

## Enhanced recovery after surgery (ERAS) protocol in stoma reversals

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### Abstract

**Objective:** To compare the length of hospital stay and return of bowel movement using the conventional management versus 'enhanced recovery after surgery' protocol.

**Methods:** This study was conducted at the Civil Hospital, Karachi, from June 2014 to May 2015, and comprised patients undergoing stoma reversal. Patients were randomly allocated in two equal groups, i.e. A (treated with conventional peri-operative management) and B (with 'enhanced recovery after surgery' protocol). Prolonged ileus, wound infection and length of hospital stay between the two groups were compared. SPSS 20 was used for statistical analysis.

**Results:** There were 60 participants who were divided into two groups of 30(50%) each. Overall, 39(65%) patients were males and 21(35%) were females. The mean age was 27.80±9.99 years in group A and 23.87±4.56 years in group B. Besides, 25(83%) patients in group A had prolonged ileus compared to 3(10.7%) in group B (p=0.00). Moreover, 14(46.7%) patients in group A and 8(26.7%) patients in group B had wound infection (p=0.10). The mean duration of hospital stay was also less in group B compared to group A (p<0.05).

**Conclusion:** The application of 'enhanced recovery after surgery' protocol was found to be safe.

**Keywords:** ERAS, Ileostomy, Ileus. (JPMA 67: 1674 2017)

### Introduction

Bowel surgeries, especially anastomoses, traditionally have been managed by prolonged abstinence from oral intake post-operatively together with cumbersome pre-operative mechanical bowel preparation. This traditional approach meant a long duration of in-hospital stay. Despite these extensive measures, the complication rates in these procedures remained high at 15-20%.<sup>1</sup> This high complication rate led to extensive research into the factors involved. It was postulated that both the hospital stay and the complication frequency were the result of stress response to the surgery and its preparation. This realisation led to the development of fast-track programmes in order to optimise peri-operative care to enhance patient recovery.<sup>2</sup> Professor Henrick Kehlet was the first to introduce the concept of 'fast-track surgery' in 1999.<sup>3,4</sup> These enhanced recovery protocols challenged the age-old concepts such as mandatory mechanical bowel preparation and prolonged fasting pre-operatively, and introduced several new concepts like epidural analgesia and early mobilisation. It was hypothesised that these measures would reduce the body's stress response and hence lead to better and early recovery.<sup>1</sup>

In a meta-analysis by Eskicioglu,<sup>5</sup> three of four included

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randomised controlled trials (RCTs) showed significantly reduced primary stay in hospital, comparing enhanced recovery after surgery (ERAS) with conventional methods and no significant difference in post-operative mortality.<sup>6</sup> Serclova et al.<sup>7</sup> also observed the length of hospital stay in the traditional group to be 10.4±3.1 days and that of fast-track group to be 7.0±1.3 days. They also reported a faster return of bowel movement in the latter group (1.3±0.8 days) than the former (3.1±1.0 days).

The ERAS protocol has been modified in different studies according to the availability of resources<sup>8</sup> and has been applied in different surgeries. The promising results of the fast-track programmes in bowel surgeries led to other surgical specialties to incorporate and apply fast-track protocols in their surgeries and they too showed promising results.<sup>9,10</sup>

Patients with stoma require a longer stay in hospital, increasing the demand on health care systems. Adopting ERAS protocol would improve peri-operative management and benefit patients. In the light of such supportive evidence, the present study compared ERAS protocol in peri-operative management of stoma reversal to conventional method. We also tried to establish a definitive role of the ERAS protocol in decreasing the length of stay and early resolution of ileus in patients undergoing stoma reversal so that the better of the two protocols would be used in future. The current study was planned to compare the length of hospital stay and return

of bowel movement using the conventional management versus ERAS protocol in patients undergoing two-end ileostomy reversals.

## Patients and Methods

This study was conducted at surgical unit II of the Civil Hospital, Karachi, from June 2014 to May 2015. Approval of the institutional review board (IRB) of Dow University of Health Sciences was obtained. Ileus was defined as transient cessation of coordinated bowel motility after surgical intervention which prevents the effective transit of intestinal contents or tolerance of oral intake.

