical procedures, either gender, of any age, had Mild/moderate/severe head injury, hypertensive bleeds, intraventricular bleeds or ICSOL, admitted to our hospital. The GCS of patients were monitored for the first 24 hours of admission and prognosis/disability checked by using modified rank in scale at one year. Patients were divided into three categories according to GCS, First category is GCS 13 –15, second is GCS 9 – 12 and third is 3-8. And three caegories according to mRS , mRS 0-2 means no symptoms to mild disability , mRS 3-5 suggestive of moderate to severe disability and mRS 6 means dead patient.

Result: Out of 102 patients, 80 were males and 22 were females. Majority of patients (40) were between 31 to 50 years. Intraparenchymal haemorrhages (IPH) were commomly seen in patients. Decompressive craniectomies (42) were most commomly performed procedure. Out of 102 patients 30 patients had mRS 6. In these 102 patients, 47 patients had GCS between 3-8. Out of these 47 patients, 29 patients had mRS 6, 6 patients has MRS 0-2 and 12 patients had MRS 3-5. Out of 102 patients, 36 patients had GCS between 9-12. Out of these 36 patients, 26 patients had MRS 0-2, 9 patients had MRS 3-5 and 1 patient had mRS 6. Out of 102 patients, 19 patients had GCS between 13-15. Out of

these 19 patients, 17 patients had MRS 0-2, 2 patients had MRS 3-5 and no patients had MRS 6.

Conclusion: Initial Glasgow coma scale score is a very efficient predictor of prognosis in post-operative cases of neurosurgical cases and it has a very good corroboration with modified rankin scale.

Keywords: Intraparenchymal haemorrhages, Prognosis, Mild disability, ICSOL.

Introduction

Traumatic brain injury (TBI) , intraparenchymal bleeds , acute/chronic subdural haematoma (SDH) , extradural haematoma(EDH), depressed fracture , intraventricular bleed with hydrocephalus , brain tumors and meningitis with hydrocephalus is the main cause of mortality and morbidity in people under 45 years old in developing countries, most likely due to increased motor vehicle usage and violence in the cities, hypertension, diabetes mellitus, coagulopathies, alcoholic liver disease, hyperlipidemia etc .Number of patients with above issues are admitted to neurosurgical intensive care units, but prognosis after one year are difficult to anticipate during the acute events. Some patients will have no neurological manifestations; whereas, others will have permanent neurologic deficits. Patients and family members often ask the neurosurgeons if any focal neurological deficits may occur. Therefore, neurosurgeons need some ability to predict patient's prognosis at the time of admission. The Glasgow Coma Score (GCS) is a measurement of consciousness of patients with depressed brain function[(1)]. The GCS can be a good predictor of short-term outcome in patients with TBI; however, its role as a predictor of long-term prognosis is still under investigation. When GCS combines with modified rankin scale(mRS) may predict the prognosis.

Figure 1: modified rankin scale - mRS

Modified Rankin Scale (MRS)

0 No symptoms
1 No significant disability, despite symptoms; able to perform all usual duties and activities
2 Slight disability; unable to perform all previous activities but able to look after own affairs without assistance
3 Moderate disability; requires some help, but able to walk without assistance
4 Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
5 Severe disability; bedridden, incontinent, and requires constant nursing care and attention
6 Death

Figure 2: Glasgow Coma Score -GCS

Behaviour	Response
 Eye Opening Response	4. Spontaneously 3. To speech 2. To pain 1. No response
 Verbal Response	5. Oriented to time, person and place 4. Confused 3. Inappropriate words 2. Incomprehensible sounds 1. No response
 Motor Response	6. Obeys command 5. Moves to localised pain 4. Flex to withdraw from pain 3. Abnormal flexion 2. Abnormal extension 1. No response

Material and Methods: Present study was tertiary care hospital-based prospective observational study conducted in patients who undergone neurosurgical procedures, either gender, of any age, had Mild/moderate/severe head injury, hypertensive bleeds, intraventricular bleeds or ICSOL, admitted to our hospital. The GCS of patients were monitored on admission and prognosis/disability checked by using modified rankin scale at one year. Patients were divided into three categories according to GCS, First category is GCS 13 –15, second is GCS 9 –12 and third is 3-8. And three caegories according to mRS , mRS 0-2 means no symptoms to mild disability , mRS 3-5 suggestive of

moderate to severe disability and mRS 6 means dead patient.

Results

Table 1:

Age (Years) /Sex	Male	Female	Total
0 - 10	2	1	3
11-20	6	1	7
21-30	15	1	16
31-40	13	7	20
41-50	15	5	20
51-60	12	4	16
61-70	14	2	16
71-80	3	1	4
Total	80	22	102

There are 102 patients in the study. Out of 102 patients, 80 patients are male and 22 patients are female.

