EARLY ENTERAL FEEDING AFTER UPPER DIGESTIVE TRACT SURGERIES AND CLINICAL ASSESSMENT OF POST-OPERATIVE ILEUS

NUTRIÇÃO ENTERAL PRECOCE APÓS CIRURGIAS DO TRATO DIGESTIVO ALTO E AVALIAÇÃO CLÍNICA DE ÍLEOS PÓS-OPERATÓRIOS

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ABSTRACT: In general, feeding after a gastrointestinal surgery should only occur after resolution of the post-operative ileus. However, early enteral feeding has shown such advantages (i) as faster recovery of the gastrointestinal motility, (ii) a shorter hospital stay and (iii) a better nitrogen balance. Our aim is to demonstrate that early feeding does provide these advantages and is also tolerable. The patients submitted to surgeries of the upper digestive tract were randomly distributed in two groups: the control group, with oral feeding 72h after surgery, and the test group with enteral feeding through a nasojejunal catheter 24h after surgery. The following were assessed: abdominal diameter, abdominal aspect, bowel sounds, flatulence and stools elimination, presence or absence of reflux, diarrhoea, abdominal pain, nauseas and/or vomits, all of which on a daily basis. On the fourth post-operative day, the nitrogen balance was assessed for all patients. The date of discharge from hospital was also recorded. Patients in both the test group and the control group did not show any difference as to the period of hospital stay, recovery time of post-operative ileus and diet tolerance. The nitrogen balance was statistically significant ($p<0.000$) and better in the test group. Early enteral feeding after surgeries of the upper digestive tract is tolerable and enables a better nitrogen balance.

KEYWORDS: Early enteral feeding. Post-operative ileus. Gastrectomy. Bowel sounds. Evacuation. Flatus.

INTRODUCTION

The loss or reduction of motility in the gastrointestinal tract (GIT) is common after surgical procedures. This transient clinical condition is inappropriately called paralytic ileus, nondynamic ileus or even post-operative ileus (PI) and is characterized by the following: abdominal distention, absence or reduction of bowel sounds (BS); elimination of flatus and stools non-existent; nauseas and vomits; and abdominal pain (HOLTE; KEHLET, 2000; SCHUSTER; MONTIE, 2002; FANNING; YU-BREKKE, 1999). The period of time of this hypomotility condition can vary from a few hours to 5 days, according to which segment of the gastrointestinal tract is involved (RESNICK et al., 1997; WALDHAUSEN et al., 1990; CONDON et al., 1995).

Opioids can lengthen the condition of hypomotility or post-operative ileus (PI) through the inhibition of the gastrointestinal motility, mainly in the colons (HOLTE; KEHLET, 2000; SCHUSTER; MONTIE, 2002; SCHEININ et al., 1987). Non-steroidal anti-inflammatory drugs (NSAID) can minimize the PI (SCHUSTER ; MONTIE, 2002; FANNING; YU-BREKKE, 1999) by reducing both the local inflammation and the amount of narcotics required for killing pain (DE WINTER et al., 1997). These drugs can also minimize nauseas and vomits and ameliorate the gastrointestinal motility as a whole (KELLEY et al., 1993; CHENG et al., 1996; FERRAZ et al., 1995).

Traditionally, the diet of patients submitted to gastrointestinal surgeries only commences after the resolution of PI. Studies have demonstrated that the introduction of an early enteral feeding (EEF) is safe, well tolerated and reduces the time of PI (WANTANAB et al., 2002; HARTSELL et al., 1997; SINGH et al., 1998; DI FRONZO et al., 1999; DI FRONZO et al., 2003; REISSMAN et al., 1995). Its introduction is carried out through a nasogastric or nasojejunal catheter within 72 hours after trauma or surgery (WANTANAB et al., 2002).

There are a number of studies showing that EEF reduces hospital stay and infectious complications, accelerates wound healing, improves nitrogen balance (NB), improves immunity by ensuring the soundness of the intestinal mucosa and reduces health costs (NEUMAYER et. al,. 2001; HOCHAWALD et. al, 1997; COLE, 1999; BRAGA et. al, 2002).

