

## Pre-operative Carbohydrate Load and Early post-operative Feeding in Elective Colorectal Surgery, Does it matter?

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**Abstract: Background:** Pre-operative carbohydrate loading and early post-operative feeding as components of enhanced recovery after surgery (ERAS) yields a better post-operative outcome in colo-rectal surgery. Aim of the work was to prove the benefits of preoperative carbohydrate loading and early post-operative feeding over the traditional protocol. **Patients and Methods:** This prospective randomized comparative study included patients who presented to the Surgery Department of El-Maadi hospital needing colorectal operation ending with anastomosis not stoma within the period from July 2017 to February 2018. These patients were randomly divided into two groups with each had its management approach, ERAS protocol adopting group: 27 patients and traditional protocol adopting group: 27 patients. The procedure was explained to the patients, and they were consented as regard to the postoperative morbidity and mortality. **Results:** Quilting technique significantly decrease the incidence of seroma ( $p=0.03$ ); Total drain output in the first 7 days and the There were statistically significant difference between both groups in which application of ERAS protocol decreases the post-operative ICU stay ( $P = 0.0005$ ). On the other hand, postoperative blood glucose level ( $P = 0.00002$ ), showed significant lower level in the ERAS protocol adopting group whereas other complications as wound complications ( $P = 0.552$ ), cardio-pulmonary complications, urinary tract infections and anastmotic leakage showed no statistically significant difference between two groups. **Conclusion:** Pre-operative carbohydrate loading and early post-operative feeding as components of ERAS have a remarkable improving effect on post-operatives outcomes and should be adopted in colo-rectal surgery as long as no contraindications for this protocol.

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**Key words:** colo-rectal surgery, enhanced recover after surgery (ERAS), carbohydrate loading, early post-operative feeding.

### 1. Introduction:

It is necessary to understand the fundamental changes occurring following injury including surgery as a metabolic response to stress, as decreased nutrition during metabolic stress from any type of injury differs from that under physiological conditions (Soeters et al., 2016).

Any injury including surgery provokes the release of stress hormones and inflammatory mediators leading to a reaction known as systemic inflammatory response syndrome (Gillis et al., 2015).

In this reaction, glycogen, fat and protein are catabolysed yielding glucose, free fatty acids and amino acids in the circulation to be used in the immune response and tissue healing (Alazawi et al., 2106).

Protein catabolism results in loss of muscle mass and that inversely affects the process of post-operative recovery both on the short and long run (Aahlin et al., 2015).

Moreover, insulin effects are reduced leading to more insulin release as the blood glucose level is

elevated with insulin resistance predicting long hospital stay (Thorell et al., 1999).

Hence nutrition for surgical patient must be properly planned to avoid the above mentioned consequences. „Fast track surgery“ or „enhanced postoperative recovery protocol“ being a set of rules including nutritional rules aiming at obviously and dramatically improving the patient recovery (Bakker et al., 2015).

In the past when the dictum „nil per os“ was introduced fearing the risk of aspiration in the anaesthetized patient, proved to be not only of no advantage but also improves the sense of well-being by maintaining the integrity of GIT mucosa and preventing the psychological upset of fasting. So clear fluid is recommended to be ingested up to 2 hours pre-operatively as the fluids are soon emptied from the stomach (American Society of Anesthesiologists, 2011).

But the debates are still ongoing regarding the benefits of pre-operative carbohydrate loading. Having preoperative carbohydrate beverages either of complex structures, monosaccharides or

disaccharides were encouraged to prevent insulin resistance with its bad effects on proteins, fats and carbohydrate metabolism. Although in other studies its favorable effects on lessening the post-operative complications and hospital stay was not well established (Smith et al.,2014) (Amer et al.,2017).

In many randomized studies and observational studies, early (<24 h) feeding accelerated GI recovery and decreased the length of hospital stay and the rate of complications and mortality (Fujii et al.,2014)

The aim of this study was to report the pre-operative effect of carbohydrate loading and early post-operative feeding.

