

Can Postoperative Nutrition be Favourably Maintained by Oral Diet in Patients with Emergency Temporary Ileostomy? A Tertiary Hospital Based Study

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ABSTRACT

Introduction: Temporary ileostomy is an emergency procedure performed in cases having septic peritonitis in presence of perforation or obstruction or gangrene of small intestine. These patients usually suffer from gross malnutrition following surgery.

Aim: To measure nutritional status of patients with emergency temporary ileostomy and to determine whether their postoperative nutrition can be favourably maintained by oral diet alone.

Materials and Methods: Sixty patients were enrolled for the study on the basis of inclusion and exclusion criteria during the study period from January 2012 to December 2013. Oral feeding was started as soon as ileostomy started functioning and patients expressed hunger, about 48-72 hours postoperatively. An individualized diet chart was formulated for each patient using Harris Benedict Equation. Nutritional assessment was done on 1)

1st day of oral feeding, 2) After 7 days of oral feeding, 3). After three months of oral feeding. Nutritional parameters (anthropometric, biochemical) employed were tabulated and statistically analysed with SPSS v 17, Chicago.

Results: Out of 60 patients, 36 males and 24 females were enrolled in the study. The patients were in the age group of 20-60 years with a mean age of 45 years. After 7 days of oral nutrition the nutritional status deteriorated with a significant decrease in body weight ($p < 0.001$) and serum haemoglobin ($p < 0.001$). However, at the end of the study, the patients had their nutritional status restored satisfactorily with normalization of basic parameters like bodyweight, haemoglobin and serum albumin ($p < 0.001$).

Conclusion: Proper dietary advice and oral nutrition were found to be sufficient for gradual restoration and maintenance of satisfactory nutritional status in the postoperative period.

Keywords: Gangrenous small intestine, Nutritional status, Postoperative nutrition

INTRODUCTION

Temporary ileostomy is a lifesaving procedure which needs to be performed in emergency cases having perforated or obstructed or gangrenous small intestine. These patients generally have septic peritonitis with fecal contamination and unhealthy bowel [1-5]. Ileostomy results in gross impairment of absorptive capacity in the postoperative period with increased stomal loss of fluids and electrolytes. The patients have an inappropriate food intake due to physical morbidity and emotional trauma. Therefore, they suffer from chronic dehydration, gross malnutrition, impaired immunity and deranged body function [1-4]. It is thus a challenge for the surgeon to provide appropriate and adequate nourishment in presence of catabolism and sepsis. Oral nutrition is preferable as it is physiologic, cost effective with fewer complications [1,2].

The present study was carried out to determine the postoperative nutritional status of patients having emergency ileostomy receiving only oral nutrition. The aims of the study were to detect the changes in the nutritional status of ileostomy patients after starting postoperative oral feeding using specific nutritional parameters and also to determine whether a satisfactory state of nutrition can be achieved in ileostomy patients kept only on oral diet.

MATERIALS AND METHODS

The study was carried out in the Department of Surgery of a Government Medical College having tertiary care facility. It was an institution based, prospective, single arm, observational study over a period of two years from January 2012 to December 2013. The study was approved by the Hospital Ethics Committee. A written and witnessed informed consent was obtained from all patients and formally recorded in the casesheet. Only adults aged more than 12

years of age requiring emergency ileostomy were enrolled in the study.

Sixty admitted patients (Male-36, Female-24) were recruited for the study on the basis of following inclusion and exclusion criteria. The patients were in the age group of 20-60 years with a mean age of 45 years. Most of the studied patients had a low socio-economic condition. All of them presented with an acute abdomen and needed emergency surgery and construction of a temporary ileostomy.

Inclusion criteria

All the patients were found to have perforated or obstructed or gangrenous small bowel. In each case a temporary stoma was created in the ileum as a lifesaving emergency surgery.

Exclusion Criteria

- 1) Patients with incidentally discovered or previously diagnosed gut malignancies.
- 2) Major medical co-morbidities e.g.- diabetes mellitus, chronic renal failure, chronic obstructive pulmonary disease, cardiac failure, hepatic failure etc; presence of which significantly affects maintenance of nutrition.
- 3) Paediatric patients, < 12 years.
- 4) Patients needing colostomy.
- 5) Patients with tube jejunostomy for feeding.
- 6) Patients requiring TPN.
- 7) Major postoperative complications like wound dehiscence, prolapse or retraction of stoma, severe dehydration hindering oral feeding.