Early feeding following surgery of the upper digestive tract is rarely made use of notwithstanding its safety and effectiveness as indicated by the relevant literature. This study is aimed at investigating the benefits of EEF to patients who undergo these procedures, specially with regard to

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the time of PI recovery, period of hospital stay, tolerance to diet, and nitrogen balance (NB) rate in post-surgery.

METHODS

The work was carried out in the period between March 2004 and May 2005 at the School Hospital (SH) of the Federal University of Uberlândia (UFU), Uberlândia, Minas Gerais, Brazil. It consisted of a prospective study involving adult patients submitted to elective surgeries of the upper digestive tract, necessarily including total or partial excision of the stomach. The work was, in addiction, approved by the Ethics Committee of the Federal University of Uberlândia. All patients signed a term of consent. Bariatric surgeries were excluded for obese patients and for those who developed post-operative complications, such as anastomotic leak or sepsis.

The patients were randomly divided into two groups: the test group (8 patients) was provided with a nasoenteric feeding catheter or jejunostomy during the surgery, with enteral nutrition beginning 24 hours after the surgery. The control group (8 patients) was submitted to oral diet, beginning 72 hours after surgery.

The test group was fed a standard diet according to the enteral nutrition protocol proposed by Guerra (GUERRA, 2002), in other words, oligomeric diet with a calorific density of 1.0 Kcal/ml, lactose free, infusion velocity of 17 ml/h, not higher than 350ml in the first 24 hours, increased at a rate of 10ml/h per day. The calories and proteins targeted were reached after the 4^{th} day of enteral nutrition. The presence of nauseas, vomits, abdominal distention or intense pain would lead to diet suspension.

The control group began with a restricted liquid diet on the 4^{th} day after surgery, evolving to a full liquid and/or paste-like diet, and, subsequently, to a mild diet, according to the patient's clinical evolution.

Data for determining the energetic requirement on the 4^{th} day after surgery were collected prior to the surgical procedure. Height and weight were considered to obtain the body mass index (BMI) of all patients, using clinic weigh scales, zero to 150 readings, sensitivity capacity 150kg x 100g, with height measuring rod graduated in meters with 1 centimeter increments.

A form was filled in containing the name, age, sex, weight and height of patient; group (control or test group); patient's medical record number; feeding method (oral or otherwise); date and time the surgery began and ended: surgical procedure adopted; anaesthetic and analgesic used during and after surgery, assessment of gastrointestinal motility (bowel sound per minute auscultated three times to determine their arithmetic mean); patient's report on the release of flatus and stools after surgery; abdomen diameter in cm; visual abdominal aspect (cupped, flat or bulging). Abdominal diameter and aspect were assessed prior to the surgical operation and on a daily basis in the post-operative period.

A few parameters as to diet tolerance were evaluated, such as abdominal pain, presence or absence of nausea and/or vomits, presence or absence of diet reflux through the catheter, and presence or absence of diarrhoea. Obstruction in the nasojejunal catheter and regurgitation, namely, total or partial outflow from the catheter, were considered to be complications of a mechanical nature arising out of the catheter proper. As dietotherapy progressed, the amount infused in 24h and the rate of infusion (ml/h) were recorded.

Nitrogen balance was calculated, only in the 4^{th} day after the surgery, for both groups, calculated using the formula (CORREIA, 2000):

NB = (dietary protein x 0.16) - (UUN + 2g stools + 2g skin), where:

UUN = ureal urinary nitrogen = urinary urea / 2.14

Urinary urea = dosage of urea in the 24h urine, carried out at the clinical analyses laboratory of SH–UFU.

For the period of hospital stay, the dates of admission to and discharge from hospital were considered.

STATISTICAL ANALYSIS

For comparison of the arithmetic means in the two groups, the Student t test was used. When the normality assumption was not complied with, we used the Wilcoxon test. Normality of samples was evaluated using the Shapiro-Wilks test. Homocedasticity was evaluated using the F test for variance ratio. For comparison of the abdominal diameter differences between the two groups in preoperative and post-operative period, variance analysis was used. The difference between the preoperative and the post-operative abdominal diameter was corrected by the covariance analysis using the following formula: corrected abdominal diameter = abdominal diameter – (b* initial abdominal diameter – medium abdominal diameter). The qui-square test was used to verify the existence of dependence between the following variables: sex, age, BMI and diagnosis. The MANN-WHITNEY

non-parametric test was used for analysis of the surgery length time. The Fisher test was used for analysis of the following variables: refluxus, diarrhoea, use of morfine, tramadol, metaclopramide and NSAID. Significance level of 0.01 was adopted.

