Editorial

Severe hepatic encephalopathy: an osmotic shift in management

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Provenance: This is an invited Editorial commissioned by the Executive Editor Dr. Zhongheng Zhang (Department of Emergency Medicine, Sir Run-Run Shaw Hospital, Zhejiang University School of Medicine, Hangzhou, China).

Comment on: Liotta EM, Romanova AL, Lizza BD, *et al.* Osmotic Shifts, Cerebral Edema, and Neurologic Deterioration in Severe Hepatic Encephalopathy. Crit Care Med 2018;46:280-9.

Received: 09 October 2018; Accepted: 10 October 2018; Published: 02 November 2018.

doi: 10.21037/jeccm.2018.10.02

View this article at: http://dx.doi.org/10.21037/jeccm.2018.10.02

Acute or acute-on-chronic, severe hepatic failure is associated with high mortality that increases with severity of encephalopathy (1). Death and morbidity from neurological causes is usually due to severe cerebral edema, which can progress to herniation, a late complication (2).

An increase in serum ammonia is central to our understanding of acute hepatic encephalopathy. The brain lacks a urea cycle for detoxication of ammonia (3,4). The conversion of urea into glutamine is a glial function, but the glial internalization of urea, glutamine and other compounds, some toxic, is thought to cause glial swelling and cerebral edema. Cerebral edema is likely to occur with serum ammonia concentrations above 200 mols/L (5). Careful clinical monitoring for behavioural and cognitive changes is important to prompt intervention to prevent progression to brain swelling. Methods to reduce ammonia toxicity include: use of enteral lactulose and intravenous L-ornithine-L-aspartate (6); enteral rifampin and probiotics are useful in patients with cirrhosis (7,8).

The mechanism for cerebral edema is likely multifactorial. The edema is both cytotoxic (mentioned above) and vasogenic (due to alterations in the blood-brain barrier), but the cytotoxic mechanism, related to astrocytic swelling predominates (9).

Once cerebral edema occurs, measures are needed to monitor and reduce brain swelling. Intracranial pressure monitoring is recommended, but, because of the frequent association of coagulopathy in these patients, is seldom done. Serial CT head scans is one method of monitoring such patients. Liotta *et al.* (10) in this issue followed the changes intracranial CSF volume as a method of detecting and following cerebral edema in patients with severe hepatic encephalopathy. Furthermore, they showed a correlation of decline in serum osmolality with worsening cerebral edema. Changes in serum sodium concentration did not correlate as well, constituting an osmolar gap. This is an important and overlooked finding and represents an important means of following and preventing worsening of cerebral edema by preventing osmotic shifts. Thus, treating plasma osmolarity is key. This is usually done, in extreme cases treated in ICUs, by using mannitol or hypertonic saline. Measures to reduce serum ammonia are still worth attempting. The combination of such strategies can buy time to allow hepatic function to recover or for liver transplantation.

Acknowledgements

None.

Footnote

Conflicts of Interest: The author has no conflicts of interest to declare.

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doi: 10.21037/jeccm.2018.10.02
Cite this article as: Young GB. Severe hepatic encephalopathy: an osmotic shift in management. J Emerg Crit Care Med 2018;2:87.

