Original Research Paper

Volume - 14 | Issue - 10 | October - 2024 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Neurosurgery

INTRACRANIAL PRESSURE MONITORING GUIDED MANAGEMENT OF HEMORRHAGIC CONTUSION IN PATIENT WITH SEVERE TRAUMATIC BRAIN INJURY

Dr Deepak Kumar	Senior Resident, Department of Neurosurgery, RIMS, Ranchi.
Dr Anand Prakash*	Additional Professor, Department of Neurosurgery, RIMS, Ranchi. *Corresponding Author
Dr Vikas Kumar	Senior Resident, Department of Neurosurgery, RIMS, Ranchi.
Dr Md Habibullah Ansari	Senior Resident, Department of Neurosurgery, RIMS, Ranchi.
Dr Manjar Ali	Senior Resident, Department of Neurosurgery, RIMS, Ranchi.

ABSTRACT Head injury or traumatic brain injury (TBI) is considered an instant epidemic in the developed world. Head injuries account for one quarter to a third of all trauma-related deaths. According to the Global Status Report on Road Safety 2018, more than 1.35 million people were killed in a single year. Out of these, 90% of the casualties occurred in developing countries, and India contributes about 11% of the total share. Until the last decade, cardiac disease, cancer, and road traffic accidents were considered the leading causes of death in our country. It is predicted that if the incidence of Road Traffic Accidents continues at the present rate, then by the end of 2025, the head injury will become the most common cause of death worldwide. The head injury patients pose a unique challenge to the treating physicians in the early period of hospitalization and the later duration of follow-up. The primary role of intensive care management is preventing and treating intracranial hypertension, which causes derangement in cerebral perfusion pressure (CPP), thereby preventing secondary brain injury. In the present review, we discuss intracranial pressure monitoring guided management of hemorrhagic contusion in patient with severe traumatic brain injury.

KEYWORDS : Brain edema, traumatic Brain Injuries, Road traffic accident.

INTRODUCTION

A major health and socioeconomic problem in the world is accounted for by traumatic brain injury (TBI)[1]. It affects people of all ages and is considered as a silent epidemic, because the effects of TBI is largely unknown to the common population. Hence epidemiological studies are required for targeted prevention and effective treatment of TBI patients. TBI was recently defined as: 'An alteration in brain function, or other evidence of brain pathology, caused by an external force'[2].The Global Burden of Disease Study 2016 showed that there were 27.08 million new cases of traumatic brain injury, and age-standardised incidence rates of 369 per 100,000 population, per year[3]. Tagliaferri et al. conducted a systematic review of epidemiology of TBI in Europe and concluded that mortality rate was 15 per lakh population and case fatality rate was 2.7%[4]. There are various factors that determine the pattern and severity of TBI, such as age, socioeconomic factors, geography, level of awareness among the citizens, the implementation of stricter traffic laws. Some studies have shown that falls are the most common cause for TBI, followed by road traffic accidents[5].

There are various methods of classifying the severity of TBI, to highlight the amount of brain parenchymal disruption. These are the Glasgow Coma Scale (GCS), the Abbreviated Injury Severity Score (AIS), and so on. The aim of categorization is to predict the outcome. TBI may also be divided as mild/moderate/severe TBI or as primary/secondary. Primary brain injury includes cortical disruption, axonal injury, vascular injury, haemorrhage and so and occur at the time of impact. Secondary injury results from various etiologies, such as inflammation, hypoxia, oedema and ischemia. This study was done to assess intracranial pressure monitoring guided management of hemorrhagic contusion in patient with severe traumatic brain injury so that steps for prevention and patient betterment can be taken in the future.

MATERIALS AND METHODS

This study with a Hospital based prospective cohort study design. A sample size of 120 patients with hemorrhagic contusion was taken. Out of 120 patients 60 patients was monitored with ICP monitor (our department has few monitors and the probe used in this is very costly) and 60 was monitored by regular scans. The study setting was Department of Neurosurgery, RIMS, Ranchi. The study period was May-2020 to april-2023. Device used for ICP monitoring was Codman model monitor. Data was entered in Excel sheets and appropriate analysis done using SPSS software. IEC clearance was taken, as also consent from study subjects.

