Comparative Study on Complications of Early Enteral Feeding and Nil Per Oral in Mild and Moderate Acute Pancreatitis

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Abstract

Introduction: Acute pancreatitis is a potentially lethal disease with wide variation in severity ranging from mild and self-limiting to a rapidly progressive illness leading to multiorgan failure. In accordance with this wide variation in clinical presentation, the treatment of acute pancreatitis requires a multidisciplinary approach. Mild acute pancreatitis causes disturbance in the homeostatic mechanism of the body is minimal; the treatment is aimed at supporting the native reparative processes of the body. One of the main supportive mechanisms is adequate and safe nutritional supplementation.

Objectives: To assess the occurrence of infective and non-infective complications in cases of acute pancreatitis on early enteral nutrition.

Materials & Methods: This is a prospective study conducted on patients who were admitted to SSIMS AND RC Davangere with symptoms suggestive of acute pancreatitis from July 2019 to July 2021. Patients with a clinical picture consistent with the diagnosis of acute pancreatitis, along with more than a 3-fold elevation of serum amylase and elevated serum lipase were considered to have acute pancreatitis. After initial diagnosis and assessment, patients were duly informed regarding the study and consent was obtained. A 16-gauge nasogastric Ryle's tube was inserted for all patients included in the study. The feeding patterns were initiated depending upon the severity of acute pancreatitis. Feeding was started after calculating the nutrition requirement. In the early feeding group, patients were given a protein powder to achieve a target nutrition in a stepwise manner. The tolerance to feeds, infective and non-infective complications and the time taken to start on an oral diet were noted and analysed.

Results: The incidence of infective complications in our study was found to be 2% with none of the infections involving the pancreas itself. The incidence of non-infective complications in our study was found to be 30% with 13% involving the pancreas proper.

Conclusions: The use of early enteral feeding does not influence the incidence of infective and non-infective complications in mild and moderate acute pancreatitis. Early enteral feeding delivers nutrition, in a simpler and more cost-effective. Nasogastric and oral feeding reduces the morbidity of the patient by accelerating the return to normal activities.

Keywords: Acute pancreatitis, enteral feeding, infective complications, non-infective complications

Introduction

Acute pancreatitis has been recognized since antiquity[1,2] but the importance of the pancreas and the severity of its inflammatory disorders were realized only in the middle of the 19th century[3].

Acute pancreatitis is a common disorder. The data available are mainly from US and UK. It has been noticed in most of the studies that there is an increase in the disease by a factor of 10 in the past three decades. The reason for the increase is speculated to be an increase in alcohol abuse and an improved ability to diagnose the disease. But the disease has been a cause of significant morbidity and mortality[4,5]. Both sexes are equally affected

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Since the disturbance in the homeostatic mechanism of the body is minimal, the treatment is aimed at supporting the native reparative processes of the body. One of the main supportive mechanisms is adequate and safe nutritional supplementation. Acute pancreatitis is a hypermetabolic state marked by increased energy expenditure, proteolysis, gluconeogenesis, and insulin resistance. Nutritional supplementation in acute pancreatitis is complicated by these diverse pathophysiologic derangements associated with the disease.

Increasing evidence suggests that enteral feeding maintains the intestinal barrier function and prevents or reduces bacterial translocation from the gut. Furthermore, enteral nutrition eliminates some of the complications of parenteral nutrition such as catheter-related sepsis, thrombosis, thrombophlebitis, catheter-related embolism and pneumothorax.

Objectives

To assess the occurrence of infective and non-infective complications in cases of acute pancreatitis on early enteral nutrition.

Methodology

This prospective study was conducted on patients admitted to SS Hospital with symptoms suggestive of acute pancreatitis from July 2019 to December 2021.

Sample size: 50 patients.

