The Benefits of Early Oral Nutrition in Mild Acute Pancreatitis

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Objective To determine whether early patient-directed oral nutrition in children with mild acute pancreatitis decreases the length of hospitalization without increasing complications.

Study design Hospitalized patients aged 2-21 years of age who met the criteria for acute pancreatitis based on the Revised Atlanta Classification were enrolled prospectively and allowed to eat by mouth at their discretion (patient-directed nutrition [PDN]). These patients were compared with a retrospective cohort of children who were allowed to eat based on traditional practices (treatment team-directed nutrition [TTDN]). Outcomes included length of hospitalization, time nil per os (NPO), and complications within 30 days of discharge.

Results The study included 30 patients in the PDN group and 92 patients in the TTDN group. Patients in the PDN group had a median length of stay of 48.5 hours (IQR 37-70 hours) compared with 93 hours (IQR 52-145 hours) in the TTDN group ($P < .0001$). Patients were NPO for a median of 14 hours (IQR 7-19.5 hours) in the PDN group compared with 34 hours (IQR 19.3-55 hours) in the TTDN group ($P < .0001$). No patients in the PDN group developed complications within 30 days of discharge.

Conclusion Early patient-directed oral nutrition in mild acute pancreatitis was well tolerated and resulted in decreased length of NPO status and hospitalization with no obvious complications. *(J Pediatr 2017;■■:■■-■■).*

Clinical Trial Registration ClinicalTrials.gov: NCT01423786.

Pancreatic inflammation in acute pancreatitis can range from mild and self-limited disease to severe disease with multisystem involvement.[1] The symptoms are severe midline epigastric pain and vomiting that can lead to dehydration and hospitalization. The incidence of acute pancreatitis in the pediatric population has increased during the last 2 decades, likely as the result of increased awareness and improved detection.[1-4] In recent reports, the estimated incidence of hospitalization for acute pancreatitis is 13.2 in 100 000 children per year,[5] affecting almost 10 000 children per year in the US. The inpatient cost for children with acute pancreatitis alone is approximately $200 million per year, which does not include lost work time for family members or outpatient clinic visits.[3]

Nutrition plays an important role in the treatment of acute pancreatitis; however, the optimal nutritional management in both adults and children remains unclear. Historically, patients with acute pancreatitis were treated with fasting to avoid stimulation of pancreatic enzyme secretion and further pancreatic autodigestion. Parenteral nutrition was used if the fasting was prolonged to prevent the deleterious effects of starvation.[1,6] However, this approach was challenged, as clinical studies in adults demonstrated that early enteral feedings reduced infectious complications, length of hospital stay, and mortality in severe pancreatitis,[1,6-10] regardless of route of administration.[11] Parenteral nutrition is now reserved for instances in which enteral nutrition is not tolerated or cannot be attempted.[1]

The current adult guidelines for nutritional management in mild acute pancreatitis are vague; oral intake is recommended as signs and symptoms improve or resolve.[8,12] The patient is to gradually advance their intake of a low-fat (<30% of total energy intake) diet over 3-7 days with the introduction of nutrition supplementation (enteral or parenteral) regardless of disease severity if the anticipated duration of fasting is >5-7 days.[13,14]

Given the limited pediatric literature on this subject, the management of acute pancreatitis varies widely.[2] The aim of this study was to evaluate the outcomes of early, patient-directed oral nutrition in mild acute pancreatitis in children in comparison with the more traditional approach of the treatment team determining dietary advancement. We hypothesized that allowing early patient-directed oral nutrition in children with mild acute pancreatitis would decrease the length of hospitalization without increasing the risk of complications.

Methods

We performed a prospective study (ClinicalTrials.gov: NCT01423786) of patient-directed dietary management of mild acute pancreatitis at Nationwide

NPO	Nil per os
PDN	Patient-directed nutrition
TPN	Total parenteral nutrition
TTDN	Treatment team–directed nutrition

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Children's Hospital in Columbus, Ohio. Patients aged 2-21 years hospitalized with an admission diagnosis of primary or secondary acute pancreatitis from August 2011 through October 2013 were included. Written informed consent was obtained from the parents or guardians of the children who served as subjects in the investigation. We used the Revised Atlanta Classification for acute pancreatitis that subsequently was adopted for use in children.[15,16] Patients included in the analysis had at least 2 of the 3 following criteria: clinical symptoms consistent with acute pancreatitis (primarily abdominal pain as well as nausea and/or vomiting), lipase or amylase >3 times the upper limit of normal, and/or imaging findings consistent with acute pancreatitis. Patients diagnosed with acute pancreatitis at outside institutions and transferred to our institution were included in our study. We used the initial laboratory and imaging values obtained at the outside institution as our initial values in our analysis. Additional inclusion criteria included enrollment within 24 hours of diagnosis and a baseline diet of all oral nutrition.

