Early versus Late Oral Feeding on the Recovery of Normal Bowel Functions After Caesarean Section: A Randomized Controlled Study

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ABSTRACT

Background. To compare early oral feeding (EF) versus late oral feeding (LF) on the return of normal bowel functions in spinally anesthetized women after having lower segment Caesarean section (LSCS). Secondary outcomes such as maternal satisfaction and gastrointestinal complications were also evaluated.

Methods. Three-hundred and sixty-two singleton pregnant women undergoing elective LSCS with spinal anesthesia were assigned to receive either EF (n=183) or LF (n=179) after surgery. Participants began to take normal diet between immediately and 6 hours, or began sipping water after 12 hours and soft diet after 24 hours then normal diet after 48 hours of surgery.

Results. The ages of participants ranged from 19 to 47, with a mean age of 35±12 years. There was no loss follow-up and no significant difference in patient characteristics. Participants given EF were more likely to experience bowel sound the next morning after surgery than patients given LF (EF 93% vs. LF 71%, P<0.05). However, there was no difference in time to passing flatus and time to passing stool. Maternal satisfaction, rated on a 5-point scale was significantly higher in the EF group. However, there was no significant difference in gastrointestinal complications between both groups.

Conclusion. The findings of this trial support the recommendation of EF for women who undergo uncomplicated LSCS under spinal anesthesia.

Key words: Early oral feeding, Late oral feeding, Caesarean section, Spinal anesthesia, Bowel function.

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INTRODUCTION

Caesarean section is the most common surgery in the world [1-3]. Women who have a lower segment Caesarean section (LSCS) usually have a choice of two or three options: A general anesthesia, where they are unconscious, and two types of regional anesthesia known as "epidural" and "spinal" anesthesia. Regional anesthetics numb the body from the waist down. The woman is awake for the birth and can see her child immediately afterwards. In an epidural anesthesia, the anesthetic is injected into the "epidural space" surrounding the spinal cord in the thoracic or lumbar regions of the spine. This only numbs the nerves that lead to the region of the spinal cord where the anesthetic was injected. Epidurals start relieving pain after 10 to 20 minutes. In spinal anesthesia, also known as spinal block, the medication is injected closer to the spinal cord: into the cerebrospinal fluid in the subarachnoid space. This causes the entire lower half of the body to feel numb. Spinal blocks work faster than epidurals, and a smaller amount of anesthetic medication is needed. General anesthetics can be done faster, so they are used if the opera-
Recovery of bowel function is an emergency, or if the woman cannot have a regional anesthetic. If there is more time, or if it is a planned (elective) Caesarean section, then the woman might have a choice of anesthetic. Her decision will usually depend on whether or not she would like to be awake for the birth. The most, preferred and convenient anesthetic technique for Caesarean section is the spinal anesthesia both for elective and emergency cases unless otherwise contraindicated [1, 4]. Current LSCS procedures are less complicated and involve shorter hospital stays than in the past [5], although several postoperative complications such as ileus (9.3%), nausea (4.6%) and vomiting (2.4%), can occur [6, 7].

Following LSCS, activity in small intestines starts within 2–3 hours and function is completely recovered within 6–12 hours. Stomach function returns 12–24 hours after surgery with the large intestines recovering fully between 48–72 hours [8]. Bowel sound (examined by a physician), passing flatus, and bowel movement provide clinicians with key indicators to gauge the return of bowel function [9]. Factors influencing these metrics include the size of the incision, operative time, blood loss, type of anesthesia, opioids, general health of the patient, nutrition, and psychiatric condition [8, 10]. A typical LSCS patient in Prince Meshari Bin Saud Hospital (PMH), Baljurashi, Saudi Arabia, lies down flat following the procedure for at least 6–8 hours. Patients will begin sipping water the morning after surgery and progress to stepping diet consisting of a liquid diet for the first meal, a soft diet for the next, then a regular diet at each following meal. Intravenous fluid discontinued as soon as the patient resumes eating. Urine catheter removed after 8 hours of the operation and the patient is advised to ambulate. The patient is typically discharged 72 hours after surgery.

