# Regain of gastrointestinal motility after general anesthesia versus spinal anesthesia in a cesarean section

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**Objective**
The objective of the study was to compare the effect of spinal and general anesthesia in return of gastrointestinal motility in an elective cesarean section (CS).

**Background**
CS is a common major hospital surgical procedure performed nowadays. One of the most common postoperative complications is postoperative gastrointestinal paralysis (ileus) that must be minimized due to its possible serious consequences.

**Patients and methods**
One hunderd and forty pregnant women who were admitted for CS and fulfilled the criteria of the study population were enlisted in this prospective, controlled study and were then assigned to either group A or B. Group A included 70 patients for general anesthesia, while group B included 70 patients for spinal anesthesia.

**Results**
This study results were shown to have a statistically significant effect of spinal anesthesia versus general anesthesia in terms of shorter mean time interval to normal intestinal sound, passage of flatus, first motion, and discharge from hospital. Also, the study showed beneficial effect of spinal anesthesia versus general anesthesia in terms of less use of opioids, less use of NSAIDs, less incidence of distension, and less incidence of ileus.

**Conclusion**
Spinal anesthesia results in a quicker return of bowel activity after a CS, decreased hospital stay, and less use of postoperative opioids than general anesthesia.

**Keywords:**
cesarean section, general anesthesia, intestinal motility, postoperative ileus, spinal anesthesia

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## Introduction

Cesarean delivery defines the birth of a fetus via laparotomy and then hysterotomy. There are two general types of cesarean delivery: primary refers to a first-time hysterotomy and secondary denotes a uterus with one or more prior hysterectomy incisions [1]. One of the most common postoperative complications is adynamic paralysis that must be minimized due to its serious consequences including delayed enteral feeding resulting in patient discomfort, prolonged hospitalization, and increased healthcare costs [2]. Postoperative ileus usually manifests itself from the third to the fifth day after surgery mainly with nausea, vomiting, retention of stool, and flatus and abdominal distention with absent bowel sounds [3]. In fact, many factors appear to affect the delay in the return of gastrointestinal activity, including intraoperative bowel manipulation, postoperative sympathetic inhibitory pathway to gastrointestinal tract (GIT), inflammation, anesthetic agents, and narcotics analgesia [4]. Spinal anesthesia is the preferred method in cesarean section (CS) as general anesthesia is associated with airway-related adverse outcome, aspiration risk, intraoperative awareness, and increased uterine atony leading to higher blood loss [5]. The late recovery of GIT motility in general anesthesia may be due to the residual sedative effect of anesthetics used in induction and maintenance of general anesthesia [6]. General anesthesia may be necessary because of specific risks to the mother or child. Patients with heavy and uncontrolled bleeding may not tolerate the hemodynamic effects of regional anesthesia. General anesthesia is also preferred in very urgent cases, such as severe fetal distress, when there is no time for performing spinal anesthesia [7]. The aim of the study was to compare the effect of spinal and general anesthesia in return of the GIT motility in elective CS.