The sample size was calculated by using the formula,

Sample size(n)= $2(Z\alpha+Z\beta)2\ P(1-P)$

D^2

Sample size estimation was done using open epi software 2.3.1

At 95% confidence level

80% is power of the study

According to Petrov sm et al [6] : The portion of study subjects who tolerated oral fully following Nasogastric tube: 50% =P1. The portion of study subjects who tolerated oral fully following Nasogastric tube: 5.8%=P2. According to the formula, the sample size estimated in each group is 20. Assuming that there 20% loss of cases 20+4=24 approximately 25. Hence sample size is 25 in the Early Feeding group and 25 in nil per oral Group.

Method Of Collection of Data:

Patients with a clinical picture consistent with the diagnosis of acute pancreatitis, along with more than a 3-fold elevation of serum amylase and elevated serum lipase were considered to have acute pancreatitis.

The clinical findings considered suggestive of acute pancreatitis are as follows:

i. acute epigastric pain
ii. radiation of pain to the back
iii. associated nausea/vomiting
iv. history of alcoholism, history suggestive of gall stone disease
v. above symptomatology not attributed to any other obvious pathology

All the cases considered for the study underwent a comprehensive evaluation as follows

: 1) Thorough clinical history and examination with emphasis on age, character of pain abdomen, radiation to the back, history of alcoholism / gallstone disease and treatment history.

2) Biochemical investigations relevant for Ranson's scoring which include: - On admission: Random blood sugar (RBS), total leucocyte count (TLC), serum lactate dehydrogenase (LDH), serum aspartate transaminase (AST), haemoglobin and packed cell volume (PCV), blood urea nitrogen (BUN), serum creatinine, arterial blood gas analysis (ABG). - After 48 hours of admission: Serum calcium, Repeat PCV, BUN, ABG.

3) Imaging modalities: Chest x-ray, Ultrasound abdomen, contrast enhanced CT scan abdomen.

Based on the Ranson's score, the severity of acute pancreatitis will be graded as follows [6]

Score </=1 ---- Mild acute pancreatitis

Score 2 – 3 ---- Moderate acute pancreatitis

Score > 3 ------- Severe acute pancreatitis

INCLUSION CRITERIA:

- Age < 70yrs
- Cases of mild (Ranson score ≤1) and moderate (Ranson score 2-3) acute pancreatitis.
- Systolic blood pressure > 90mmhg.
- Serum Creatinine ≤ 2 mg/dl

EXCLUSION CRITERIA:

- Age > 70yrs - Cases of severe acute pancreatitis (Ranson's score > 3)
- Serum Creatinine > 2mg/dl
- Signs of shock at time of presentation
- Complications of acute pancreatitis like: Peri-pancreatic abscess Pancreatic necrosis Drug induced pancreatitis Post ERCP pancreatitis

Initial diagnosis and assessment were done by the treating unit in surgery and the patients were admitted in the surgical wards. Patients were duly informed regarding the study and after obtaining the consent,

a 16/14-gauge Nasogastric Ryle's tube was inserted for all patients included in the study. The feeding patterns were initiated depending upon the severity of acute pancreatitis as follows:

Timing of Enteral Feeding :

1. Mild Acute Pancreatitis: Started immediately on diagnosis
2. Moderate Acute Pancreatitis: Started within 48 hrs of diagnosis

The nutritional requirement was calculated based on the weight of the patient and the recommended caloric intake for that weight. The weight was measured at the time of admission or approximated using the recumbent height if the patient's condition did not permit a formal measurement. The formulae used to calculate the nutritional requirement are as follows:

Caloric intake: 35 Kcal/kg/day (target caloric delivery)

Protein intake: 1.5 gm/kg/day

Fat intake: < 15% of the total calories required per day.

The goal of achieving the target nutrition delivery was achieved in four steps:

Step 1: initiation of clear liquids only

Step 2: delivering 15 Kcal/kg/day

Step 3: delivering 25 Kcal/kg/day

Step 4: delivering 35 Kcal/kg/day

The stepwise initiation of feeds was designed to minimize pain and avoid metabolic complications due to nutritional overload in a suboptimally functioning digestive system.