Reviews of the literature reveal that early oral feeding (EF) can minimize protein depletion or destruction in the body, aid healing of the surgical wound, improve mental-state, reduce sensation of thirst and hunger, and reduce post-operative pain [11-14]. Other benefits of EF include improved recovery of bowel function, decreased time to lactation, decreased abdominal bloating, decreased time to pass flatus or stool, reduced number of used intravenous bags, reduced time for removal of urine catheter, shortened time to ambulation and discharge, and lastly, improved overall satisfaction with the surgery [6,7,11-20]. While support for advising EF is well-documented [18, 20], specific recommendations regarding the ideal time to begin feeding have not been clearly established. The primary outcome investigated in this study was the impact of EF on the return of bowel function. Secondary evaluated outcomes were time to passing stool and/or flatus and post-operative maternal satisfaction.

**MATERIALS AND METHODS**

**Study design**

This is an open label randomized controlled study conducted under the intention-to-treat analysis. It was conducted at Department of Obstetrics & Gynecology, Prince Meshari Bin Saud Hospital (PMH), Baljurashi, Saudi Arabia. Between 1 January 2019 and 31 August 2019. An informed written consent was obtained from each participant before enrollment. The study protocol was approved by PMH Research Committee, and all procedures were conducted in accordance with the Declaration of Helsinki (1983). Minimum sample size was calculated as 148 participants to achieve a statistically significant result of less than 0.05. Therefore, each group should have a minimum of 74 women. To make sure to reach significance, the decision was taken to recruit all women fulfill the inclusion criteria during the period of the study as long as the number in each arm of the study is more than 74 women. Inclusion criteria are singleton pregnancy, elective LSCS under spinal anesthesia, desire to join the study after being given the research information, no chronic diseases, no underlying diseases that affect digestion and no history of gastrointestinal surgery. Women who had intraoperative and postoperative complications such as gastrointestinal injury, genitourinary tract injury, and postpartum hemorrhage were excluded.

The randomized allocation was performed using file number randomization. Women who have file numbers ending in odd numbers were joined the EF group, while women with file numbers end in even numbers were joined the LF group. No blinding was applied since both women and nurses know the allocation. Assessor (author) cannot be blinded, because he performed all the operations, wrote post-operative orders and collected data.

**Intervention**

All participants were randomly allocated to receive either EF or LF. The EF group was assigned to start normal diet between immediately and 6 hours after surgery, the order writ-
ten as “Normal diet immediately”. The LF group followed the following pattern: began sipping water after 12 hours post-operation and soft diet after 24 hours of operation then normal diet after 48 hours of operation. Trial was explained to all participants at the outpatient clinic in the last antenatal visit before LSCS and an informed consent was obtained from each participant. The same consultant performed the LSCS for all participants under spinal anesthesia. Anesthesia was administered by anesthesiologists using the standard protocol.

**Study outcomes**

The primary outcome of this study was to assess the return of bowel functions after LSCS, as gauged by time to pass flatus, time to pass stool, and the presence of bowel sounds the morning after surgery. Secondary outcomes included the evaluation of maternal satisfaction and gastrointestinal complications, defined as mild and severe ileus symptoms. The presence of abdominal cramping, or mild distension on physical examination is defined as mild ileus symptoms. Marked abdominal distension with more than three episodes of vomiting in 24 hours after surgery, or the inability to tolerate a liquid diet with delayed step diet is defined as severe ileus symptoms. In the post-partum ward, following surgery, assessment forms were given to the participants who recorded gastrointestinal complications (nausea, vomiting, and abdominal bloating), time to passing flatus, time to passing stool, time to lactation, time to removing the intravenous fluids. Nurses in the post-partum ward administered oral feeding according to doctor orders. Bowel sounds were examined the morning after surgery. The study results collected by the author. This same individual also handed out the forms and examined the bowel sounds.