Sampling Method

1. The study subject was selected randomly by using random table number or toss method where odd number was taken as Non ICP monitoring and even was kept on ICP monitoring.
2. Odd patient was taken in Group A and the even patient was taken in Group B
3. Samples were collected till the required sample size is reached in each group.

Inclusion Criteria

1. Age>18 years.
2. Severe TBI (GCS score 3 to 8) at the time of admission patients
3. Patients with hemorrhagic contusion with blood volume 20 to 50ml in initial CT.

Indication Of ICP Monitoring In My Study Was

1. Hemorrhagic Contusion
2. Midline Shift > 5mm
3. Midline Shift < 5mm and volume between 20-50ml

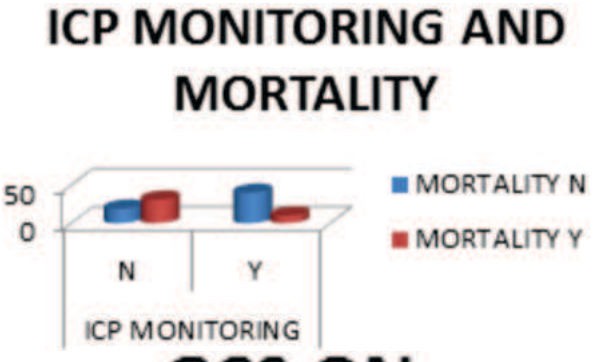
Exclusion Criteria

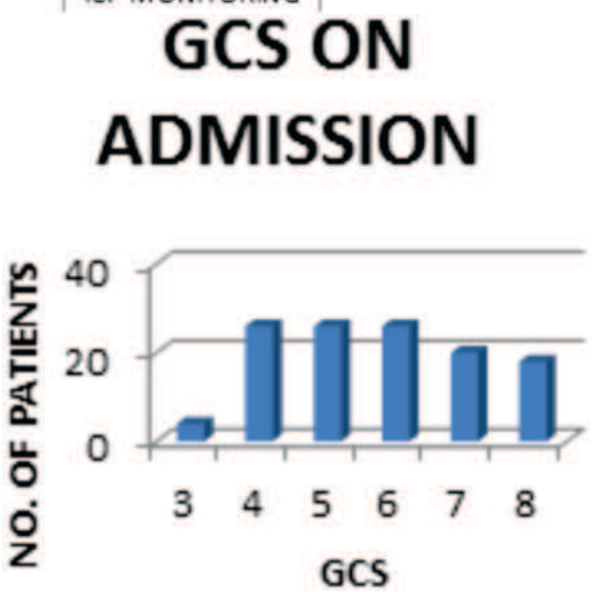
1. Patients who were transferred to another acute care hospital within 24 hours of hospital stay.
2. Patient Left against medical advice
3. Patients initially being treated in other hospital.
4. Patients with penetrating injury or other chest and abdominal blunt injury.
5. All re-admitted patients
6. Coagulopathies
7. Not giving consent for ICP monitoring
8. Patients with any other CT findings like EDH, Depressed fracture and diffuse axonal injury, etc.

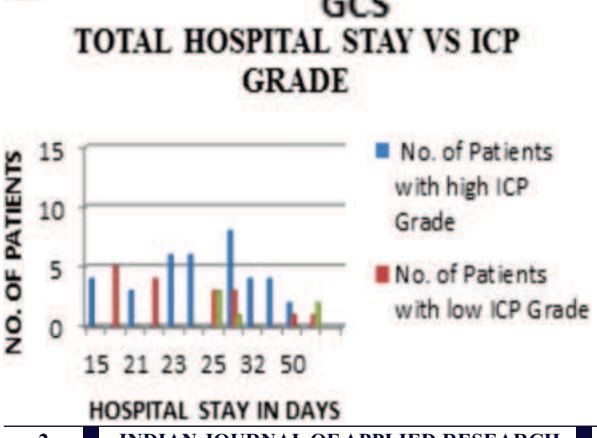
RESULTS:

In this study The mean age was 44.11 years and Male: Female is 3:1. In this study group the mean GCS on Admission was 5.56 with a standard deviation of 1.305. In the study with increase in ICP grade the duration of hospital stay increased. ICP grade was done as Low- 16-20, moderate- 21-30, high- 30-40, Refractory- >20 for a sustained period of 15 minutes. The maximum number of stay was 58 days while maximum patients stayed for 28 days. There was 31 death in patient in whom ICP was not monitored while 10 death in patients in whom ICP was monitored. In Non-ICP monitored patients who were operated out of 11 complications, 72% had CSF leak, 9% had meningitis and 19%

had SSI. In the ICP monitored group Out of 21 patients, 48% had CSF leak, 14% had meningitis and 38% had SSI. Most common complication was CSF leak.







