



# Does the anesthesia technique of cesarean section cause persistent low back pain after delivery? A retrospective analysis

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## Abstract

**Objective** Cesarean sections (CS) under spinal anesthesia may lead to newly developed low back pain (LBP) after anesthesia. The cause of this pain is still unknown. This subject was investigated.

**Methods** The persistent LBP after the section was retrospectively analyzed in patients who were operated on under spinal or general anesthesia between January 1, 2018, and January 1, 2020.

**Result** General anesthesia was used in 52 women, but 251 women were operated on under spinal anesthesia. Newly developed persistent LBP was detected in 57 (18,8%) of a total of 303 patients. Of those patients with LBP, general anesthesia was used in 14 of 52 (26,9%) patients, but 43 of 251 (17.1%) patients received spinal anesthesia. Baby weight after CS was the only variable associated with persistent LBP after 3 and 6 months ( $P < 0.05$ ) in multiple logistic regression analysis. Patient age and anesthesia type were not associated with persistent LBP ( $P > 0.05$ ).

**Conclusion** This study shows anesthesia type as spinal or general was not associated with increased persistent LBP. Performing more spinal than general anesthesia in the cesarean section may be false data about the increased rate of LBP after CS.

**Keywords** Spinal anesthesia · General anesthesia · Cesarean section · Low back pain · Persistent · Technique

## Introduction

Today, LBP is one of the most common problems worldwide [1–4]. LBP is the most common health problem in the European workforce [5]. Currently, enormous advancement has been observed in medical practice [6, 7]. There are huge quantities of information [8], but despite this technological advancement and information, we still have a very limited understanding of the pathophysiology of persistent low back pain (LBP) following spinal anesthesia in patients in whom the cesarean section had been performed. This chronic pain

remains extremely challenging to manage clinically. Currently, the novel coronavirus disease 2019 (COVID-19) is a global pandemic with international concern [9–11]. Almost the entire world, not only China, is currently experiencing the outbreak of this virus [12]. The impact of this pandemic, caused by this virus, had far-reaching implications on how we deliver routine care to patients [13], and this outbreak of Covid-19 has likely prompted to reduce in the need for general anesthesia in obstetric practice healthcare professionals, and as a result, all non-urgent cesarean sections are undertaken with the use of spinal anesthesia technique because spinal anesthesia seems to have some advantage for managing patients with COVID-19. Since the beginning of the COVID-19 pandemic, many questions have come up regarding safe anesthesia management of patients with the disease. Endotracheal intubation and extubation of general anesthesia procedures may be considered a high-risk procedure in a patient with Covid-19 infection. In general, spinal anesthesia is the most common regional anesthesia employed in many types of surgery, including the cesarean section (CS). It can be easily used and practically applied. CS under spinal anesthesia has several benefits, including rapid onset of action, and fewer complications [14], for that

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reason, the majority of women prefer spinal anesthesia for cesarean section. We think that this subject is an important scenario for investigation in the Covid-19 pandemic.

It is known that low back pain is common among pregnant women. It occurs in more than 50% of pregnant women [15], and some patients experience LBP after CS under spinal anesthesia [14]. When a symptom of LBP persists for more than 6 months after CS, it is known as chronic or persistent LBP. The burden of treatment of this LBP after CS is challenging due to a lack of pathophysiological understanding, persistence or chronic LBP after pregnancy varies from 5% to around 40% half a year after delivery [16], especially in women with the cesarean section under spinal anesthesia. This persistent and chronic LBP after CS has negative effects on the quality of life and productivity of patients and generally results in an enormous individual, economic and societal burden. We defined chronic LBP after CS as pain that persists continuously for more than 6 months after delivery. The pain extends into the buttocks of patient. Despite having been major changes in the medical practice in the last decades [17], the reasons some women have this persistent pain after cesarean section remain unclear, the negative impact of this pain on a mother. There is a growing concern that spinal anesthesia may lead to LBP [18, 19], and whether spinal anesthesia leads to an increased risk of persistent low back pain after CS is a controversial issue. Identification of the potential risk factors for developing LBP following CS under spinal anesthesia is an important issue because there is no definitive treatment, so it may prevent it to occur. Considering the increase in cesarean rates in recent years, and the negative impact of this kind of pain on a mother, so the development of LBP after cesarean delivery is an important issue. Any contribution to our knowledge of the cause of this subject will always be welcome. As back pain after CS under spinal anesthesia is a relevant public health problem, it is necessary to evaluate whether or not spinal anesthesia is associated with persistent back pain. As the authors, this subject was investigated.