**Statistical analysis**

All statistical analysis was performed using SPSS version 15.0 (SPSS Inc., Chicago, USA) and all outcomes were tested for normality prior to statistical analysis. For normally distributed data, the student’s t-test was performed after generation of the mean and standard deviation (SD) while categorical data were analyzed using the chi-square test. Data that did not follow a normal distribution pattern were analyzed using a Mann-Whitney U test. P-values below 0.05 were considered statistically significant.

**RESULTS**

Three-hundred and sixty-two participants were enrolled in this case control study. One hundred and eighty-three women were randomly assigned to EF group and 179 to the LF group. No women dropped out from the study. Age of participants ranged from 19–47 years, with a mean of 35±12 years and all participants were observed from the initial recruitment until discharge. As shown in Table 1, there were no differences in participants’ characteristics between both groups (Table 1).

The outcomes of the study are shown in Table 2. Early feeding has led to significant increase in bowel sounds the morning after surgery (EF 93.0% vs. LF 71%; P<0.05, chi square test). However, no differences were observed in both

**Table 1. Patients’ characteristics prior to enrollment**

| Characteristics | EF (n=183) | LF (n=179) |
|-----------------|------------|------------|
| Age             | 35 ± 12    | 35 ± 11    |
| Gestational age | 38 ± 2.1   | 38 ± 2.2   |
| Parity          |            |            |
| 0               | 11 (6.0)   | 12 (6.7)   |
| 1               | 13 (7.1)   | 13 (7.2)   |
| 2               | 33 (18)    | 31 (17.3)  |
| 3               | 21 (11.5)  | 20 (11.5)  |
| >4              | 22 (12)    | 24 (13.4)  |
| BMI             |            |            |
| <18             | 12 (6.5)   | 11 (6)     |
| 18-25           | 46 (25.1)  | 48 (26.8)  |
| 25.1-30         | 23 (12.6)  | 20 (11.2)  |
| >30.1           | 19 (10.4)  | 21 (11.7)  |
| LSCS indication |            |            |
| Distress        | 14 (7.6)   | 13 (7.2)   |
| CPD             | 18 (9.8)   | 16 (8.9)   |
| Previous CS     | 56 (30.6)  | 58 (32.4)  |
| Others          | 12 (6.5)   | 13 (7.2)   |
| History of previous CS |    |            |
| None            | 13 (7.1)   | 13 (7.2)   |
| 1               | 14 (7.6)   | 17 (9.5)   |
| ≥2              | 73 (39.8)  | 70 (39.1)  |
| Operative time (min) | 18 ± 4 | 18 ± 3.5 |
| Time to bowel sound (min) | 1070 ± 61 | 1096 ± 64 |

Data are presented as mean ± SD or number (%). All parameters showed no significant differences between the two groups (student’s t-test [mean ± SD] and chi square test [n and %]). CPD= cephalopelvic disproportion.
time to passing flatus and time to passing stool after surgery between the two groups (954 ± 16 vs. 1145 ± 18 min; P = 0.942, and 1231 ± 17 vs. 1517 ± 19 min; P = 0.621 respectively, student’s t-test). Maternal satisfaction were significantly greater in the EF group as compared to the LF group (P<0.05, chi square test). There was no difference in the incidence of mild gastrointestinal complications between both groups. Likewise, there were no major gastrointestinal complications reported in both groups.

