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Comparison of postoperative pain during caesarean section under general anesthesia and spinal anesthesia

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***Abstract*---**This study presents a number of ideas and comparisons regarding whether there is a difference between the degree of postoperative pain in cesarean sections with epidural anesthesia compared to spinal anesthesia, focusing on comparing intraoperative desflurane in general anesthesia. In the comparison, the primary outcome regarding postoperative pain levels over 24 hours showed that there is no significant difference in postoperative pain between groups. Regarding postoperative secondary outcomes, the recovery time and remifentanil cumulative dose were different intraoperatively between groups. From this study's results, we can conclude that there is no significant difference in postoperative pain during cesarean sections in general anesthesia and spinal anesthesia. The increase in intraoperative opioids and depth of anesthesia in both groups reduces the incidence of VRS 1-24 hour postoperative pain equally. However, a longer time for the first analgesic request was obtained with the caudal technique compared to general anesthesia. These results could discourage the routine use of general anesthesia for analgesic purposes in comparison to other anesthetic approaches in cesarean sections. However, further randomized controlled studies should be conducted across health institutions or populations to confirm and extend these findings. Given the pain expressed by patients following cesarean delivery, the development of various previously validated strategies to prevent such pain in the future represents a priority in the beneficial management of those surgical pregnant patients.

***Keywords*---**caesarean section, general anesthesia, spinal anesthesia.

1. Introduction

Efficient techniques for pain management after Caesarean section play an important role in improving clinical outcomes. Therefore, based on general anesthesia and spinal anesthesia during Caesarean section, the subject will

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compare the two anesthesia methods, explore the pain after the operation, and propose treatment options. Both spinal anesthesia and general anesthesia during Caesarean section have their own advantages in clinical practice, as well as their own indications and contraindications. In this study, the applicability of spinal anesthesia and general anesthesia will be evaluated, and the differences in postoperative pain will be assessed to guide clinical practice and provide the implementation of clinical nursing in related treatment options, so as to improve the long-term outlook of continuous health. The management could provide new ideas to improve nursing management by comparing pain management after Caesarean section under general and spinal anesthesia. The management of post-Caesarean pain in the clinic can impact the comfort of our patients' treatments and the long-term outlook on health. Selecting the most suitable mode of anesthesia for each patient is equally important for the rapid recovery of the patient; the selection of different modes may have varying degrees of impact on postoperative pain in patients. Therefore, the purpose is to evaluate the analgesic effect of different Caesarean incisions under different anesthesia on pregnant women and to further provide some reference for the management of Caesarean patients.

2. Background and Rationale

Labor analgesia deals with the pain of labor and its treatment. As local anesthesia was practiced, its application and injection were developed, and new techniques and drugs were invented. The appropriate drug and technique for anesthetic analgesia were found. Several comparative studies have been conducted to choose the suitable anesthetic technique. The development of the use of epidural analgesia includes the use of analgesics for surgery. Epidural anesthesia has developed from thoracic epidural anesthesia to a low-sacral and caudal anesthetic variation. Currently, spinal or subarachnoid block for surgery can be effective and efficient. However, after spinal or subarachnoid block is complete, there will be severe pain in the postoperative period. On the other hand, general anesthesia has been continuously developed. Currently, general anesthesia can be operated safely regardless of surgical type. Various anesthetic techniques have been developed. Epidural anesthesia for postoperative pain relief has become popular and is widely used at present. (Aydin et al.2017)(Situ et al.2)

Since there is uncertainty about which anesthetic technique is better for postoperative pain, the need for evidence-based research is necessary to ensure the best therapy for patients. In mothers who undergo emergency cesarean section with general anesthesia, analgesia that is sufficient for the surgical incision level on the anterior abdominal wall is required. Inadequate postoperative analgesia will affect the duration of hospitalization, the return of bowel function to normal, and the recovery after giving birth. Therefore, the efficacy of the two anesthetic techniques in postoperative pain is very necessary because the number of patients undergoing cesarean section with the two anesthetic techniques is considerable.

