

Is there any place for combined enteral/parenteral?

Volume 7 Issue 5 - 2017

Wael Gomaa, Khaled Sewify

Senior Consultant Intensivist, Saudi Arabia

Correspondence: Khaled Sewify, Senior Consultant Intensivist, King Fahd Military Medical Complex, Dhahran- 31932, P.O. Box 946, Saudi Arabia, Tel 966-54480229, Email drsewafie@hotmail.com

Received: March 08, 2017 | **Published:** March 24, 2017

Introduction

Nutritional support in the intensive care unit (ICU) is highly debated as critically ill patients are frequently hypermetabolic, catabolic and at risk of both underfeeding and overfeeding.

Enteral nutrition (EN) is frequently recommended over parenteral nutrition (PN) as it may preserve gut mucosal barrier function^{1,2} and has been shown to demonstrate beneficial effects on (gut) immunity

The current literature shows evidence in favour of early enteral nutrition (EEN) commenced within 24 to 48h after ICU admission.³ EEN is associated with decreased morbidity, healing, decreased mechanical ventilation duration, ICU and hospital length of stay and duration of recovery⁴ and even reduced mortality.⁵

Therefore, EN is the preferred route over parenteral nutrition whenever EN is possible. Achieving caloric targets with EN may be challenging in the critically ill, a caloric deficit frequently occurs due to slow intake progression, unnecessary stoppages, Delayed gastric emptying, enteral feed intolerance and delays in post-pyloric feeding tube placement.⁶

The cumulative deficit or caloric debt has been reported to be associated with adverse clinical outcomes.

Villet and co-workers showed that delayed initiation of feeding resulted in a marked cumulative energy debt during the first week after ICU admission associated with an increase in infectious complications, days of mechanical ventilation and length of ICU stay. However, possibly not only energy deficit but also deficient protein intake may be relevant and is suggested to play a role in outcome.^{7,8}

Does optimised nutrition support and monitoring in the intensive care unit improve clinical outcome?

Enteral nutrition (EN) alone is often associated with an insufficient energy provision, leading to energy deficit; the latter is associated with fat-free mass loss, increased risk of infections and complications, and increased mortality. Systematic parenteral nutrition (PN) without appropriate indication is associated with increased risks of overfeeding, hyperglycaemia, and promotes infections, hepatic steatosis, liver disease, hypoglycaemia (as a result of high insulin doses), and mortality.

Optimal nutrition support improves the clinical outcome. It includes the adequate choice of nutritional support:

- I. EN in first line, then together with supplemental parenteral nutrition in case of failure or contraindication to optimised EN;
- II. Parenteral nutrition alone when appropriate with respect to the indications, the preferred use of 'all-in-one' solutions, and the glycaemic control;
- III. The nutritional and metabolic monitoring: adequation of protein/energy provision towards target, blood glucose and insulin doses According to on-going protocols. The assessment of fat-free mass may become the key part of the nutritional management of ICU patients, but validation studies are needed. The following Figure 1 show us how to optimize nutritional support;

Does Supplemental parenteral nutrition improve energy provision and nutritional status?

The combination of parenteral nutrition with enteral nutrition increases calorie delivery in comparison with enteral nutrition alone (28 ± 5 vs 20 ±

5kcal/kg/day, $p < 0.0001$).¹⁰ Suggesting that the combination of enteral nutrition and parenteral nutrition allows the achievement of the energy target sooner during critical illness.



Thibault et al. Figure 1

Figure 1

A randomized controlled trial (Heidegger, Lancet 2012) was undertaken in two centers in Switzerland concluded that Individually optimized energy supplementation with SPN starting 4days after ICU admission should be considered as a strategy to improve clinical outcome in patients in the ICU for whom EN is insufficient.¹¹

Does supplemental parenteral nutrition reduced nosocomial Infections?

Heidegger and colleagues found that short-term (ICU days 4 to 8) Supplementation of EN with PN reduced nosocomial infection, the primary endpoint, but did not affect several secondary endpoints, Including mortality, duration of mechanical ventilation, and ICU length of stay.¹² These findings suggest that the treatment may be of benefit in a select group of patients.

When should you start enteral and parenteral nutrition? Early versus late;

Initially according to EPaNIC (Casaer, NEJM 2011) Trial,¹² they found that early initiation of TPN increased ICU and hospital stay, the incidence of infection, and total healthcare costs. Delaying parenteral nutrition up- to 7days had no effect on mortality.

This study has certain limitations:

- A. First, the parenteral nutrition that used contained neither glutamine nor specific immune-modulating compounds, but rather reflected the

parenteral nutrition given in common daily practice. The data favouring the administration of glutamine remain controversial.