The sample size was estimated using openepi.com, version 2, open source calculator taking mean length of hospital stay at  $10.4 \pm 3.1$  days and the return of bowel movement at  $3.1 \pm 1.0$  days in the traditional group and at  $7.0 \pm 1.3$  days and  $1.3 \pm 0.8$  days in the fast-track group.<sup>7</sup> Patients of either gender, aged at least 15 years, and undergoing two-end ileostomy reversal were included. Causes of stoma formation in all the patients were tuberculous, enteric and traumatic perforations with contamination of peritoneal cavity. None of the patients had stoma formation due to malignancy or as protective stoma in anterior resection. Patients with neurological and/or renal disorders, cardiac disease, bed-ridden patients, with diabetes mellitus, those who were on steroids and patients who were unable to understand verbal and written commands were excluded. Informed consent was taken from each patient about surgery and this study. Patients were randomly allocated in two groups, i.e. A (treated with conventional peri-operative management) and B (with ERAS protocol), by a computer-generated list to minimise sampling bias.

All stoma reversals were performed by senior surgeons. Pre-operatively, all patients in group B were counselled about modified ERAS protocol (Figure), fasting of less than 6 hours, fluid and carbohydrate loading with Glaxose-D (glucose juice) 6 hours before surgery and antibiotic prophylaxis. Intra-operatively, short acting anaesthetic agents like sevoflurane/atracurium were used, bowel anastomosis were performed by hand-sewn method using two-layer anastomosis, first-layer continuous suturing full thickness technique and second-layer interrupted seromuscular sutures using vicryl # 4/0 suture material. Drain in abdominal cavity, urinary catheter and nasogastric tube were avoided. Post-operatively, fluid overload was avoided, paracetamol was used for pain management, patients were asked to mobilise 6 hours after the surgery, and oral sips (15ml/hour) were started. Patients were continued to free clear liquids within 24 hours if tolerated orally and then to

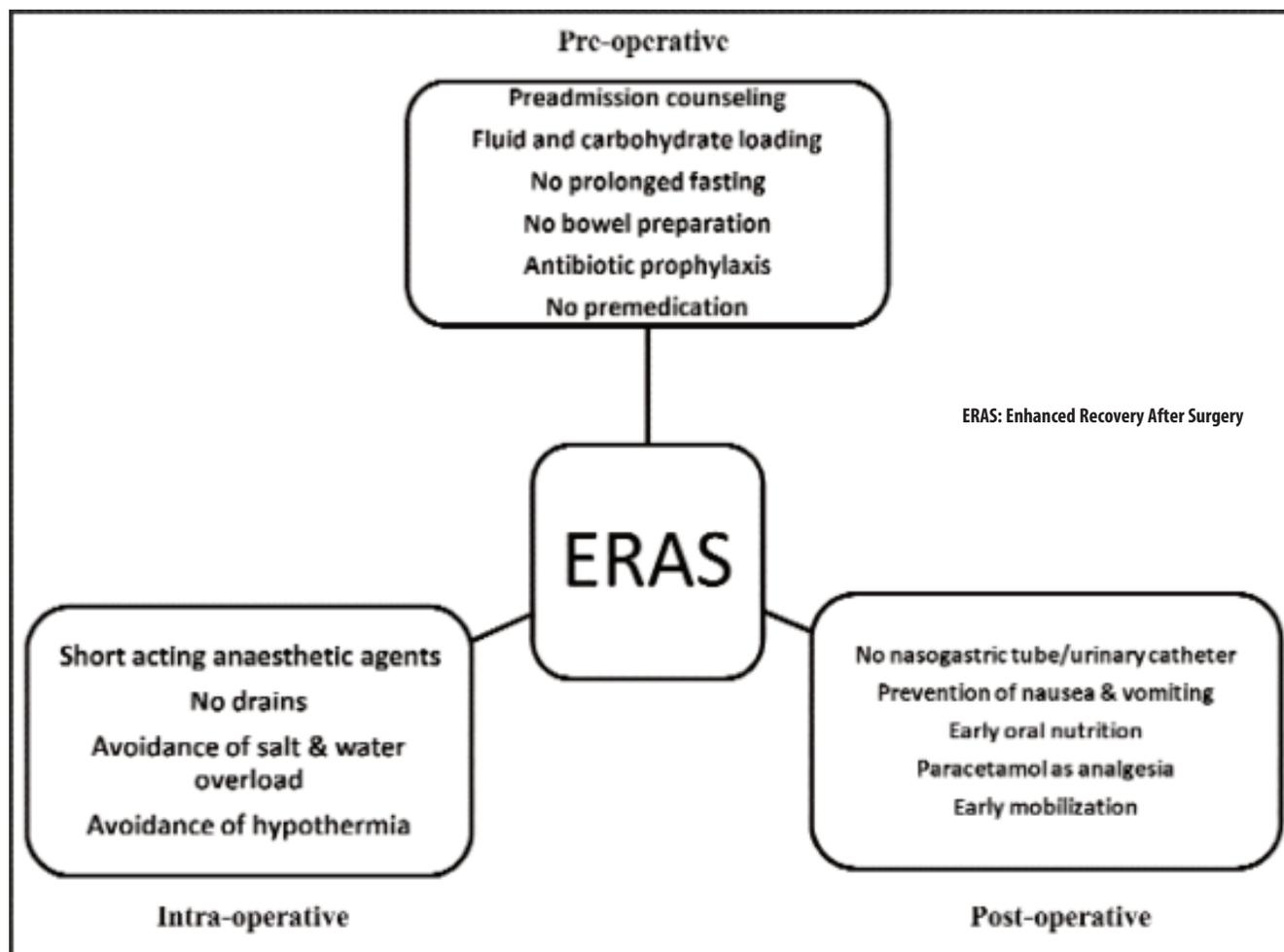
semi-solid diet after 24 hours of surgery. Patients in group A were counselled about conventional peri-operative management, fasting of 06 hours, no fluid and carbohydrate loading before surgery and antibiotic prophylaxis. Intra-operatively, routine anaesthetic agents were used and placement of urinary catheter and nasogastric tube was done if required. Anastomotic technique was the same as done in group B. Post-operatively, fluid overload was avoided, paracetamol was used for pain management, patients were asked to mobilise after 24 hours of surgery and start of oral feed after 24 hours with sips of clear fluid (15ml/hour) and then to free clear liquids and then continued to semi-solid and solid diet. The time duration of passage of first flatus and passage of faeces (in hours) and total length of hospital stay was assessed by senior registrar or senior resident (postgraduate trainee 3-4 years) in both groups.