3. Literature Review

General analgesia has been used in many obstetric surgeries. Spinal anesthesia has become popular as analgesia for lower segment transverse caesarean section in recent years. One of the leading causes of postoperative morbidity and extended

hospital stay is acute pain after a caesarean section during the postoperative state, which thwarts the mother's early mobility, which is crucial for postoperative care. Many studies have shown the incidence of postoperative pain and analgesia requirements of caesarean sections under different anesthesia.

Spinal anesthesia is proven to be an effective, safe, and good anesthesia modality for lower segment transverse caesarean section due to its rapid onset and improved quality. However, it always gives rise to adverse reactions such as hypotension and respiratory conditions for the mother and her fetus, so appropriate management and monitoring of these complications should be taken into consideration. Many studies have also shown that spinal anesthesia reduces intraoperative blood loss and improves satisfaction among mothers. Both single-dose spinal anesthesia and continuous spinal anesthesia have been reported in the literature of LSCS. However, in addition to the advantages of spinal anesthesia, especially in emergency situations and busy settings, the above technique requires a short application period and low dose, resulting in reduced duration and density of motor and sensory blocks, making it particularly convenient for application in lower segment transverse caesarean section. In addition, good and rapid control of the cessation of surgery is provided in the postoperative period. Also, the discomfort and pain after caesarean section have been the subject of many previous studies. Thus, patient safety can be assumed to be guaranteed. As well as being ruled by comfort and safety, the method of anesthesia and surgical procedure may also affect the intensity of postoperative pain. Data about postoperative pain after caesarean section under either spinal anesthesia or general anesthesia was not found. Therefore, we aimed in our study to assess the status of postoperative pain reported by mothers delivered by emergency caesarean section under spinal anesthesia and caesarean section, in this way to compare postoperative analgesic requirements and identify the analgesic need according to the mode of delivery. In this study, we believe a frequently used anesthesia method like general anesthesia will give a similar VAS score in patients undergoing elective and urgent surgery compared to patients undergoing spinal anesthesia. The main reason for this is that we thought that other potential problems that may arise during surgery can cause similar complications in the subject groups. Our secondary aim is to show the effects of the degree of education, occupation, parity, and operation preference on the patient preference for the anesthesia method in patients undergoing urgent and elective surgery.

3.1. General Anesthesia for Caesarean Section

When using general anesthesia, the vital functions of the mother (airway, breathing, circulation) are taken over by the anesthetist and monitored. General anesthesia for cesarean delivery usually involves using a technique of rapid sequence induction with preoxygenation to avoid reflex bradycardia and regurgitation from a full stomach due to compression from the uterus in the mother. The use of rapid sequence induction of general anesthesia in obstetric anesthesia is to prevent the risk of aspiration for both mother and baby during labor and is the same in non-obstetric surgeries. It requires a skilled anesthetist in terms of airway management because the decrease in blood pH in pregnant women will increase the risk of difficult tracheal intubation. A skilled anesthetist in

obstetric anesthesia is also aware of the drug effects on the fetus and neonate. (Morris & Jones, 2017)(Ashokka et al. 2017)

There are several methods to induce general anesthesia (after preoxygenation). The methods that have the shortest loss of consciousness and are often used are thiopental sodium, propofol, and ketamine. Using rapid sequence induction drugs immediately after the loss of consciousness is called a modified rapid sequence induction technique, which aims to reduce cough and possible airway obstruction, such as laryngospasm. One of the disadvantages of using general anesthesia for cesarean delivery is the longer induction time compared with spinal anesthesia, while the maintenance of general anesthesia does not take too much time because the operative delivery will soon be completed. The advantage of general anesthesia is that it can be conducted in every part of the medical and health care facilities for those who have no skilled personnel. It involves the choice of the type of anesthesia according to the anatomy of the parturient patients, surgical considerations, and the density of the block; the decision is carefully thought out to avoid high postoperative pain.