## Material method

The study was approved by the Ethics Committee of Recep Tayyip Erdogan University Medical Faculty. The study was approved by the appropriate Institutional Review Board (IRB), and the requirement for written informed consent was waived by the IRB. The women who underwent a cesarean section at the Departments of Obstetrics and Gynaecology at Recep Tayyip Erdogan University between January 1, 2018, and January 1, 2020, were included. The exclusion criteria were contraindications to spinal anesthesia, allergic to opioids or local anesthetics used in spinal anesthesia pre-existing pain low back pain, lumbar spinal pathologies such

as disc herniation, listhesis, and stenosis before pregnancy, and chronic disease. Women were retrospectively divided into two groups as either those who received spinal or general anesthesia. Spinal anesthesia was performed at the L3–4 or L2–3 interspaces with the patient in the lateral position using a 27- or 25-gauge Quincke-type needle, and free flow of cerebrospinal fluid was verified. Two milliliters of hyperbaric 0.5% bupivacaine (10 mg) was injected intrathecally. Immediately after intrathecal injection, patients were immediately placed in a supine position with the operating table in a slight head-up tilt position. For general anesthesia, a standardized technique was used. The trachea was intubated after the neuromuscular blockade. Outcome measures were persistent LBP. Persistent LBP was defined as any new-onset pain after CS under spinal or general anesthesia for more than six months. The patients were contacted by telephone, by one of the authors. If she has low back pain, a lumbar MRI was obtained. The primary endpoint is defined as newly developed persistent LBP following anesthesia technique after the cesarean section for at least six months After a cesarean section, the patients were followed for two years. If the patient has had an LBP without any lumbar disc herniation for more than 6 months, these patients accepted the LBP of this patient as chronic or persistent. The patients with "previous cause for the persistent cases of LBP such as degenerative disc disease, overweighted pregnancy, temporary LBP after CS" were excluded from the study.

## Statistics

Pearson's Chi-square test was used to test the difference between the two groups for categorical data. To identify potential risk factors associated with persistent LBP after cesarean delivery, a logistic regression analysis was performed. Covariates were mother age, baby weight and anesthesia type. Target was the presence of persistence LBP. All analyses were performed using SPSS 22.0 statistical software, and a *P* value of less than 0.05 was considered to indicate statistical significance.

## Results

A total of 303 patients who had undergone cesarean section under spinal or general anesthesia were analyzed. General anesthesia was used in 52 women, but 251 women were operated on under spinal anesthesia. Newly developed persistent LBP was detected in 57 (18,8%) of a total of 303 patients. Of those patients with LBP, general anesthesia was used in 14 of 52(26,9%) patients, but 43 of 251 (17.1%) patients received spinal anesthesia. The pain of the patient was treated with a paracetamol tablet. The crosstabulation of anesthesia type and LBP is shown in Table 1. Table 2

**Table 1** The crosstabulation of anesthesia type and LBP

		Anesthesia type		Total
		General	Spinal	
No LBP	Count	38	208	246
	Expected count	42,2	203,8	246,0
Yes LBP	Count	14	43	57
	Expected count	9,8	47,2	57,0
Total	Count	52	251	303
	Expected count	52,0	251,0	303,0

shows the data of patients' mean age, baby weight and the number of patients with persistent LBP. The median follow-up time was two years. The Chi-square test revealed that the occurrence of persistent LBP was not statistically significant rate between spinal and general anesthesia. Multiple logistic regression revealed that baby weight after CS under spinal anesthesia was the only variable associated with persistent LBP after 3 and 6 months ( $P < 0.05$ ). Patient age and anesthesia type such as spinal or general were not associated with persistent LBP ( $P > 0.05$ ) (Table 3).

**Table 2** The Pearson Chi-square test revealed that the occurrence of persistent LBP was not statistically significant rate between spinal and general anesthesia

Chi-square tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-square	2.704 <sup>a</sup>	1	.100		
Continuity correction <sup>b</sup>	2.101	1	.147		
Likelihood ratio	2.514	1	.113		
Fisher's exact test				.118	.077
Linear-by-linear association	2.695	1	.101		
N of valid cases <sup>b</sup>	303				

<sup>a</sup>0 cells (.0%) have expected count less than 5. The minimum expected count is 9.78

<sup>b</sup>Computed only for a 2 × 2 table

**Table 3** Multiple logistic regression analysis revealed that baby weight after CS under spinal anesthesia was the only variable associated with persistent LBP after 6 months ( $P < 0.05$ )

	B	S.E	P value	OR	95% C.I. for EXP(B)	
					Lower	Upper
Anesthesia	.691	.363	.057	1.996	.979	4.067
Baby weight	.570	.284	.045	1.769	1.014	3.087
Mother age	.031	.026	.229	1.032	.981	1.085
Constant	- 4.464	1.314	.001	.012		

Patient age and anesthesia type such as spinal or general were not associated with persistent LBP ( $P > 0.05$ )  
 OR odds ratio; CI confidence interval; B beta coefficient; SE standard error

## Discussion

### Key results

Spinal anesthesia is still the gold standard for cesarean section. The main conclusions of this study were as follows: Persistent LBP is almost exclusively associated with baby weight after CS. It increases 1,7 times persistent LBP. The patient's age and anesthesia type have no significant role in persistent LBP after CS under spinal anesthesia.

