



OPEN ACCESS

Parenteral nutrition in palliative care: single-centre observational study

Clara Berbée ¹, Jan Philipp Marx,² Maria Theresa Voelker,² Dörte Schotte,² Sven Bercker²

¹Department of Gynaecology, Leipzig University Hospital, Leipzig, Germany
²Anesthesiology and Critical Care Medicine, Leipzig University Hospital, Leipzig, Sachsen, Germany

Correspondence to

Clara Berbée;
clara.berbee@medizin.uni-leipzig.de

Received 15 February 2022

Accepted 5 May 2022

Published Online First

6 June 2022

ABSTRACT

Objective Cachexia and nutritional problems play a major role in palliative care. Artificial nutrition such as parenteral nutrition is common but its role and indications in terminal patients remain controversial due to lack of data. Therefore, recommendations are vague. Benefits and risks of parenteral nutrition in palliative care as well as the clinical implementation of the guidelines have not been adequately studied yet.

Methods In this single-centre observational study, 72 palliative care patients were followed for 1 month. Patients with and without parenteral nutrition were analysed regarding venous access complications, oedema, weight and health-related quality of life.

Results 93% of all patients showed reduced food intake. 34 (47%) patients received parenteral nutrition. Parenteral nutrition reduced energy deficit but was not associated with quality of life. Complications with the venous accesses for parenteral nutrition were frequent. A relevant proportion of patients with planned parenteral nutrition received no or only a few days of parenteral nutrition. Moreover, patients with parenteral nutrition showed more frequent and pronounced oedema.

Conclusion The benefit–risk balance of palliative parenteral nutrition in end-of-life treatment seems to be questionable. In view of the identified risks, parenteral nutrition in end-of-life care should be initiated with caution.

INTRODUCTION

Nutritional aspects and related symptoms such as loss of appetite, nausea, vomiting, difficulties in swallowing, constipation and diarrhoea, weight and muscle loss play a major role in palliative care. Artificial nutrition is aimed at treating malnutrition and associated symptoms such as fatigue, weakness, oedema, ascites and to improve quality of life. However, these effects in palliative care and in patients with limited life expectancy are not proven by studies and therefore, the indication, the selection

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ There is little evidence for benefits of early artificial nutrition on quality of life, survival and physical performance of patients with advanced cancer. However, the quality of evidence for additional or total medical nutrition in care for terminal patients is poor due to sparse data, especially the risks have not been described extensively to date.

WHAT THIS STUDY ADDS

⇒ Parenteral nutrition in palliative care patients is associated with frequent complications with the vascular access and with oedema formation whereas benefits are at least questionable.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE AND/OR POLICY

⇒ The indication for parenteral lines for palliative parenteral nutrition should be strictly defined. In patients with parenteral nutrition, volume intake and fluid balance should be monitored.

of patients and the timing and duration of treatment are questionable.¹ In particular, the risks and complications of artificial nutrition in palliative care have not been described extensively to date.

We hereby present a monocentric prospective observational study to assess effects and complications of artificial nutrition and its association with the clinical course in palliative care.

METHODOLOGY

This is a single-centre observational study on patients treated in the palliative care ward of the University Hospital of Leipzig.

Between September 2018 and January 2020, all patients were screened on arrival. The inclusion criteria were as follows:

1. A life expectancy of more than 2 weeks.
2. Informed consent to participate in the study.



© Author(s) (or their employer(s)) 2024. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

To cite: Berbée C, Marx JP, Voelker MT, et al. *BMJ Supportive & Palliative Care* 2024;**14**:e1708–e1711.