Oral feeding was started as soon as ileostomy started functioning and the patient expressed hunger; about 48-72 hours postoperatively. Anthropometric and biochemical examination was performed to observe the outcome in nutritional parameters. Nutritional status was assessed on:-

- 1) 1st day of oral feeding; 2) After 7 days of oral feeding; 3) After 3 months of oral feeding (patients were followed up in the surgical OPD).

Nutritional status was measured by using the following parameters:-

- a. Body weight.
- b. Blood tests- Haemoglobin (Hb), Total leucocyte count (TLC).
- c. Blood biochemistry- serum total protein, serum albumin, serum electrolytes (Na⁺, K⁺).
- d. Stomal output: volume and consistency.

All recorded data were statistically analysed with SPSS v17, Chicago to draw an appropriate conclusion.

In the immediate postoperative period all the patients received intravenous fluids and blood transfusion. Once oral nutrition was started, intravenous fluids were discontinued. An individualized diet chart was formulated for each patient using Harris- Benedict Equation [1]. Oral diet was at first restricted to clear liquids. Gradually solid food was introduced; different food items introduced one at a time and stopped immediately if adverse symptoms developed. All patients were offered a diet to which he/she was otherwise accustomed i.e. common food items consumed locally. During entire period of study nutrition offered was purely oral and none of the patients received any intravenous nutritional supplements. Certain dietary guidelines have been recommended for these patients [2,3,5-9].

1. Food consumed is to be chewed properly for better tolerance. Small amounts of meal taken frequently (6-8 times/day) is preferable to large quantities all at one time.
2. Have the biggest meal during daytime to reduce ileostomy output at night. Taking fluids between meals(at least 8-10 cups/day) reduces dumping and prevents stoma blockage.
3. Swallowing air causes gas, so it is advisable to avoid chewing gum, carbonated drinks, tobacco smoking and chewing quickly.
4. Recommended foods include:-
 - a. Dairy products (milk, cheese, yoghurt)- may avoid in first month if bloating, diarrhea occurs.
 - b. Adequate protein e.g.-meat and poultry, fish and eggs- they may cause odor and need to be tried in small amounts first.
 - c. Cereals and bread.
 - d. Food items which provide constipation relief-cooked fruits and vegetables, fruit juices, mild laxatives.
 - e) Food which provide control of loose stool- rice, bananas, toast, potatoes.
5. Patients need to take an oral multi-vitamin supplement as well as oral preparation of iron, calcium, liquid magnesium, zinc, manganese, selenium etc. Patients enrolled in our study were instructed to follow the above guidelines. The patients were taught to record their daily diet, any adverse symptoms noticed and ileostomy output in a diary. Each patients' intake was strictly monitored and all patients were regularly reviewed for diet compliance. Any minor postoperative complication like wound infection, skin excoriation, mild dehydration was managed accordingly.

RESULTS

The various indications of emergency ileostomy in the patients enrolled are shown in [Table/Fig-1]. In our study ileal perforation

(49.8%) due to disease or trauma was the commonest indication of construction of ileostomy. Abdominal tuberculosis (33.3%) was the commonest disease affecting the small gut with an emergency presentation of perforative peritonitis or acute intestinal obstruction. The nutritional status of the studied patients was first assessed on the 1st day of oral nutrition [Table/Fig-2]. This initial assessment showed that the nutritional parameters were below average/subnormal in most of the studied patients. The parameters were again measured 7 days after initiation of oral nutrition. The results are shown in [Table/Fig-2,3]. The tables show that the haemoglobin level, body weight and total leucocyte count declined significantly in these 7 days ($p < 0.001$). Mean of serum protein level was increased

Sl No.	Ileostomy Indication	No. of Patients (N=60)	Percentage
1	Abdominal TB -ileal perforation	08	13.3%
2	Abdominal TB -ileal stricture/s with intestinal obstruction	12	20%
3.	Enteric fever-ileal perforation	06	10%
4.	Band obstruction of small gut with gangrene	08	13.3%
5.	Strangulated hernias with gangrenous gut	08	13.3%
6.	Blunt/ penetrating abdominal trauma with ileal perforation/ transection	08	13.3%
7.	Iatrogenic ileal Injury	04	6.6%
8.	Worm perforation	02	3.3%
9.	Crohn's disease	02	3.3%
10.	Others	02	3.3%