Nutritional Preparation Used: The nutritional requirement was fulfilled using a standardized preparation to avoid differences in nutrient composition and rates of absorption. The nutritional preparation used was Malzix Protein powder.

Composition of Malzix Protein powder being:

Table 1: Composition of Malzix Protein powder

Each 100 gm contains :	
Protein (Nitrogen content 22500mcg)	36 g
Carbohydrates	58 g
Tri Calcium Phosphate	2 g
Methylcobalamin	500 mcg
Glucosamine Sulphate	500 mg
Vitamin A	5000 IU
Vitamin D_3	250 IU
Vitamin B_1	1 mg
Vitamin B_2	1 mg
Vitamin B_6	0.6 mg
Vitamin E	10 IU
Folic acid	500 mcg
Biotin	250 mcg
Niacinamide	10 mg
Sodium Selenate	250 mcg
Chromium Picolinate	100 mcg
Zinc Gluconate	20 mg
Ferrous Gluconate	20 mg
Magnesium	100 mg
Potassium	100 mg
Iodine	125 mcg
Sodium	250 mg
Manganese	1 mg
Copper	250 mcg
N. Acetyl Cysteine	10 mg
L.Lysine Mono Hcl	1 mg
Dietary Fibre	1 mg
EAA (Essential Amino Acids)	q.s.
Energy	376 k. Calories

Grams of Malzix Protein powder required per day = Kcal required for 24 hours × 100/ 511.9

The time taken to achieve the target nutrition was calculated.

Mild exacerbations of pain were treated by analgesics and antispasmodics. The patient was closely monitored for any infective and non-infective complications. Once the target nutrition was achieved and the patient had normal bowel sounds on auscultation, the nasogastric tube was removed and the patient started on normal oral feeds.

Results

The subjects were divided into two categories.

Group A: Patients who were allowed early feeding

Group B: patients who kept nil per oral and allowed orally later on.

Table 2: Demographic details and clinical data of the patients

	Group A	**Group B**	**Total**
Age-			
< 40 yrs	15 (60%)	16 (64%)	31
40 – 60 yrs	10 (40 %)	8 (32%)	18
> 60 yrs	0	1 (4 %)	1
Gender-			
Male	20 (80%)	20 (80%)	40
Female	5 (20%)	5 (20%)	10

Aetiology-			
Alcoholic	19 (76%)	15 (60%)	34
Gall Stones	3 (12%)	5 (20%)	8
Idiopathic	3 (12%)	5 (20%)	8
Chief complaints-			
Pain Abdomen	25 (100%)	25 (100%)	50
Nausea and Vomiting	16 (64%)	12 (48%)	28
Co-Morbidities-			
Present	6 (24%)	4 (16%)	10
Absent	19 (76%)	21 (84%)	40
Vitals- Pulse rate (per min)	81.20 ± 8.83	84.92 ± 7.04	
Respiratory rate (per min)	17.40 ± 2.68	16.40 ± 2.31	
SPO2	96.12 ± 3.06	95.12 ± 2.58	
Lab Investigations			
Serum Amylase	619.96 ± 229.62 U/L	655.20 ± 230.14 U/L	
Serum Lipase	645.96 ± 158.94 U/L	648.92 ± 143.71 U/L	
Imaging modalities			
USG + CT	9	8	
USG	16	17	
Severity of Acute pancreatitis			
Mild	12 (48%)	10 (40%)	
Moderate	13 (52%)	15 (60%)	

Table 2 shows, the demographic and clinical data of the patients. Out of 50 patients majority (31) of the patients belonged to age less than 40 years. Out of the 50 patients studied, 40 were males and 10 were females. This may due to the intake of alcohol is more in men.

The aetiology for pancreatitis was most commonly associated with alcohol in the majority of the patients. In 8 patients, the cause was due to gall stones and in 8 patients, the cause was idiopathic. This is in par with most of the studies that state that alcohol is the most important risk factor for pancreatitis.

