Enteral nutrition in Traumatic Brain Injury

Isotonic solutions (such as Isocal® or Osmolyte®) should be used at full strength starting at 30 ml/ hr. Check gastric residuals q 4 hrs and hold feedings if residuals exceed ≈ 125 ml in an adult. Increase the rate by ≈ 15–25 ml/hr every 12–24 hrs as tolerated until the desired rate is achieved [1].

Dilution is not recommended (may slow gastric emptying), but if it is desired, dilute with normal saline to reduce free water intake.

Cautions:

● Nasogastric tube feeding may interfere with absorption of phenytoin;

● reduced gastric emptying may be seen following head-injury [2] (NB: some may have temporarily elevated emptying) as well as in pentobarbital coma; patients may need IV hyperalimentation until the enteric route is usable.

The technique of hypocaloric feeding [3] (AKA “trophic feed,” “trickle feed,” among others) through an enteral feeding tube (e.g. Dobhoff tube) at a rate variously defined as at 10–20 ml/hr may be tolerated and may reduce mucosal atrophy while providing a portion of nutritional requirements. Others have described better tolerance of enteral feedings using jejunal administration [4]

In a review of the nutritional guidelines for the Management of Severe Traumatic Brain Injury, Fourth Edition, the articles cited demonstrate early transpyloric enteral feeds within 24 to 48 h significantly decrease morbidity and mortality [5] [6] [7] [8] [9] [10].

While these articles provide clear evidence that early nutrition is critical to survival, the most recent cited reference is 2012 and the articles lack the detail of which specific macro/micronutrients may benefit the traumatized brain. This is not a critique of the authors creating the guidelines but rather an observation of the need for serious large multi-institutional nutritional studies on TBI. Recently, there have been several studies demonstrating the highly beneficial effects of branched chain aminoacids (BCAAs) in the patient suffering mild to severe brain injury [11] [12] [13].

1)
Clifton GL, Robertson CS, Contant CF, et al. Enteral Hyperalimentation in Head Injury. J Neurosurg. 1985; 62:186–193
2)
Ott L, Young B, Phillips R, et al. Altered Gastric Emptying in the Head-Injured Patient: Relationship to Feeding Intolerance. J Neurosurg. 1991; 74: 738–742
3)
Preiser JC, van Zanten AR, Berger MM, et al. Metabolic and nutritional support of critically ill patients: consensus and controversies. Crit Care. 2015; 19. DOI: 10.1186/s13054-015-0737-8
4)
Grahm TW, Zadrozny DB, Harrington T. Benefits of Early Jejunal Hyperalimentation in the Head-Injured Patient. Neurosurgery. 1989; 25:729–735
5)
Carney N, Totten AM, O’Reilly C, et al. Guidelines for the management of severe traumatic brain injury, 4th Ed. Neurosurgery. 2017;80(1):6-15.
6)
Chourdakis M, Kraus MM, Tzellos T, et al. Effect of early compared with delayed enteral nutrition on

endocrine function in patients with traumatic brain injury:an open- labeled randomized trial. J Parenter Enteral Nutr. 2012;36(1):108-116.
7)

Dhandapani S, Dhandapani M, Agarawal M, et al. The prognositc significance of the timing of total enteral feeding in traumatic brain injury. Surg Neurol Int. 2012;3:31-36.
8)

Acosta-Escribano J, Fernandez-Vivas M, Grau CT, et al. Gastric versus transpyloric feeding in severe traumatic brain injury: a prospective, randomized trial. Intensive Care Med. 2010;36(9):1532-1539.
9)

Lepelletier D, Roquilly A, Demeure DL, et al. Retrospective analysis of the risk factors and pathogens associated with early-onset ventilator-associated pneumonia in surgical- ICU head-trauma patients. J Neurosurg Anesthesiol. 2010;22(1):32-37.
10)

Hartl R, Gerber LM, Ni Q, Ghajar J. Effect of early nutrition on deaths due to severe traumatic brain injury. J Neurosurg. 2008;109(1):50-56
11)

Jeter CB, Hergenroeder GW, Ward NH, et al. Human mild traumatic brain injury decreases circulating branched-chain amino acids and their metabolite levels. J Neurotrauma. 2013;15(8):671-679.
12)

Elkind JA, Lim MM, Johnson BN, et al. Efficacy, dosage, and duration of action of branched chain amino acid therapy for traumatic brain injury. Front Neurol. 2015;30:66-73.
13)

Sharma B, Lawrence DW, Hutchison MG. Branched chain amino acids (BCAAs) and traumatic brain injury: a systematic review. J Head Trauma Rehabil. 2017. doi: 10.1097/HTR.0000000000000280.