Original Article

EARLY ENTERAL NUTRITION IN UPPER GI EMERGENCY SURGERY – IS IT SAFE?

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Summary

The benefits of early enteral nutrition are well known, however a considerable resistance exists in surgical departments to introduce early postoperative enteral feeding**.** The aim of this study was to compare the results of early versus late feeding in patients undergoing emergency operations of upper GI tract. All together 1773 patients were included in the study group: 434 patients in the early feeding group (feeding started before day 3), and 1339 patients in the late feeding group. Mortality, length of hospital and ICU stay, duration of mechanical ventilation and complications were studied. General and gastrointestinal complications showed no statistically significant difference between the two groups, however pneumonia and sepsis were more frequent in the group with late feeding ($p<0.05$). The hospital stay was longer in the group with late feeding (16.4 vs 11.2 days, $p<0.05$) as well. Early enteral feeding is safe and beneficial for patients with emergency operations of upper gastrointestinal tract.

Key words: early enteral nutrition, emergency surgery, postoperative nutrition

Introduction

More than 30% of emergency patients hospitalized in surgical departments with the diseases of digestive system are with various degrees of malnutrition. If the disease is complicated with sepsis, approximately 80% of patients exhibit a hypermetabolic state with increasing energy expenditure [1, 2]. Undernutrition, malnutrition, delayed return to oral intake further worsens postoperative outcomes, in both elective and emergency surgery.

Early enteral nutrition has been demonstrated to decrease the hypermetabolic response to tissue injury, and to preserve intestinal mucosal integrity, to improve nitrogen balance and wound healing, to reduces septic complications and not to increase the rate of anastomotic leakage [3, 4, 5]. However the common believe is that patients can tolerate 5-7 days of starvation without detrimental clinical effects, and enteral nutrition is frequently postponed for 5-7 days until the return of gastric emptying and bowel sounds.

Disturbed physiology and edema of the gut, postoperative ileus, intestinal ischemia, anastomotic leakage and compartment syndrome are frequent in emergency surgery of the upper gastrointestinal (GI) tract, resulting in additional delay of oral intake. Timely evaluation of preoperative nutritional status of the patient and adequate nutritional support pre- and postoperatively is essential for the course and severity of disease and ultimate outcome [6]. Identification of patient at risk who needs mandatory nutritional support timely is a priority task of surgeons.

The aim of the study was to evaluate the results of early oral or enteral feeding in patients with diseases of the upper GI, emergency surgery or complications following elective surgery.

Materials and Methods

The study included 1773 patients treated at the university hospital. The study was carried out in two steps: a retrospective study for the period 2003-2007, and a prospective study for 2007-2011. The patients included in the study had the diseases of the upper GI tract and/or underwent emergency surgery. Two groups were formed: early enteral feeding (until the third postoperative day) and late enteral feeding (after the fourth postoperative day). The study included patients in severe shock, with intestinal ischemia present at the time of surgery. Patients who died by the third postoperative day were excluded from the study.

Our study was based on the recommendations of European Society for Clinical Nutrition and Metabolism (ESPEN) 2006 about early enteral nutrition in patients with operative procedures on the upper GI tract [7].

According to the definition of ESPEN, early enteral feeding implies "nutrition in the first 72 hours after surgery – a liquid diet, light diet, enteral feeds. Use of clear water during this period is not considered early nutrition".

Mortality, length of hospital and ICU stay, duration of mechanical ventilation and complications were studied.

Data were entered and processed with statistical package SPSS 12.0.1. Level of significance in rejecting null hypothesis selected $p < 0.05$. Parametric (Student's t-test) tests were used to compare differences between group means, and nonparametric test (Chi squared) for categorical data.

Results

The patients with the following diagnosis: perforated ulcers, ulcer hemorrhage, ulcer with two and more complication, mechanical jaundice, anastomotic leakage, acute cholecystitis, acute pancreatitis, abdominal trauma, treated in the surgical departments of University Hospital - Pleven between 2003 and 2011 years were included in the study.

Age range of patients was between 16 and 99 years. The average postoperative hospital stay was 13.1 days. The average stay in ICU department was 4.5 days. Mechanical ventilation with a mean duration of 4.7 days was applied for 331 patients. The distribution of patients according surgical diagnosis is presented in Table 1 and on Figure 1.