Table 2:

Glasgow Coma Scale (GCS)		Modified Rankin Scale (MRS)							
	Sex	0	1	2	3	4	5	6	Total
13 -15	Male	12	0	0	0	1	0	0	13
	Female	4	1	0	1	0	0	0	6
9 - 12	Male	15	6	4	4	4	0	1	34
	Female	1	0	0	0	1	0	0	2
3-8	Male	3	1	1	3	4	3	18	33
	Female	0	1	0	0	1	1	11	14
Total		35	9	5	8	11	4	30	102

Out of 102 patients 30 patients (29.41%) had MRS 6. In these 102 patients, 47 (46.08%) patients had GCS between 3-8. Out of these 47 patients, 29 (61.7 %) patients had mRS 6. Out of these 47 patients 6 (12.76 %) has mRS 0-2 and 12 (25.54%) had mRS 3-5. Out of 102 patients 36 (35.3%) had GCS between 9-12. Out of these 36 patients, 26 (72.2%) had mRS 0-2, 9 (25%) mRS 3-5 and 1 (2.8%) has MRS 6. Out of 102 patients 19 (18.62%) had GCS between 13-15. Out of these 19 patients , 17 (89.47%) had mRS 0-2 , 2(10.53%) mRS 3-5 and 0(0%) has mRS 6.Overall out of 102 patients 49(48.04%) patients had mRS 0-2 , 23 (22.55%) had mRS 3-5. This values suggest that patient with GCS below 8 has more disability and mortality.

Table 3:

	Sex		Total↓
	Male	Female	
Diagnosis			
Burst Lobe	6	2	8
Subdural Haematoma (SDH) (Acute/Chronic)	19	1	20
Extradural Haematoma (EDH)	10	1	11
Intraparenchymal Haemorrhage (IPH)	18	8	26
Intraventricular Haemorrhage (IVH)/Post Operative Or Meningitic Hydrocephalus	5	4	9
Depressed Fracture	5	1	6
Intracranial Space Occupying Lesion (ICSOL)	7	4	11
Extradural Haematoma (EDH) + Depressed Fracture	5	1	6
Brain Parenchymal Infarct	1	0	1
Intraparenchymal Haemorrhage (IPH) + Intraventricular Haemorrhage (IVH)	2	0	2
Extradural Haematoma (EDH)+ Subdural Haematoma	1	0	1
Subdural Haematoma (SDH) + Depressed Fracture	1	0	1
Total	80	22	102

Overall, Intraparenchymal haemorrhage is the most frequently found pathology followed by subdural haematoma, extradural haematoma and ICSOL. In males, subdural haemorrhage is more frequently found

and followed by IPH and extradural haematoma. In females, IPH is more commomnly seen, followed by meningitic hydrocephalus and ICSOL.

Table 4:

	Sex		Total
	Male	Female	
Operations/Procedures			
Surgery For Intracranial Space Occupying Lesion	7	4	11
Decompressive Craniectomy	35	7	42
Craniotomy	15	5	20
Burr Hole	12	1	13
Ommaya Insertion	6	3	9
Surgery For Depressed Fracture	5	2	7
Total	80	22	102

Overall, Decomprssive craniectomy is more commomly performed surgery in our hospital, followed by craniotomy and burr hole.

Discussion

We have shown that higher GCS scores on admission are strongly associated with improved mRS after one year in patients with TBI. These observations are in relation with some previous studies (2,3).Corral et al evaluated 214 patients with TBI and reported that prognosis at 6 months and 1year were better in patients with higher GCS score on admission (6-8) than in the group with lower GCS (3-5)[4].

In our study, 47 patients had GCS below 8 and 29 patients out of 47 were died, 12 patients are living with severe disability. We had 19 patients with GCS 13 -15, 17 out of 19 had no symptoms/ mild disability following treatment. We had 36 patients with GCS 9-12, 26 out of 36 had no symptoms/mild disability following, 1 patient out of 36 died and 9 patients living with moderate to severe disability. (Table 2)

Furthermore, GCS scores are generally regarded as the most accurate predictor of outcome in patients with head trauma when combined with pupillary response and when broad outcome categories are used [2]. The motor parameter of the GCS yields similar prediction rates as the summed GCS score, and better prediction occurs with very high or very low GCS scores [2]. One study revealed that after six months, the evaluation of outcome of patients with TBI is inconclusive, so making an assessment of patient's outcome after one year seems more reasonable [4]. In jenetts view, He indicated that using the best state observed during the first 24 hours more reliably predicts outcome[5]. A study shows that the early consciousness can be used to reliably predict the prognosis in patients with an initial GCS higher than 7 or less than 4 [6].Accurate prognosis usg only the GCS can't be made with in few hours after admission for the patients with intial GCS below 7 but by 24 hours, accurate prediction based only on GCS are possible[6].

In a study by sonukumar et al. Out of the 120 patients participating , 47(39%) patients were classified as severe head injury on admission on the basis of GCS score i.e. with GCS 8 and less, out of 47 patients who were classified as severe head injury 44 died and only 3 survived but with severe disability. All patients who had an initial GCS score in the range of 3 to 8 had an unfavourable outcome i.e. they were either severely disabled or died during treatment[7]. Mittal B et al. Observed 47.5% mortality in patients with GCS score of 3-7 and 10.7% deaths in those having GCS score ranging from 8 to 13 while only 7% cases with GCS score of 14-15 died[8]. Mishra HB et al. Found mortality figures of

62% in those having score of 3-7 while 12.8% and 2.2% died who had Glasgow Coma Score of 8-14 and 15 respectively [9].

Conclusion

Initial Glasgow coma scale score is a very efficient predictor of prognosis in post-operative cases of neurosurgical cases and it has a very good corroboration with modified rankin scale. We can say that GCS is inversely propotional to modified rankin scale. But GCS is not the only factor which is directly related to prognosis, there are some other factors like metabolic issue, spo2, pupillary reactivity and comorbidities should be considered too.

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