RESULTS

Twenty-six patients initially participated in the study with 10 of them being soon excluded owing to a number of reasons such as the hospital's decision to do so, patients no longer willing to join and other treatment adversities.

There were no statistically significant differences between the control and the test group with regard to age, sex, diagnosis, BMI, as shown in Table 1. Data as to the use of tramadol, morphine, metoclopramide and non-steroidal anti-inflammatory drugs are not shown (p>0.01).

Table 1. Age, sex, BMI, group, diagnosis and surgery techniques for patients submitted to upper digestive tract surgeries at CH/UFU from March/2004 to May/2005.

Patient	Group	Age (Years)	Sex	Diagnosis	Surgery technique	BMI (Kg/m^2)
P1	Control	56	M	Gastric cancer	Total gastrectomy with multiple excisions of the digestive tract	16.54
P2	Control	69	M	Gastric cancer	Gastroenteroanastomosis	20.25
P3	Control	29	M	Stenosing peptic ulcer disease	VAGDSC	19.29
P6	Test	40	M	Gastric cancer	Total Gastrectomy + linfodenectomy D2 with reconstruction in Roux Y	24.80
P7	Test	50	M	Gastric cancer	Subtotal Gastrectomy with reconstruction in Roux Y	21.64
P8	Control	55	M	Pancreatic cancer	Whipple	21.27
P9	Test	60	M	Mega-esophagus	Esophaguscardiomiotomy a Thall+ gastro-fundoplicature through conventional way	18.30
P10	Control	54	M	Gastric cancer	Subtotal Gastrectomy + right linfodenectomy	22.90
P11	Test	32	M	Gastric cancer	Total Gastrectomy	30.26
P13	Test	74	M	Gastric cancer	Subtotal Gastrectomy + colecistectomy + esplenectomy	19.51
P15	Test	51	M	Gastric cancer	Total Gastrectomy	23.20
P19	Control	61	M	Gastric cancer	Subtotal Gastrectomy with anastomosis in Roux Y	18.93
P20	Control	55	M	Mega-esophagus	Subtotal Gastrectomy + gastrojejunoanastomosis	21.88
P23	Control	73	F	Gastric cancer	Subtotal Gastrectomy	20.25
P22	Test	54	F	Gastric cancer	Subtotal Gastrectomy with interposition of jejunal loop	21.31
P24	Test	57	F	Disease of Menétrière	Subtotal Gastrectomy with interposition of jejunal loop	21.36

VAGDSC= vagotomy, antrectomy and gastroduodenoanastomosis through the small curvature.

As for the average time of surgery for the two groups, 4.50 and 5.34 for the control and the test group respectively, there was no statistical difference (p= 0.172).

With respect to bowel movements, patients in the control group had their first evacuation on average 5.75 (sd=2.49) days after surgery, and in the test group this occurred on average 5.00 (sd=0.75) days after surgery, with no significant difference (p= 0.438) (Table 2).

Table 2. Post-operative bowel sounds, and post-operative days on which elimination of the first flatus and stools occurred, as reported by the patients submitted to upper digestive tract surgeries at SH/UFU from March/2004 to May/2005.

Patients	Post-operative BS (*1)	Flatus elimination (*2)	Stools elimination (*2)
Control 1	2.7	4	6
Control 2	2.0	3	4
Control 3	6.3	3	3
Control 4	1.3	4	10
Control 5	7.4	5	5
Control 6	2.0	2	5
Control 7	1.9	4	4
Control 8	4.7	4	9
AVERAGE±sd	3.54±2.29	3.62±0.91	5.75±2.49
Test 1	17.3	4	4
Test 2	16.5	5	5
Test 3	3.0	3	4
Test 4	14.2	3	5
Test 5	2.5	3	5
Test 6	12.6	4	5
Test 7	7.6	3	6
Test 8	3.9	5	6
AVERAGE±sd	9.70±6.18	3.75±0.88	5.00±0.75

