

## Managing feeding intolerance in a patient with Traumatic Brain Injury



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### *Synopsis*

This case study discusses the nutritional management of a critically ill patient with a traumatic brain injury (TBI). Due to poor tolerance of gastric feeding, his nutritional requirements could not be met using a polymeric formula. His feed was changed to Peptamen® HN (a 100% whey peptide feed) and enteral absorption improved, allowing his full nutritional requirements to be met without the need for post-pyloric feeding. When an attempt was made to return to a polymeric feed, enteral feed tolerance declined necessitating a return to a whey based peptide feed.

### *Nutrition Support in Traumatic Brain Injury*

Provision of nutrition support is a key component in the management of patients with traumatic brain injuries (TBI). Research has shown that nutrition support should be started early (within 24-48 hours of admission) and if possible should be provided via the enteral route.<sup>1,2</sup> Adequate early nutrition support has been shown to reduce morbidity and mortality in the TBI patient, as well as minimising the loss of lean muscle mass associated with the catabolic process.<sup>3,4</sup>

## Nutrition Support in Traumatic Brain Injury, cont.

Malnutrition may increase the risk of developing infections, increases number of ventilator days and length of ICU admission, and extends length of hospital stay.<sup>5</sup> Mortality rates have been shown to significantly improve with each 10 kcal/kg increase in intake, up to approximately 25 kcal/kg. The likelihood of death for TBI patients who were not fed within five days of injury was double that of patients who were fed. For those patients not fed within seven days, the likelihood of death increased by four times.<sup>6</sup>

There are however many challenges to feeding the TBI patient; enteral tolerance is often sub-optimal due to the effects of sedation, paralysis and raised intracranial pressure.<sup>7</sup> Patients are hyper-metabolic with studies showing a 40% increase of basal energy expenditure post TBI.<sup>2</sup> Protein requirements are also raised, and patients should be fed at least 1.25g/kg body weight/day.<sup>2</sup>

At University Hospital Southampton NHS Trust, enteral nutrition is started on the intensive care unit (ICU) using a feeding protocol to ensure early and safe initiation of enteral feeds. The neurosciences ICU standard feed protocol uses a polymeric 1.5 kcal/ml feed, beginning at 50ml/hr and increasing to target rate on day 2 of feeding.

## Patient History

The 72 year old male patient was admitted following a fall of 2-3 metres onto his head onto a concrete surface, resulting in a severe TBI. He had no significant past medical history and was fit and well prior to admission. A CT scan of the head showed:

- A right acute subdural haemorrhage
- Subarachnoid haemorrhage
- Left frontal and right parietal contusions
- A base of skull fracture

An extraventricular drain was inserted in theatre for management of raised intracranial pressure. The patient was intubated, ventilated, sedated and paralysed on admission to the ICU.

Prior to admission the patient was well nourished with a normal dietary intake. Weight was 76kg, height 1.78m, giving a BMI of 24.8kg/m<sup>2</sup>. Nutritional requirements were calculated by predictive equations<sup>8,9</sup> and estimated to be approximately 2,000 kcal, 95g protein per day.

## Nutritional Assessments

Day  
1



Feeding was started via an oro-gastric feeding tube using the standard ICU feeding protocol, with a polymeric 1.5 kcal/ml feed at 50ml/hr. Gastric residual volumes increased throughout the day up to 450ml, 4 hourly. The unit feeding protocol stated that gastric aspirates should be replaced up to 250ml, and the remainder discarded. Due to discarding of gastric aspirates and the inability to increase feed rate because of poor enteral tolerance, the patient was unable to meet target nutritional requirements. The patient was commenced on regular metoclopramide and erythromycin as prokinetics.

Day  
2

(Initial dietetic review). Due to ongoing high gastric residual volumes and failure to meet target enteral feed volumes, the dietitian recommended changing the patient to a whey based peptide feed (Peptamen® HN 1,500ml/day to provide 1,995 kcal, 99g protein).

**The unit neuro ICU guidelines state peptide based feeds should be used as a first line dietetic recommendation for all TBI patients not tolerating polymeric gastric feeding.**

Day  
4

The patient remained sedated and paralysed. His gastric residual volumes were reduced to minimal amounts and his bowels were opening with laxatives and suppositories (as per the unit bowel protocol). As his target feed volume was being achieved, the dietetic plan was to continue with the current feeding regimen. The patient remained on regular prokinetics.