[Table/Fig-1]: Various indications of emergency ileostomy

Parameters		Mean	N	±SD	SEM
Haemoglobin (gm/dl)	1 st day of oral feeding	9.57	60	1.655	0.214
	7 days after oral feeding	9.06	60	1.109	0.143
Total Leucocyte Count/μL	1 st day of oral feeding	14020.00	60	4210.511	543.575
	7 days after oral feeding	10976.67	60	3287.850	424.460
Serum Sodium (mEq/L)	1 st day of oral feeding	131.73	60	6.028	0.778
	7 days after oral feeding	133.97	60	3.962	0.511
Serum Potassium (mEq/L)	1 st day of oral feeding	3.61	60	0.615	0.079
	7 days after oral feeding	3.63	60	0.567	0.073
Total Protein (gm/dl)	1 st day of oral feeding	4.98	60	0.755	0.097
	7 days after oral feeding	5.20	60	0.585	0.076
Serum albumin(gm/dl)	1 st day of oral feeding	2.54	60	0.409	0.053
	7 days after oral feeding	2.55	60	0.363	0.047
Stomal output(CC/24 hrs)	1 st day of oral feeding	122.33	60	67.281	8.686
	7 days after oral feeding	900.00	60	270.593	34.933
Body Weight (kg)	1 st day of oral feeding	54.23	60	8.062	1.041
	7 days after oral feeding	47.03	60	7.839	1.012

[Table/Fig-2]: Nutritional parameters at the onset (day 1) and after 7 days of oral feeding.

Difference between Parameters on 1 st & 7 th day of Oral nutrition	Paired	Samples	Test			t	df	Significant (2-tailed)
	Mean	±SD	SEM	Lower	Upper			
	Paired	Differences		95.5%	C.I			
	Mean	±SD	SEM	Lower	Upper			
Haemoglobin	0.507	0.945	0.122	0.263	0.751	4.154	59	< 0.001
Total leucocyte count	3043.333	2638.911	340.682	2361.630	3725.036	8.933	59	<0.001
Serum Sodium	-2.233	6.366	0.822	-3.878	-0.589	-2.718	59	0.009
Serum Potassium	-0.018	0.760	0.098	-0.215	0.178	-0.187	59	0.852
Total Protein	-0.227	0.544	0.070	-0.367	-0.086	-3.226	59	0.002
Serum albumin	-0.012	0.396	0.051	-0.114	0.091	-0.228	59	0.820
Stomal Output volume	-777.667	251.068	32.413	-842.524	-712.809	-23.993	59	<0.001
Body weight	7.200	1.715	0.221	6.757	7.643	32.513	59	<0.001

Table/Fig-3]: Paired t-test difference between nutritional parameters at the onset (Day1) and after 7 days of oral feeding

Parameters		Mean	N	±SD	SEM
Haemoglobin (gm/dl)	7 days after oral feeding	9.06	60	1.109	0.143
	3 months after oral feeding	10.54	60	0.819	0.106
Total Leucocyte Count/μL	7 days after oral feeding	10976.67	60	3287.850	424.460
	3 months after oral feeding	6530.00	60	1024.166	132.219
Serum Sodium (mEq/L)	7 days after oral feeding	133.97	60	3.962	0.511
	3 months after oral feeding	135.90	60	2.245	0.290
Serum Potassium (mEq/L)	7 days after oral feeding	3.63	60	0.567	0.073
	3 months after oral feeding	3.69	60	0.285	0.037
Total Protein (gm/dl)	7 days after oral feeding	5.20	60	0.585	0.076
	3 months after oral feeding	6.18	60	0.426	0.055
Serum albumin(gm/dl)	7 days after oral feeding	2.55	60	0.363	0.047
	3 months after oral feeding	3.41	60	0.314	0.040
Stomal output(CC/24 hrs)	7 days after oral feeding	900.00	60	270.593	34.933
	3 months after oral feeding	615.00	60	133.499	17.235
Body Weight (kg)	7 days after oral feeding	47.03	60	7.839	1.012
	3 months after oral feeding	51.73	60	7.666	0.990

[Table/Fig-4]: Nutritional Parameters after 7 days and after 3 months of oral feeding

significantly ($p < 0.001$) and serum albumin increased slightly. Mean of changes in serum electrolyte level increased slightly. Stomal output considerably increased, ($p < 0.001$) the consistency mostly liquid in nature. So changes in Haemoglobin, Total leucocyte count, stomal output, serum total protein and body weight are statistically significant whereas changes in serum albumin, serum sodium and potassium level were found to be insignificant (p -value > 0.005). The parameters were again measured 3 months after initiation of oral nutrition; the results are shown in [Table/Fig-4]. Mean of haemoglobin, and body weight improved optimally whereas mean of Total leucocyte count and stomal output decreased. Serum electrolytes increased slightly. Serum total proteins and serum albumin increased to reach acceptable normal values. [Table/Fig-5] shows that except for serum potassium levels, p -value of changes of all other parameters were found to be statistically significant ($p < 0.001$). It signifies that at the end of the study, the basic parameters (haemoglobin, body weight, total leucocyte count, stomal output, serum albumin) which play pivotal roles in terms of morbidity and fitness for next surgery (stomal closure) are normalized. After 7 days of oral nutrition, stomal output increased in almost every patient and was mainly liquid in consistency. With progress of the study there was gradual decline in volume of stomal output and the consistency became semisolid or solid in nature.

