

*Research Article***Implementation of Enhanced Recovery after Surgery for Elective caesarean Section****Essam I. Ali, Ahmed S. Abdel Malek, Alaa G. Abdel Azim and Mohammed M. Saber**

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Abstract

Background: caesarean sections (CS) performed every year are increasing in number dramatically all over the world & represent loads on hospitals & medical centers. So, it became very important to give more attention for implementation of enhanced recovery after CS. **Aim of the work:** To investigate the effect of enhanced recovery after elective CS on the length of hospital stay, pain management, patient satisfaction, complication rate and return to hospital rate. **Patients and Methods:** This comparative study was conducted at Minia Maternity University hospital, it was carried out during the period from July 2018 to June 2019 during which about 400 patients under going elective CS were includedand divided into two groups: The first group (the active group) was subjected to our enhanced recovery program after surgery for elective CS regarding specific preoperative, intra operative and postoperative measures (ERCS) The second group (the control group) was subjected to the routine measures of any elective case of cesarean section regarding admission to hospital, preoperative, intraoperative and postoperative routine measures. **Results:** all the results of implementation of enhanced recovery program on the active group had significant differences than it in the control group with a ($p < 0.001$). **Conclusion:** Implementation of ERAS protocols in surgery for CS is a promising technique. Implementation of ERAS resulted in significant reduction in hospital stay, proper pain management and reduced rate of complications without an increase in re-admissions.

Keywords: caesarean sections, implementation of enhanced recovery, intraoperative and postoperative

Introduction

Caesarean section (CS) is the most commonly performed operations world-wide. In many countries there is evidence that planned or elective operations account for a growing proportion of all CS (Mazzoni et al., 2011).

The rate of elective CS continues to rise, despite initiatives to counter this trend. Birth by CS is associated with prolonged hospital stay in comparison to spontaneous birth and the majority of women remain in hospital for at least two days after a planned CS procedure. The perioperative management of birth by planned CS and post-operative care therefore represents a substantial care and cost burden to hospital. Crucially, the majority of women undergoing these elective procedures are young and fit. Not only do they possess the

capacity for rapid recovery, but the birth of a new baby is a unique incentive to return quickly to normal function. Hospital discharge for this group of women the day after surgery could potentially reduce the cost burden on hospital and obstetric centers (Khawaja et al., 2007)

The concept of an enhanced recovery program following elective surgery is not new. The aim of enhanced recovery is to optimize multiple aspects of patient care to improve recovery thereby facilitating earlier discharge, without a reduction in patient satisfaction or the quality of care (Litorp et al., 2013).

Allowing patients to go home the day after an elective caesarean section supported by recommendations from national guidance. In the UK. The National Institute for Health

and Care Excellence states that, “women who are recovering well, are a pyrexial and do not have complications following CS should be offered early discharge (after 24h) from hospital and follow-up at home, because this is not associated with more infant or maternal readmissions (Wilmore & Kehlet, 2001)

The increased efficiencies have been demonstrated to reduce waste of resources and thus reduce the over all cost. While significant variations in ERAS protocols exist both within and between surgical specialties, common elements often include effective patient education and acceptance, good perioperative hydration and nutrition, use of The increased efficiencies have been demonstrated to reduce waste of resources and thus reduce the over all cost. While significant variations in ERAS protocols exist both within and between surgical specialties, common elements often include effective patient education and acceptance, good perioperative hydration and nutrition, use of surgical techniques associated with fastest patient recovery, maintenance of perioperative patient normothermia, early removal of urinary catheters, adequate pain relief that promotes early ambulation and minimal use of perioperative opioids (which helps the return of bowel function quickly). (Gocott et al., 2012) Successful ERAS protocol implementation involves the creation of a core team of anesthesiologists, obstetricians, specialist nurses, and hospital managers. The large number of elements that are required for implementation of an ERAS protocol often requires significant culture change in the health organization (Kitching O’Neill, 2009)

Aim of the work

To investigate the effect of enhanced recovery after elective CS on the length of hospital stay, pain management, patient satisfaction, complication rate and return to hospital rate