- B. Second, the use of standardized, premixed parenteral-nutrition products resulted in a relatively low protein-to-energy ratio. However, high-level evidence of an improved outcome with increased protein doses is currently lacking.
- C. Third, the amount of nutrition was calculated without measurement of energy expenditure with the use of indirect calorimetry, a technique that is not recommended by evidence-based guidelines.
- D. Finally, because of the nature of the study, patients or their designated representatives and their ICU providers were aware of study-group assignments.

In contrast to the EPaNIC study, (Doig, ANZICS, JAMA, May 2013) a Multicentre, randomized, single-blind clinical trial,¹⁴ conclude that The provision of early PN to critically ill adults with relative contraindications to early EN, compared with standard care, did not result in a difference in day-60 mortality. The early PN strategy resulted in significantly fewer days of invasive ventilation but not significantly shorter ICU or hospital stays.

In recent guidelines, controversy regarding the timing of supplemental PN (SPN) in ICU patients was found.⁷⁻⁹ The European Society for Clinical Nutrition and Metabolism (ESPEN) guidelines recommend the addition of SPN within 24 to 48h in patients who are expected to be intolerant to EN within 72h of admission.⁷ The American Society for Parenteral and Enteral Nutrition (ASPEN, 2016) recommends postponing the initiation of PN until day 7-10 after ICU admission.⁹

Whereas Canadian Clinical Practice Guidelines 2015, Recommend that parenteral nutrition not be used routinely, but early PN should be considered in nutritionally high-risk patients with a relative contraindication to early EN.¹²

Conclusion

What if you can't provide adequate nutrition enterally? ...

To TPN or not to TPN...

- a. Case by case decision
- b. Maximize EN delivery prior to initiating PN
- c. Use early in high risk cases

The following diagram may simplify the answer of that question (Figure 2).

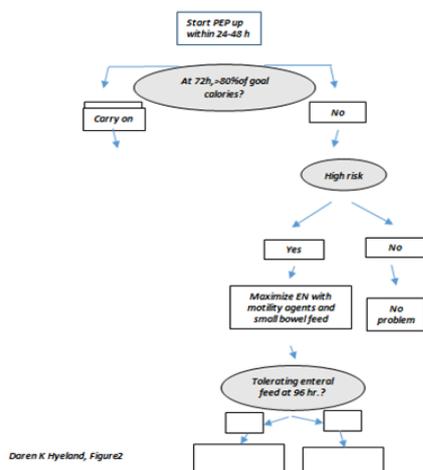


Figure 2

SPN is used in a step-up approach when full enteral support is not possible or fails to reach caloric targets. This review based on a systematic literature review summarizes results of trials reported in ICU patients. Addressing the optimal timing of (S) PN.

Acknowledgments

None.

Conflicts of interest

Author declares there are no conflicts of interest.

Funding

None.

References

- Alverdy J. The effect of nutrition on gastrointestinal barrier function. *Semin Respir Infect.* 1994;9(8):248–255.
- Jiang XH, Li N, Li JS. Intestinal permeability in patients after surgical trauma and effect of enteral nutrition versus parenteral nutrition. *World J Gastroenterol.* 2003;9(8):1878–1880.
- McClave SA, Heyland DK. The physiologic response and associated clinical benefits from provision of early enteral nutrition. *Nutr Clin Pract.* 2009;24(3):305–315.
- Heidegger CP, Darmon P, Pichard C. Enteral vs. parenteral nutrition for the critically ill patient: a combined support should be preferred. *Curr Opin Crit Care.* 2008;14(4):408–414.
- Gerlach AT, Murphy C. An update on nutrition support in the critically ill. *J Pharm Pract.* 2011;24(1):70–77.
- Cove ME, Pinsky MR. Early or late parenteral nutrition: ASPEN vs ESPEN. *Crit Care.* 2011;15(6):317.
- Singer P, Berger MM, den BG V, et al. ESPEN: ESPEN guidelines on parenteral nutrition: intensive care. *Clin Nutr.* 2009;28:387–400.
- Heyland DK, Dhaliwal R, Drover JW, et al. Canadian clinical practice guidelines for nutrition support in mechanically ventilated, critically ill adult patients. *JPEN J Parenter Enteral Nutr.* 2003;27(5):355–373.
- McClave SA, Martindale RG, Vanek VW, et al. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). *JPEN J Parenter Enteral Nutr.* 2009;33(3):277–316.
- Heidegger CP, Berger MM, Graf S, et al. Optimisation of energy provision with supplemental parenteral nutrition in critically ill patients: a randomised controlled clinical trial. *Lancet.* 2013;381(9864):385–393.
- The New England Journal of Medicine Downloaded from nejm.org.
- Doig GS, Simpson F, Sweetman EA, et al. Early PN Investigators of the ANZICS Clinical Trials Group. Early Parenteral Nutrition in Critically Ill Patients With Short-term Relative Contraindications to Early Enteral Nutrition A Randomized Controlled Trial. *JAMA.* 2013;309(20):2130–2138.