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Evaluation of supporting role of early enteral feeding via tube jejunostomy following resection of upper gastrointestinal tract

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Abstract

Background: Today, early diagnosis of upper gastrointestinal (GI) tract malignancies and their surgical resection is becoming more feasible. One of the important side effects in upper GI tract malignancies is malnutrition which has direct relationship with postoperative complications. Nonetheless, there is no easy regimen of nutrition for these patients especially for the first week after operation. Accordingly we present a simple method for improving feeding such patients via tube jejunostomy. The aim of this study was to investigate the impact of early enteral feeding (EEF) on postoperative course after complete resection of upper gastrointestinal tract malignancy and reconstruction.

Methods: Between September 2005 to September 2008, 60 consecutive patients (22 female, 38 male) with upper GI tract malignancies who had undergone complete resection and reconstruction enrolled in this study. The patients randomly divided equally in two groups of control and EEF. Control group was treated with traditional management of nil by mouth and intravenous fluids for the first five postoperative days and then with liquids and enteral regular diet when tolerated. In EEF group the patients were fed by tube jejunostomy from 1st postoperative day and assessed for nutritional status before surgery and 5 days after surgery. Both groups were monitored on the basis of weight gain, clinical and paraclinical parameters and postoperative complications.

Results: Sixty patients were randomly divided to two equal groups. Surgical procedures were similar in two groups and no significant difference in demographic and basic nutritional status were found. On 5th postoperative day serum albumin was 4.2±0.4 g/dl in EEF and 3.6±0.3 g/dl in control group (p= 0.041). Also serum transferrin was 260.8±2.5 mg/dl and 208±1.8 mg/dl in EEF and control group respectively (p<0.001). Moreover, hospital stay was shorter in EEF group (7.7±3.1 vs. 14±2.5 days, p=0.009).There were four (13.3%) anasatomotic leakages in control group and one (3.3%) in EEF group (p=0.353). Also there was six (20%) wound infection in control group and three (10%) in EEF group (p=0.472).

Conclusion: The EEF by tube jejunostomy can be an effective method of feeding patients in postoperative days of resection of GI malignancies. Postoperative hospital stay would be shorter and the level of laboratory parameters especially serum transferrin is higher in EEF in comparison with control group. It also may reduce postoperative complications such as wound infection and enterocutaneous fistula.

Keywords: Nutrition, Postoperative Complications, Enteral feeding, Tube jejunostomy.

Introduction

The incidence of gastrointestinal (GI) caner is increasing each year and it is estimated that in the year 2011, 17000 new

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cases of carcinoma of the esophagus will occurr in the United States and 15000 people would die due to this cancer (1). Of those new cases, malnutrition is a common comorbidity (2). Compared to patients with other digestive and extra digestive neoplasia, the highest incidence of malnutrition (78.9%) was found in those with esophageal cancer (3). Patients typically suffer from with malnutrition at the time of diagnosis, while the severe side effects of multimodality treatments contribute to further risk for nutritional deficits. In a review of 30 esophageal cancer patients admitted to our center, nutritional deficit, as a weight loss of >10%, was apparent in 70%. In most cases, weight loss occurred rapidly over a period less than four months as a result of progressive dysphagia and/or anorexia with intolerance to regular diet. Because weight loss has been identified as a poor prognostic factor in patient's outcome, (4) prompt nutritional interventions are necessary. This article reviews strategies that can be used by clinicians to preserve or restore the nutritional status of the aforementioned patients throughout their surgical treatment using tube jejunostomy.

Methods

This study was a randomized controlled trial performed in Shariati Hospital of Tehran University of Medical Sciences. The study protocol was approved by university research committee. All patients filled in informed written consent to participate in the study.

Sixty patients with upper gastrointestinal disorders were selected for GI tract resection enrolled in the study. The preoperative oncological assessment such as chest X ray, CT scan of chest and abdomen, upper GI endoscopy and abdominal sonography were conducted on each patient. High risk patients such as diabetics, and patients suffered from COPD, cardiac diseases, hepatic and renal failure were excluded from the study. All signs of sepsis, and surgical complications, as well as the length of postoperative hospital stay and 30 day mortality were recorded. The patients randomly divided equally in two equal groups, control and early enteral feeding (EEF) group. Control group treated by traditional management of nil by mouth and intravenous fluids for the first five postoperative days and then with liquids and enteral regular diet when it was tolerated. In EEF group the patients were fed by the tube jejunostomy from 1st postoperative day. Patients were assessed for nutritional status before surgery and 5 days after surgery. Both groups were monitored on the basis of weight gain, clinical and paraclinical parameters and postoperative complications.