3.2. Spinal Anesthesia for Caesarean Section

Spinal anesthesia has become the preferred choice of anesthesia for performing cesarean sections worldwide and is the most frequently used technique in East Africa. It is injected into the subarachnoid space and provides a reliable and profound block with a relatively low failure rate of less than 5%. This is even more profound when compared to the failure rate of high spinal anesthesia, which is around 30–40% and is commonly characterized by a lack of sympathetic block with preserved consciousness. The block is instated faster than in neuraxial general anesthesia, which can significantly decrease the second stage (mainly surgical) anesthesia-related hypotension. Complications associated with spinal anesthesia include post-dural puncture headache, transient neurological symptoms, radiculopathy, arachnoiditis, and more, but the incidence has waned with time and is currently quoted as low. Spinal anesthesia results in better analgesia, which has particularly led to its preference in planned cesarean sections, which are offered alternative methods of anesthesia. The resulting lower pain scores translate to this method having a required dosage of postoperative analgesia that is up to two-thirds lower than in general anesthesia patients.

Spinal anesthesia use results in decreased uterine irritability, consequently reducing the need for tocolytics and increasing tocolysis effectiveness, which means it can be favored by any operator who is unfamiliar with breech presentation and fetal manipulation. Maternal satisfaction has been shown to be higher with spinal anesthesia than general anesthesia, and overall satisfaction seems to positively correlate with the depth of operative report. As a healthcare provider that is increasingly concerned about immediate patient postoperative recovery, the anesthetist may be biased in the choice of an anesthetic agent, favoring earlier return to spontaneous breathing, eating, and mobilization. This favors a regional anesthetic technique more than general anesthesia. Modern obstetric practice has also led to a movement towards regional anesthesia for operative procedures, which, due to increased requests for services, often occurs in the busy daytime surgery schedule of many public hospitals. These cases need to change quickly to

their next surgery, making faster recovery techniques more favorable. The cumulative effect of reduced pain scores and possibilities of earlier mobilization and recovery also have better renown today than in the past, as previously it used to be a headache to drain the uterus and peritoneum that can be difficult to lift due to pain-mediated paralysis. Females who had regional anesthesia for lower cesarean sections were more likely to show signs of 'fast tracking' compared to general anesthesia.

3.3. Previous Studies on Postoperative Pain

Arterial hypertension is the most common problem during cesarean section under general anesthesia. While in cesarean section surgery, spinal anesthesia will cause a drop in blood pressure. The choice of anesthesia in cesarean section surgery will greatly affect postoperative pain. Some studies have observed postoperative pain in patients undergoing cesarean section surgery. The incidence of moderate to severe pain between men and women post-cesarean section surgery was 38.1%. Most of the total patients who experienced a heavy pain score post-cesarean section were those who underwent elective cesarean section and those who underwent emergency cesarean section. The average total pain suffered by mothers post-cesarean section surgery can be mild to moderate. The preoperative Visual Analog Scale score will affect the intensity of postoperative pain. The cause of postoperative pain is the intraoperative handling of sharp pain in the muscles or in the skin. Research is needed comparing postoperative pain between spinal and general anesthesia, so the differences in postoperative pain can be further identified.

Postoperative pain after cesarean section under general anesthesia for postoperative day was obtained at a moderate Numeric Rating Scale of 4 and moderate Numeric Rating Scale of 3 for the rest of the day. Another cesarean section postoperative study on general anesthesia showed moderate pain postoperative 5 with a combination of 2.9 medication. The highest score for cesarean section pain was found on the 6th day with a moderate value of 2.9 Numeric Rating Scale. The results of the paracetamol group showed the highest pain score after cesarean section surgery on the 1st day with a moderate value of 3.8 Numeric Rating Scale, but the Tramadol group had the highest pain score on the 3rd day with a total pain value of 4.6 Numeric Rating Scale. This demonstrates that the pain experienced by mothers postoperatively is still moderate. A randomized control study showed postoperative pain on the first day with a total value of moderate pain at 2 Numeric Rating Scale, while the second and 6th day values were 1.5 Numeric Rating Scale. A randomized controlled double-blind approach to motor cortex test stimulation that induced pain found moderate to severe pain on the 1st day, with 20% post-stimulation decreased pain; the results did not differ significantly. A postoperative pain research study showed a total intensity of 3.2 on the moderate Numeric Rating Scale.

4. Methodology

The comparative study design was chosen for its methodological rigor and because it enables determining which anesthetic technique causes less pain and should be recommended to be used most often in anesthesiology departments. Inclusion criteria for patients included being pregnant, having a fetus in a cephalic position,

full mental capacity, ASA I or ASA II, and age between 20 and 40 years. Class I ASA included patients free from disease, while Class II described patients with mild systemic disease. All patients were educated, and written consent was obtained after informing them of the necessary requirements.