### Interpretation

It is known that LBP is common among pregnant women. Changes in normal physiology during pregnancy may lead to the complexity of LBP. LBP during pregnancy may be related to increased levels of relaxin, biomechanical changes, weight gain and sagittal imbalance [15], but in this study, persistent post-cesarean low back pain was associated with the weight of the baby and not with the anesthetic technique.

Statistical testing involves a null hypothesis, which typically states that procedures (e.g., CS under general versus spinal anesthesia in this study) have the same effect on some outcomes (e.g., LBP after spinal or general anesthesia). Our study supports the null hypothesis that general and spinal had a similar rate of persistent low back pain incidence after

CS. Both anesthetic techniques can be used according to the patient's medical situation. The persistent LBP after CS or normal vaginal delivery is not dependent on the type of anesthesia, but some of the physiological and anatomical changes that take place during pregnancy can affect the frequency of the persistent LBP. In clinical practice, a high proportion of women may suffer from persistent low back pain after CS. The present study shows that persistent LBP might not be directly attributable to the anesthesia type, because we concluded that spinal anesthesia was not associated with low back pain because there was no significant difference in frequency of occurrence. However, the lack of a significant difference does not necessarily mean that they are equivalent. If the sample size increases, there may be a significant difference. Regression analysis indicates that baby weight after CS is an important determinant of persistent LBP.

Previously, the association between persistent low back pain, spinal anesthesia and cesarean section has been studied [16]. Even many years after pregnancy, some women may suffer persistent LBP. When focusing on new-onset pain that began after CS, we found that the low back pain after CS under spinal anesthesia might not be directly attributable to the spinal anesthesia. But the baby's weight after delivery has an effect on low back pain in these patients. The human body is asymmetric [20]. The balance of the body essentially depends on how far the head is to the midline [21]. Unilateral low back pain after spinal anesthesia with spinal anesthesia may be related to postural and structural changes during pregnancy. The increased lordotic posture in the parturient and weight gain during pregnancy may lead to LBP [14]. Spinal imbalance occurs in pregnant women such as increased lordosis. The spinal imbalance is important during pregnancy because one of the essential roles of the spine is to support mechanical loads in the upright position.

**Aging:** Aging is one of the most complex biological processes [1]. Muscle atrophy occurs by aging [22], and a whole host of gross-level neuroanatomical changes take place as we get older [23], especially in pregnant women, but in this study, it was shown that aging is not a contributor to persistent LBP according to anesthesia type.

### **Why do the pain physicians meet many patients with persistent LBP following CS under spinal anesthesia?**

Such a question may arise. The incidence of CS, which is one of the most important interventions in obstetric surgery, is gradually increasing worldwide. Anesthesia is an important field [24]. CSs are commonly performed under spinal anesthesia to avoid the risk of complications. Regional anesthesia, compared to general anesthesia, reduces the risk of complications associated with general anesthesia [14]. The

maternal mortality rate under general anesthesia is 16 times as high as that for regional anesthesia [14]. For that reason, delivery by the CS has become increasingly common [14], and currently, medicine has gone through moments of great renewal [25], and spinal anesthesia is the gold standard for CS. Why are there more cases with persistent LBP following CS under spinal anesthesia? If we see our patient number in the present study, CSs were performed in 52 women under general, but 239 women under spinal anesthesia during the study period. Interestingly, persistent LBP in 14 patients of 52 (26,9%) occurred under general anesthesia, 42 of 239 (17,5%) CS under spinal anesthesia. To examine the outcomes of therapy, it is necessary to have testable hypotheses [26]. There were more cases with persistent LBP in spinal anesthesia than in general anesthesia, but when we look at the percentage of persistent LBP, the rate of the spinal group is lower than the general anesthesia group. This means more total cases, more cases with persistent LBP, fewer cases lead to fewer cases with persistent LBP. We concluded that that is the reason why we meet the women with persistent LBP who have undergone CS under spinal anesthesia. This study also shows that the persistent LBP following CS is almost exclusively associated with baby weight. It increases 1,7 times persistent LBP. This is a novel finding that, to the best of our knowledge, has not been reported previously. The recognition of this fact is of importance. If indeed one is the first to report something, that something is of value [27].