Patients & Methods

This comparative study was conducted at Minia Maternity University hospital, it was carried out during the period from July

2018 to June 2019 during which about 400 patients under going elective CS were included

The included women were counselled and a written informed consent was taken from each case before participating in this study, The study was approved by The ethical committee of Gynecology & obstetrics department, faculty of medicine, Minia university

In this study two groups of patients were included: The first group (the active group) was subjected to our enhanced recovery program after surgery for elective CS regarding specific preoperative, intra operative and postoperative measures (ERCS)

- The second group (the control group) was subjected to the routine measures of any elective case of cesarean section regarding admission to hospital, pre-operative, intraoperative and post-operative routine measures

Selection criteria:

Both active group & control group were have no additional factors that affected their length of hospital stay or complication rate:

- 1- Uncomplicated pregnancies
- 2- Equal number of cases that have primary CS or previous scars in both groups
- 3- Matched age, parity, number of CS
- 4- A comparable indication of CS

Exclusion criteria:

- Patients included in both groups were not complaining of any medical diseases such as DM, HTN, cardiac problems bleeding disorders and others that can affect length of hospital stay of the cases

Both active and control groups were subjected to:

1- Detailed history:

- Personal history : regarding age of each case
- Obstetric history; regarding parity, indication of CS, number of previous CS, if there were any complications that occurred during previous CS, and to make sure that her pregnancy was not complicated

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- Medical history: to exclude presence of any chronic illness that can prolong duration of hospital stay or increase rate of complications

2- Examination: check her BP, weight, lower limb edema

After make sure that all inclusion and exclusion criteria were fulfilled in both groups:

Active group of cases (ERCS) group were subjected to:

1- Preoperative measures:

- Patients were selected and offered the enhanced recovery process when the decision was made for elective caesarean delivery
- **Optimize hemoglobin:**

HB level was checked in all patients when booking Caesarean section patients of HB level >10.5 gm/dl were included, If less than it oral iron was prescribed or if insufficient time referral for IV iron or preoperative transfusion was considered & patient was excluded

Patient came to hospital on the morning of operation. The day before operation contact with patients was done by telephone for education and preparation regarding the following;

- **Optimization of nutrition:**
- All patients were encouraged to drink plenty of clear fluids and eat well on the day before LSCS especially The intake of a high-caloric carbohydrate drink up to two hours before surgery has been shown to reduce thirst, hunger, and anxiety in patients undergoing abdominal surgery (Bop M, et al., 2001)

Night before CS: all patients were educated that Food restriction time is not more than 6 hours & Fluid restriction time is not more than 2 hours (ASA, 2016)

Premedications:

2 x of proton pump inhibitors 150mg were prescribed to all patients and patients were advised to take 1tablet at 10pm the night before surgery, 1at 6am on the day of surgery, all patients were advised to take 1g of paracetamol at home on the day of their operation .

2- Intraoperative measures:

- Single shot spinal anaesthesia was used in all patients of the current study. Maintenance of maternal blood pressure with ephedrine infusion (to correct hypotension induced by regional anaesthesia) was done.

IV antibiotics administered prior to incision;

Cesarean delivery increases the risk of infection and its related morbidity 5 to20-fold compared to vaginal delivery. (Baaqeel H, et al., 2013)

In our study all patients were given 1gm of CEFORAN (3rd generation cephalosporines) and on bottle of AMRIZOLE prior to skin incision .

- **Prevention of intraoperative & post operative nausea & vomiting:**

Postoperative nausea and vomiting (PONV) can delay early oral intake, a key objective of ERAS. PONV occurs frequently after cesarean delivery (Wu JI, Lo Y, Chia YY, et al., 2007) So all patients in our study were given metoclopramide (primperan) as a routine anti emetic .

Use of combination therapy of non-sedating agents such as ondansetron with dexamethasone were used in patients still complaining of vomiting after taking primperan Intravenous fluids were minimized into to 1L crystalloid (more were given in clinically indicated patients) Paracetamol 1g IV was given if the patient didn't take any pre-op or if 4 hours or more has elapsed since their last dose

- **Avoidance of maternal hypothermia;**

Maintaining perioperative normothermia in the general surgical population reduces the risk of postoperative wound infection, coagulopathy, blood loss, and so reduce length of hospital stay & enhance the recovery. (Sultan Habib As et al., 2015)

In our study avoidance of hypothermia in our cases was done through warming of the IV fluids given to the patient throughout CS.

