Antioxidative Amino Acids in Early Enteral Versus Parenteral Nutrition Following Major Rectal Surgery

Citation for published version (APA):

Smeets, B. J., Heesakkers, F. F., Huijbregts, C. P., Luyer, M. D., Bakker, J. A., Roos, A. N., Rutten, H. J., Bouvy, N. D., & Boelens, P. G. (2020). Antioxidative Amino Acids in Early Enteral Versus Parenteral Nutrition Following Major Rectal Surgery. *Critical Care Medicine*, 48(10), E990-E991. <https://doi.org/10.1097/CCM.0000000000004516>

Document status and date:

Published: 01/10/2020

DOI:

[10.1097/CCM.0000000000004516](https://doi.org/10.1097/CCM.0000000000004516)

Document Version:

Publisher's PDF, also known as Version of record

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Dr. Connors' institution received funding from CSL Behring, and she received funding from Abbott, Portola, Takeda, and Bristol-Myers Squibb. The remaining authors have disclosed that they do not have any potential conflicts of interest.

REFERENCES

- # Antioxidative Amino Acids in Early Enteral Versus Parenteral Nutrition Following Major Rectal Surgery

Following major rectal surgery, postoperative ileus is common and few patients reach nutritional goals in the first days after surgery. A previous trial randomized patients to receive supplementary early enteral versus parenteral nutrition after major rectal surgery. Enteral nutrition was superior, as patients experienced less postoperative ileus and anastomotic leakage when compared with patients receiving parenteral nutrition (1).

This was a substudy of a prospective, single-center, randomized controlled trial including 123 patients undergoing surgical resection of primary locally advanced or recurrent rectal carcinoma. The aim was to investigate whether the route of supplementary nutrition early after major rectal surgery affected postoperative plasma concentrations of antioxidative amino acids (taurine, hydroxyproline, glutamic acid, glycine, and N-acetylcysteine). Furthermore, amino acid concentrations were studied in relation to clinical outcomes. For additional information on methodology, see the Methods section in our previous publication (2).

Baseline characteristics were similar between groups (2). No differences were seen between groups in rate of advancement in oral diet. Since exact nutritional value of oral intake could not be registered, cumulative intake of amino acids via artificial route was calculated over the first 5 postoperative days (PODs).

Cumulative intake of total amino acids ($p = 0.037$), glycine ($p < 0.001$), and glutamine ($p < 0.001$) was higher in the parenteral group, while cumulative intake of cysteine was higher in the enteral group ($p < 0.001$). Cumulative intake of proline was similar between groups ($p = 0.278$).

N-acetylcysteine was not detectable in any blood sample. At baseline, plasma concentrations of all amino acids were comparable between groups (**Table 1**). Glycine concentrations were lower in the enteral group on POD 1 ($p = 0.003$) and POD 5 ($p = 0.005$) when compared with the parenteral group. No other differences between groups were observed. Taurine concentrations on POD 1 correlated with occurrence of anastomotic leakage ($r = 0.211$; $p = 0.024$). Proline concentrations on POD 1

TABLE 1. Plasma Amino Acid Concentrations ($\mu\text{mol/L}$) After Major Rectal Surgery

Amino Acid	Day	Early Enteral Nutrition (n = 56)	Early Parenteral Nutrition (n = 61)	p	Effect Size (95% CI)
Taurine	0	44.50 (33.00–56.00)	48.00 (35.00–60.50)	0.555	–0.09 (–0.46 to 0.27)
	1	33.00 (21.50–40.75)	35.00 (28.50–44.00)	0.138	–0.34 (–0.70 to 0.03)
	5	29.00 (19.75–38.00)	32.50 (23.00–45.75)	0.108	–0.35 (–0.72 to 0.02)
Glutamic acid	0	35.50 (27.25–42.75)	33.00 (26.00–45.00)	0.950	–0.08 (–0.45 to 0.28)
	1	30.50 (21.75–35.00)	30.00 (22.00–39.00)	0.913	0.05 (–0.32 to 0.42)
	5	32.50 (25.00–43.25)	37.50 (28.50–51.75)	0.062	–0.34 (–0.70 to 0.04)
Glycine	0	172.00 (143.50–221.25)	172.00 (144.00–202.00)	0.787	–0.10 (–0.46 to 0.26)
	1	142.50 (117.00–176.25)	170.00 (140.50–197.50)	0.003	–0.55 (–0.91 to –0.17)
	5	133.50 (113.25–182.50)	170.00 (142.00–209.75)	0.005	–0.58 (–0.95 to –0.20)
Hydroxyproline	0	5.00 (4.00–8.00)	5.00 (3.00–7.00)	0.115	0.37 (0.00–0.73)
	1	2.00 (1.00–3.25)	2.00 (0.00–3.00)	0.268	0.20 (–0.17 to 0.57)
	5	2.00 (1.00–4.00)	2.50 (1.00–4.00)	0.860	0.08 (–0.28 to 0.45)

Values are presented as median (interquartile range). Boldface entries are statistically significant values.

($r = -0.246$; $p = 0.008$) correlated with occurrence of early ileus. No other significant correlations were found. Multivariable regression analysis revealed no significant correlations between any plasma amino acid concentration and clinical outcomes.

In conclusion, postoperative amino acid plasma concentrations were lower or similar in the enteral group, while a better clinical outcome was observed when compared with the parenteral group. However, plasma concentrations were not directly associated with clinical outcomes. As such, we postulate that changes in amino acid concentrations may be considered as an epiphenomenon to a diseased state, rather than a valid contributor to impaired surgical convalescence (3). Other studies are needed to explain the beneficial effect of enteral nutrition following major rectal surgery.

This preplanned substudy was funded by Maastricht University Medical Center, Department of General Surgery. The original study was supported by an unconditional, nonrestrictive research grant by Nutricia Netherlands BV, Zoetermeer, The Netherlands.

Dr. Smeets's institution received funding from Maastricht University Medical Center, Department of General Surgery, and from Nutricia Netherlands BV, Zoetermeer, The Netherlands. Dr. Luyer's institution received funding from Nutricia, ZonMw, Fondsnotsohra, Medtronic, Dutch Cancer Foundation, and Galvani. The remaining authors have disclosed that they do not have any potential conflicts of interest.

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REFERENCES

- Boelens PG, Heesakkers FF, Luyer MD, et al: Reduction of postoperative ileus by early enteral nutrition in patients undergoing major rectal surgery: Prospective, randomized, controlled trial. *Ann Surg* 2014; 259:649–655
- van Barneveld KWW, Smeets BJJ, Heesakkers FFBM, et al: Beneficial Effects of Early Enteral Nutrition After Major Rectal Surgery: A Possible Role for Conditionally Essential Amino Acids? Results of a Randomized Clinical Trial. *Crit Care Med* 2016; 44:e353–e361
- Gunst J, Vanhorebeek I, Thiessen SE, et al: Amino acid supplements in critically ill patients. *Pharmacol Res* 2018; 130:127–131

DOI: 10.1097/CCM.0000000000004516

A Centrally Acting Antihypertensive, Clonidine, Sedates Patients Presenting With Acute Respiratory Distress Syndrome Evoked by Severe Acute Respiratory Syndrome-Coronavirus 2

To the Editor:

The severe acute respiratory syndrome-coronavirus 2 pandemics overwhelmed the critical care units (CCUs) in Alsace, France. The disease evokes acute respiratory