Patient's demographics (age and gender), hospital registration number, group of patients (group A and B), time of passage of flatus and faeces and length of hospital stay were recorded. Confounding variables were controlled by excluding patients with neurological and/or renal disorders, bed-ridden patients, diabetics and those on steroids. Bias was minimised by the assessment of passage of first flatus, presence of wound infection by senior registrar or senior resident (postgraduate trainee 3-4 years), common post-operative regime to patients of both groups and data being entered by postgraduate resident not participating in this study.

Data was analysed using SPSS 20. Mean and standard deviation were computed for numerical variables like age and final outcome, whereas frequency and percentages were employed to assess the categorical variable like gender and wound infection. Unpaired t-test was used to compare the mean time of passage of first flatus, faeces, length of hospital stay, while wound infection between two groups was compared using chi-square test. Statistical significance was taken at  $p < 0.05$ . Stratification was done with regard to age and gender to control the effect modifier.

## Results

There were 60 participants in the study divided into two groups of 30(50%) each. Overall, 39(65%) patients were males and 21(35%) were females. The mean age was  $27.80 \pm 9.99$  years in group A and  $23.87 \pm 4.56$  years in group B. The number of patients aged 30 years or below was 20(66.7%) in group A and 28(93.3%) in group B ( $p=0.01$ ). Besides, 25(83%) patients in group A had prolonged ileus compared to 3(10.7%) in group B ( $p < 0.05$ ). Also, 14(46.7%) patients in group A and



**Figure:** Components of ERAS.

**Table-1:** Patient characteristics according to group.

	Group A n (%)	Group B n (%)	p-value
Mean Age	27.80 ± 9.99	23.87 ± 4.56	
≤30	20 (66.7)	28 (93.3)	0.01
> 30	10 (33.3)	02 (6.7)	
<b>Gender</b>			
Male	19 (63.3)	20 (66.7)	0.78
Female	11 (36.7)	10 (33.3)	
Prolonged Ileus	25 (83.3)	03 (10.7)	0.00
Wound infection	14 (46.7)	08 (26.7)	0.10

8(26.7%) patients in group B had wound infection (p=0.10) (Table-1).

The mean time of passing first flatus and faeces was lower in group B patients (31.63±9.63 and 55.17±7.37 days)

**Table-2:** Mean comparison according to group.

	Group A Mean±SD	Group B Mean±SD	p-value
Mean Time of first flatus passed	51.77 ± 7.37	31.63 ± 9.63	0.00
Mean Time of first faeces passed	82.77 ± 10.71	55.17 ± 12.63	0.00
Mean Duration of hospital stay	7.23 ± 1.16	4.13 ± 1.04	0.00

SD: Standard deviation.

compared to group A (51.77± 7.37 and 82.77± 10.71 days) (p< 0.05). The mean duration of hospital stay was 4.13±1.04 days in group B and 7.23±1.16 days in group A (p<0.05) (Table-2).

