

Investigating the Incidence Rate of Patient Refusal of Spinal Anesthesia in Elective Caesarean Section and its risk factors in patients in AL-BATOOL Hospital

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ABSTRACT

Introduction: Patient's preference plays a significant role in determining the type of anesthesia used. This study aims to examine the reasons behind the refusal of spinal anesthesia among pregnant women undergoing elective cesarean section and to determine the incidence rate of such refusals.

Methods: A prospective cohort study of 105 pregnant women candidates for cesarean section between January and May 2023. Participants were interviewed according to a structured pre-coded questionnaire by one of the investigators. In this study, we examined 15 likely risk factors affecting the acceptance of spinal anesthesia in pregnant mothers who are candidates for elective cesarean section.

Results: The findings revealed a spinal anesthesia rejection incidence rate of 24.8%. The most common concern and reason for the patient's refusal was the "recommendation of others not to choose spinal anesthesia." The next two reasons were "fear of back pain" and "fear of needlings". The logistic regression model was statistically significant, $\chi^2(4) = 46.483$, $p < .0005$. According to the statistical data, the best regression model contained 3 preoperative factors ($P < .05$). Having a previous history of the cesarean section using general anesthesia, having a previous history of the cesarean section using spinal anesthesia, and increasing the knowledge of patients about different types of anesthesia affect the probability of not accepting spinal anesthesia by 3.17, 0.25, and 0.15 times, respectively, in pregnant patients who are candidates for elective cesarean section.

Conclusion: The refusal rate of spinal anesthesia and the tendency to use general anesthesia among Iraqi pregnant women is still slightly higher than the spinal method and needs to be more considered when compared with the developed communities. This study has identified three significant independent predictors of having a previous history of a cesarean section using general anesthesia, having a previous history of a cesarean section using spinal anesthesia, and increasing patients' knowledge about different types of anesthesia.

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1-INTRODUCTION

The prevalence of cesarean section as a delivery method has significantly increased among pregnant women. In the United States, approximately one out of every three women undergoes a cesarean section. This ratio is even higher in certain countries, with four out of five women undergoing a cesarean section [1]. The choice of anesthesia for a cesarean section is based on several factors, including the nature of the operation, the procedure's urgency, the anesthesiologist's preferences, and the patient's condition. Anesthesiologists have three options: epidural, spinal, and general anesthesia [2]. It is important to note that each of these methods has potential complications, and the anesthesiologist must carefully assess and select the most suitable approach that minimizes risks, including fetal depression [3]. The ultimate goal is to ensure the mother and baby's safety and well-being throughout the procedure.

KEYWORDS:

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Spinal anesthesia is a widely used regional anesthesia technique in various surgical procedures, offering several advantages compared to general anesthesia [4]. It has been associated with lower rates of complications [5-7]. These benefits have contributed to the accepted favored techniques of anesthesia, particularly in cesarean sections. In the United States, a comprehensive study found that 93% of cesarean sections were performed using regional anesthesia with low rates of complications and mortality [8].

Spinal anesthesia, specifically, is considered the optimal choice for cesarean sections due to its advantages [9]. It allows mothers to eat earlier, promotes better digestive system function with reduced oxytocin consumption, extends the duration of pain relief, and facilitates prompt patient discharge after surgery. Compared to general anesthesia, spinal anesthesia eliminates the need for respiratory devices, profound pain relief, stable hemodynamics, and minimal bleeding during surgery, allows the patient to remain awake during the operation [10, 11]. These advantages contribute to its safety, enable the mother to remain awake and conscious, minimize fetal depression, require lower drug doses, have a low failure rate, provide rapid onset of anesthesia, and offer greater comfort for both the mother and the anesthesiologist [12-14].

General anesthesia is chosen when patients decline regional anesthesia, have contraindications for regional anesthesia, or have time constraints during emergency operations.