The patient's baseline diet was defined as the diet that was tolerated most recently before the diagnosis of pancreatitis. Patients with >1 episode of acute pancreatitis who met inclusion criteria were included as separate encounters. Exclusion criteria included a diagnosis of chronic, moderately severe, or severe pancreatitis; nonverbal communication; surgical patients; and/or a baseline nutritional regimen including total parenteral nutrition (TPN) or enteral tube feeds. Surgical patients were defined as patients on the surgery service or patients requiring a procedural intervention that would affect nil per os (NPO) status. Patients were considered to have chronic pancreatitis if there was evidence of pancreatic calcifications or ductal abnormalities on imaging. Patients were considered to have moderately severe pancreatitis if there was evidence of transient (<48 hours) end organ dysfunction and severe pancreatitis if there was evidence of persistent (>48 hours) end organ dysfunction with or without local complications (pancreatic necrosis, fluid collection, or abscess).[15] End organ dysfunction was characterized by the presence of shock (systolic blood pressure less than the fifth percentile for age), pulmonary insufficiency (requirement of invasive/noninvasive ventilation or >50% fraction of inspired oxygen requirement), or renal failure (creatinine >2× upper limit of normal for age).[17]

The research team explained the study protocol to all medical services, and all patients were allowed a low-fat oral diet at the time of admission. A low-fat diet was limited to <5 g of fat per entrée and <1 g of fat per side or snack; only 1 entrée or side could be ordered at a time. However, the treating physicians were allowed to change the diet orders if felt to be medically necessary. Tolerance of oral nutrition was defined as no change in the diet order. Patient characteristics on presentation (sex, age, body mass index, and abdominal pain severity), initial laboratory values (amylase, lipase, direct bilirubin, alanine aminotransferase, and white blood cell count), diagnostic abdominal imaging (ultrasonography or computed tomography scan, with notes made of peripancreatic fluid, biliary sludge, dilated biliary or pancreatic ducts, pancreatic heterogeneity, pancreatic edema, and gallstones), dietary interventions (use of enteral tube feeds and TPN), suspected etiology, hours fasting, length of stay in hours, and complications were analyzed for each patient. The suspected etiology was categorized as obstructive, medication or toxin-related, metabolic, multisystem, infection, hereditary, trauma, and idiopathic. Complications included development of moderately severe or severe pancreatitis after dietary intervention during the index hospitalization and recurrence of symptoms within 30 days after discharge.

For historical controls, we performed a retrospective chart review of patients with mild acute pancreatitis who were managed according to "traditional treatment team-directed" advancement of diet. Before this study, patients with a diagnosis of mild acute pancreatitis were NPO until they showed sufficient improvement in clinical symptoms and/or biochemical markers (amylase or lipase) at the discretion of the provider.

Patients from January 2009 to August 2011 with a discharge diagnosis of acute pancreatitis were screened for inclusion in the study. These charts were further reviewed and those with an admission diagnosis of primary or secondary acute pancreatitis were included. The inclusion and exclusion criteria as described for the patient-directed nutrition (PDN) group also applied to this patient group with the exception that patients on the surgical service who had not had a surgical intervention were included. Furthermore, if a patient did have a surgical intervention, careful consideration was taken to determine whether any part of their hospitalization could be included in our review. If the patient was classified as NPO following the diagnosis, the type of nutrition (oral or enteral) that initially was attempted also was recorded. Data were collected regarding the perceived tolerance of nutrition. Patients were considered intolerant to the initial method of nutrition if the physician team ordered further limitations in the diet. When this occurred, the reason for dietary change was determined. The charts were reviewed for the same patient characteristics on presentation as the PDN study group (with the exception of abdominal pain severity which could not be adequately determined retrospectively), initial laboratory values, diagnostic abdominal imaging, dietary interventions, suspected etiology, hours fasting, and length of stay in hours (as described previously) for each patient. The study protocols were approved by the institutional review board at Nationwide Children's Hospital.

The primary outcome of this study was comparison of the length of stay in the PDN group with the treatment team–directed nutrition (TTDN) group. This was determined by comparing the time of admission order placement and discharge order placement for each patient. The secondary outcome was comparison of the time in hours to the first oral feeding. The hours fasting was determined by calculating the time of admission order placement to the time the first substantial solid meal was tolerated for each patient in the PDN group and the time the NPO order was discontinued in the TTDN group. To address any concern that patients on the surgical service led to discrepancy among the groups, we ex-

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