## 2. Patients and methods:

Starting at July 2017 and continued for 6 months, this study was conducted at both El-Maadi Military Hospital in Cairo and Zagazig University hospitals, Egypt. In this study 54 patients were included with final diagnosis colorectal cancer as proved with enhanced pelviabdominal CT and lower GIT endoscopic study with tissue biopsy proving the diagnosis of adenocarcinoma. The studied patients were having beginning at 20 years or older provided that being operable in regard of their general body status and staging of their malignancy.

The patients were randomly allotted to 2 groups; one destined to follow fast track surgery and the other group followed the traditional protocol.

### Inclusion criteria:

### Exclusion criteria:

- All patients with inoperable disease or any comorbidity contraindicating surgery
- diabetic patients suspected to have gastropathy Simultaneous reconstructive surgery

A written informed consent was obtained from each patient before surgery.

Preparation of the patients with left colonic cancer was performed beginning 48 hours pre-operatively in the form of; giving metronidazole 500 mg and neomycin 500 mg tid, doing enema using 500 ml saline 0.9% every 8 hours until having clear output, while in right colonic cancer the above was not followed. The group destined to follow the fast track protocol was given 100 ml of carbohydrate beverage 8 hours preoperatively to be repeated 6 hours later, while the group of the traditional protocol was put to fasting 8 hours before surgery.

The radical surgical resection is done through a midline incision allowing adequate exploration of the entire abdomen. Resection limits are determined according to the site of the primary tumour. The duration of the operation was recorded in addition to the amount of blood loss and the need for blood transfusion. After the operation ends the patient is transferred to the ICU for the recovery period until the

patient is stable enough to be transferred to the common ward. The patient following the fast track protocol were given oral fluids at the day of surgery and the next day (day 0 and 1) and solid food was introduced at day 2 post-operatively. While the patients of the traditional protocol were prevented from having oral feeding up to 5th postoperative day.

The length of ICU stay, the emergence of any post-operative complications and the post-operative laboratory results were all recorded.

## 3. Results

The total number 54 patients were included in the study. The baseline demographic criteria of patients were given in table (1). 27 patients followed fast track protocol; 27 patients followed the traditional protocol.

In the fast track group, 18 patients were males and 9 were females with age ranging from (34-74) and mean age (56.59), but in the traditional group, 16 patients were males and 11 were females, their ages ranged from (22-81) with mean age was (58.59).

15 patients were hypertensive in the fast track group compared to 11 ones with the same comorbidity in the traditional group. There were no significant co-morbidities in either of them.

Regarding the primary tumour site; 18 patients had right colonic mass (8 in fast track and 10 in traditional), 7 patients had left colonic mass (4 in fast track and 3 in traditional), 29 patients had sigmoid mass (15 in fast track and 14 in traditional).

Regarding the pre-operative laboratory results with risk impact; 12 patients had Hb level < 10 gm% (6 in either of them) and 14 patients had albumin level < 3 gm% ( 8 in fast track and 4 in traditional group).

Regarding the operative data including the duration of the operation, the amount of blood loss and the amount of the transfused blood all shown in table (2).

Concerning the postoperative follow-up, the length of ICU stay was significantly shorter in ERAS adopting group (1.48 days) compared to traditional protocol adopting group (2.59). Also the the blood glucose level was significantly lower in the ERAS adopting group compared to the second group. However the rate of wound infection was quite similar in both groups with no significantly statistical difference between both groups. All are shown in table (3).

## 4. Discussion:

There is an essential fact stating that the success of surgery is not attributed exclusively to excellent surgical skills, but also to metabolic interventional therapy, considering the ability of the patient to carry

a metabolic load and to provide appropriate nutritional support (Gustafsson et al.,2016).

Surgery results in inflammation proportionated to the severity of the surgical trauma, and leads to a metabolic stress response. To have proper healing and

functional recovery (“restitutio ad integrum”) a metabolic response is necessary, with nutritional therapy is needed especially with the malnourished patient and prolonged stress/inflammatory response (Yeh et al., 2016).