The selection of anesthesia type is determined by the anesthesiologist, taking into consideration the clinical condition of both the mother and the fetus, as well as the urgency of the procedure. However, in elective situations, the mother's preference also plays a significant role in the decision-making [15]. Therefore, pregnant women need to be well-informed about the different types of anesthesia, along with their respective advantages and disadvantages, before the procedure, enabling them to make an informed choice without any pressure or coercion [4, 16].

This study aimed to examine the reasons behind the refusal of spinal anesthesia among pregnant women undergoing elective cesarean section and to determine the incidence rate of such refusals. It is important to note that this study focuses explicitly on elective surgeries, and the circumstances surrounding emergency surgeries will not be included in the analysis.

2- MATERIALS AND METHODS

2-1- Study Design

This prospective cohort study was conducted by the department of Anesthesia at Al-Batool Hospital on pregnant women candidates for elective cesarean section. Data were collected from January to May 2023 in Mosul, Iraq. We aimed to evaluate the causes and incidence rate of spinal anesthesia refusal among pregnant women undergoing cesarean section. The data were collected in the labor operating rooms.

2-2- Study Population

During the pre-anesthetic review, all pregnant women aged between 18 and 45 years with American Society of Anesthesiologist (ASA) physical status class I to III candidates for elective cesarean section from January to May 2023 were included in this study.

Patients over 45 years of age, patients with language barriers, emergency conditions or psychological disorders, or patients whose available information is insufficient for the study were excluded. Patients who did not consent to participate were also excluded.

2-3- Data Collection

All women were face-to-face interviewed according to a structured pre-coded questionnaire by one of the investigators, and the sequence of questions was followed strictly. The questionnaire was filled out according to the responses and deposited with the research assistant of the Department on the same day. All patient data were collected prospectively.

A researcher-designed checklist was used to collect the preoperative variables. The data collection tool comprised various thematic areas, encompassing demographic information of mothers, socioeconomic information of the mothers, history of previous illness or surgery, and previous history of anesthesia, as well as the reasons and concerns of mothers about the anesthesia method, focusing on acceptance or non-acceptance of the mother. Additionally, the standard questionnaire was used to evaluate the knowledge level of mothers about anesthesia methods. Patients' knowledge about anesthesia services and methods was evaluated using a questionnaire similar to the one used in the study of Solomon Suglo et al. [17].

2-4- Sample Size Determination

The following formula calculates the number of samples required for the study. The information needed to calculate the number of samples was obtained from a prospective study conducted in 2022 M Babajide Adegboye et al. [18] in South Korea. Assuming a type 1 error of 5%, if according to the studies conducted in connection with this study in the past, the incidence of refusal is about 22%, and assuming the accuracy of the study is 0.08, we need at least 105 samples;

$$n = \frac{Z_{1-\frac{\alpha}{2}}^2 \times pq}{d^2} = \frac{1.96^2 \times 0.22 \times 0.78}{0.08^2} = 103.003 \cong 105$$

$$\alpha = 0.05$$

$$\beta = 0.2$$

$$d = 0.08$$

$$p = 0.22$$

$$q = 1 - p = 1 - 0.22 = 0.78$$

2-5- Statistical Analysis

The SPSS 22.0 software was used for statistical analysis (SPSS Inc, Chicago, IL, USA). Continuous variables will be shown as means and SD; categorical data will be presented as proportions (number and percentage). Continuous variables will be compared between the spinal and general anesthesia groups using t-tests or Wilcoxon tests. The t-test will be used if the data will normally distribute in both groups; The Chi-square or Fisher exact test will be conducted for the frequencies. Proportional odds logistic regression analysis will be undertaken to analyze the risk factors. A P-value of 0.05 was regarded as

statistically significant.

2-6- Ethical Approval

These investigations were fully approved by the Institutional Research Ethics Committee School of Medicine-Tehran University of Medical Sciences . This study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments. Prior to participating in the study, each respondent provided informed consent. The mothers expressed their consent by signing a written document. To guarantee anonymity and confidentiality, the respondents' names were never included on the questionnaire.