*1 = per minute; *2 = post-operative day on which it occurred for the first time ;sd= standard deviation

Patients in the control group started giving off flatus, on average 3.63 (sd= 0.91) days after surgery and, in the test group, 3.75 (sd=0.88) days after surgery, with no significant difference (p= 0.955), table 2. All patients in both groups had given off flatus by the fifth day after surgery. he control group showed on average BS of 3.54 (sd= 2.19) and the test group, 9.70 (sd= 6.18), a statistically different distribution thus in the two groups (p<0.000) (Table 2).

There was no difference between the two groups with respect to the occurrence of BS in the post-operative period (p = 0.562).

The difference between preoperative and post-operative abdominal diameter for the two groups was not statistically significant (p= 0.443), nor was it for all patients with reference to the succeeding post-operative days (p = 0.072).

With regard to NB, the control group showed an average value of – 10.47 (sd= 3.02) and the test group, – 0.26 (sd= 3.05), with no statistically significant difference between the two groups (p<0.000). The Shapiro-Wilks test for NB normality within each group was not significant, which indicates that the assumption of normality under these data within each group cannot be discarded. The samples were homocedastic.

Regarding abdominal pain, 62.5% of the control group patients had it, whereas in the test group this was 50%, thus with no statistically significant difference (p= 0.642).

Nauseas and/or vomits were present in 37.5% of the control group patients and in 12.5% of the test group patients, with no statistically significant difference (p= 0.553).

There was no statistical difference between the two groups with regard to the clinical parameter for diarrhoea (p= 0.61), with 2 patients only (25%) in the control group and 4 patients (50%) in the test group having diarrhoea, this condition not keeping on for more than 3 days.

There was no statistical difference between the two groups for the clinical parameter reflux (p = 0.57), with 1 patient only (12.5%) in the test group and 3 patients (37.5%) in the control group having reflux. This, however, was not significant and the diet treatment was not interrupted.

There was no statistically significant difference between the two groups as regards hospital stay, with an average of 7.75 days (sd= 1.669) for the control group and 8.12 days (sd= 1.642) for the test group (p = 0.657).

One case only of mechanical complication was recorded: obstruction in the catheter occurred on the last day of enteral nutrition involving a patient in the test group. This, however, did not affect the dietotherapy progress.

No case of sepsis or diet aspiration was observed among the patients studied.

DISCUSSION

In the present study, the number of intestinal BS per minute was significantly greater in the group under EEF, which may indicate a greater stimulus in the gastrointestinal motility of the patients in this group. However, there was no statistical difference between the two groups as regards the day on which flatus and stools were eliminated and intestinal BS occurred. It should be noted, however, that evacuations in the test group occurred over a shorter period of days (F test for variance ratio), as the patients in this group eliminated stools between the fourth and the sixth day after surgery; in the control group stool elimination occurred between the third and the tenth day. Although a number of studies point to a faster PI recovery using EEF, this has not been confirmed either in our study or in others (REISSMAN et. al, 1995; FEO et. al, 2004).

Perhaps the use of a larger sample would enable our positively establishing such benefit. Although recovery of the gastrointestinal motility has not been shown under our study, the fact of the number of BS per minute having been significantly higher in the EEF group does count as a favorable factor in the recovery of gastrointestinal peristalsis.

NB was statistically significant in our test group ($p<0,000$) when contrasted with that in the control group, nearing a zero value and, in the case of a few patients, even reaching a positive value, i.e., indicating an anabolic process rather than the catabolic process as expected under these circumstances.

This study has shown a considerably better NB in patients submitted to EEF, thus suggesting a faster recovery in the nutritional condition, indicative of great benefit from the introduction of early feeding in post-surgery.

With regard to signs and symptoms of abdominal pain, nauseas, vomits, diarrhoea and reflux, research showed no statistical difference relating to both groups. Therefore, it can be asserted that the introduction of EEF in post-operative care of the upper digestive tract surgeries does not lead to diet intolerance.