It was noticed that the most common chief complaint in all the patients was pain abdomen. All 25 patients, in each group, had some form of pain abdomen. Some presented with pain and tenderness in the epigastric region and some in the umbilical region and some in the left lumbar region.

It was also observed that the majority of the patients (28) presented with the chief complaints of nausea and vomiting associated with pain abdomen.

Out of the 50 patients, 10 patients had co-morbidities. These co-morbidities only worsened the prognosis of the patient and had complications.

It was seen that in mild and moderate cases of pancreatitis, the serum amylase and serum lipase ranged from 500- 1000 U/l. Out of 50 patients, 17 patients underwent both USG and CT. 33 patients underwent only USG. The reason for not doing CT in all patients was the cost factor.

Categorization of patients based on the severity; 22 patients were found to have mild pancreatitis with a Ranson's score of 0 to 1. 28 patients were found to have a score 2 to 3 – moderate pancreatitis.

Table 3: Association of Acute pancreatitis with respect to enteral feeds

	Group A	Group B	P value
Starting of Oral feeds (in no of days)	1.44 ± 0.51	5.04 ± 0.68	0.001
Severity of Acute Pancreatitis based on the day of starting oral feeds			
Mild Pancreatitis	1.00 ± 0.00	4.90 ± 0.57	0.001
Moderate Pancreatitis	1.85 ± 0.37	5.13 ± 0.74	0.001
Average	1.425	5.015	0.001
Initiation of normal diet	5.16 ± 1.11	7.08 ± 0.57	0.001
Severity of Acute Pancreatitis based on the day of starting normal diet			
Mild Pancreatitis	6.25 ± 1.5	6.80 ± 0.42	0.001
Moderate Pancreatitis	5.15 ± 0.98	7.27 ± 0.59	0.001
Average Days	5.7 days	7.035 days	0.001

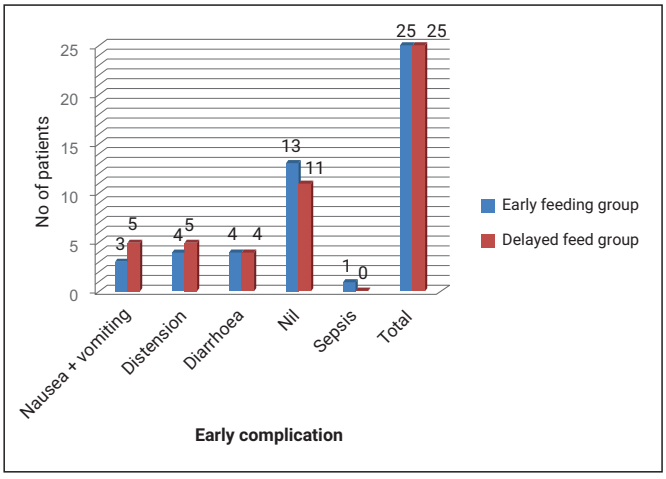
Table 3 shows, based on the starting of the oral feeds in Group A, the feeds were either started on the first day and in Group B the feeds were started on mean day 5. Since the p was is less than 0.05, this was found to be statistically significant. Severity of Acute Pancreatitis based on the Oral feeds in the group A, the feeds were started earlier when compared to group B. Since the p was is less than 0.05, this was found to be statistically significant.

By day 5 most of the early feeding group was on normal diet and by day 7, most of the late feeding group was on normal diet. Since the p value is less than 0.05 this is highly significant. Group A tolerated normal feeds much earlier than Group B patients. Group A patient could reach the target nutrition earlier than Group B. It is seen that in group A, where patients were taking early feeds, normal diet was started earlier than in those who took delayed feed.