3- RESULTS

During the 5-month study interval, 115 pregnant patients were admitted to the labor operating rooms; 108 (93.9%) were enrolled in the cohort, and 3 (2.7%) met exclusion criteria. Exclusions included three patients, in which 2 cases had incomplete data collection, and one had a psychological disorder.

In total, 105 consecutive pregnant women candidates for cesarean section at Al-Batool Hospital were prospectively studied during a 5-month interval in 2023. The mean mother's age and gestational age of participants were 27.92 ± 7.47 (age range: 18-43 years) and 37.10 ± 1.35 (gestational age range: 33-39 weeks) respectively.

About half of the participants had moderate socioeconomic status (52.4%). The participants were mostly undereducated (79 %). Majority of the participants were multiparous (82.8%). About half of the participants had a previous surgical history (46.7%) out of which 67.3% mentioned a history of previous cesarean section. Among the participants who mentioned a history of previous cesarean section, 27.2% were under general anesthesia and 60.6% were under spinal anesthesia. Also, 12.2% had experienced both types of anesthesia in their previous cesarean sections. About half of the participants had previous exposure to anesthesia (46.7%) out of which 46.9% had spinal anesthesia, 32.6% had general anesthesia and 20.4% experienced both. Majority of the participants had medium knowledge about their surgical anesthesia method (63.8%). Table 1 shows a summary of the socio-demographic aspects of the participants.

In our study, the incidence of refusal of spinal anesthesia in elective cesarean section was relatively high, with one in four (24.8%) pregnant women. Concerns and Reasons for the Rejection of Spinal Anesthesia by Participants are listed in Table 2. The highest frequency (7.6%) is related to recommendations from other individuals regarding this anesthesia method. The minor concerns (1%) are fears of headaches, paraplegia, and manipulation.

Variables with significantly different frequencies between the two general and spinal anesthesia groups were incorporated into a stepwise logistic regression analysis. The logistic regression model was statistically significant, $\chi^2(4) = 46.483$, $p < .0005$. The model explained 53.1% (Nagelkerke R²) of the variance and correctly classified 82.9% of cases. According to the statistical data, the best regression model contained 3 preoperative factors ($P < .05$). Having a previous history of the cesarean section using general anesthesia, having a previous

history of the cesarean section using spinal anesthesia, and increasing the knowledge of patients about different types of anesthesia affect the probability of not accepting spinal anesthesia by 3.17, 0.25, and 0.15 times, respectively, in pregnant patients who are candidates for elective cesarean section. Multivariate, stepwise logistic regression analysis for predictors of patient refusal of spinal anesthesia in the elective cesarean section are provided in Table 3.

4- DISCUSSION

The study was a prospective cohort study conducted at Al-Batool Hospital in 2023 from January to May. One hundred and five consecutive pregnant women candidates for cesarean section at Al-Batool Hospital were prospectively studied during a 5-month interval. This study aimed to examine the reasons behind the refusal of spinal anesthesia among pregnant women undergoing elective cesarean section and to determine the incidence rate of such refusals.

This study marks the initial exploration of the occurrence and determining factors of not accepting spinal anesthesia among pregnant women candidates for cesarean section in Iraq. The findings reveal a spinal anesthesia rejection incidence rate of 24.8%, higher than previously documented rates of spinal anesthesia rejection in pregnant women candidates for cesarean section [18, 19]. One of the reasons for the higher rate of refusal of spinal anesthesia in our study was the collection of information from the patients before explaining anesthesia methods to the anesthesiologist.

In this study, we examined 15 likely risk factors affecting the acceptance or non-acceptance of spinal anesthesia in pregnant mothers who are candidates for elective cesarean section. Ultimately, the study identified seven factors that exhibited a higher prevalence among those who did not accept spinal anesthesia and preferred general anesthesia compared to those who accepted spinal anesthesia, with statistical significance indicated by a p-value of less than 0.05.