Of all, 48(80%) patients were aged 30 years or below while 12(20%) were aged above 30 years. Of the former, 20(41.7%) had prolonged ileus and 15(31.2%) had wound infection compared to 8(66.7%) and 7(58.3%) patients in

**Table-3:** Stratification according to age and gender.

Age group	≤ 30 years n= 48	> 30 years n= 12	p-value
Prolong ileus	20 (41.7)	08 (66.7)	0.121
Wound infection	15 (31.2)	07 (58.3)	0.664
Duration of stay	5.35 ± 1.81	7.00 ± 1.75	0.006
	Male n= 39	Female n= 21	p-value
Prolong ileus	19 (48.7)	09 (42.9)	0.664
Wound infection	14 (35.9)	08 (38.1)	0.866
Duration of stay	5.67 ± 1.91	5.71 ± 1.95	0.927

Data is shown in numbers followed by percentages in parenthesis.

the latter age group ( $p=0.121$  and  $p=0.664$ , respectively). Besides, 19(48.7%) males prolonged ileus compared to 9(42.9%) females ( $p=0.664$ ), whereas 14(35.9%) males had wound infection compared to 8(38.1%) females ( $p=0.866$ ) (Table-3).

## Discussion

Enhanced recovery pathways are now being propagated around the world in a variety of surgeries.<sup>7,8,10</sup> The basic aim is not to change the discharge criteria, but to help the patient achieve the criteria sooner than what he will achieve with the traditional care.<sup>3,4</sup>

We observed lower time for the stoma to work in patients in whom we intervened, showing  $31.63 \pm 9.63$  hours when compared to the  $51.77 \pm 7.37$  hours taken in patients in whom the protocols were not applied. Similarly, the hospital stay was significantly reduced from  $7.23 \pm 1.16$  days to  $4.13 \pm 1.04$  days.

To achieve this aim, these fast-track or enhanced recovery programmes were introduced. The scientific community aimed to control the physiological responses that follow the surgical stress via measures taken from before surgery to the time of discharge. Though not universal, components of many programmes include pain management, via epidural or patient controlled anaesthesia in the post-operative period, to omission of bowel preparation and reduced duration of pre-operative fasting.<sup>5,11</sup>

Pre-operative oral high carbohydrate drinks is associated with less muscle loss, better whole-body protein balance, and shorter hospital stay after major abdominal surgery.<sup>12,13</sup> Bowel cleansing by the means of mechanical bowel preparation has not been demonstrated to reduce post-operative complication rates in RCTs.<sup>14</sup> Mechanical bowel preparation either demonstrates no benefit or

harmful effects of mechanical bowel cleansing.

The fashioning of a temporary stoma brings with itself the fact of the inevitable reversal. Just like any other procedure it carries its own risks.<sup>14-16</sup> The healthcare system of Pakistan is underfunded and overstretched and these additional cases inevitably put additional burden on the already limited hospital beds and resources. Traditionally the care offered post-anastomosis/reversal of stoma resulted in the inevitable stay of the patient in hospital for around 5-6 days.

Peacock et al.<sup>17</sup> conducted a study on closure of loop ileostomy as day care procedure; the variables included in the study were cost, complications, hospital stay and readmissions. They observed ileus in 8% of patients, while wound complications were seen in 7.3% cases. Hospital stay was 23 hours which was standardised as part of day care procedure, while readmission was seen in only 6% of cases.

Similar to our observation, Aditya J. et al.<sup>18</sup> reported 5(16.7%) vs 4(13.3%) overall complications in their comparative study between conventional and fast-track surgery groups, respectively. Prolonged ileus was seen in 10% vs 01% while mean hospital stay was  $7.27 \pm 1.36$  in the conventional group vs  $4.73 \pm 1.34$  in group treated with fast-track surgery ( $p < 0.05$ ).

The results demonstrate that implementing the locally developed fast-track programme in a seemingly routine and uncomplicated cases can lead to significant improvement in the patient outcome, even in the absence of sophisticated tools. This translates into lower days of hospital bed occupancy, hence reduces cost to the government and the load on the public hospitals.

## Conclusion

The application of ERAS protocol in the appropriate setting was found to be safe and it decreased peri-operative complications in terms of hospital stay, resolution of ileus and wound infections. Such protocol is easy to apply in small bowel surgeries and results in better outcome.

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**Conflict of Interest:** None.

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