### **The reason for preferring MRI in this study**

Neurological and radiological examinations have been done in patients with persistent LBP following CS. High technology has been used in the medical practice [8], especially in radiological modalities [28], which heralded a revolution in noninvasive imaging of spinal disorders [29]. We wanted to use objective parameters. In the history of diagnostic radiology, the invention of the X-ray is an important event in the very early twentieth century [30]. Computed tomography (CT) and magnetic resonance imaging (MRI) of the spine are now possible because of advances in imaging technology, the sensitivity of CT and MR images is different [31], MRI scans are an excellent, noninvasive means of imaging the entire lumbar spine [14]. In the 1980s, the advent of MRI technology [32] and the progressive increase in the definition of this modality of imaging led to the use of this modality in spinal disorders [33, 34], so we preferred to use the MRI images in this study.

We think that a heavy fetus may have triggered back pain. However, the process of caring for a heavy newborn may have intensified the back pain. It can be assumed that the data were too weak to conclude. In this study, it is interesting to note that baby weight was associated with back pain.

However, the correlation in this study was weak and the causal relationship may be unclear. Our study may encourage a tendency for pregnant women to favor low birth weight. We advise readers to be cautious in interpretation of our result.

The pain of patient was treated with a paracetamol tablet.

## Limitations

One of the limitations is the sample size, this study has a good sample size (291 cases), but it is retrospective, and the number receiving general anesthesia is small. The sample size of a study is an important issue [35]. If a researcher selects fewer samples, it may lead to missing any significant difference even if it exists in the population [36]. There is an increase in the use of spinal anesthesia during CS. In the present study, it was found that spinal anesthesia has been used more often than general anesthesia. In this study, we retrospectively analyzed data from 303 CS cases; we think that this case number is sufficient. In this study, the groups to be compared are highly heterogeneous, and the results may be biased. We could not see any control or comparative study done for back pain with high baby weight in normal vaginal delivery in the literature, and we concluded a higher percentage of LBP in general anesthesia compared to spinal anesthesia based on baby weight. There is some concern about the validation of the study. Validity in a study refers to how accurately an investigation answers the study question [37]; in this study, validity refers to comparing the anesthesia type for CS on the LBP. In this study, "If the patient has low back pain, a lumbar MRI was obtained, to exclude lumbar disc herniation." For that reason, the finding of lumbar MRI was not given in results sessions. Smoking was not assessed in this study.

The recent outbreak of Covid-19 [3] has likely prompted to reduce the need for general anesthesia in obstetric practice healthcare professionals, and as a result, all non-urgent cesarean sections are undertaken with the use of spinal anesthesia technique, because spinal anesthesia seems to have some advantage for managing patients with COVID-19. For that reason, this subject is an important scenario for investigation in the Covid-19 pandemic. In this study, the data for patients who underwent cesarean section between January 1, 2018, and January 1, 2020, were included; however, this period was not related to the Covid-19 pandemic. Therefore, the basic hypothesis seems to not be reasonable. We wanted to note the increased rate of CS in this pandemic.

In this study, the classification and scoring of the pain were not assessed based on the common spine-related pain scoring systems such as VAS, SF-36 or Oswestry. The pains of the patient were generally extended to the buttocks, but the frequency and severity of LBP were not evaluated. This is another disadvantage of the study. Another problem is

regarding the technique of spinal anesthesia [38]. It is known that a variety of spinal or anesthesia techniques (i.e., the gauge of the spinal needle, the number of punctures and the experience of the anesthesiologist) may affect low back pain [38]. LBP commonly occurs in pregnant patients after cesarean section under spinal anesthesia. It has not been observed other lower body surgeries (lower extremity fractures, appendicitis, abdominal hernias) under spinal anesthesia. We are planning to investigate this subject.

In the future, we plan to perform another study with more detailed demographic data.

The difficulty of the randomization; the randomization of a study is crucial to compare the effect of spinal anesthesia on the occurrence of LBP after CS with the effect of general anesthesia. This is a retrospective study that compares the occurring LBP according to anesthesia type after CS. The retrospective nature of this study contributes to the difficulty in the quantification of the result. The solution to this problem is the randomized clinical trial, especially so far as it is designed to emulate actual results.

## Conclusion

Low back pain (LBP) occurs in more than 50% of pregnant women, and sometimes, this pain may be persistent and chronic. The persistent and chronic LBP after CS has negative effects on the quality of life and productivity of patients. As the authors, we compared low back pain in patients who underwent cesarean section under spinal anesthesia and those who underwent cesarean section under general anesthesia and concluded that spinal anesthesia was not associated with low back pain. The present study indicates that there is a causal association between the increased baby weight and LBP, because it was shown that persistent LBP is almost exclusively associated with baby weight after CS. It increases 1,7 times persistent LBP. We suggest that there is a causal association between increased baby weight and LBP. The patient's age and anesthesia type have no significant role in persistent LBP after CS under spinal anesthesia. More studies are required.

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