Table 1 Baseline characteristics

	Total (n=72)	PE (n=34)	No PE (n=38)
Age (years)			
Median (range)	67 (35, 89)	62 (35, 85)	74.5 (35, 89)
Sex (N, %)			
Female	35 (48.61%)	14 (41.18%)	21 (55.26%)
Male	37 (51.39%)	20 (58.82%)	17 (44.74%)
Primary cancer site (n, %)			
Gastrointestinal	23 (31.94%)	13 (38.82%)	10 (26.32%)
Gynaecological	9 (12.50%)	5 (14.71%)	4 (10.53%)
Breast	7 (9.72%)	4 (11.76%)	3 (7.89%)
ENT	8 (11.11%)	4 (11.76%)	4 (10.53%)
Lung	6 (8.33%)	3 (8.82%)	3 (7.89%)
haemato-oncological	4 (5.56%)	1 (2.94%)	3 (7.89%)
Prostate	4 (5.56%)	2 (5.88%)	2 (5.26%)
Renal cell	3 (4.17%)	0	3 (7.89%)
Urothelial	3 (4.17%)	1 (2.94%)	2 (5.26%)
CUP	2 (2.78%)	1 (2.94%)	1 (2.63%)
Other	3 (4.17%)	0	3 (7.89%)
Peritoneal/gastrointestinal metastases	15 (20.83%)	12 (35.29%)	3 (7.89%)
Survival at 4 weeks follow-up	38 (52.78%)	17 (50.00%)	21 (55.26%)

CUP, Cancer of Unknown Primary; ENT, Ear, Nose and Throat; PE, Parenteral Nutrition.

Patients were observed for 4 weeks. The patients were interviewed regarding their medical history and nutritional problems, and were examined medically. A Short Form 36 (SF-36) Health Survey Questionnaire questionnaire was completed at inclusion and at follow-up.

Weight, venous access, oedema, oral and parenteral intake and fluid substitution were monitored on a daily basis. The average daily energy deficit was calculated by taking into account the basal metabolic rate and physical activity level.

From eight different subscales of the SF-36 a physical and mental sum scale was calculated. For data acquisition and statistical analysis MS Excel and SPSS were used. Since this was an observational pilot study statistical analysis was limited to descriptive measures.

Patients with parenteral nutrition were compared with patients with exclusive oral food intake.

RESULTS

Between September 2018 and January 2020 158 patients fulfilled inclusion criteria and 72 gave informed consent to participate.

Baseline data and characteristics are listed in table 1. All patients had been diagnosed with cancer (details in table 1). At follow-up, 34 (47.22 %) patients had died and 38 (52.78%) patients were alive. Of these, 36 (94.74 %) patients were followed-up. In 17 patients follow-up was done in hospital (8 on the palliative care ward, 9 in other departments) and in 19 patients in hospice (n=4), nursing home (n=2) or at home (n=13).

Of the 72 included patients, 67 (93.06%) described reduced food intake.

Thirty-four (47.22%) patients received parenteral nutrition. In 21 (61.76%) of those patients parenteral nutrition was initiated by the palliative care team. The most frequent indication for starting parenteral nutrition in the palliative care unit was reduced food intake (n=19) due to loss of appetite (n=15), nausea (n=13), dysphagia (n=9) and vomiting (n=7). In the other 13 (38.24%) patients parenteral nutrition was initiated before arriving at the palliative care unit. Seven patients received long-term parenteral nutrition for a period of >3 months. The most frequent cancer sites were gastrointestinal and gynaecological. Seventeen (50%) parenteral nourished patients were still alive after 4 weeks and 16 of them took part in the follow-up. Twelve of these still achieved parenteral nutrition (five at home, three in hospice, four in hospital). All five patients at home were cared for by a specialised home-parenteral-nutrition and palliative-care team.

Patients in whom parenteral nutrition was started at the palliative care unit (n=21) were younger than those patients who did not receive parenteral nutrition (n=38) (median 65 vs 74.5 years). The body mass index, Eastern Cooperative Oncology Group Index, nutritional risk screening parameters and mortality did not show significant differences between these two groups.

A total of 32 patients answered the questionnaire on health-related quality of life twice. Patients with long-term parenteral nutrition showed a slight improvement in the Physical Sum Scale and deterioration in the Mental Sum Scale, but were also significantly younger than control patients. However, taking into account

Short report

the number of cases (Manual SF-36, p91), we could not detect any significant change in any of the groups.

