



Applied nutritional investigation

Effect of overweight and obesity on weight loss and length of stay in patients with walled-off pancreatic necrosis



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ARTICLE INFO

Article history:

Received 3 September 2016

Accepted 19 January 2017

Keywords:

Pancreatitis

Weight loss

Enteral nutrition

Parenteral nutrition

Clinical study

ABSTRACT

Objective: The aim of this study was to assess the association between admission weight, weight loss, and length of stay (LOS) in patients with walled-off pancreatic necrosis.

Methods: We classified the admission body mass index (BMI) of 18.5 to <25 kg/m² as normal weight, 25 to <30 kg/m² as overweight, and ≥30 kg/m² as obesity. The Nutritional Risk Screening score-2002 was calculated to identify patients at risk for undernutrition.

Results: We included 38 patients (61% men, 68% with infected necrosis; 40% normal weight; 60% overweight/obesity). Four patients (11%) required treatment at the semi-intensive care unit, 11 (29%) developed pneumonia, and 10 (26%) developed septicemia. One patient died due to respiratory failure and hemorrhage. The remaining patients were discharged after a median of 49 d (36–64 d). During admission, 14 patients (38%) achieved an energy–protein intake of at least 75% and 17 (46%) achieved ≥70% coverage. The percentage weight loss was different ($P < 0.01$) for patients with normal weight (4%), overweight (9%), and obesity (14%). There was no difference between groups regarding percentage of energy or protein coverage. Patients with overweight/obesity had a longer hospital LOS ($P = 0.016$). In univariable regression analysis, overweight, obesity, energy, and protein coverage predicted weight loss. LOS did not predict weight loss. In multivariable regression analysis, overweight and obesity were the only remaining significant predictors of weight loss.

Conclusions: Patients with walled-off pancreatic necrosis are at considerable risk for undernutrition. A BMI >25 kg/m² predicts greater weight loss and longer LOS.

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Introduction

Acute pancreatitis caused approximately 275 000 hospitalizations in 2009 and is the most frequent gastrointestinal (GI) cause of hospital admission in the United States [1]. Approximately 20% of the cases are severe [2] and may develop necrotizing pancreatitis with pancreatic or extrapancreatic necrosis requiring treatment in hospital for several months. The necrosis may eventually become encapsulated, a condition known as walled-off pancreatic necrosis (WON). The traditional treatment of WON has been open surgery, but during recent decades, a number of different minimally invasive techniques have emerged and are now considered treatment of choice. These techniques have considerably reduced morbidity and mortality

in this group of critically ill patients [2]. However, a number of unresolved issues remain, as data is lacking on adequate supportive treatment, including fluid resuscitation, antibiotic therapy, and nutrition. Ensuring adequate nutrition in this group of patients is challenging as the majority experience problems with decreased appetite and nausea caused or aggravated by mechanical compression of the stomach and duodenum from pancreatic fluid collections.

To our knowledge, no studies have evaluated the association between nutrition and the prognosis of patients with WON. Previous studies, including patients admitted to hospital for medical or surgical diseases, found that a nutritional decline during hospitalization is associated with a poor prognosis [3]. In the general population, a higher body mass index (BMI) is associated with increased mortality [4–6]. Studies including patients with acute illness have found that a higher BMI predicts mortality [7]. A similar conclusion was reached in a study

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Table 1
Characteristics of 38 patients with walled-off necrosis

Characteristics of patients	Normal weight n = 15	Overweight n = 16	Obesity n = 7	All N = 38
Men, n (%)	9 (64)	11 (65)	3 (43)	23 (61)
Age, y, median (IQR)	61 (50–69)	65 (55–71)	58 (37–68)	63 (53–70)
Alcohol-related pancreatitis, n (%)	6 (43)	1 (6)	1 (14)	8 (21)
Gallstone-related pancreatitis, n (%)	4 (29)	10 (59)	4 (57)	18 (47)
C-reactive protein mg/L, median (IQR)	45 (12–210)	125 (52–230)	34 (18–74)	74 (20–165)
White blood cell count, median (IQR)	10 (9–12)	12 (10–17)	8 (11–14)	11 (10–14)
Number of smokers, n (%)	6 (43)	2 (13)	1 (14)	9 (25)

IQR, interquartile range

including patients with acute pancreatitis [8] and suggestions have been made to include the BMI in scoring systems for prediction of the severity of acute pancreatitis [9,10]. A meta-analysis demonstrated that overweight patients with acute pancreatitis have an increased risk for suffering from local complications and death compared to normal weight patients [11]. It is possible that a similar association between the BMI and prognosis exists for patients with WON. The aim of the present study was to assess the association between admission weight, weight loss, and hospital LOS in patients with WON.

Methods and materials

We conducted a cohort study including all patients with WON admitted to our tertiary referral center from January 2014 to January 2016. Patients were identified prospectively, but some data were registered in a retrospective manner. All patients had a documented episode of severe acute pancreatitis leading to confirmed diagnosis of WON, as defined by the revised Atlanta criteria [2]. The study was approved by the Danish Data Protection Agency.

