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Research Article

SEVERITY OF INJURY AS ASSESSED BY GLASGOW COMA SCORE AND COAGULOPATHY IN PATIENTS WITH ISOLATED HEAD TRAUMA

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ABSTRACT

The outcome of patients with Traumatic brain injury (TBI) is affected by hemostatic derangements which contribute not only to mortality but also morbidity. As coagulation abnormalities are evident soon after trauma, their identification and subsequent treatment will help improve prognosis in these patients. This study aimed to assess the prevalence of coagulopathy in patients with varied severity of TBI. Complete blood count including platelet count, Prothrombin time and Activated partial thromboplasin time were performed on one hundred patients admitted within 12hours of varied severity of head injury. Mild (GCS13-15;n=45), moderate (GCS 9-12;n=28) and severe (GCS 3-8;n=27). Based on the value of PT (11sec) and APTT (28sec) of laboratory controls, coagulopathy was defined as prolonged PT (>14sec) and/or APTT(>34sec). The prevalence of coagulopathy was 39%. In 30(76.9%) patients associated thrombocytopenia was present, while 18 patients had only thrombocytopenia. The prevalence of coagulopathy and thrombocytopenia increased with increasing severity of injury. Both were present in patients with mild injury also. A highly significant ($p<0.001$) association was seen between GCS and coagulopathy and thrombocytopenia. Measurement of hemostatic parameters in patients with head injury at admission irrespective of severity will help identify patients who will benefit with additional therapy.

INTRODUCTION

Traumatic brain injury (TBI) remains a leading cause of post traumatic morbidity and mortality (Dutton, 2003). Considering the high economic burden of TBI, evaluation of factors which can predict prognosis will aid in better management of these patients. Glasgow coma score (GCS) (Jennett, 1977) at admission is one of the variables which predicts prognosis. Coagulopathy has been observed in patients with TBI and it's presence is reported to be an independent predictor of mortality (Saggar, 2009). Patients with coagulopathy have a greater risk of secondary cerebral injury which contributes to morbidity (Pahatouridis, 2010). Coagulation abnormalities are evident soon after trauma and allow identification of patients who will develop secondary complications. This study aimed to assess the prevalence of coagulopathy in patients with isolated head trauma who had varied severity of TBI.

MATERIAL AND METHODS

One hundred patients admitted within 12hours of head injury were enrolled in the study. A written informed consent was obtained from patients /attendants for their inclusion in the study. After a detailed history and clinical examination, GCS (Jennett, 1977) was assessed in each patient. Head injury was classified as mild (GCS13-15), moderate (GCS 9-12) and severe (GCS 3-8). The following investigations were done on each patient: complete blood count including platelet count (Automated analyser LH 500), Prothrombin time (PT Dade Behring Thromborel S), Activated partial thromboplasin time (APTT Dade Behring Actin FS). Based on the value of PT (11sec) and APTT (28sec) of laboratory controls, coagulopathy was defined as prolonged PT (>14sec) and/or APTT (>34sec) [5]. The study received clearance from the Institutional Ethics Committee for human research.

RESULTS

The study included 78(78%) males and 22(22%) females in the age range of 7-82y (Mean ±SD 33.7 ±13.6y).

Table 1 Platelet count, PT, INR and APTT and abnormal results in patients with TBI

Parameter	Range	Mean ±SD	Abnormal result %	
Platelet count ($x10^9$/L)	46-274	152.8± 58.4	<150	48
PT(sec)	10.9-52.6	14.4± 5.5	>14	31
APTT(sec)	28.0-61.0	32.5±5.0	>34	26
INR	1.0-4.8	1.3± 0.5	>1.3	27

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The most frequent mode of head injury was road traffic accident (74%), the others being fall from a height (13%) and physical assault (13%). The results of platelet count, PT, INR and APTT and the abnormal result in each parameter are shown in T able 1.

There was a significant ($p<0.05$) decrease in platelet count and a significant ($p<0.05$) increase in PT and APTT as the severity of injury increased. (Table 2)

Table 2 Platelet count, PT, APTT in varying severity of injury

Parameter	Mild injury	Moderate injury	Severe injury	p (one way Anova)
Platelet count ($x10^9$/L)	182.6±49.1	150.2±54.8	105.7±44.2	0.000
PT(sec)	12.3±1.1	13.6±3.8	18.9±8.3	0.000
APTT(sec)	30.2±2.4	32.8±3.8	36.1±6.8	0.000

The prevalence of coagulopathy in this study was 39%. Thirty of these 39 (76.9%) patients had associated thrombocytopenia while 18 patients had thrombocytopenia without associated coagulopathy.

Table 3 Coagulopathy and thrombocytopenia in varying severity of injury

Severity of injury	Coagulopathy (%)	Thrombocytopenia (%)
Mild	17.9	29.2
Moderate	23.1	20.8
Severe	59.0	50.0

When the presence of coagulopathy was assessed in varying severity of head injury as evaluated by GCS, it was observed that the prevalence increased with increasing severity of head injury. Coagulopathy was seen in 7(17.9%), 9(23.1%) and 23(59.0%) patients with mild, moderate and severe injury respectively. Thrombocytopenia showed a similar trend and was observed in 14(29.2%), 10(20.8%) and 24(50%) patients with mild, moderate and severe injury respectively. A highly significant ($p<0.001$) association was seen between GCS and coagulopathy as also thrombocytopenia.

DISCUSSION

This study observed a significant association between coagulopathy and severity of TBI. Coagulopathy was observed in 39% patients, 30 of whom had associated thrombocytopenia while 18 patients had thrombocytopenia only. The prevalence of coagulopathy increased with increasing severity of injury being present in 7(17.9%), 9(23.1%) and 23(59.0%) patients with mild, moderate and severe injury respectively. Thrombocytopenia was observed in 14(29.2%), 10(20.8%) and 24(50%) patients with mild, moderate and severe injury respectively.

A variable prevalence (10-90%) of coagulopathy has been reported in patients with TBI depending on the criteria used for defining coagulopathy and patients studied besides others. In a study on 100 patients with moderate and severe TBI, coagulopathy was seen in 52.5% and 76.7% patients respectively. The authors concluded that there was a statistically significant association between severity of injury and coagulopathy (Shrestha, 2015). Similar results have been reported by other authors (Carrick, 2005, Affonseca, 2007).

In a study on 42 patients with head injury, a significant ($p=0.04$) association was seen between GCS and coagulopathy (Ghaemi,2011). May et al demonstrated that 81% patients with GCS score < 7 and 100% patients with GCS <5 had coagulopathy at admission (May,1997). Similarly, coagulopathy was observed in 100% patients with GCS score of 3 or 4 (MacLeod,2003). In a study on 52 patients with head injury, a significant negative correlation was seen between PT, APTT, INR and GCS (Salehpour, 2011).

In most studies, the prevalence of coagulopathy has been studied in patients with moderate and severe head injury. Mild TBI constitutes majority of cases of head injury (Shehata, 2011). The prognosis in these patients is good provided treatable complications are not missed (KLauber, 1989). This study observed coagulopathy and thrombocytopenia in 17.9% and 29.2% patients with mild head injury respectively. Therapeutic decisions are often based on the assessment of prognosis. As coagulopathy is known to predict an adverse outcome, it's identification even in patients with mild TBI assumes importance. Hence, tests of coagulation must be done in all patients of TBI at admission irrespective of severity of injury along with other variables for better stratification and planning of management.

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