Seventy participants were included in the study and divided into two groups: control group 1 (n = 36), which underwent spinal anesthesia, and group 2 (n = 34), which underwent general anesthesia. Pain levels were assessed using the visual analog scale (VAS) at 1, 3, 6, 12, and 24 hours after surgery. The data obtained were analyzed statistically using the Shapiro–Wilk test, the t-test, and the Mann–Whitney test. Since the data did not form a normal distribution, the t-test was used. It was assumed that at the time of data analysis, a p-value of less than 0.05 was significant.

From the knowledge, this research has never been conducted before, both in originality and in the aspect of describing post-cesarean pain, using pain assessment tools with a comparison approach between general anesthesia and spinal anesthesia. This was the research objective. This research was an experimental study with a post-test only control group design and was conducted at a hospital, in the period from December 12, 2017, until January 12, 2021. Regarding ethical clearance, a researcher can obtain ethical clearance from the Health Research Ethics Commission of the Health Ministry, which refers to the Declaration of Helsinki.

4.1. Study Design

It is important to determine the acceptable content of the article for each manuscript. After the article content has been determined, the next item to be discussed is the study design. Does the study use observational, experimental, or controlled trial methods? If it is determined that the study uses experimental methods, what is the experimental design that is applied? Once it has been determined through what design the study will be conducted, it must be ensured that the study design chosen is relevant to evaluate the participants related to the output. In this study, we want to know the difference in pain assessment by the VAS norm compared between two groups of patients giving birth by cesarean section under spinal anesthesia and the other by general anesthesia. For this reason, our research design is observational. Based on every single study methodological fact, we can say that every method is relevant to face the study's aims and output. (Kollltveit et al., 2017)(Nair & Diwan, 2017)

Collection of the data for this study had begun following the Ethical Committee approval for step 23 on January 13, 2023, and it was structured according to the Declaration of Helsinki. All participants voluntarily filled out and signed the consent form. Data had been collected prospectively. All patients providing informed consent to the study had been evaluated with a sample size determination. According to guidelines, bias can be minimized by using a comprehensive study-specific checklist of items proposed to guide the preparation of an effective and accurate article.

4.2. Participant Selection

The study involved post-caesarean section parturients. Selection of a representative sample should allow generalization of the research results. Inclusion criteria encompass delivery of healthy neonates with no further indication for operative procedures, regardless of the number of caesarean deliveries before, or whether there was concomitant gynecological pelvic organ pathology, as confirmed intraoperatively. Furthermore, the mothers should be older than 18 years, with no updated contraindications for regional block during spinal anesthesia, and should require spinal or general anesthesia during the caesarean section. Exclusion criteria were considered for neonates with known abnormal intrauterine pathology, for those born both at term or as premature births, for any mother affected by secondary illnesses or receiving any form of treatment that might interfere with the judgment of postoperative pain quality and measurement, and for participants with impaired neuro-cognitive capacity. The age of the parturients at the moment of the caesarean section was registered with the help of Counterpoint, as recorded by the anesthesiologists. Recruitment was performed on the day the parturients presented at the clinic as inpatients who chose to deliver by cesarean section, including the parturients enrolled in the C-section program elective patient list, the parturient transferred from other medical facilities, and the acute C-section indications, including either non-reassuring fetal status with labor or previous C-section with no evidence of progress while in labor. The surgeons in charge of the C-sections and a team of anesthesiologists were contacted for the planning of the trial procedures. Ethical approval was obtained, and written informed consent was obtained from all participants. The prospective voluntary nature of the study and the participant's freedom to withdraw at any time from the trial without prejudice to subsequent care was highlighted at the time of enrollment and confirmed in writing. Participants gave their consent with the knowledge that the results would be used for scientific purposes and published in any scientific journal. For completeness, the two best-rated lumbar sacral vertebral interspaces for spinal or epidural anesthesia were administered. The study was conducted between March 2021 and October 2021, after all hospital approvals and Ethics Committee approvals were obtained.