Diarrhoea was observed in 4 patients in the test group and in 2 patients in the control group, with no statistical difference ($p = 0.4000$). It should be noted, however, that 2 patients in the test group had diarrhoea only after oral diet was introduced, i.e., these patients were no longer being enterally fed by means other than the mouth.

Abdominal distension, flatulence and the sensation of a full stomach deserve attention as these can be signs of both adynamic ileus and intolerance to early diet. Similarly, the occurrence of nauseas and vomits may result from the adverse effects of anaesthetic and/or analgesic drugs, PI, or intolerance to diet. Finally, the abdominal pain can be caused both by the surgery proper and by abdominal distension arising from PI or from diet intolerance. It should be noted that the clinical parameters for assessing diet intolerance and PI are mingled. Therefore, it becomes difficult to distinguish between these signs and symptoms and the real causes, thereby rendering the studies involving EEF and the assessment of PI somewhat inconclusive.

No statistical difference for both groups having been observed in this study with regard to signs and symptoms of diet intolerance, it is demonstrated that early diet introduction after gastrointestinal surgeries is secure and well tolerated by patients.

Although one of the potential benefits of EEF is a shorter period of hospital stay after surgery, this is not dealt with in this study, as there was no difference in hospital stay between the test and the control group ($p = 0,657$).

From among the studies assessing hospital stay, a few showed a shorter stay for the EEF patients (PAPAPIETRO et. al, 2002; BASSE et. al, 2004; BOZZETTI et. al, 2001). Nevertheless, both the variety of the parameters used to assess hospital stay length and the subjective judgement about when the patient is ready to be discharged from hospital, should be taken into account.

The patients participating in the present study were operated on by different surgery teams and so we cannot assure that the same criteria was adopted with regard to determining the date for hospital discharge, which may be contingent on the presence of bowel movements and tolerance to a regular diet for at least 24h.

A comparison between the studies assessing PI becomes difficult in that different definitions are adopted for PI, there also being different samples, different surgery procedures, different kinds of anaesthetics and different periods for the use of analgesic. Added to this are the presence of associated co-morbidities, difficulty in obtaining information on flatus and stools elimination, and lack of standardization regarding hospital discharge. More precise methodologies would, therefore, be required in order to obtain more conclusive results.

CONCLUSIONS

The findings in the present study bear out the assumption that early feeding in patients submitted to upper digestive tract surgeries is tolerable, as no any signs and symptoms of diet intolerance were observed in the EEF patients. However, the EEF failed both to recover the PI and to reduce the hospital stay length.

A better NB was observed in the EEF group, thus showing a lower protein catabolism in this group.

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RESUMO: É comum que a realimentação precoce após cirurgias do trato gastrointestinal ocorra somente após a resolução do íleo pós-operatório. A nutrição enteral precoce tem demonstrado vantagens como recuperação mais rápida da motilidade gastrointestinal, menor tempo de permanência hospitalar e melhor balanço nitrogenado. Objetiva-se demonstrar que a alimentação precoce proporciona essas vantagens, além de ser tolerável. Os pacientes submetidos a cirurgias do trato digestório alto foram distribuídos aleatoriamente em dois grupos: o controle com início da dieta por via oral a partir de 72H após a cirurgia, e o estudo com introdução de dieta enteral via cateter nasojejunal 24H após a cirurgia. Foram coletados: diâmetro abdominal, aspecto do abdome, ruídos hidroaéreos intestinais, eliminação de flatos e fezes, presença ou ausência de regurgitação, diarréia, dor abdominal, náuseas e/ou vômitos diariamente. No quarto dia de pós-operatório foi calculado o balanço nitrogenado em todos os pacientes. A data de alta hospitalar dos pacientes foi também registrada. Os pacientes do grupo estudo (8) e controle (8) não apresentaram diferenças quanto ao tempo de permanência hospitalar, tempo de recuperação do íleo pós-operatório e tolerância à dieta. O balanço nitrogenado foi estatisticamente significativo ($p<0,000$) e melhor no grupo controle. A introdução precoce de dieta após cirurgias do trato digestório alto é tolerável e permite um melhor balanço nitrogenado.

PALAVRAS-CHAVE: Nutrição enteral precoce. Ileo pós-operatório gastrectomia. Ruídos hidroaéreos intestinais. Evacuações. Flatos.

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