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## Patients and methods

This prospective, controlled study was carried out at Obstetrics and Gynecology Department in Berket El Saaba General Hospital during the period from October 2017 to June 2018 after approval by the hospital ethics committee on human research. An informed consent was obtained from all participants. The required sample size was estimated using the G*Power software version 3.1.2 (Heinrich-Heine-Universität Universitätsstraße 1, Gebäude: 23.03, Etage/Raum: 00.68, 40225 Düsseldorf). It was calculated at power 80% and 95% confidence interval, so that the total sample was 140 and was divided into two groups according to a randomization scale. At the end of the study, the data of all participants was collected and they were: group A (general anesthesia including 70 patients) and group B (spinal anesthesia including 70 patients). The criteria of the patients who have been included in this study were as follows: age from 19 to 35 years, term pregnancy (37–42 weeks), singleton pregnancy, no medical disorders such as diabetes mellitus and thyroid disease and absence of any pathology associated with pregnancy. The following cases have been excluded from this study: allergy to local or general anesthetic, high-risk pregnancies such as preeclampsia or eclampsia, previous intestinal surgery (except appendectomy), previous CS, and previous uterine surgery. Assessment of the patients included history taking with particular aspect relevant to this study, general, obstetrical, and vaginal examination, obstetrical ultrasonographic evaluation, and full laboratory investigations especially (full blood count, liver function test, kidney function test, and random blood sugar). On arrival to the operation room, standard monitoring was applied with noninvasive blood pressure measurement and pulse oximetry. Parturients in group A received standard rapid sequence induction with preoxygenation by 100% oxygen for 3 min followed by 4–5 mg/kg thiopental and 100 mg succinylcholine; cricoid pressure was applied throughout induction once necessary. After correct placement of the tracheal tube was confirmed, anesthesia was maintained with up to 1.5% isoflurane and oxygen; neuromuscular blockade was maintained with 0.4 mg/kg atracurium while parturients in group B were prehydrated with 500 ml lactated Ringer's solution intravenously within 15 min in the sitting position. Low back was prepared and draped in a sterile fashion with betadine solution 10%. Spinal anesthesia was performed at L2–L3 or L3–L4 intervertebral space using a fine spinal needle (size 22 G '3.5 inch'). Injection of local anesthetic bupivacaine (Marcaine) into the subarachnoid space (1.5–3.5 ml) was used (Pfizer235 East 42nd Street New York, NY 10017). The operative data were included: skin was opened by pfannenstiel incision. The abdomen was opened in layers. The peritoneum was dissected sharply. Transverse incision was made in the lower uterine segment. The baby was delivered. Intravenous infusion containing 20 U of oxytocin after shoulder delivery was applied. Spontaneous placental delivery was done. Closure of uterine incision in two layers using blunt needle and absorbable continuous Vicryl 1 sutures was done (Johnson & Johnson New York, USA). Peritoneum was closed by continuous absorbable suture Vicryl 2–0. Rectus sheath was sutured using continuous absorbable suture Vicryl 1 sutures. The fascia was closed with continuous Vicryl 1 sutures, subcutaneous fat was closed with interrupted Vicryl 2–0 sutures and the skin was closed with subcuticular Prolene 2–0 sutures (Johnson & Johnson New York, USA). The data were recorded including: presence of adhesions, application of intraperitoneal drain, estimated blood loss, operative time, time from CS start to fetal extraction and closure events. After the end of surgery**:** patients had been under close observation for vital data, vaginal bleeding, urine output and uterine massage. Both groups had the same hospital fluid regimen which was 500 ml of 5% glucose every 6 h, 500 ml of ringer every 12 h and 500 ml of saline every 24 h. All participants were received the same intraoperative prophylactic antibiotic ampicillin + sulbactam vial 1.5 g before skin incision that had been repeated every 12 h for the first 24 h. For postoperative analgesia, intramuscular doses of 75 mg diclofenac sodium and opioid (pethidine 100 mg) were offered; the first was given once needed after waning of the effect of anesthesia and the second 12 h later. No oral or rectal bowel stimulants were given after surgery. Then auscultation for intestinal sound was started 2 h after operation and was performed at 1 h interval till normal bowel sounds were detected. The patients were allowed to sip small amount of water only 12 h postoperatively. The oral intake of clear fluid and soft food was allowed when normal bowel sounds were detected and flatus has passed with advancement to regular diet after passage of first bowel motion.

### Statistical analysis

Data were collected, coded, revised and entered to the statistical packages for the social sciences, version 20 (IBM-SPSS, Chicago, Illinois, USA). Data from questionnaires entered as numerical or categorical, as appropriate. Quantitative data showed as mean, SD, and range. Qualitative data expressed as frequency and percent. $\chi^2$-Test used to measure association between qualitative variables. Mann–Whitney *U*-test used to compare mean and SD of two sets of quantitative when this data is not normally distributed. Spearman's correlation used to study correlation between two variables having not normally distributed. *P* value will

be considered statistically significant when it is less than 0.05.