Feeding Protocol

Before operation patients from both groups were weighed and their calorie requirements estimated on the bases of Harris benedict equation and by basal energy expenditure was calculated but because of surgery we considered about 30-50% above than calculated BEE. The protein requirement was calculated and because of postoperative stress it was estimated about 1.5to2g/kg.

The formula for blenderized gavage was prepared on the basis of the following formula : 1) Beef 1.1 kcal/g and 0.22 protein/g; 2) One egg 75.2kcal and 6.2 g protein; 3) Corn oil, 9 kcal/g; 4) Rice 3.67kcal/g and 60mg protein/g; and 5) Glucose 4 kcal/g.

The needed calorie was estimated and then formula prepared as1 kcal/ml in boil water. The needed calorie consisted of 60% to 70% from carbohydrates and 30%to 40% from fat. Protein was supplied by beef and egg based on calculations. The gavage feeding was started the 1st day after operation in EEF group. In the first 24 hours, only 5%dextrose water was fed through gavage and the formula diet started the next day. At the first day of formula feeding about 50% of calorie was provided and reached to maximum needed calorie within 3 days. The total volume of gavage was divided in small doses and fed every 2 hours. The gavage feeding was ceased at 2 am till 6

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Table 1. Demographic data and basic nutritional parameters in both groups on daily basis before operation.

Parameter	Control group		Case group		p_value
	Mean	Standard deviation	Mean	Standard deviation	
Age (year)	57.26	5.4	54	4.5	0.072
Weight (kg)	59.9	5.4	60.9	5.8	0.152
Total protein (g/dl)	6.58	0.7	6.4	0.6	0.453
Serum albumin(g/dl)	3.4	0.47	3.8	0.32	0.6
Serum transferrin(mg/dL)	218	2.1	224	0.32	0.08
Hb (g/dl)	12.8	1.5	12.5	1.3	0.41
Hct (%)	30.94	3	30.8	3.2	0.568
Mg (mg/dL)	2.34	0.8	2.4	0.6	0.094
Ca (mg/dL)	8.3	1.2	8.4	1.1	0.084
P (mg/dL)	2.94	0.93	2.7	0.98	0.12
Blood Sugar (mg/dL)	96.8	7.4	101	6.8	0.087

am(midnight omitted).In control group only routine IV fluid therapy was done and at 5th day of operation limited amount of liquid diet started followed by semi solid and then solid diet after that. In this group biochemical parameters were measured like case group.

All patients were weighed daily and biochemical parameters measured twice weekly and also before operation. On the 5th day of operation a fluoroscopically contrast swallow of water soluble contrast medium was done to assess the anastomosis and thereafter oral diet using first liquid and then semiliquid food was begun in both groups.

Statistical Analysis

Statistical analysis was performed using the SPSS version 18.0. Normality of distribution of quantitative data was tested by Kolmogorov-Smirnov test. Between group comparisons for the mean of variables with normal distribution was performed by independent T-test, while for data without normal distribution Mann-Whitney U-test was used. Qualitative data was analyzed with Chi-square and $p<0.05$ considered as statistically significant.

Results

From September 2005 to September 2008, 60 patients (22 female, 38 male) were studied in two equal groups. In both groups preoperative nutritional status were estimated using the preoperative weight loss for three consecutive months and preoperative body mass index (BMI). Accordingly about 90% of patients were suffered from malnutrition. In control group, 16 patients (53.3%) suffered from gastric carcinoma, 13 (43%) esophageal carcinoma and one (3.3%) cancer of papilla. In EEF group, 10 patients (33.3%) were suffered from esophageal carcinoma and 19 (63.4%) gastric carcinoma and one (3.3%) from gastric leiomyoma. There was no significant difference in demographic and basic nutritional status of both groups (Table 1).