DISCUSSION

Traumatic brain injury has been termed a silent epidemic. With the spread of motorized transport, its prevalence is growing and it has the unfortunate predilection for targeting young adults resulting in devastating health, economic and societal effects. Curbing this epidemic will likely involve public health strategy, but also progress in the management of acutely injured patients. The management of severe TBI requires detailed knowledge of complex intracranial and systemic physiology. Intracranial monitoring offers the possibility for early detection and therefore amelioration of physiological insults.

In this study majority of the TBI patients were in the age group 21-50 years. The male:female ratio was 3:1. 74 patients had GCS in the range 3-6 indicating severe head injury while 26 patients had moderate head injury (GCS- 7-9). The mean GCS was 5.56. The patients in whom ICP was monitored 29 patients had high ICP grade while 16 had low ICP grade.

In this study group 10 patients died in ICP monitored group while 21 patients died in Non-ICP monitored patients indicating that ICP monitoring helps in decreasing the mortality rate and is beneficial to patients. This shows that ICP monitoring helps in proper management and early surgical intervention.The duration of hospital stay or ventilatory support was almost equal in both the groups.

In Non-ICP monitored patients who were operated out of 11 complications, 72% had CSF leak, 9% had meningitis and 19% had SSI. In the ICP monitored group out of 21 patients, 48% had CSF leak, 14% had meningitis and 38% had SSI. This shows that surgical intervention is associated with increased risk of complication.

Study	No. Of Patients	Mean Age In Years	GCS	Mean ICP	Out Come
Thorat et al., 2008	12	38.58 ± 14.95	6	43.89 ± 26	Unfavourable
Ho et al., 2008	16	38 ± 15.7	6 ± 3	25 ± 4	Favourable
Rosenthal et al., 2011	20	36.45 ± 15.22	6 (4-8)	N/A	favorable
Jaeger et al., 2012	80	49.15 ± 11.55	N/A	N/A	N/A
Tang et al., 2015	21	47.7 ± 21.2	11±4	29.32± 8.26	N/A
Present Study	120	44.11±13.959	5.56±1.305	35.33± 2.3	favourable

CONCLUSION

For patients, cerebral contusion volume of more than 20ml, strategy based on ICP monitoring was superior to strategy based on traditional methods. The 6-month favorable outcome rate and good recovery rate in the ICP-monitoring group were both significantly higher than the traditional methods group, accompanying a decrease in hyperosmolar therapy and DC. The prognosis of cerebral contusion patients who underwent non-surgical treatment may be improved by ICP-monitoring.

REFERENCES

1. Cole TB. Global road safety crisis remedy sought: 1.2 million killed, 50 million injured annually. JAMA. 2004;291:2531-2.
2. Menon DK, Schwab K, Wright DW, Maas AI, Demographics and Clinical Assessment Working Group of the International and Interagency Initiative toward Common Data Elements for Research on Traumatic Brain Injury and Psychological Health Position statement: definition of traumatic brain injury. Arch Phys Med Rehabil. 2010;91:1637-40.
3. Global Burden of Disease Study 2016. Traumatic Brain Injury and Spinal Cord Injury Collaborators. Global, regional, and national burden of traumatic brain injury and spinal cord injury, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet Neurol. 2019;18(1):56-87.
4. A systematic review of brain injury epidemiology in Europe. Tagliaferri F, Compagnone C, Korsic M, Servadei F, Kraus J Acta Neurochir (Wien). 2006; 148(3):255-68.
5. Laccarino C, Carretta A, Nicolosi F, Morselli C. Epidemiology of severe traumatic brain injury. Journal of Neurosurgical Science. 2018;62(5):535-41.