## Results

Regarding the demographic data of the patients participated in the study, the mean age was 24 ± 3.129 years with a range of 18–31 years and the mean gestational age was 39.09 ± 1.59 weeks with a range of 32–41 weeks. It was found that the mean age in group A (general anesthesia group) was 23.81 ± 2.92 years with a range of 18–30 years, while the mean age in group B (spinal anesthesia group) was 23.71 ± 3.03 years with a range of 18–31 years. The mean gestational age in group A was 38.50 ± 1.39 weeks, while the mean age of group B was 38.75 ± 1.59 weeks. There is no significant difference between general anesthesia and spinal anesthesia regarding demographic data (age and gestational age). According to regain of gastrointestinal motility after recovery from anesthesia, it was found that the mean time of first auscultated abdominal intestinal sound in group A and group B was 22.4 ± 2.7 and 7.7 ± 1.36 h, respectively, while the mean time of first passage of flatus in group A and group B was 24.3 ± 2.8 and 11.35 ± 1.22 h, respectively. The mean time of first motion passage in group A was 29.37 ± 2.9 h, while in group B it was 13.8 ± 1.3 h. The mean length of hospital stay in group A was 43.44 ± 5.4 h and group B was 24.6 ± 1.29 h as shown in Table 1. There is highly significant difference toward the spinal group regarding first intestinal sound (difference of 14.7 h), first flatus (difference of 12.95 h), first motion (difference of 15.57 h) and hospital stay (difference of 18.77 h). The mean duration of CS surgery in group A and group B was 41.31 ± 3.9 and 42.2 ± 3.4 min, respectively. There is no significant difference regarding the duration of surgery. Some postoperative complications were detected, for example, intraperitoneal drain, fever, distension, and surgical site infection. The patients needed intraperitoneal drain in group A were eight (11.4%) patients while in group B there were four (5.7%) patients. Patients suffered from postoperative fever in group A were only two (3.63%) patients and in group B were 10 (13.99%) patients. Abdominal distention occurred in 24 (34.3%) patients in group A, while in group B, eight (11.4%) patients suffered from distention. Three (4.3%) patients in group A presented with postoperative surgical site infection and one (1.4%) patient with surgical site infection in group B (Table 2). There is highly significant difference between both groups regarding fever (more in group B) and distension (more in group A), while there was no statistically significant difference regarding intraperitoneal drain (despite more in group A), ileus, and surgical site infection (despite more in group A). The number of patients who needed postoperative opioid analgesia in group A and group B was nine (13.47%) and seven (10.36%), respectively, while those who needed NSAID medication in group A and group B were 56 (80.31%) patients and 24 (34.72%) patients, respectively (Fig. 1). There is a highly statistically significant difference between the two studied groups regarding NSAID use (more in group A), while there was no statistically significant difference regarding opioid use (but more in group A). There was no correlation found between gestational age and regain of gastrointestinal motility in spinal and general anesthesia groups as shown in Table 3. In general, in both groups A and B, there was a highly statistically significant positive relation between regain of gastrointestinal motility (first sound, first flatus, and first motion) and hospital stay (Figs. 2 and 3).

**Table 1 Comparison between general and spinal anesthesia regarding regain of gastrointestinal motility and hospital stay after a cesarean section**

| | Group A (*n*=70) | Group B (*n*=70) | *U* | *P* |
|---|---|---|---|---|
| Time of first intestinal sound (h) | | | | |
| Mean±SD | 22.4±2.7 | 7.7±1.36 | 40.9 | 0.001** |
| Median | 20.0 | 8 | | |
| Range | 14-26 | 5-11 | | |
| Time of first passage of flatus (h) | | | | |
| Mean±SD | 24.3±2.8 | 11.35±1.22 | 10.245 | 0.001** |
| Median | 24.0 | 11.5 | | |
| Range | 18-30 | 9-15 | | |
| Time of first passage of motion (h) | | | | |
| Mean±SD | 29.37±2.9 | 13.8±1.3 | 10.253 | 0.001** |
| Median | 29.0 | 14.0 | | |
| Range | 22-35 | 10-17 | | |
| Length of hospital stay (h) | | | | |
| Mean±SD | 43.44±5.4 | 24.6±1.29 | 10.25 | 0.001** |
| Median | 45 | 25.0 | | |
| Range | 30-50 | 21.5-28 | | |

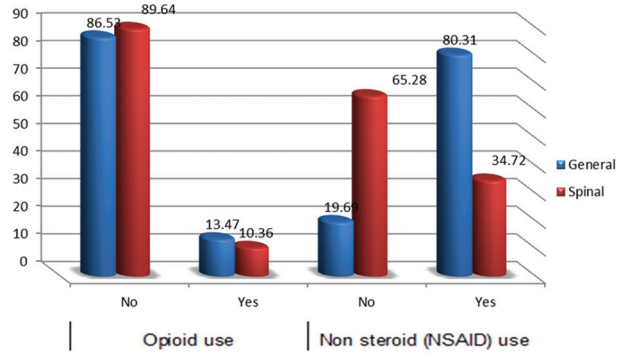
*U*, Mann-Whitney test. **Significant result.