In order to identify predictive risk factors for patient refusal of spinal anesthesia in elective cesarean section, logistic regression analysis was employed to analyze seven variables that exhibited p-values less than 0.05 between the spinal and general anesthesia groups. The findings of our study revealed several independent predictors of refusal of spinal anesthesia, including having a previous history of the cesarean section under general anesthesia, lack of a previous history of the cesarean section under spinal anesthesia, and insufficient knowledge of patients about various anesthesia methods.

In this study, we investigated the reason for patients' refusal of spinal anesthesia. The patients' most common concern and reason were the "recommendation of others not to choose spinal anesthesia." The following common reasons include fear of hearing sound during the operation, fear of back pain, and fear of needles. Other reasons for the patients include the following: fear of headache, fear of manipulation, fear of watching scenes, and fear of paraplegia.

The study by Adegboye et al. [18] in 2022 aims to assess maternal satisfaction regarding the use of spinal anesthesia for cesarean section procedures. The researchers gathered data from a sample of women who underwent cesarean sections under spinal anesthesia in Nigeria. Maternal satisfaction was evaluated using a structured questionnaire covering various aspects of the anesthetic procedure and overall birthing

experience. The study found that many women were delighted with spinal anesthesia for cesarean section. In this study, the dissatisfaction rate of spinal anesthesia was 3.7%, and the refusal rate was 3.2%. The study revealed several factors that were associated with dissatisfaction with spinal anesthesia. These included undergoing more than three puncture attempts, experiencing paresthesia at the puncture site, postoperative nausea and vomiting, and postoperative backache. Furthermore, postoperative backache and overall dissatisfaction were the risk factors for refusing spinal anesthesia. Notably, the study considered preoperative reasons and evaluated intraoperative and postoperative factors.

Siddiqi and Jafri [20] conducted a study that showed that a significant proportion of patients who underwent spinal anesthesia for cesarean deliveries reported a high level of satisfaction (81.4%) and expressed a desire to choose spinal anesthesia again in the future (53.66%). These findings highlight this patient population's positive reception and preference for spinal anesthesia. In Charuluxananan et al.'s study [7], the dissatisfaction rate was found to be 3.8%, while the refusal rate for future spinal anesthesia procedures was 6.7%. This prospective descriptive study identified several factors associated with dissatisfaction, including increased attempts during the spinal block, pain experienced during the procedure, inadequate analgesia, and postoperative urinary retention. Furthermore, the factors associated with refusing spinal anesthesia again for similar surgeries were female gender, low body weight, intra-operative vomiting, and a low satisfaction score regarding spinal anesthesia. These findings emphasize the importance of prioritizing the quality of spinal anesthesia, enhancing the clinical expertise of anesthesiologists, and focusing on preventing potential side effects, particularly urinary retention, to further improve patient satisfaction.

In the study conducted by Choi et al. [7], it was found that out of the 194 patients who received spinal anesthesia, 31 patients (16%) would reject it if they had the chance to have it again. The study revealed several factors associated with refusing spinal anesthesia, including low back pain, Quincke needle type, and tingling sensation in the lower extremities after spinal anesthesia induction. Additionally, the study found that low back pain was significantly associated with the number of attempts for spinal block. Another study by Sindhvananda et al. [21] compared maternal satisfaction between epidural and spinal anesthesia. The study found that 90% of patients in the spinal group reported being satisfied. There was no significant difference in maternal satisfaction regarding the techniques and outcomes between epidural and spinal anesthesia. However, it is important to note that most studies' high satisfaction rate for spinal anesthesia could be overestimated due to patients wanting to please staff and meet social expectations by replying with "satisfied" [20, 21].