Table 1. Surgical diagnosis of the patients included in the study

Diagnosis	Total	After 2007 year	ICU	Deaths
Perforated ulcers	267	125	160	14
Ulcer hemorrhage	64	33	63	8
Ulcer with 2 and more complications	122	60	97	16
Anastomotic leakages	40	18	40	14
Mechanical jaundice	350	160	290	26
Acute cholecystitis	434	232	180	20
Acute pancreatitis	326	102	326	22
Abdominal trauma	170	90	170	21
Total	1773	820	1326	115

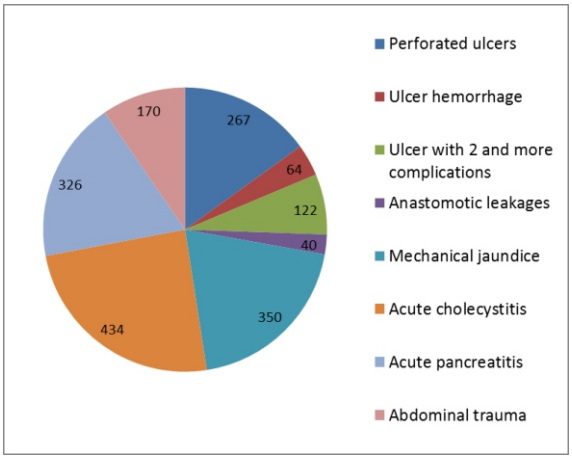

Figure 1. Distribution of cases by surgical diagnosis

The patients with early oral or enteral nutrition were 434, the patients who started late enteral nutrition were 1339 (Figure 2).

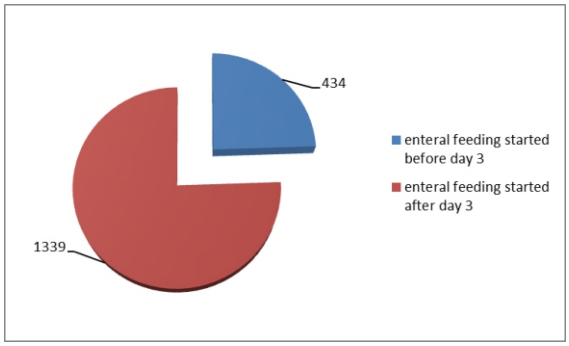

Figure 2. Early and late enteral nutrition

Route of administration of enteral nutrition and the number of cases and day of initiation of enteral nutrition are shown in Figure 3 and Figure 4.

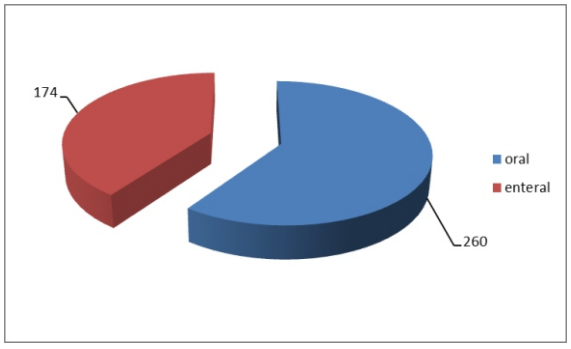

Figure 3. Route of administration of early nutrition

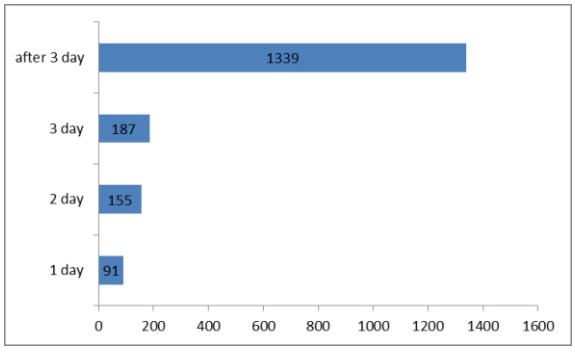

Figure 4. Number of cases and day of initiation of enteral nutrition

End points of the study were length of hospital and ICU stay, duration of mechanical ventilation and mortality. There was a significant difference between the groups regarding length of hospital stay (11.1 versus 16.4 days, p=0.002). The stay in ICU was also significantly shorter (3.7 versus 4.9 days, p=0.044). There was no significant difference between the groups as to the percentage of patients on mechanical ventilation. However, duration of ventilation was, though not significantly, shorter in the patients on early enteral nutrition as compared to those on late nutrition. The main characteristics for both groups are shown in Table 2.