DISCUSSION

Temporary ileostomy is a surgically created opening in the ileum on to the anterior abdominal wall. Created in the emergency setting of perforation or gangrene with peritonitis, temporary ileostomy is lifesaving. It enables individuals to enjoy normal activities even though they have a stoma [1-5]. Nutritional depletion occurs in patients with ileostomy due to both anatomical and functional loss of gut, ongoing inflammatory activity due to disease with sepsis, pre-existing malnutrition and the added surgical stress. All these factors are to be considered while formulating an appropriate

Difference between Parameters after 7 th day & after 3 months of Oral nutrition	Paired	Samples	Test	95%	C.I	Significant (2-tailed)
	Mean	±SD	SEM	Lower	Upper	
Haemoglobin	-1.482	0.750	0.097	-1.675	-1.288	<0.001
Total leucocyte count	4446.667	2838.206	366.411	3713.480	5179.853	<0.001
Serum Sodium	-1.933	3.672	0.474	-2.882	-0.985	<0.001
Serum Potassium	-0.062	0.615	0.079	-0.220	0.097	0.440
Serum Protein	-0.978	0.589	0.076	-1.131	-0.826	<0.001
Serum Albumin	-0.860	0.473	0.061	-0.982	-0.738	<0.001
Stomal output volume	285.000	269.699	34.818	215.329	354.671	<0.001
Body weight	-4.700	2.102	0.271	-5.243	-4.157	<0.001

[Table/Fig-5]: Paired t-test difference between nutritional parameters after 7 days and after 3 months of oral feeding

management plan to restore and maintain nutritional status [1-3,5-9]. Enteral alimentation is the primary and preferred route for nutrition in patients with ileostomy. Enteral nutrition is physiologic, maintains intestinal integrity, reduces bacterial translocation and preserves the normal gut flora and the enteral immune system. It is more convenient, cost-effective with fewer complications [2,3,6]. Ileostomy allows early oral feeding in postoperative period, since the chances of anastomotic failure with increased morbidity is eliminated [1-4,6,7]. Traditionally three phases have been described in ileostomy patients receiving oral nutrition [2]. The first phase is the immediate postoperative phase with decrease in effective absorptive surface and capacity and patient may suffer from diarrhea. The second phase starts in the first week with the beginning of intestinal adaptation. It appears that food is a potent stimulus for secretion of gut hormones (motilin, neurotensin), mucosal development and bacterial colonization. The strategy of initiation of early oral feeding is an important component of intestinal adaptation and improved nutrition after small gut exteriorization [2,3,5-7]. The third and final phase is the phase of complete bowel adaptation which develops within a few weeks of initiation of oral feeding [1-3,6-9].

Dietary advice is an important aspect of the maintenance of oral nutrition. The aim of dietary management is to prevent stoma blockages after surgery, to promote healing of stoma wound and to minimize unpleasant gastrointestinal symptoms. The goal of the dietary approach is to provide a stepwise management of care. It is planned to progress from a liquid to a semisolid/solid diet. It is important to provide a high energy, high protein diet that is low in excess insoluble fibre [2,3,5-7,9]. It is advisable to add one new food at a time to observe its effects. Offending foods can be thus identified and avoided if felt necessary [2,3,5,7-9]. Most people can return to a normal diet after few weeks of oral feeding [2-5,8,9].

In the present study, the initial nutritional assessment on the 1st day of oral feeding showed subnormal parameters. This is probably because the studied patients mostly came from a low socioeconomic background, were already malnourished and their nutritional status had worsened due to the surgical pathology compounded with the stress of emergency surgery. The initial assessment was useful because it provided baseline values to which subsequent changes at the end of the study could be compared. The choice of various parameters employed was decided on the basis that they were simple to measure, required no elaborate equipment, results were quickly available and the results provided a fairly accurate estimate of all body components [1,5-7,9,10]. When the nutritional assessment was done after 7 days, all the studied patients had a remarkable weight loss.

