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Evaluation of Regional Anesthesia Complications in Caesarean Section

Sezeryan Operasyonlarında Rejyonel Anestezi Komplikasyonlarının Değerlendirilmesi

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ÖZET

Amaç: Bu çalışmada, sezeryan operasyonlarında rejyonel anestezi komplikasyonlarının değerlendirilmesi amaçlanmıştır.

Gereç ve Yöntem: Ocak 2010 ve Ocak 2011 yılları arasında rejyonel anestezi altında sezeryan operasyonu geçiren hastalar, çalışmaya dahil edildi. Demografik veriler, rejyonel anestezi metodu, uygulama pozisyonu, girişim sayısı, lokal anestezi sırasında hastanın hissettikleri, duyuşal seviye ve komplikasyonlar kaydedildi. Herbir rejyonel anestezi tekniği için sonuçlar analiz edildi ve sunuldu.

Bulgular: Çalışma süresi içerisinde toplam 425 sezeryan operasyonu uygulandı. Rejyonel anestezi altında gerçekleştirilen toplam 269 sezeryan operasyonu çalışmaya dahil edildi. Yirmi yaş altı %1.5 oranında, 20-34 yaş arası %91.1, ve 35 yaş üstü %7.4 hastaya sezeryan operasyonu uygulandığı saptandı. Spinal anestezi, epidural anestezi ve kombine spinal-epidural anestezi uygulanan hasta sayısı sırasıyla, 236, 9, 24 idi. Bu çalışmada en sık uygulanan rejyonel anestezi tekniği spinal anestezi idi. Lokal anestezi enjeksiyonu sırasında en sık hissedilen duyu %54.6 ile sıcaklıktı. Spinal anestezi grubunda dura ponksiyonu sonrası baş ağrısı % 6,3 ve sırt ağrısı % 8,8 oranında gözlemlendi. Nörolojik komplikasyon iki hastada görüldü.

Tartışma: Bu çalışma sonucunda, üniversitemizde rejyonel anestezi komplikasyon oranlarının günümüz literatürleri ile benzer olduğu görülmüştür.

Anahtar sözcükler: Anestezi; spinal; epidural; komplikasyonlar; sezeryan.

ABSTRACT

Aim: We aimed to evaluate the complications of regional anesthesia techniques in caesarean operations.

Material and Methods: Patients who underwent caesarean operation managed with regional anesthesia between January 2010 and January 2011 were included in this study. Demographic data, regional anesthesia method, position during approach, number of attempts, patient feelings during local anesthetic injection, dermatomal level, and complications were recorded. The results were analyzed and presented for each regional anesthesia technique.

Results: A total of 425 were performed in the study period. Totally 269 caesarean sections under regional anesthesia were included in this study. Caesarean sections were performed at a rate of 1.5 % in patients below 20 years of age, 91.1 % in 20-34 years of age and 7.4 % in over the age of 35 years. Specifically, spinal anesthesia, epidural anesthesia, and combined spinal-epidural anesthesia were applied to 236, 9, and 24 patients, respectively. Spinal anesthesia was the most frequently applied regional anesthesia technique in this study. The most common sensation during local anesthetic injection was feeling of warmth at a rate of 54.6 %. Post dural puncture headache was observed at a rate of 6.3 % (n=15), and backpain 8.8 % (n=21) in the spinal anesthesia group. Neurological complications occurred in 2 patients.

Discussion: The present study revealed that the complication rates of regional anesthesia techniques in our university had consistent results with the current literatures.

Keywords: Anesthesia; spinal; epidural; complications; caesarean section.

Introduction

Cesarean delivery is described as the removal of an infant through incisions in the abdominal and uterine walls. This operation was rarely performed until the nineteenth century because of maternal mortality [1, 2]. Over the past 25 years, the rate of caesarean operations has increased with the development of modern surgical techniques and strict compliance with sterilization rules [1, 3, 4].

The anesthetic management of caesarean section is important for reducing morbidity and mortality of the mother and fetus. Anesthetic methods have important implications for operative and patient care [5]. Obstetric anesthesia focuses on the effects of anesthetic interventions on the mother, fetus, and neonate [2]. There are two anesthesia methods (general anesthesia and neuraxial anesthesia) in cesarean operations [6]. In recent years, the anesthetic technique preferred has shifted from general anesthesia to neuraxial anesthesia [5]. Neuraxial anesthesia can be performed in the form of spinal anesthesia and epidural anesthesia. Patients undergoing neuraxial anesthesia have less postoperative pain. In these patients, there are fewer complications such as thromboembolic complications. Due to these benefits, neuraxial anesthesia is often preferred compared to general anesthesia [5-7]. For regional anesthesia, spinal anesthesia is generally preferred due to the simplicity of the technique, fast onset, reliability, cost-effectiveness, and minimal fetal exposure to drugs [4, 5]. In contrast, intrathecal local anesthetics can produce high levels of sensory and motor block and hypotension that is particularly important for mothers undergoing cesarean section, as maternal hypotension causes decreased uteroplacental blood flow [4, 5].