According to research, postoperative backache has been commonly linked to patient satisfaction and the refusal of spinal blocks, even though it may not be directly caused by the spinal block itself [22]. Several variables can contribute to postoperative backaches, such as age, surgical trauma, tight casts or surgical dressings, positioning during surgery, operation time, needle type, and the number of punctures, making it challenging to pinpoint the exact cause of back pain [22]. Rhee et al. [19] found that the number of attempts made during a spinal block, notably more than three attempts, played a differentiating role between satisfied and dissatisfied groups. Of 1,190 patients, 105 experienced more than three attempts, resulting in a 9.4% dissatisfaction rate with the spinal block. Additionally, Choi et al.'s study [7] demonstrated that the

number of punctures had a statistically significant impact on refusing spinal blocks. However, Schwabe and Hopf [23] reported that postoperative backache following a spinal block was not associated with patient characteristics or technical factors but exclusively with pre-existing back pain. In the current study, 3.8% of patients cited the fear of back pain as the main reason for refusing to accept spinal anesthesia. Also, 3.8% of patients stated fear of needles as the main reason.

The evaluation of patients' attitudes toward the acceptance or non-acceptance of spinal anesthesia in other surgeries has also been studied. In the review of 400 questionnaires collected from surgical patients before the pre-anesthetic visit by Mavridou et al. [24], 81 patients (20.25%) experienced preoperative anxiety. Their primary anxiety source was fear of postoperative pain (84%). They stated in their study that more than 60% of people fear spinal anesthesia and have no desire for this type of anesthesia. In a similar study by Bheemanna et al. [25], which was performed on 150 candidate patients and investigated the level of fear of regional anesthesia, they showed that 75.3% of the studied subjects feared anesthesia before the operation. The lowest level of fear was related to variables such as nausea, vomiting, headache, and spinal paralysis were assigned. In this study, the highest level of fear of the patients was due to the fear of pain during surgery (49.3%) and the fear of needles (48.7%). In a study conducted on 1216 pregnant women candidates for spinal anesthesia, Matthey et al. [26] showed that approximately 27% of the participants were very concerned about possible post-anesthesia injuries, including permanent paralysis, back injury, postoperative pain, seeing the surgical procedure by the patient. The needles were in the back part of the back, and only 6% of the people were worried about possible headaches after the operation.

In a similar study that was conducted in 2021 on 76 pregnant patients who underwent cesarean surgery at Shariati Hospital in Tehran, Shoebi et al. [27] showed that age, level of education, and previous history of cesarean surgery do not affect the level of fear of anesthesia in patients. However, patients with previous spinal anesthesia history had significantly less fear of feeling pain during surgery, seeing surgery, spinal anesthesia needles, and back injuries. Also, patients with a history of general anesthesia had a significant fear of spinal anesthesia needles, nausea, and vomiting compared to others. It should also be noted that the pre-op anesthesia visit and pre-op assessment clinics are critical and practical in increasing patient awareness and education, reducing fear and anxiety, and increasing relaxation and Reinsurance. The findings of our study revealed several independent predictors of refusal of spinal anesthesia, including having a previous history of the cesarean section using general anesthesia, lack of a previous history of the cesarean section using spinal anesthesia, and low knowledge of patients about various anesthesia methods.

In a study conducted by Gajraj et al. [28] on 100 pregnant women in order to investigate the reasons patients for refusing to accept epidural and spinal anesthesia, the results showed that the most common reasons were fear of backache (33%) and fear of the needle placement being painful (28%). Following a brief discussion with the anesthetist in this study, 21% of the patients decided to opt for a regional technique. When these patients were questioned after the operation, only two said that they would not have a spinal or regional technique in the future because they did not like being unable to move their legs. The fear of needles is commonly known among patients [29]. In this study, 3.8% of patients refused to accept spinal anesthesia due to fear of needles.

Nevertheless, it is important to reassure patients that the use of local anesthetic can make the insertion of a spinal needle only slightly more uncomfortable than the insertion of an intravenous cannula. Approximately 7% of patients have reported fears about seeing and hearing events during the procedure in our study. However, these concerns can be alleviated by using screens and playing music in the background or via headphones.