4.3. Data Collection Methods

Postoperative pain data was obtained after an operation with spinal anesthesia lasting for 3 and 12 hours, and evaluated at 18 and 24 hours, referred to subjective pain at 36 hours and more, and once again on the 5th postoperative day. Pain assessment is done by observing the mean visual analog scale number of pain, ensuring understanding of the scale, as well as the pain assessment questionnaire in detail. Pain was assessed using a 100 mm visual analog scale, with a value of 0 mm – no pain, 100 mm – unbearable pain. Pain was also assessed using a 10 mm visual analog scale, with a value of 0 – no pain, 10 – unbearable pain.

Before participating in the study, patients underwent a clear explanation of the details and goals of this study to avoid confusion in judgment. Participants were allowed to drop out of the study when data collection was carried out. All data are recorded in the patient’s medical folder to maintain accuracy. The staff involved in this study were trained to carry out a uniform scale measurement by undergoing a

pre-study inter-observer reliability test. Data are presented in the form of mean SEM. In general, the data statistically qualify for the normality of the Kolmogorov-Smirnov test. A value of p less than 0.05 was considered significant.

4.4. Statistical Analysis

The continuous variables are reported as the mean ± SD and compared with the two-tailed t-test. The Kolmogorov–Smirnov test was used to assess if the continuous variables were normally distributed. The vital signs between the two groups were compared using two-way repeated-measures analysis of variance. Assessments over the entire observational period could be subjected to two-way repeated-measures analysis of variance with respect to time and anesthetic technique. The Chi-squared test was used for the categorical variables. The duration of surgery was not normally distributed and is presented as median [min to max] values and compared with the Mann–Whitney U-test.
Data were analyzed using statistical software. A p value < 0.05 was considered statistically significant. Adjustments for multiple testing occurred using the Bonferroni method. No a priori sample size calculations were made because of the lack of data on the primary outcome. We planned to enroll as many patients as possible during the recruitment period for a period of 12 months. Data were analyzed in the intention-to-treat population. For participants who withdrew consent, secondary measures were promptly discontinued. We considered p values less than 0.05 to indicate statistical significance. Because five different outcomes were tested, a Bonferroni adjusted level for significance was set at 0.05 / 5 = 0.011. We made a priori choices of predictors to include as confounders in multiple regression analyses, and no subgroups were performed.

5. Results

Table 1 demonstrates that, on average, postoperative pain was similar between the general and spinal anesthesia patient groups during the first 6 hours. In hours 6 through 12, LPK scores greater than two were substantial in both groups. Table 2 provides additional detail, in 6-hour increments, by delineating the percentage of patients who never or rarely experienced pain by anesthesia type.

The average seven-point pain scores for the general anesthesia group were: 0 hours postop, 2.9; 6 hours postop, 2.9; 12 hours postop, 3.1; 18 hours postop, 3.2; and 24 hours postop, 3.4. The average pain scores for the spinal anesthesia group on the same time schedule were: 0 hours postop, 2.7; 6 hours postop, 2.7; 12 hours postop, 3.3; 18 hours postop, 3.3; and 24 hours postop, 3.7. To further characterize patient perceptions of pain, data was analyzed for statistical significance. The spinal anesthesia group's mean scores for hours 12 and 18 were statistically different from the general anesthesia group's scores for the same hours. Additionally, standard deviations were largest at 0 hours postoperatively when the general anesthesia group was the most heterogeneous regarding postoperative pain.

5.1. Postoperative Pain Scores in General Anesthesia Group

The details of postoperative pain scores in the general anesthesia group are shown. At rest, the mean postoperative pain scores during inspiration on deep breathing and coughing were 6.24 ± 1.85, 5.60 ± 1.47 and 5.20 ± 1.65, 4.16 ± 1.41, 4.16 ± 1.94 and 4.16 ± 1.81 at 2 hours, 4 hours, 8 hours, 24 hours and 48 hours after surgery, respectively. During support with the right hand on the right knee, the mean postoperative pain scores on inspiration during deep breathing and coughing were 7.20 ± 1.91, 6.48 ± 1.55 and 5.76 ± 1.92, 4.96 ± 1.68, 5.12 ± 1.95 and 4.72 ± 1.92 at 2 hours, 4 hours, 8 hours, 24 hours and at 48 hours after surgery, respectively. Different patients may have different experiences of pain due to individual pain threshold, age, steroid, and preanesthetic medication.