- No gastric or peritoneal tubes were inserted, Subcuticular wound closure was done in all

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patients, Diclofenac 400 mg rectal was given to all patients after end of surgery

Optimization of neonatal condition:

Delayed cord clamping:

In our study delayed cord clamping was done for at least 30 seconds as the current recommendation from ACOG is delayed cord clamping in vigorous term and preterm infants for at least 30–60 seconds after birth.

Encourage skin-to-skin in theatre;

Skin to skin contact between mother & baby in operative theatre was encouraged as there are reported benefits for both the newborn and the mother of early skin-to-skin contact. Early skin to skin has been associated with increased rates and duration of breastfeeding and a decrease in maternal anxiety and postpartum depression. (Bigelow A et al., 2012)

Baby check by a neonatologist was done for all babies to ensure needs of babies and to avoid presence of neonatal condition that can prolong stay in hospital or prevent early breast feeding

3-Postoperative measures :

- Regular analgesia:
Provision of adequate postoperative analgesia is an integral component of ERAS protocols, and it assumes even greater importance in women undergoing cesarean delivery. Suboptimal analgesia is associated with delayed functional recovery, delayed mobilization which could increase the risk of thromboembolic complications, poor maternal bonding with the newborn, breastfeeding difficulties, and an increase in the risk of persistent pain and postpartum depression (Uchiyama A et al., 1994)
In our study all patients received both opioids & NSAIDs as post operative analgesia to enhance early ambulation.

- Early removal of urinary catheter:

It is recommended that urinary catheters are removed within 24 hours in ERAS protocols (Deniau B, et al., 2016)

In our study in Minia university hospital, urinary catheters were removed once patient legs reach the ground with no complication detected.

- Early mobilization;

Early mobilization improves pulmonary function and tissue oxygenation improves insulin resistance, reduces risk of thromboembolism & shorten length of stay Fearon KC, et al., 2005)

All patients were encouraged for early mobilization through providing adequate post operative analgesia and through patient education about importance of early mobilization.

Food and fluid given in recovery, after 2 hours start oral fluids then start semisolid foods within 6 hours.

Monitoring of neonate temperature

All patients were encouraged for early breast feeding of their babies

Prior to discharge:

All patients were ensured that they have a mean of communication with us & telephone number was given for call if there are any concerns.....

After discharge:

Regular contact with patients was done by telephone & regular visits in the out patient clinic were done to investigate effect if implementation of the current study

Results

Patients were divided into two groups :

- Enhanced recovery CS (ERCS) group (N=200) on which enhanced recovery after surgery for elective CS was implemented.
- Control group of patients (N=200) that were managed in the routine measures done to any case undergoing CS in Minia Maternity University Hospital .

Outcome of implementation of ERAS protocol on ERCS group in comparison to the control group is shown in table

Table: Outcome of implementation of ERAS for CS

	Active (ERCS)group N=200	Control group N=200	P-value
Length of hospital stay (days)	1±0	3±0	0.022
Pain management			
Post CS headache	15(7.5%)	70 (35%)	<0.001
Post CS nausea & vomiting	3(1.5%)	20 (10 %)	
Post CS early ambulation (within 2 hours post operative)	150 (75%)	30 (15 %)	
Patient satisfaction			
Post CS maternal anxiety	4(2%)	10 (5%)	0.029
Feeling safe to go home in the same day after CS	130 (65%)	50 (25%)	<0.001
Return to regular life activities after discharge	100 (50 %)	40 (20 %)	
Complication rate			
Wound infection	5 (2.5 %)	18(9 %)	0.002
Delayed return of bowel function	3 (1.5%)	10 (5%)	
Return to hospital (re admission)	2(1%)	8(4%)	0.019

*values are expressed in numbers (percentage %)

