



Contents lists available at ScienceDirect

Clinical Nutrition Experimental

journal homepage: <http://www.clinicalnutritionexperimental.com>



Enteral versus parenteral nutrition in patients undergoing pancreaticoduodenectomy: A meta-analysis of randomized controlled trial

Dear Editor,

Nutrition support have undergone total parenteral nutrition (TPN) in postoperative patients in decades, Recent studies have elaborated that the advantages of early enteral nutrition (EEN) in reducing complications incidence [1,2], however, some studies have claimed that EEN was insignificant in decreasing complication after abdominal surgery [3,4]; thus, the role of EN remains debatable. Current evidence was limited and inconclusive. To determine the safety and effectiveness of EN for patients after pancreaticoduodenectomy (PD), we performed an up-to-date meta-analysis to EN versus PN route after pancreaticoduodenectomy including all randomized clinical trials on the impact on nutritional status and postoperative complications of the patients.

Eligible studies in the PUBMED, the Cochrane Library and Embase were retrieved. Fixed-effect model or random-effects model was used via State 12.0 software, and $P < 0.05$ indicated statistical significance. Calculation for dichotomous variables was carried out using the risk ratio (RR) and their 95% confidence interval (CI) as the summary statistic. Six randomized controlled trial with 866 patients were included, in which 435 patients underwent early EN and 431 patients underwent parenteral nutrition routes following PD. The main characteristics were shown in Table 1. The postoperative Nutritional Index the level of serum albumin increased in the late postoperative days, and there was significant difference between two groups (mean difference, -0.29 ; 95% CI, -0.47 to -0.11 ; $P = 0.002$), and there is significant difference in hospital stay (mean difference, -0.29 ; 95% CI, -0.56 to -0.02 ; $P = 0.038$), but no significant difference could be found in delayed gastric emptying (relative risk (RR) 0.94; 95% CI, 0.71–1.24; $P = 0.66$), postoperative infection (relative risk (RR) 0.88; 95% CI, 0.68–1.13; $P = 0.31$), pancreatic fistulas (relative risk (RR) 1.22; 95% CI, 0.88–1.70; $P = 0.231$), gastrointestinal bleeding (relative risk (RR) 0.83; 95% CI, 0.55–1.25; $P = 0.37$), mortality (relative risk (RR) 1.41; 95% CI, 0.61–3.23; $P = 0.423$).

Early enteral nutrition is shown to be beneficial to immune function and decreased risk of sepsis, improve wound healing [11,12], however, postoperative total enteral feeding was associated with EN-related complications such as diarrhea, abdominal distention, vomiting and abdominal cramps, these symptoms could lead to discontinuance of enteral feeding [13,14]. Thus, the role of EN remains debatable.

Our results revealed that EN has advantages in improving early postoperative nutritional status, reducing hospital stay, and postoperative EN was safe and well tolerated, and showed no negative effect on postoperative complications. It was recommended that the routine postoperative enteral nutrition for patients undergoing PD was beneficial. Future large-scale, high-quality, multicenter trials are still required to clarify the issues of EN in patients undergoing PD.

<https://doi.org/10.1016/j.clnex.2017.10.001>

2352-9393/© 2017 Published by Elsevier Ltd on behalf of European Society for Clinical Nutrition and Metabolism. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Table 1

Characteristics of included studies.

Study	Year	Nation	EN	PN	Style	Setting	Procedure	Operation
Gianotti [5]	2000	Italy	73	68	RCT	Single center	EN VS PN	PD
Tien [6]	2009	China	123	124	RCT	Single center	EN VS PN	PD
Liu [7]	2011	China	28	30	RCT	Single center	EN VS PN	PD
Park [8]	2012	Korea	18	20	RCT	Single center	EN VS PN	PD
Guo [9]	2013	China	90	88	RCT	Multicenter	EN VS PN	PD
Mariette [10]	2016	France	103	101	RCT	Multicenter	EN VS PN	PD

PD pancreatoduodenectomy, PN parenteral nutrition, EN enteral nutrition.