In this survey, one patient stated she had heard of someone who suffered paralysis following spinal anesthesia. However, survey reports suggest that severe neurological problems resulting from spinal or epidural anesthesia are uncommon, with an occurrence rate of less than 1 in 10000 [30, 31]. To avoid creating negative associations with the term "spinal," medical professionals have suggested using the phrase "regional anesthetic" instead when discussing the procedure with patients. This approach can help create a less intimidating environment and provide more informative patient education.

A study was conducted by Shayeghi et al. [32] at Shahid Beheshti University in Tehran to investigate which type of anesthesia patients prefer for cesarean section and what reasons or factors influence this choice. This study showed that patients tend to choose general anesthesia for cesarean section. Regardless of the type of elective anesthesia, familiarity with previous anesthesia, and reluctance to try a new experience, the recommendations of other patients and acquaintances are considered the most critical factors influencing decision-making and selection. In contrast, doctors' recommendations or public education play the least role in this issue. The choice of general anesthesia has often been due to avoiding intraspinal anesthesia rather than its advantages. In this study, most patients who previously had any type of anesthesia chose the same method again because they did not want to experience something new. However, in the group with a history of both general and local methods, there was more desire for the local method, which could be due to greater satisfaction than the regional method. They concluded that convincing patients is the most important way to increase the use of regional anesthesia for cesarean section. It seems that Iranian society does not know the advantages of the regional method, which can be caused by the lack of public education and anesthesia visits before the operation. Similarly, in our study, patients with a previous history of the cesarean section using general anesthesia and a lack of a previous history of cesarean section using spinal anesthesia were significantly associated with increased non-acceptance of spinal anesthesia in patients.

The relationship between education and general knowledge about anesthesia is another issue that has been paid attention to. Our study found no correlation between the level of education and non-acceptance of spinal anesthesia. However, there was a significant relationship between the patients' knowledge level about anesthesia methods and their advantages and disadvantages and non-acceptance of spinal anesthesia in such a way that the higher the level of this knowledge, the lower the level of non-acceptance. A study conducted by Jathar et al. [33] in India in 2002 examined the level of anesthesia and anesthesiologist awareness among patients. The findings indicated a positive correlation between education level and anesthesia knowledge, further enhanced after the preoperative visit with an anesthesiologist. Specifically, individuals with higher education levels benefited more from the anesthesia visit in terms of increased effectiveness and usefulness.

The limitations of this study include the following: First, in this study, we only examined preoperative risk factors. This study

did not investigate intraoperative, postoperative risk factors and complications caused by anesthesia and cesarean surgery. Second, the small sample size could limit the generalizability of the findings and the ability to detect significant associations between risk factors and non-acceptance of spinal anesthesia. Validation of the results in larger cohorts would strengthen the conclusions. Another limitation is that the study was conducted in a single delivery room, which may introduce a potential selection bias and limit the generalizability of the findings to other delivery centers or patient populations.

5- CONCLUSION

This study demonstrated that the refusal rate of spinal anesthesia and the tendency to use general anesthesia among Iraqi pregnant women is still slightly higher than the spinal method compared to developed nations and needs a further consideration. This study has identified three significant independent predictors of having a previous history of a cesarean section using general anesthesia, having a previous history of a cesarean section using spinal anesthesia, and increasing patients' knowledge about different types of anesthesia.

Overall, the results of this study have the potential to improve patient care, enhance the informed consent process, and optimize anesthesia decision-making for pregnant women undergoing elective cesarean sections at Al-Batool Hospital.

Statements and Declarations

Ethics approval and consent to participate

These investigations were fully approved by the Institutional Research Ethics Committee School of Allied Medical sciences-Tehran University of Medical Sciences. This study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

Consent for publication

Written informed consent was obtained from the patients for publication of this report and any accompanying images. The copies of the written consents are available for review by the Editor-in-Chief of this journal.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from Mojgan Rahimi on reasonable request.

Competing interests

All authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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Conflict of interest

The authors say they have no competing interests

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