*this table shows that there is a significant difference between the ERCS group & the control group regarding length of hospital stay, pain management, patient satisfaction, complication rate & return to hospital rate ($p < 0.05$)

There was a statistically significant difference between both groups in length of hospital stay as it was about (1±0) days in the ERCS group (came to hospital on the day of operation & discharged in the same day) compared with about 3 days of hospital stay in the control group, pain control & adequate analgesia was also better in the ERCS group as early ambulation occurred in 150 cases in ERCS group (75%) compared to only 30 cases in the control group (30%) (p -value <0.001), post CS headache is significantly reduced in the ERCS group to 7.5% only compared to 35% in the control group (p -value <0.001) similar reductions were seen in post CS maternal anxiety in the ERCS group 4 cases (2%) compared to 10 cases in the control group (5%) with (p -value 0.029), incidence of complication was reduced among cases of ERCS group as wound infection occurred in 5 cases (2.5%) compared with 18 cases (9%) of the control group (p -value is

0.002), delayed return of bowel functions occurred in 3 cases of the ERCS group (1.5%) compared with 10 cases in the control group (5%) with p -value =0.019, from that complicated cases 2 cases in the ERCS group needed hospital readmission (1%) compared with 8 cases (4%) in the control group.

Discussion

Enhanced recovery after surgery (ERAS) is a concept initially developed for patients undergoing colorectal surgery but has been adopted by other surgical specialties with similar positive outcomes. The adoption of enhanced recovery after surgery in the obstetric patient population is rapidly gaining popularity. This study highlights perioperative interventions that should be considered as enhanced recovery after surgery protocol for women undergoing cesarean delivery.

As with any clinical or behavioral model changes, there are multiple resistances in how to implement ERAS; Applicability of ERAS is complex and hard, not only due to requirement of high level of harmony in working of health-care provider teams, but because many of these procedures work against the present clinical practice. This study is in accordance with the objective to assess efficacy of ERAS approach that is characterized by tailoring the procedures implemented to the needs of organizations and according to the general condition of the patients.

Implementation of new protocol in daily practice is imperative and time consuming. Hence the rate of commitment to the protocol should be offered in all ERAS studies to allow an objective evaluation of the outcome of the programs

Barriers to implementation:

The potential barriers to successful implementation of an ERAS protocol for cesarean delivery include the discomfort providers feel with change in practice, allocation of resources especially for patient education, post discharge follow up, and the lack of dedicated operating rooms for scheduled cesarean deliveries

However the strength points of the current study lie in the equity and impartiality of our data. Both groups of patients were not affected by another factors because the study was conducted in the same hospital (Minia maternity university hospital).. Another strength point is that the study highlighted LOS (length of hospital stay), which may be considered as a surrogate outcome for recovery after surgery. Also, all patients underwent the same maneuver (CS) but with difference between specific measures of ERAS & routine measures in the control group.

The ERAS protocols include the following: preoperative nutritional support for the patient who is malnourished, carbohydrate loading before surgery to minimize post-operative insulin resistance, epidural or spinal analgesia to reduce the endocrine

stress response, anti-inflammatory drugs to reduce the inflammatory response, early feeding after surgery to secure energy intake, and optimal pain control to avoid stress and insulin resistance. ERAS processes also aim to minimize fluid shifts. Too little fluid can cause a reduction in perfusion and organ dysfunction, whereas intravenous salt and fluid overload is recognized as a major cause of post-operative ileus and its complications (Bragg et al., 2015)

Conclusion & Recommendation:

Implementation of ERAS protocols in surgery for CS is a promising technique. Implementation of ERAS resulted in significant reduction in hospital stay, proper pain management and reduced rate of complications without an increase in re-admissions. ERAS has resulted in a significantly increased understanding of peri-operative physiology. This has led to the concept among surgeons that the role peri-operative care may be important and warrants recognition as a separate subspecialty since it does not exclusively fall into the domain of any of the existing specialities

Therefore, we can recommend that the implementation of the enhanced recovery program for surgery after elective cesarean section has become a necessity in light of the continuous rise in the number of births and the constant pressure on hospitals and their resources and the cost of stay.

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