**Table (1): Demographic data, co-morbidities, tumour site and pre-operative risk factors in both groups.**

Demographic data, presentation, tumour site and pre-operative serum CEA level		ERAS protocol N (27)	Traditional protocol N (27)	P Value
Age (years)	(Mean)	56.59 (34-74)	58.59 (22-81)	0.298
Sex of patients	Male	18 (67%)	16 (59%)	0.573
	Female	9 (33%)	11 (41%)	
Comorbidities mostly hypertension		15 (56%)	11 (41%)	0.276
Site of primary tumour	Right colon	8	10	0.819
	Left colon	4	3	
	Sigmoid colon	15	14	
Pre-operative risk factors	Hb <10 gm%	6	6	1.0
	Alb <3 gm%	8	4	0.190

**Table (2): Operative data.**

	ERAS protocol N (27)	Traditional protocol N (27)	p-value
Duration of the operation (min)	134.44	157.78	0.0252
Amount of blood loss (ml)	355	377.78	0.331
Amount of transfused blood (ml)	351.85	277.78	0.274

**Table (3): Postoperative follow-up and complications**

Post-operative follow-up and complications	ERAS protocol N (27)	Traditional protocol N (27)	p-value
ICU stay (days)	1.48	2.59	0.005
Blood sugar (mg%)	139.63	238.41	0.00002
Wound complications	0	1	0.552
Specific cardio-respiratory complications, urinary infections, ileus or anastomotic leakage	Nocase recorded in either groups		1.0

Our work aimed to evaluate the benefits of adopting ERAS protocol compared to the traditional protocol in colo-rectal surgery.

Following the patient up in both groups during the immediate postoperative period, those having been put to the ERAS protocol showed significantly lower blood glucose level post-operatively compared to the group of the traditional protocol. This may be explained by giving the carbohydrate containing beverages pre-operatively and rapid post-operative oral feeding in ERAS adopting group, this could minimize the stress response with hyperglycemia and insulin resistance, rendering the situation more controlled, the matter that did not happen with those adopting the traditional protocol being deprived of both events.

ICU stay was significantly shorter in ERAS adopting group compared to those followed the traditional group this was attributed to more rapid

cardiorespiratory stabilization and more rapid ventilator weaning in the first compared to the second.

Few cases in both groups had surgical site infection without favoring either of the two protocols, with no other significant complications recorded in either of them.

These findings are quite similar to those mentioned in A Meta-analysis of Randomized Controlled Trials done by Greco et al. (Greco et al., 2014). Ionescu et al., Ren et al., Vlug et al., Wang et al. and Yang et al., all these are studies included in that meta-analysis proved in common that the overall morbidity rate was less in those followed ERAS protocol compared to the traditional one also the showed no advantage of ERAS over the traditional one in occurrence of ileus or anastomotic leakage. But in contrary to our study, some of them showed more cases with UTI in the traditional compared to the

ERAS however, it did not reach a significant difference (14-21).

In the Clinical Practice Guidelines for Enhanced Recovery After Colon and Rectal Surgery From the American Society of Colon and Rectal Surgeons and Society of American gastrointestinal and Endoscopic Surgeons published in DISEASES OF THE COLON & RECTUM (2017), it considered having clear liquid diet up to 2 hours before surgery is based on high quality evidence, (1A) which means strong recommendation while having carbohydrate load before surgery is based on moderate quality evidence, (2B) which means weak recommendation (Carmichael et al., 2017).

### 5. Conclusions:

Based on this study, we conclude that Pre-operative carbohydrate loading and early post-operative feeding has a promising effect on the post-operative recovery and functional outcomes in colorectal surgery and that will consequently affects early post-operative morbidity. This protocol is considered a safe one and easily applicable especially in the non-diabetic patients; but still studies to be done to prove its efficacy in diabetics and those with other advanced co-morbidities compromising wound healing.

### Disclosure Policy

**“The author (s) declare (s) that there is no conflict of interest regarding the publication of this paper.”**

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