**Table 2 Comparison between spinal and general anesthesia as regards postoperative complications**

| | Group A (*n*=70) [*n* (%)] | Group B (*n*=70) [*n* (%)] | Fisher's exact test | *P* |
|---|---|---|---|---|
| Intraperitoneal drain | | | | |
| No | 62 (88.6) | 66 (94.3) | 1.45 | 0.227 |
| Yes | 8 (11.4) | 4 (5.7) | | |
| Fever | | | | |
| No | 68 (96.37) | 60 (86.01) | 11.64 | 0.006** |
| Yes | 2 (3.63) | 10 (13.99) | | |
| Distention | | | | |
| No | 46 (65.7) | 62 (88.6) | 10.37 | 0.001** |
| Yes | 24 (34.3) | 8 (11.4) | | |
| Ileus | | | | |
| No | 70 (100.0) | 70 (100.0) | $\chi^2$ | - |
| Surgical site infection | | | | |
| No | 67 (95.7) | 69 (98.6) | 1.029 | 0.620 |
| Yes | 3 (4.3) | 1 (1.4) | | |

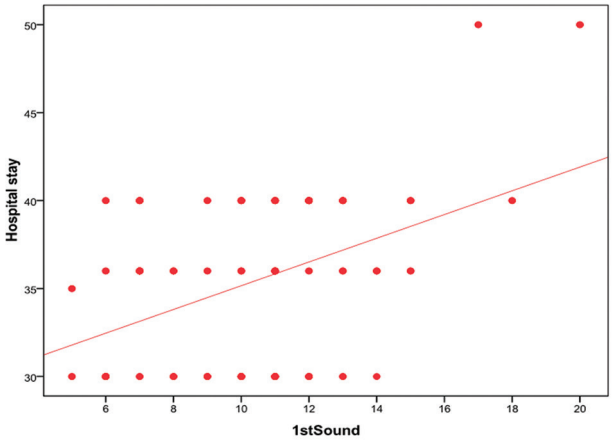
**Highly significant result.

**Figure 1**




Comparison between spinal and general anesthesia regarding the use of postoperative analgesia. NSAID, non steroid anti-inflammatory drugs.

**Figure 2**




Correlation between first sound and hospital stay in the spinal.

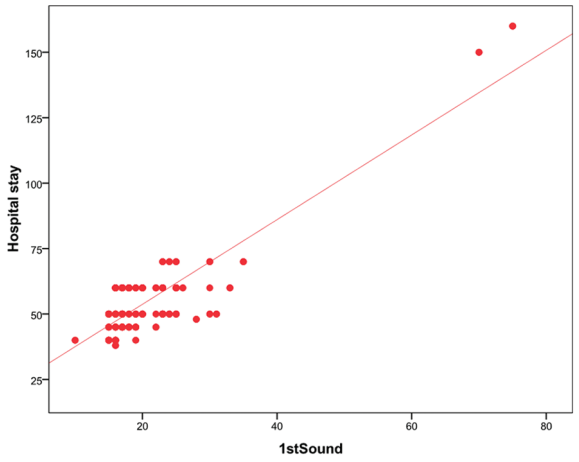
## Discussion

Postoperative ileus is defined as a temporary disturbance in gastric and bowel motility following abdominal surgery including CS [8]. Transient postoperative ileus is recognized as an expected outcome of any major abdominal surgery, especially when the peritoneum is entered, or the bowel is extensively manipulated or reconstructed [9]. No studies have identified any specific therapy, other than supportive care, to resolve prolonged postoperative ileus [10]. This study was conducted on 140 pregnant women. In this study, the patients age ranged from 18 to 31 years with a mean ± SD of 23.81 ± 3.03 years, gestational age in weeks ranged from 36 to 41 week with mean ± SD of 39.09 ± 0.941 weeks, and the duration of surgery 42.2 ± 3.9 min. This study showed that there was no statistically significant difference between the two studied groups regarding demographic data (age and gestational age) and duration of surgery. Also, no correlation was found between age, gestational age, and regain of gastrointestinal motility and postoperative complications in spinal and general anesthesia patients. Consistent with our findings, Bayoumi [11] showed that there was no statistically significant difference between the two studied groups regarding demographic data (age, BMI, and gestational age) and no correlation was found between age, gestational age, and regain of gastrointestinal motility and postoperative complications in the spinal and general anesthesia patients. Our data showed statistical significance beneficial the effect of spinal anesthesia in decreasing the time interval to hear first bowel sounds after a CS to 7.7 versus 22.4 h in the general anesthesia group ($P < 0.001$). This agrees with the result of Havas *et al.* [6] study which showed a decrease in the time interval to hear first bowel sound to 4.75 h in the spinal anesthesia group versus 16.6 h in the general anesthesia group ($P < 0.001$). In this study, there was statistically significant effect of spinal anesthesia versus general anesthesia in terms of shorter mean time interval to passage of flatus (11.35 h in spinal anesthesia vs. 24.3 h in general anesthesia). Also, the result of Havas *et al.* [6] recorded statistically significant effect as regards time interval to first pass of flatus after a CS, which decreased in the spinal anesthesia group than in