Table 2. Group characteristics

Group characteristics	Early feeding n (%)	Late feeding n (%)	p value
Length of hospital stay (days)	11. 1±4.9	16.4±20.9	0.002
Patients in ICU	295 (68%)	1031 (70%)	0.32
Length of ICU stay (days)	3.7±5.0	4.9±10.3	0.044
Mechanical ventilation	66 (20%)	265 (19.9%)	0.8
Duration of mechanical ventilation (days)	3.8±6.1	7 ±7.7	0.225
Deaths	20 (4.6%)	95 (7.1%)	0.82

All patients after 2007 (434 in early feeding group, and 386 in the late feeding group) were followed up to detect complications such as postoperative ileus, abdominal pain, diarrhea, wound complications, anastomotic leakage, pneumonia, and sepsis. Cases with reported complications after administration of enteral nutrition in both groups are presented on Table 3 and Figure 5.

Table 3. Complications in both groups

Complications / number of cases (%)	early feeding N (%) 434 after 2007	late feeding N (%) 386 after 2007	p-value
Postoperative ileus	34 (7.83%)	39 (10.10%)	0.225
Abdominal pain	43 (9.91%)	39 (10.10%)	0.926
Diarrhea	82 (18.89%)	72 (18.65%)	0.93
Anastomotic leakage	3 (0.69%)	3 (0.78%)	0.713
Wound complications	100 (23.04%)	93 (24.09%)	0.723
Sepsis	12 (2.76%)	28 (7.25%)	0.003
Pneumonia	25 (5.76%)	72 (18.65%)	0.0001

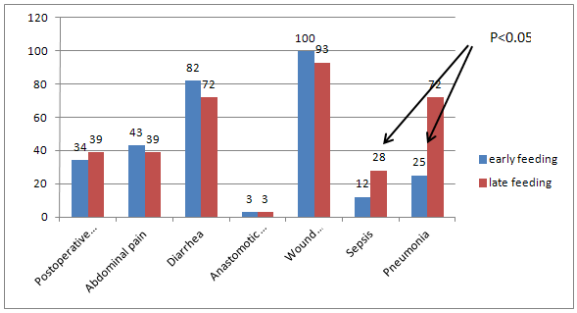

Figure 5. Complications in both groups

There was no difference between two groups in proportion of patients with postoperative ileus, abdominal pain and anastomotic complications. Diarrhea and wound complications were slightly higher in the early enteral nutrition group but not significant. Pneumonia and sepsis cases were more frequent in the group with late feeding

($p<0.05$).

The mortality rate in early feeding group was lower than in late feeding group 4.6% versus 7.09%, although the difference was not significant ($p=0.82$).

Discussion

We actively started to introduce and promote early enteral feeding in our patients since 2007. According to ESPEN recommendations, feeding could be started six hours following a surgery of the upper GIT. The patients with mesenteric vascular ischemia and intestinal obstruction contraindicated for early enteral feeding were treated with high doses of vasopressors.

Asymmetry in the two groups in terms of early enteral nutrition – 434 patients in early group against 1339 patients in the late group was due to the current resistance in the surgical community to feed patients before first flatulence.

The complications registered after the start of enteral nutrition were: postoperative ileus, abdominal pain, flatulence, diarrhea, anastomotic leakage, wound complications, sepsis and pneumonia. Frequency of complications was the same in both groups. There was no statistically significant difference between two groups for general and gastrointestinal complications, pneumonia and sepsis are more frequent in the group with late feeding ($p <0.05$). Postoperative period in the group with late enteral feeding is more eventful, and ICU and hospital stay of this patient group is longer.

Our results are consistent with data from the literature that proper early enteral nutrition is beneficial for surgical patients [8].

However our study has some limitations:

Most severe patients were on high doses of catecholamines and were contraindicated for early enteral feeding; thus producing selection bias between groups. Late feeding group is more severe.

Part of the study is retrospective, including period before 2007 year when active promotion of early enteral nutrition was started, so part of the cases suitable for early feeding were treated according "nil by mouth" rule after operation.

Conclusion

Early enteral nutrition could be beneficial for patients after emergency abdominal operations. More detailed randomized prospective study is needed.

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