Table 2. Patients’ outcome at the end of the study

| Outcome                          | EF (n=183) | LF (n=179) |
|----------------------------------|------------|------------|
| Time to pass flatus (min)        | 954 ± 16   | 1145 ± 18  |
| Bowel sounds next morning        | 170 (93)   | 127 (71)†  |
| Time to pass stool (min)         | 1231 ± 17  | 1517 ± 19  |
| Mild ileus symptoms              |            |            |
| Nausea                           | 11 (6.0)   | 7 (4.0)    |
| Vomiting                         | 4 (2.2)    | 2 (1.1)    |
| Bloating                         | 24 (13.1)  | 23 (12.8)  |
| Severe ileus symptoms            | 0          | 0          |
| Satisfaction (1-5 scale)         |            |            |
| Thirst                           | 4.6 ± 0.7  | 2.1 ± 1.1* |
| Hunger                           | 4.8 ± 0.4  | 2.0 ± 0.7* |

Data are presented as mean ± SD or number (%). Significance levels: *P<0.05 (student’s t-test); †P<0.05 (chi square test).

**DISCUSSION**

In this study, data for the return of bowel function following uncomplicated Caesarean section under spinal anesthesia were evaluated in the EF and LF groups. This comparative evaluation revealed that EF is superior to LF as documented by increased bowel sounds the morning after surgery. On top of that, there was no difference in gastrointestinal complications between the EF and LF groups. In addition, EF increased maternal satisfaction. Previous studies also support the advisability of EF, with a variety of benefits identified including the time to passing flatus, [6, 14, 15, 17-19], time to return of bowel sound, time to passing stool, [7, 12-19], and time to bowel movement. This trial finding confirm that EF increases bowel sound the morning after surgery. However, these results did not demonstrate significant differences between EF and LF groups in time to passing flatus and time to passing stool. A lack of statistically significant variation in these factors may be due to the homogeneity in the characteristics of trial population. Sample consisted of low-risk, elective LSCS recipients with similar operative times, lacks variation in terms of the quantity and severity of significant factors contributing to ileus. With factors contributing to ileus similar and few, and the likelihood of complications low, statistically significant variation is less likely to reveal itself, especially in studies with smaller sample sizes. However, our findings were generally consistent with those typically found in the literature.

Reports vary regarding the effects of EF on maternal satisfaction. In 2015 meta-analysis study conducted by Guo and co-workers reported no link between EF and general improvements in maternal satisfaction [20]. In contrast, Teoh and co-workers in 2007 study of Singaporean population found that EF participants enjoyed higher maternal satisfaction [15]. Increased maternal satisfaction is an important outcome of care as it affects postpartum blues, decisions about future pregnancies, and doctor and hospital reputation.

Previous studies are almost unanimously in confirming no difference in gastrointestinal complications associated with EF as compared to LF, and this study reported similar findings. On the other hand, in a rare finding, the study headed by Teoh and co-workers reported increased nausea in EF participants, who began sipping orange-juice at only 30 min post-operation. Despite the increased nausea (10.2% vs 2%, P<0.05) experienced by EF recipients, maternal satisfaction was clearly higher in this group [15]. However, nausea experienced was so mild and easily treatable and did not affect maternal satisfaction. Certainly, maternal satisfaction is affected by more severe nausea symptoms and gastrointestinal complications that can cause postoperative pain, impede progress in the stepping diet, and increase the duration of hospital stay.

This piece of research, presented herein, is a randomized controlled study with no-loss to follow up. The participants filled-out their assessment surveys in real-time as they recovered in the post-partum ward, reducing the recall bias in participants. However, this study has some limitations. Women included in this investigation were elective and uncomplicated LSCS. Thus, the results cannot be reliably ap-
plied to complicated or emergency LSCS. Additionally, we could not blind the nurses and participants. This trial experience and findings suggest that further studies should include a larger sample size, emergency cases, earlier oral feeding, and look more closely at the effects on key metrics.

In conclusion, improvements in return of bowel function and maternal satisfaction, coupled with a lack of gastrointestinal complications, support the advisability of EF over LF. Further research should consider beginning EF earlier, should also include emergency cases, as well as other categories of LSCS where factors contributing to ileus are more severe and varied.

**Conflict of interest**

The authors declare that they have no conflict of interest.

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