Conflict of Interest

We declare that we have no financial and personal relationships with other people or organizations that can inappropriately influence our work, there is no professional or other personal interest of any nature or kind in any product, service and/or company that could be construed as influencing the position presented in the manuscript entitled “**Enteral Versus Parenteral Nutrition in Patients Undergoing Pancreaticoduodenectomy: a meta-analysis of randomized controlled trial**”.

References

- [1] Rayar M, Sulpice L, Meunier B, Boudjema K. Enteral nutrition reduces delayed gastric emptying after standard pancreaticoduodenectomy with child reconstruction. *J Gastrointest Surg* 2012;16:1004–11.
- [2] Feng Y, Ralls MW, Xiao W, Miyasaka E, Herman RS, Teitelbaum DH. Loss of enteral nutrition in a mouse model results in intestinal epithelial barrier dysfunction. *Ann N Y Acad Sci* 2012;1258:71–7.
- [3] Padussis JC, Zani S, Blazer DG, Tyler DS, Pappas TN, Scarborough JE. Feeding jejunostomy during Whipple is associated with increased morbidity. *J Surg Res* 2014;187:361–6.
- [4] Gerritsen A, Besselink MG, Cieslak KP, Vriens MR, Steenhagen E, van Hillegersberg R, et al. Efficacy and complications of nasojejunal, jejunostomy and parenteral feeding after pancreaticoduodenectomy. *J Gastrointest Surg* 2012;16:1144–51.
- [5] Gianotti L, Braga M, Gentilini O, et al. Artificial nutrition after pancreaticoduodenectomy. *Pancreas* 2000;21(4):344.
- [6] Yuwen T, Yang CY, Wu YM, et al. Enteral nutrition and biliopancreatic diversion effectively minimize impacts of gastroparesis after pancreaticoduodenectomy. *J Gastrointest Surg* 2009;13(5):929–37.
- [7] Liu C, Du Z, Lou C, et al. Enteral nutrition is superior to total parenteral nutrition for pancreatic cancer patients who underwent pancreaticoduodenectomy. *Asia Pac J Clin Nutr* 2011;20(2):154.
- [8] Joon Seong P, Hye-Kyung C, Ho Kyoung H, et al. Postoperative nutritional effects of early enteral feeding compared with total parental nutrition in pancreaticoduodenectomy patients: a prospective, randomized study. *J Korean Med Sci* 2012;27(3):261–7.
- [9] Guo JC, Li J, Hu Y, Zhang TP, Liao Q, Dai MH, et al. The role of perioperative enteral and parenteral nutrition treatment in pancreatic cancer: a multicenter, prospective randomized controlled trial. *Zhonghua Wai Ke Za Zhi* 2013;51(11):987–90.
- [10] Perinel J, Mariette C, Dousset B, et al. Early enteral versus total parenteral nutrition in patients undergoing pancreaticoduodenectomy: a randomized multicenter controlled trial (Nutri-DPC). *Ann Surg* 2016;264(5):731.
- [11] Azuma H, Mishima S, Oda J, Homma H, Sasaki H, Hisamura M, et al. Enteral supplementation enriched with glutamine, fiber, and oligosaccharide prevents gut translocation in a bacterial overgrowth model. *J Trauma* 2009;66:110–4.
- [12] Slotwinski R, Olszewski WL, Slotkowski M, et al. Can the interleukin-1 receptor antagonist (IL-1ra) be a marker of anti-inflammatory response to enteral immunonutrition in malnourished patients after pancreaticoduodenectomy? *J Pancreas* 2007;8:759–69.
- [13] Baradi H, Walsh RM, Henderson JM, Vogt D, Popovich M. Postoperative jejunal feeding and outcome of pancreaticoduodenectomy. *J Gastrointest Surg* 2004;8:428–33.
- [14] Yang H, Feng Y, Sun X, Teitelbaum DH. Enteral versus parenteral nutrition: effect on intestinal barrier function. *Ann N Y Acad Sci* 2009;1165:338–46.

Ao Ren*, Shiqiao Luo, Xin Yi

Department of Hepatobiliary Surgery, The First Affiliated Hospital of Chongqing Medical University, Chongqing, 400016, China

* Corresponding author.

E-mail address: 965933590@qq.com (A. Ren)

28 September 2017

Available online 13 October 2017