On 5th postoperative day there was significant difference of nutritional parameters in both groups with higher serum protein, serum albumin, total calcium, serum transferrin, blood sugar in EEF group in comparison with the control group (Table 2). Also the hospital stay was shorter in EEF group (7.7±3.1 vs. 14±2.5 days in control, p =0.009).

There was four (13.3%) anasatomotic leakage in control group and one (3.3%) in EEF (p=0.353). Also there was six (20%) wound infection in control group and three (10%) in EEF (p=0.472). However, none of them was statistically significant. There was no mortality in both groups.

Discussion

The clinical impact of malnutrition on pa-

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tients with cancer can be significant. Nutritional status in cancer patients has been correlated with surgical resectability rates (5) response rates to chemotherapy (6), length of hospital stays (7), and survival (4,8,9). Significant weight loss prior to surgery has also been associated with substantially higher postoperative morbidity and mortality rates in patients with esophageal cancer (10,11). These results are consistent with the abundance of literature that has documented that an increased susceptibility to postoperative infectious complications could be induced in malnourished cancer patients (12,13) and may be related to the adverse effect on immune status (14,15).

Nutritional support may benefit in those malnourished patients who have potential for a positive response to treatment. Proper nutritional support with early intervention can lead to improvement in nutritional status (16). Nonetheless, suppression of the gluconeogenesis associated with cancer cachexia, may decline digestive catabolism (17). Nutritional support in malnourished cancer patients has also been shown to impact clinical outcomes including improvement in tolerance to therapy (18,19), decreased number of hospitalizations (20), improved sense of well-being (21,22), and reduction in operative morbidity and mortality (23,26). Although demonstrating direct improvement in long-term survival is difficult because of the poor prognosis associated with the disease itself, adjuvant nutritional therapy is an important supportive measure that can reverse malnutrition and improve clinical outcomes in malnourished patients undergoing antineoplastic treatments.

The present study shows that EEF via tube jejunostomy is cost effective and reduces the incidence of hypoalbuminemia, hypoproteinemia, weight loss, wound infection, anastomotic leakage; enterocutaneous fistula and hospital stay in patients who underwent a complete resection of upper gastrointestinal malignancy and complications. Early postoperative nutrition via tube jejunostomy could prevent significant decrease in serum total protein and subsequently immune deficiency after major upper digestive tract surgery.

Other studies have evaluated the incidence of complication after gastrointestial surgery. Accordingly the incidence of enterocutaneous fistula and anastomotic leakage was reported as approximately 8% after upper gastrointestinal resection (2). Lewis in a systematic review and meta-analysis of 11 controlled trials found that in 8 of these trials the occurrence of anastomotic dehiscence was 2-7% in early feeding and 1-25% in control group (27).

Conclusion

On the basis of results we concluded that the percentage of complication as well as postoperative duration of hospital stay in tube jejunostomy group was less than con-

Table 2. Comparison of nutritional parameters in two groups on 5th postoperative day.

Parameter	EEF group		Control group		p_value
	Mean	Standard deviation	Mean	Standard deviation	
Total protein(g/dL)	6.8	0.8	6.5	1.1	0.05
Serum albumin(gr/dL)	4.2	0.4	3.6	0.3	0.041
Serum transferrin(mg/dL)	260.8	2.5	208	1.8	0.0001
Hb (gr/dL)	10.38	1.8	9.7	1.4	0.083
Hct (%)	31	3.1	28	3.2	0.071
Mg(mg/dL)	2.4	0.75	2.1	0.81	0.054
Ca(mg/dL)	8.4	1.35	7.8	1.41	0.006
P(mg/dL)	3	0.84	2.7	0.89	0.097
Blood Sugar (mg/dL)	105	2.6	85	3.1	0.001
Loss of weight (kg)	14	1.5	13.25	2.1	0.128
Hospitalization stay (day)	7.7	3.1	14	2.5	0.009
Hospitalization expenditure (Rials)	5510000	16000	6050000	12500	0.017

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trol group and increase in laboratory parameters especially serum transferrin was more vivid in control group. Hence, early feeding by tube jejunostomy after upper gastrointestinal tract anastomosis is effective on the progress of well-being in patients and decreases the postoperative complications.

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