The probable reasons are:-

1. Even a modest reduction of terminal ileum decreases body weight because of a reduction in body fat as there is increased fecal loss of bile acid leading to fat malabsorption [1,5-7,9].
2. In the 1st week as patient recovers from stress and sepsis, excess water in the extracellular compartment is excreted contributing to weight loss [1,2,5-7,9].
3. Excess fluid and nutrients lost from stoma, inadequate oral intake due to physical morbidity and emotional trauma were contributory to weight loss [1-7,9].

After few months of oral diet the functioning intestine subsequently adapts to hold fluid and nutrients to regain homeostasis and nutritional equilibrium with gain of weight [2-10]. In our study after 3 months, all our patients gained weight satisfactorily.

At the time of initial assessment, our patients were mildly anaemic. This is due to pre-existing malnourishment aggravated with perioperative blood loss. With oral feeding, patients were started on oral iron supplements. Yet after 7 days, the haemoglobin level went down. It appears that the loss of functional terminal ileum contributed to this anaemia in a background of persisting inflammation and

catabolism [2,5,7,9]. With intestinal adaptation, at the end of the study, all the patients regained the standard Haemoglobin level desirable for elective stoma closure. During initial assessment there was marked leucocytosis. After 7 days Total leucocyte count declined significantly after proper antibiotic coverage. After 3 months of complete resolution of sepsis, Total leucocyte count was within normal limits.

Serum albumin traditionally considered as nutritional marker is also considered as an inflammatory marker [1,2,6,7,9]. Serum albumin was below normal at the start of study. Rapid decrease in albumin levels can occur due to severe catabolism induced by sepsis. After 7 days of oral feeding albumin is slightly increased (possibly with the initiation of the anabolic phase). As absorption improved with time, and in absence of inflammation and sepsis, serum albumin became normalized. During the study initial serum electrolyte levels were slightly altered due to tissue injury, fluid retention or overzealous fluid replacement [1,5,7]. At the end of the study, p-value of changes in serum potassium levels was >0.005 i.e. statistically insignificant. However, p-value of changes in serum sodium level is statistically significant (p<0.001).

The amount, and consistency of the ileostomy output is influenced by the diet [2-9]. In our study after 7 days of oral nutrition stoma output increased in volume, was mostly liquid in nature- due to dampened mucosal integrity and poor absorptive capacity of the small gut. Amount decreased gradually and the consistency became liquid<semisolid<solid in nature with recovery of mucosal integrity and normal transit time at the end of the study.

Several similar studies have been done where emergency temporary ileostomy has been performed for almost same etiologies as documented in our study. Those studies have mentioned the stoma related nutritional complications and have noted the impact of ileostomy on diet and nutritional status of the patients. In our study, patients had a significant decline in nutritional status after 7 days of oral feeding. In the study of Mohil et al., there was an initial decline in nutritional status despite adequate nutritional support after 6 weeks of oral feeding [1]. In the study of Sinha et al., 66% of patients had a remarkable change in their diet after 6 weeks of postoperative oral feeding [11]. In our study patients had their nutritional status gradually restored after 3 months. Similar studies like that of Chowdhury et al., have noted a significant weight gain with improvement of BMI after 2 months (8 weeks) of oral feeding [12]. A study of Saini et al., have shown that with few diet modifications, the stoma patients had a satisfactory nutritional status at about 4-5 months (19 weeks) of oral feeding [4]. A study by Shaffy et al., has shown that with time, all ileostomy patients learn to adjust to a simple and bland diet to avoid flatus, odour, constipation, obstruction etc [13]. All the studies have shown that though there is an initial decline in nutritional status; with intestinal adaptation and appropriate diet modification, the digestion and absorption of patients with ileostomy gradually improve with a restoration of nutritional status after few months [4,11-14]. The patients in our study also showed improved appetite, weight gain with satisfactory nutritional parameters at the end of our study.

LIMITATIONS

There are few limitations in our study. The sample size was small with only 60 patients included in the study. Only a few nutritional parameters were considered. Many anthropometric, biochemical and immunological parameters were not measured. Even though the nutritional status was restored favourably, it is not clear how far the patients had to modify their diet and whether at all they were satisfied with their diet after 3 months of oral feeding.

CONCLUSION

Ileostomy is an emergency life saving procedure in patients with peritonitis. Maintenance of postoperative nutrition in these patients

is a challenge for the surgeon. After 7 days of oral diet the nutritional status deteriorated. However, at the end of the study after 3 months of oral diet, intestinal adaptation helped in the gradual improvement of nutritional status. Proper dietary advice and oral nutrition is sufficient for gradual restoration and maintenance of satisfactory nutritional status in the postoperative period.

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