Day  
7

Paralytic medication had been stopped, gastric residual volumes remained minimal, and the patient's bowels were opening regularly. Therefore, the feed was changed back to a 1.5 kcal/ml polymeric feed at 1,300ml/day.

Day  
8

Dietetic review was requested as gastric residual volumes had increased to approximately 250ml 4-hourly, despite continuing to receive regular metoclopramide and erythromycin. The patient was vomiting and his bowels had not opened for the last 24 hours. The feed rate was reduced by the nursing staff to 30ml/hr. The feed was therefore changed back to Peptamen® HN, at 1500ml/day.

Day  
11

Gastric residual volumes had reduced to between 0-160ml 4-hourly. Sedation and ventilation were being weaned and the patient was beginning to wake. Feeding was continued with Peptamen® HN but increased to 1,750ml/day due to reassessment of nutritional requirements. The new feed regimen provided 2,188 kcals and 110 g protein per day.

The patient was successfully extubated on day 15 and all sedation was stopped. His weight at this point remained stable at 76kg. Due to slow neurological recovery, enteral feeding was continued until day 18 when the patient was able to start an oral diet.

## Discussion

The use of a 100% whey peptide feed in this patient enabled nutritional requirements to be met via the gastric route without the need for post-pyloric feeding, as is often required in this patient group.<sup>2</sup> Patients with severe TBI often have gastric feeding intolerance due to abnormal gastric emptying and altered gastric function, secondary to increased intracranial pressure and use of opiate based sedation.<sup>7</sup> Gastric tolerance improved following initiation of the whey based peptide feed, ensuring nutritional goals were met. Upon trialling a polymeric feed, enteral tolerance appeared to worsen again, necessitating a return to the whey based peptide feed.

The comparatively higher quantity of nitrogen to calories in the feed allowed the high protein requirements of TBI to be met, without exceeding calorie requirements and without the need for additional modular protein supplements. Provision of adequate nutrition support post TBI is associated with improved mortality and improved clinical outcome post injury.<sup>4</sup>

## Conclusion

Providing sufficient enteral nutrition to meet nutritional requirements can be challenging in patients with TBI. The inability to meet nutritional goals has been shown to lead to large nutritional deficits accumulating, and worsening patient outcomes. Introduction of a high protein 100% whey peptide feed ensured calorie and protein requirements were met in this patient.

## References

1. Perel P, Yanagawa T, Bunn F, Roberts IG, Wentz R. Nutritional support for head-injured patients. Cochrane Database of Systematic Reviews. Issue 4. Art. No.: CD001530 (2006).
2. Jacobs DG, Jacobs DO, Kudsk KA, Moore FA, Oswanski MF, Poole GV, Sacks GS, Sinclair KE. Practice management guidelines for nutritional support of the trauma patient. Journal of Trauma, Injury, Infection and Critical Care 57(3): 660-679 (2004).
3. Doig GS, Heighes PT, Simpson F, Sweetman EA. Early enteral nutrition reduces mortality in trauma patients requiring intensive care: a meta analysis of randomised controlled trials. Injury 42: 50-56 (2011).
4. Chiang et al. Early Enteral Nutrition and Clinical Outcomes of Severe Traumatic Brain Injury Patients in Acute Stage: A Multi-Center Cohort Study. J Neurotrauma. 29:75-80 (2012).
5. Foley N, Marshall S, Pikul J, Salter K, Teasell R. Hypermetabolism following moderate to severe traumatic acute brain injury: a systematic review. J. Neurotrauma 25: 1415-1431 (2008).
6. Hartl R, Gerber LM, Ni Q, Ghajar J. Effect of early nutrition on deaths due to severe traumatic brain injury. J. Neurosurg. 109: 50-56 (2008).
7. Haddad SH, Arabi YM. Critical care management of severe traumatic brain injury in adults. Scand J Trauma Resusc Emerg Med. 20:12 (2012).
8. Henry CJK. Basal metabolic rate studies in humans: measurement and development of new equations. Public Health Nutrition. 2005; 8:1133-1152.
9. Frankenfield DC, Coleman A, Alam S, Cooney RM. Analysis of Estimation Methods for Resting Metabolic Rate in Critically Ill Adults. JPEN J Parenter Enteral Nutr. 2009 January; 33:27-36.