Editorial

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Current Concepts and Advancements in Management of Traumatic Brain Injury; A Glimpse at the Recently Published Evidence

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The traumatic brain injury (TBI) remains the leading cause of mortality and morbidity in trauma associated injuries worldwide [1]. Although it has been well demonstrated that the epidemiology of the TBI is changing pattern from motor-vehicle accidents to the falls in the developed world [1, 2]; in developing countries, the road traffic accidents (RTAs) remain the main etiology of TBI [3, 4]. Albeit introduction of several surgical and pharmaceutical interventions in management of TBI [5-11], there has been no clear decrease in TBI-related mortality or improvement of overall outcome over the past two decades [12].

Currently, the managment of the patients with severe TBI is based on the Guidelines for the Management of Severe Traumatic Brain Injury published by the brain trauma foundation. The available version which was the 3rd one was published at 2007 and was valid till recently [13]. However, the 4th edition was available at the end of 2016 changing some facts in management of patients with severe TBI [14]. We herein aim to summarize the recent establishments accordingly. The guideline is classified in separate surgical, pharmaceutical and critical care sections.

The new lines of evidence suggest that bifrontal craniectomy in those with severe TBI and refractory intracranial hypertension is not recommended. Decompressive hemicraniectomy of non-dominant side in these patients is recommended. In addition, a large hemicraniectomy measuring at least 12 × 15cm is recommended over a small hemicraniectomy (level II_A) [14]. After publishing of the guideline, the results of the large RESCUEicp was published by Hutchinson and co-workers [15]. The result of their large randomized clinical trial demonstrated that decompressive craniectomy in patients with severe TBI and refractory intracranial hypertension resulted in lower mortality and higher rates of vegetative state, lower severe disability, and upper severe disability than medical care. However the decompressive craniectomy was not associated with improved moderate disability or good recovery in this gourp of patients [15]. The results along with previous lines of evidance, weekens the rle of decompressive craniectomy in managmet of patients with refractory intracranial hypertension afte severe TBI.

The use of prophylactic early (2.5 hours of injury) and short-term (48 hours) hypithremia is not recommended by the new guidline (level II_B). The use

of hyperosmolar therapies such as Mannitol (0.25-1 gr/kg) has been limited to those under intracranial pressure (ICP) monitoring ot those with sign and sympoms if transtentorial heriation (level III). The cerebrospinal fluid (CSF) drainage for ICP control is recommended for those with GCS<6 during the first 12 hours of injury and it has bee indicated that continous CSF drainage is superior to intermitted one (level III). The use of prolonged prophylactic hyperventialtion with PCO_2 of less than 25mmHg is not recommended (level II_B). The propofal has been demonstrated to be associated with decreased values of ICP but no improvement in outcome. The prophylactic use of barbiturate coma has not been remmended and its administartion is limited to those with intracranial hypertension refractory to maximal surgical and medical interventions with hemodynamic stability (level II_B). The only level I recommndation is that the use of high dose methylprednisolone is associated with increased mortality and morbidity in rhose with severe TBI. The start of feeding has bee nrecommnded to be at the 5-7 day after the injury (level II_A). Transgastric jejunal feeding is superior to other routs in terms of decreasing the ventilator associated pneumonia (level II_B). The ealy tracheostomy (<7 days) has been recommnded to decrease the mechanical ventilation days without any effect on mortality and outcome (level II_A). However, recent data suggest that early tracheostomy is associated with improved outcome [16]. In addition, use of antibiotic-coated catheters has been recommended to be associated with decreased infection rate after insertion of an external ventricular drain (level III). The use of phenytoin for early post-tratumaric seizures (<7 days) is recommeded while its use in late seizure is not recommeded (level II_A) [14].

In the new guideline it has been indicated that management of patients with severe TBI using information from ICP monitoring is recommended to reduce in-hospital and 2-week post-injury mortality (level II_B). The ICP values of more than 22 mmHg are considered pathologic and intervention to reduce in value of more than that should be undertaken (level II_B). The recommednations of the previous version is now not supported by the evidance. The use of data from cerebral perfursion pressure (CPP) is also recommended to decrease 2-week mortality (level II_B). The CPP sdould be kept in between 60 to 70 mmHg (level II_B) to achieve the favorable outcome. Use of other monitoring systems such as jugular bulb monitoring of arteriovenous oxygen content difference ($AVDO_2$), has been recommedned to reduce mortality and improve outcomes at 3 and 6 months post-injury (level III). The treshold for $AVDO_2$ has bee recommeded to be 50% to reduce the mortality and improve the outcome (level III). The systolic blood pressure should be maintained ≥100 mm Hg for patients 50 to 69 years old or at ≥110 mm Hg or above for patients 15 to 49 or over 70 years to decrease mortality and improve outcomes (level III) [14].

The current knowledge of the complex nature and pathophysiology of the TBI has resulted in lack of appropriate evidence for management of these patients. Currently, no treatment or management approach exists independent of other treatments and approaches, or independent of the ecology. Future research should focus on the clinical-based approaches and interventions for treatment and management of TBI. For this purpose, the uniform research goals should be developed in order to coordinate the outcomes and results.

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