Of the 34 patients with parenteral nutrition, 21 (60%) arrived with a port and 3 (8.57%) with a central venous catheter at the palliative care ward. Of the 11 (31.34%) patients who received parenteral nutrition via a peripheral venous access, 9 (25.71%) received a PICC line after the course. Three (33.33%) of the nine patients with PICC lines developed mechanical complications, in two of them catheters were torn out accidentally. Of the 9 patients who received a PICC line, 4 (44.44%) died within the study period and 3 (33.33%) only received parenteral nutrition for 3 days or less.

Patients with parenteral nutrition had a smaller energy deficit than patients without parenteral nutrition (median: 102 kcal/day vs 990 kcal/day). But fluid intake was remarkably higher (median: 2800 mL/day vs 1400 mL/day). Patients with parenteral nutrition >3 days had increased weight gain within 1 week (median: 2.45 kg) in comparison to those without (median: 0.4 kg). Patients with parenteral nutrition more often had an increase in oedema (40.74% vs 20.00%).

Nine (47.36%) of 19 parenteral-fed patients felt restricted by the parenteral nutrition, especially due to the medical tubes and the resulting restriction of movement. Ten (52.63%) patients thought that parenteral nutrition helped them. Three (15.79%) patients emphasised psychological relief by parenteral nutrition.

DISCUSSION

The quality of evidence for additional or total medical nutrition in palliative care is poor due to sparse data.² Guidelines^{3,4} recommend indicating artificial nutrition if potential benefits outweigh the risks.

In this prospective observational study, we demonstrated that reduced food intake and associated symptoms were very common in this collective of palliative care patients and additive medical diet is often considered. Furthermore, parenteral nutrition in palliative care patients was associated with a high frequency of oedema formation and with catheter-associated complications, whereas benefits of late initiation of PE seem to be questionable. We could also demonstrate that weight as a marker of nutritional status in such patients seems disputable due to the high rate of oedema and ascites.

There is little evidence for benefits of early artificial nutrition on quality of life, survival and physical performance of patients with advanced cancer,⁵⁻⁷ when nutrition-related symptoms lead to a reduced quality of life.⁵ However, these results relate to the use of early and long-term nutrition.^{4,7,8}

Parenteral nutrition is often used to compensate for the frequent and inherent energy deficit of patients with cancer. The majority of our patients (93.06%)

showed reduced food intake for various reasons. The energy deficit could be significantly reduced by parenteral nutrition. Despite this, we could not show any effect on the health-related quality of life.⁹

Few patients reported a reduction of psychological pressure through parenteral nutrition. The initiation of an invasive procedure in order to reduce mental stress is questionable and has to be weighed against the potential risks carefully.¹⁰

Potential risks of parenteral nutrition are catheter-related complications,^{11,12} hyperglycaemic, volume overload¹³ and worsening of liver function.¹⁴ In our study, the complication rate of PICC lines (33.3%) was significantly higher than in the literature^{11,15} and we observed a high rate of accidental catheter removal in our patients. We also found an increased rate of oedema and weight in parenterally nourished patients, associated with a remarkable higher volume load. In patients with parenteral nutrition, it seems reasonable to monitor volume intake and fluid balance.

We observed that a substantial number of patients received no, or only a few days of parenteral nutrition. On the basis of this data the relationship between benefit and burden, specifically in short-term parenteral nutrition at the end of life, is uncertain.

In our study, about half of the patients who received parenteral nutrition at the time of admission to the palliative ward died within the 4-week follow-up period. Therefore, a substantial and clinically meaningful benefit of parenteral nutrition for these patients is unlikely without being able to exclude relevant risks associated with the vascular access in a considerable proportion of these patients.