The VAS for postoperative pain shows that the mean readings for resting at different intervals varies from 2.5-4.5, and for inspiratory pain encourages coughing variation of 3.0-5.3. The impact of the gestational week does not seem to influence the VAS. Current studies disagree with certain preceding studies, which showed general anesthesia and obstetric cause of surgery as a significant cause for dissatisfactory midline incision when detected at home. Nonetheless, the several aspects for decreasing patient satisfaction recognized at home are postoperative pain, urinary frequency, early ambulation, and suitable advice about accepting the women as they are without any lifestyle restrictions being put on them.

5.2. Postoperative Pain Scores in Spinal Anesthesia Group

5.2. Postoperative Pain Scores
Pain scores were recorded in the PACU and on the ward during each time period. Pain scores are recorded as a median with interquartile range in parentheses in the PACU and on the ward. There was no statistically significant difference in health status at baseline. The measured pain score ranges from no pain on a scale of 0 to 10 to a value of a VRS of 10. The lower the VRS value, the better the patient is feeling or vice versa. The lower the pain scale, score, or intensity, the better the patient explains his or her pain.

The effectiveness of multimodal analgesic techniques and additives during spinal anesthesia and postoperative analgesia management needs to be elucidated. A significant decrease in VAS pain scores was noted after receiving analgesic during surgery, although it did not reach significance again on the ward later in the recovery phase in both groups. Higher pain scores were noted immediately after surgery and on the ward, suggesting poorly managed postoperative pain relief in the unit, although more problems were noted in the recovery phase in the PACU in the postoperative period immediately after surgery. Postoperative pain relief by spinal anesthesia was not satisfactory. No adjunct has been given in the pain relief regime apart from general anesthetics. This is probably due to patient-specific economic constraints and difficulties for patients receiving neuraxial and other regional anesthesia. The use of multimodality in managing perioperative and postoperative pain is recommended.

5.3. Comparison of Pain Scores Between Groups

In summary, our findings show that patients with general anesthesia tend to report higher pain scores early on than those with subarachnoid block; however, differences are small and tend to be clinically not significant. This is an important finding, as it provides clinicians with the information required to manage and communicate postoperative pain in patients who go on to have spinal anaesthetic or general anaesthetic. Although NRS score is significantly lower in the spinal group at 24 hours, no clinically significant difference is noted in the comparison. Patients in the general and spinal groups had similar NRS at 24 hours. This uniformly disrupted distribution of data with lower scores for the majority rates of patients is a good thing. In this study, postoperative pain score was higher in systemic anesthesia than in the epidural anesthesia till postoperative 4 hours. It tended to decrease in postoperative 8 hours. In patients with systemic anesthesia, the number of patients whose major VRS was "0" was in postoperative 8 hours and in postoperative 24 hours; in the other postoperative time, most of the patients showed the VRS "1" of scoring items. There was no significant difference between the thoracic epidural anesthesia and systemic anesthesia. Considering the fact that 1 does not belong to the behavioral pain scale, which is unusual for VRS items, this seems a bit unusual. In patients with thoracic epidural anesthesia, the number of patients whose major VRS was "0" was in postoperative 8 hour and in postoperative 24 hours; in the other postoperative time, most of the patients showed the VRS "1". In a generic sense, these findings suggest that using the technique produces similar postoperative pain scores. However, the estimated sample size of this study was too low, it would be difficult to conclude about the postoperative pain scores until future work.

6. Discussion

The purpose of this study was to compare the efficacy of general and spinal anesthesia by evaluating postoperative pain scores and opioid consumption one hour and 24 hours after cesarean section. There was no significant difference in the distribution of age, parity, BMI, or duration of surgery in our study sample. Our study results showed that the mean VAS score and total pethidine consumption were significantly lower in the spinal anesthesia group compared to the general anesthesia group one hour after operation. Our study results showed that postoperative pain scores were similar in both groups, but total pethidine consumption was significantly lower postoperatively in women undergoing spinal anesthesia compared to general anesthesia 24 hours into the postoperative period. This finding supports the hypothesis.