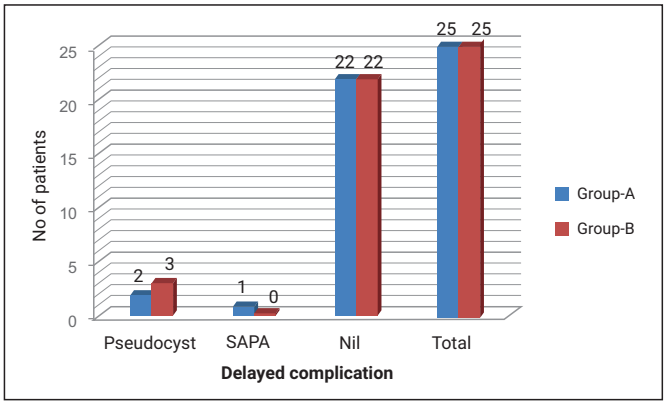
Table 4: Complications of feeds

Early Complications			
	Early feeding group	**Delayed feed group**	**Total**
Nausea + vomiting	3	5	7
Distension	4	5	9
Diarrhoea	4	4	8
Nil	13	11	24
Sepsis	1	0	1
Total	25	25	50
Delayed complications			
Complications	**Group-A**	**Group-B**	**Total**
Pseudocyst	2	3	5
SAPA	1	0	1
Nil	22	22	44
Total	25	25	50

Table 4 shows, that most of the patients in the early enteral feeding group had no complications and the most common complication being diarrhoea and ileus, 4 patients, followed by nausea and vomiting. Patients in the delayed group had ileus and nausea and vomiting as the most common complication followed by diarrhoea. One patient in the early enteral group, after feeding went into sepsis and mods and pain became severe. It was seen that 5 patients developed a pseudo cyst after the resolution of acute pancreatitis. 1 patient developed a splenic artery pseudo aneurysm (SAPA). 44 patients were without any complications.



Graph 1: Early Complications



Graph 2: Distribution of Delayed complications.

Discussion

In the present study had found the incidence of infective complications in our study was found to be 2% with none of the infections involving the pancreas itself. The incidence of non-infective complications in our study was found to be 30% with 13% involving the pancreas proper.

Patients had developed a few complications due to the feeds. The most common was nausea and vomiting followed by distension and diarrhoea. Unlike Eckerwall et al [7], our patients didn't have any features of pulmonary insufficiency, pleural effusion, atelectasis, acute fluid collection, pancreatic necrosis mods and death. Olah et al [8] also had similar complication, SIRS, MODS, Pancreatic abscess, Pneumonia and death. Abuassai et al [9] had ARDS, pancreatic necrosis, and hyperglycemia. Manjunath et al [10] had similar complications, such as nausea, vomiting being the maximum followed by ileus and diarrhoea. Petrov et al[6] had urinary infection, pneumonia and venous catheter. However, one patient did worsen after taking early enteral feeds and went into sepsis.

Long terms complications, Majority of the cases did not have any complications. 5 cases did develop a pseudocyst and one patient had a splenic artery pseudoaneurysm. There was no significant variation in the complications of pancreatitis in patients who were early fed to those who were fed late. Similar complications were also seen in Petrov et al[6], Abuassai et al[9], Olah et al[8], and Maheshwari et al[11]. No patient in our study had SIRS or MODS or death, which was seen in the above-mentioned studies.

The limitations of the present study were sample size was small. Reasons scoring system is now outdated and the Atlanta system is now preferred. We couldn't do a CT scan for all the patients of the study. Severe pancreatitis cases were excluded from the trial. The patients couldn't be followed up after they had developed complications from the study. The study

does not have a control group and does not employ double-blinding and randomization.

Conclusion

Use of early enteral feeding does not influence the incidence of infective and non-infective complications in mild and moderate acute pancreatitis. Early enteral feeding does not increase the need for surgical intervention in cases of mild and moderate acute pancreatitis. Early initiation of enteral feeding in mild and moderate pancreatitis reduces the duration of hospital stay. Early enteral feeding delivers nutrition, in a simpler and more cost-effective manner, without compromising on the benefits of enteral nutrition. Nasogastric and oral feeding reduces the morbidity of the patient by accelerating return to normal activities.

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