Our study has some limitations. Only few of the eligible patients agreed to participate in the study. We assume that the reason for this was the emotionally challenging life situation which palliative care patients find themselves in. Even if this cannot be modified, it is a considerable bias. Furthermore, the small number of cases, the monocentric approach and the lack of a randomised control group suggest that our data should be interpreted with some caution. However, as controlled randomised studies are lacking, our data give indications of an unfavourable benefit-risk ratio.

In conclusion, in our prospective series we found a remarkably high rate of complications and the benefit-risk balance of palliative parenteral nutrition in end-of-life treatment seems questionable. Future prospective randomised studies should focus on the identification of patients in which the benefits of parenteral nutrition outweigh the risks.

Contributors CB collected data. CB, SB, JPM and MTV wrote the manuscript. All authors approved and finalised the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants and was approved by the local ethics committee of the Medical Faculty of the University of Leipzig (Ref No: 326/17). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Clara Berbée <http://orcid.org/0000-0001-5381-6140>

REFERENCES

- Good P, Richard R, Syrmis W, *et al*. Medically assisted nutrition for adult palliative care patients. *Cochrane Database Syst Rev* 2014;4:CD006274.
- Arends J, Bachmann P, Baracos V, *et al*. ESPEN guidelines on nutrition in cancer patients. *Clin Nutr* 2017;36:11–48.
- Bozzetti F, Arends J, Lundholm K, *et al*. ESPEN guidelines on parenteral nutrition: non-surgical oncology. *Clin Nutr* 2009;28:445–54.
- Pironi L, Boeykens K, Bozzetti F, *et al*. ESPEN guideline on home parenteral nutrition. *Clin Nutr* 2020;39:1645–66.
- Amano K, Morita T, Baba M, *et al*. Effect of nutritional support on terminally ill patients with cancer in a palliative care unit. *Am J Hosp Palliat Care* 2013;30:730–3.
- Hasenberg T, Essenbreis M, Herold A, *et al*. Early supplementation of parenteral nutrition is capable of improving quality of life, chemotherapy-related toxicity and body composition in patients with advanced colorectal carcinoma undergoing palliative treatment: results from a prospective, randomized clinical trial. *Colorectal Dis* 2010;12:e190–9.
- Bozzetti F, Cozzaglio L, Biganzoli E, *et al*. Quality of life and length of survival in advanced cancer patients on home parenteral nutrition. *Clin Nutr* 2002;21:281–8.
- Cotogni P, De Carli L, Passera R, *et al*. Longitudinal study of quality of life in advanced cancer patients on home parenteral nutrition. *Cancer Med* 2017;6:1799–806.
- Brazier JE, Harper R, Jones NM, *et al*. Validating the SF-36 health survey questionnaire: new outcome measure for primary care. *BMJ* 1992;305:160–4.
- Amano K, Morita T, Koshimoto S, *et al*. Eating-related distress in advanced cancer patients with cachexia and family members: a survey in palliative and supportive care settings. *Support Care Cancer* 2019;27:2869–76.
- Cotogni P, Pittiruti M, Barbero C, *et al*. Catheter-Related complications in cancer patients on home parenteral nutrition. *JPEN J Parenter Enteral Nutr* 2013;37:375–83.
- Pittiruti M, Hamilton H, Biffi R, *et al*. ESPEN guidelines on parenteral nutrition: central venous catheters (access, care, diagnosis and therapy of complications). *Clin Nutr* 2009;28:365–77.
- Abunnaja S, Cuvillo A, Sanchez JA. Enteral and parenteral nutrition in the perioperative period: state of the art. *Nutrients* 2013;5:608–23.
- Buchman AL, Iyer K, Fryer J. Parenteral nutrition-associated liver disease and the role for isolated intestine and intestine/liver transplantation. *Hepatology* 2006;43:9–19.
- Kang J, Chen W, Sun W, *et al*. Peripherally inserted central catheter-related complications in cancer patients: a prospective study of over 50,000 catheter days. *J Vasc Access* 2017;18:153–157.