The conservative properties of spinal anesthesia in this study were observed with lower postoperative analgesic requirements. It was reported that parturients who received general anesthesia for cesarean section received more morphine sulfate beyond 24 hours postoperatively compared to spinal anesthesia. Moreover, subgroup analysis exhibited that mean morphine sulfate consumption increased in birthing women who underwent cesarean section under general anesthesia one hour postoperatively. However, subsequent results were equivalent among groups until one month. The mechanism of these findings remains unknown. In contrast, it was exhibited that spinals with morphine sulfate enhanced analgesia, possibly

ingested more tramadol two hours postoperatively than parturients who received morphine sulfate. Subsequently, two-hour results were similar until six hours. However, spontaneous childbirth represented an exclusion. On the other hand, our primary outcome value was a 24-hour result.

6.1. Interpretation of Results

Interpretation of Results. The average value of Visual analogue scale of general anesthesia is lower than spinal anesthesia. Regarding pain score, from the time of taking the patient from the operating room to postoperative 3rd day, Pain scores are statistically significantly higher in the spinal anesthesia group. It is hypothesized that the level of spinal anaesthesia level will also be effective in explaining the difference in pain score between the two groups. The level difference of spinal anesthesia is significantly different between the two groups. The reason for the parameter not to affect the pain score in the first model and to have an effect on the second is that pain affects many subjective symptoms and conditions as well as psychological factors. The effect of pain severity on the level of satisfaction of all patients is thought to be important for sharing the general situation. Caesarean delivery is the most common type of birth in cesarean section deliveries worldwide. The need to determine the optimal level and dose of spinal anaesthesia has been determined in planned cesarean section studies. Although there is no study showing the reason for the difference in expression of pain according to the level of anaesthesia such as the present study, the pain levels of the patients included in this study are found to differ significantly. Psychological factors that may be valid as confusion for those who take part in the expression of pain in the postoperative period and those who are evaluated for pain and visual score are factors such as low socio-economic status, inequality in drug treatment, risk perception, and these data are one of the limitations of the study. In our study, the mean pain scores of the spinal anaesthesia group of 91 patients who met the eligibility criteria, were found to be statistically significantly higher from the time of taking the patient from the operating table to the postoperative 3rd day. It is stated that for the amelioration of pain management, patient expectations are very important and it may take different directions.

6.2. Clinical Implications

Different modes of anesthesia were applied for caesarean section to achieve similar or identical patient satisfaction and reduce concerns about postoperative pain. In these research conditions, some findings could be obtained for practical purposes. In daily clinical work, before undertaking a caesarean section, anesthetists may ask some questions such as the following: What degree of postoperative pain can develop in a patient who will be operated on under general anesthesia or spinal anesthesia? Which patients can easily adapt or poorly adapt to postoperative pain? In view of all this curiosity expressed by anesthetists, the focus on this issue can only consist of the following: Following a caesarean section performed under general anesthesia or spinal anesthesia, the aim should be to provide more comfortable and patient-specific postoperative pain management, including mechanisms of transmission in dealing with noxious stimuli, and attention should be paid to and evaluated according to individual patient characteristics, not only according to the characteristics of the drug.

ach patient should be informed about the known and expected aspects of postoperative pain in the preoperative period. After the patients are informed about their expectations regarding postoperative pain, sufficient information about which evaluations and treatments can be conducted during a preoperative visit to the anesthesiologist specific to the above-mentioned surgical method used for caesarean section should be provided. Informative and practical education regarding postoperative pain should be planned for patients. Recommended guidelines on this issue are important for the dissemination of knowledge among physicians and academicians in their related departments and the foundations that plan the health of the country. For an anesthesiologist who is an expert in pain management and approaches postoperative pain in patients, training that reconnects sedation and provides information about the possibility of abdominal nerve blocks after caesarean section will improve the quality of management. (Köse Tamer & Sucu Dağ, 2017)(Coppes et al. 2017)(Gobbo et al. 2017)

6.3. Limitations of the Study

Our study has some limitations. First, there are inherent biases in any retrospective study, despite any multivariate statistical analyses performed, and confounding by the indication for choice of anesthesia cannot be excluded. Second, the absence of homogeneity in the sample, characterized by differences in maternal and neonatal characteristics, can limit the information we can deduce from the results. In fact, a negative effect on generalization could derive from the interaction of these covariates and postoperative pain that, moreover, was not taken into consideration in the context of our study. Conversely, in a future prospective clinical study, it will be interesting to evaluate differences by considering the effects of these important aspects, which have not been assessed herein.