Two investigators (S.R. and D.R.) independently reviewed the medical records for each patient and extracted a database on pilot-tested extraction sheets. Disagreements were resolved through discussion before analysis. In case of disagreements that could not be resolved through discussion, a third author (S.N.) acted as ombudsman. The extracted data at hospital admission included Nutritional Risk Screening score-2002 (NRS) [12], sex, age, etiology, Charlson Comorbidity Index [13], BMI, smoking, alcohol consumption, date of symptom onset. During admission, we registered three weekly measurements of weight, nutritional modality (parenteral nutrition [PN], nutrition through nasogastric or nasojejunal feeding tube, hospital diet), energy and protein coverage as estimated by NRS, C-reactive protein (CRP), and white blood count (WBC). We also registered date of admission, discharge, and death.

We classified the admission BMI of 18.5 to <25 kg/m² as normal weight, 25 to <30 kg/m² as overweight, and ≥30 kg/m² as obesity. We based the estimated caloric and protein requirements on weight-based equations adjusted according to nutritional status and disease severity [14,15]. An ongoing assessment of caloric and protein provision was performed. The nutritional interventions were administered using a step-up approach to ensure that patients received ≥75% of their nutritional needs.

At admission to our department, enteral nutrition (EN) was initiated in all patients, either with hospital diet, or by inserting either nasogastric or nasojejunal feeding tube. In case a patient did not achieve sufficient protein and energy coverage, PN was initiated, either as a sole nutritional therapy or in combination with EN.

All patients were treated with endoscopic, transgastric drainage, and necrosectomy, a procedure described previously [16]. A minor proportion of the patients also needed percutaneous drainage. None of the patients was treated with open surgery. All patients received antibiotics and other supportive treatment when appropriate.

Statistical analysis

We conducted the statistical analyses using Stata version 14 (Stata Corp., College Station, TX, USA). Based on the distribution of data, patient characteristics were summarized using medians with interquartile range or proportions. The groups were compared using nonparametric tests (Mann–Whitney or χ^2). The association between continuous variables was evaluated using Spearman. Results are presented with two-sided *P* values (level of significance 5%). Time-to-event (hospital LOS) analyses were conducted with log-rank tests and Kaplan–Meier Plots. We also conducted linear univariable and multivariable regression analyses to evaluate predictors of weight loss. In the regression analyses, all continuous

variables were log transformed. We repeated the analyses without log transformation, which generated the same result.

Results

Thirty-eight patients were included (Table 1). The most common etiologies were gallstones and alcohol, comprising 66% of the total. Of the included patients, 95% had a Charlson Comorbidity Index of 0 (45%) or 1 (50%). The median time from onset of symptoms to admission was 27 d (19–48 d). Twenty-eight patients (68%) had infected necrosis at the index endoscopy (confirmed by culturing), which was conducted on days 1 to 4 (median day 1). Blood tests on days 1 and 2 showed increasing CRP from 74 (5–180 mg/L) to 103 mg/L (25–183 mg/L) and WBC from $9 \times 10^9/L$ ($7\text{--}13 \times 10^9/L$) to $11 \times 10^9/L$ ($9\text{--}13 \times 10^9/L$).

The median number of endoscopic procedures was 6 (4–9). Eleven patients (29%) developed bleeding that required blood transfusion. Four patients (11%) required temporary treatment at the semi-intensive care unit. Eleven patients (29%) developed pneumonia, and 10 (26%) developed septicemia. One patient died due to respiratory failure and hemorrhage. The remaining patients were discharged after a median of 49 d (36–64 d).

At admission, 24 patients (63%) scored 1 point on the NRS and the remaining patients scored Stata Corp., Texas ≥2 points. Accordingly, all patients were categorized as being at high risk for undernutrition based on the NRS. Fifty percent had lost at least 5% of their usual weight in the period from debut of symptoms until admission to our department. Most of the patients needed different combinations of nutritional therapies, such as PN, nasogastric, or nasojejunal feeding. The proportion of patients who needed PN increased during the first weeks (from 26% during the week 1 to 37% during week 3).

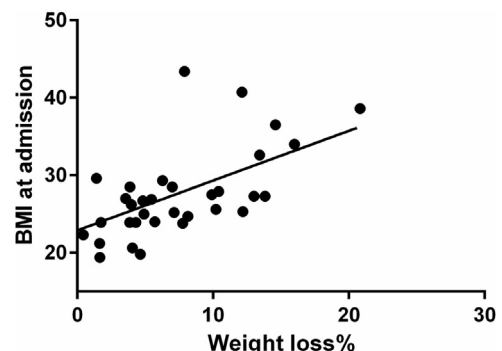


Fig. 1. Correlation between the BMI at admission and percentage of weight loss during stay in hospital. BMI, body mass index.

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