**Table 3 Correlation between gestational age and regain of gastrointestinal motility in the spinal and general anesthesia groups**

| | Gestational age | | | |
|---|---|---|---|---|
| | Group A (*n*=70) | | Group B (*n*=70) | |
| | *R* | *P* | *R* | *P* |
| First intestinal sound (h) | −0.051 | 0.44 | −0.181 | 0.058 |
| First flatus (h) | −0.04 | 0.55 | −0.052 | 0.520 |
| First motion (h) | −0.036 | 0.585 | 0.008 | 0.921 |

**Figure 3**




Correlation between first sound and hospital stay in the general group.

the general anesthesia group (19 vs. 24 h, $P < 0.001$). In this study, we found statistical significance in the time interval to first passage of motion after a CS, which was shorter in the spinal anesthesia group than in the general anesthesia group (13.8 vs. 29.37 h, $P < 0.001$). Havas *et al.* [6] also recorded statistical significance as regards time interval to passage of first motion after a CS, which passed earlier in the spinal anesthesia group than in the general anesthesia group (24 vs. 32.5 h, $P < 0.001$). Our result showed statistical significance as regards the length of hospital stay after a CS, which was shorter in the spinal group than in the general group (24.6 vs. 43.44 h, $P < 0.001$), supporting our result. The Havas *et al.* [6] result also showed statistical significance as regards length of hospital stay after a CS, which was shorter in the spinal group than in the general group (48 vs. 52 h, $P < 0.001$). Also, Ghaffari *et al.* [12] showed that regarding mobility in the first 24 h and hospital discharge after a cesarean delivery, more women in the spinal group reported no problems compared with women in the general group (64 vs. 30% women, $P = 0.00$). Also, El-Shakhs *et al.* [13] stated that there was a significant decrease in the hospital stay period for those patients who received general anesthesia with epidural analgesia. Also, there was a statistically significant effect of spinal anesthesia versus general anesthesia in terms of less use of opioids (10.36 vs. 13.47%) and less use of NSAIDs (34.72 vs. 80.31%). Consistent with our findings, Afolabi and Lesi [14] stated that the time to request analgesia, an index of postoperative pain requirements, appeared longer when mothers were given regional anesthesia. Also, Páez and Navarro [15] showed that the percentage of patients who walked during the first 24 h was higher in neuraxial anesthesia patients (51 vs. 29%, $P = 0.003$) and the percentage of mothers who saw their baby during the first postoperative day was also higher (98 vs. 51% in the general anesthesia group, $P < 0.001$). In agreement with our result, Kessous *et al.* [16] who described meperidine as a rescue in severe pain, reported higher number of meperidine requiring patients in the first 24 h following general anesthesia compared with spinal anesthesia for a CS. Thus, spinal anesthesia demonstrated a beneficial effect on postoperative ileus and postoperative pain control. Havas *et al.* [6] explained that may be due to the sympathetic blockade in the spinal anesthesia and another reason may be late oral intake observed in general anesthesia. There was no correlation between the duration of surgery in both spinal and general anesthesia groups and regain of gastrointestinal motility, this is due to the narrow range of difference in the duration between the operations (40–60 min), but it depends on the type of surgery.

## Conclusion

Spinal anesthesia results in a quicker return of bowel activity after a CS. Spinal anesthesia allows faster discharge from the hospital. Fast recovery and return of the mother to the family offer social benefits as well as quick turnover of hospital beds in heavily occupied clinics. Spinal anesthesia is safe and effective in patients experiencing post-CS pain as the use of opioids and NSAID is less. This study recommends the use of spinal anesthesia for CS especially if there is no contraindication for that.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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