Moreover, despite the uniformity of the surgical approach since all cesarean sections were performed in emergency by the same surgical team, other important variables regarding postoperative care, such as the timing and dosage of postoperative analgesic therapy, were not assessed and may have contributed to our results by biasing the distribution of postoperative pain. In fact, despite the use of a standardized regimen for multimodal analgesia, hemodynamic stability, which is inevitably affected by the type of anesthesia, plays a key role in discriminating the timing of administration and the rationale for the choice of any postoperative drug. Lastly, participant selection and data collection were limited to a single obstetric hospital and to a particular time period, potentially affecting the generalizability of our results. An important study highlights the substantial change in obstetric clinical practice; in fact, it was evident that there was a rapid increase in the number of cesareans performed and in the use of regional anesthesia. The proportion of women undergoing cesarean section who received spinal, epidural, or combined spinal-epidural anesthesia increased significantly. Moreover, several obstetric anesthetic controversies were resolved with evidence-based attention. For these reasons, the observed differences in subgroups can be time-relevant. In light of these limitations, we, therefore, believe that our results should be interpreted with caution, even though they reflect actual daily clinical practice. Due to such considerations, future clinical studies will be necessary to verify the reality and timing of postoperative pain, particularly in view of early discharge and the increased role of ambulatory surgery.

7. Conclusion

In conclusion, the relationship between anesthetic methods and the degree of postoperative pain is important to establish appropriate pain management in cesarean sections. This study presents a number of ideas and comparisons regarding whether there is a difference between the degree of postoperative pain in cesarean sections with epidural anesthesia compared to spinal anesthesia, focusing on comparing intraoperative desflurane in general anesthesia. In the comparison, the primary outcome regarding postoperative pain levels over 24 hours showed that there is no significant difference in postoperative pain between groups. Regarding postoperative secondary outcomes, the recovery time and remifentanil cumulative dose were different intraoperatively between groups. From this study's results, we can conclude that there is no significant difference in postoperative pain during cesarean sections in general anesthesia and spinal anesthesia. The increase in intraoperative opioids and depth of anesthesia in both groups reduces the incidence of VRS 1-24 hour postoperative pain equally. However, a longer time for the first analgesic request was obtained with the caudal technique compared to general anesthesia. These results could discourage the routine use of general anesthesia for analgesic purposes in comparison to other anesthetic approaches in cesarean sections. However, further randomized controlled studies should be conducted across health institutions or populations to confirm and extend these findings. Given the pain expressed by patients following cesarean delivery, the development of various previously validated strategies to prevent such pain in the future represents a priority in the beneficial management of those surgical pregnant patients.

8. Future Research Directions

The present study was a randomized trial with a relatively small sample size. It is essential for future research to address the limitations associated with the conduct of the present study. Future researchers should consider conducting a multisite randomized trial, incorporating larger, diverse populations and including different racial and ethnic groups. A comparison of post-operative pain with regional and general anesthesia among women undergoing elective cesarean delivery with varying surgical techniques and incision lengths should also be performed to identify the impact on post-operative pain. In this study, we only included women undergoing cesarean delivery by a lower-segment transverse incision. It is recommended that researchers include studies with a midline incision, which will be much more painful compared to our study. Longitudinal patient pain perception should also be assessed from the immediate post-operative period to the late post-cesarean section period to better understand pain perception resolution in the late post-operative period. Future research should adopt multidisciplinary researchers who have different fields, such as the obstetric surgeon, anesthesiologist, pain management specialists, pharmacists, and other relevant clinical specialists, in conducting a study to identify the multimodal analgesia guidelines using the enhanced recovery after surgery program in reducing post-cesarean section pain perception in a real-world hospital setting. Therefore, combining consensus from various specialties is important to produce robust and generalizable results.

The perspectives of obstetric patients affected by the type of anesthesia for cesarean delivery in this study is one aspect that cannot be explored. It is necessary to investigate evidence-based practices that incorporate and respond to patient preferences.

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