The anesthesia method selected before the operation depends on the experience of the anesthesiologist, obstetrician preference, urgency of the surgery, potential maternal and fetal complications, and mother's preference [2, 6].

In this study, we present postdural puncture headache (PDPH), hypotension, and neurological complications of neuraxial anesthesia in patients undergoing elective cesarean section and compare these complications with the literature.

Materials and Methods

In this study, after approval was received from the Ethics Committee of the Gaziosmanpasa University School of Medicine, between January 2010 and January 2011 in operating room patients who underwent caesarean section were retrospectively analyzed. The anesthesia record system used in our hospital is a scanner-based system.

Patients who underwent an elective cesarean section with neuraxial anesthesia were included in the study. In the preoperative recovery room protocol, an 18G intravenous catheter was inserted into the forearm for fluid infusion, and 500 ml of macromolecule or 1000 ml of crystalloid fluid was infused 30 minutes before regional anesthesia was applied in the clinic. Age, body mass index (BMI), and American Society of Anesthesiologists score (ASA) of the patients, regional anesthesia method, position during the regional anesthesia process, number of attempts, patient's feelings during local anesthetic injection (pain, paresthesia, heat), dermatomal level, and hypotension occurrence were recorded. Spinal anesthesia was assessed using a 25G Quincke needle. Postoperative complications such as PDPH, back pain, and neurological complications were recorded.

Normality and variance were tested using the Kolmogorov-Smirnov, skewness and kurtosis, histograms, and Q-Q plots for each variable. Quantitative data are presented as the mean and standard deviation and qualitative data as frequency and percentage. Depending on these results, parametric or nonparametric analysis was undertaken for each variable. Fisher's exact test was used to compare the ASA scores between regional anesthesia techniques. The Kruskal-Wallis analysis of variance was used to compare the age, height, weight, and BMI according to the regional anesthesia technique. Analyses were completed by using the Statistical Package for Social Sciences Windows 15.0 (SPSS, Chicago, IL) program. Statistical significance for all analysis was set at $p < 0.05$.

Results

Elective caesarean section was performed in 425 patients in one year, and 156 were performed under general anesthesia. Two hundred sixty-nine caesarean sections under regional anesthesia were included in this study. The mean age was 28.02 ± 0.29 in the spinal anesthesia group, 27.33 ± 1.48 in

the epidural anesthesia group, 27.75 ± 0.93 in the combined-spinal anesthesia group, and 27.97 ± 0.27 in all groups. The rate of caesarean sections in adolescent mothers was % 1.5, while for mothers 20-34 years of age and > 35 years of age, the rate was % 91.1 and % 7.4, respectively. Demographic values are presented in Table 1.

Table 1. The Demographic Values of The Patients

	Spinal Anaesthesia (n) (Mean ± SD)	Epidural Anaesthesia (n) (Mean ± SD)	CSE (n) (Mean ± SD)	Total (n) (Mean ± SD, CI)	p
Number of Patients	236	9	24	269	
Age	28.02 ± 0.29	27.33 ± 1.48	27.75 ± 0.93	27.97 ± 0.27 (27.43-28.51)	0.919[†]
Height	160.62 ± 0.32	159.22 ± 1.46	161.16 ± 1.22	160.62 ± 0.31 (160.01-161.23)	0.615[†]
Weight	75.41 ± 0.79	70.11 ± 2.62	76.2 ± 3.1	75.3 ± 0.75 (73.81-76.79)	0.386[†]
BMI	29.21 ± 0.29	27.65 ± 0.95	29.18 ± 0.92	29.16 ± 0.27 (28.62-29.70)	0.66[†]
ASA					
I	178	9	20	207	
II	51	—	3	54	
III	7	—	1	8	
IV	—	—	—	—	0.212^φ

[†] Kruskal-Wallis Test, Tukey's HSD revealed no significance for intergroup comparisons

^φ Fisher's Exact Test

CSE: Combined Spinal Epidural Anesthesia

Specifically, 236 women received spinal anesthesia, 9 women received epidural anesthesia, and 24 women received combined spinal-epidural anesthesia. The distribution of caesarean section in terms of anesthesia type and anesthesia specifications is shown in Table 2. In addition, % 75.8 (p=204) of the patients received regional anesthesia in the sitting position. Spinal anesthesia was the most commonly used regional technique in this study (Table 1), % 76.6 (n=206) of the regional anesthesia approaches were made in one attempt, and T6 was the most common sensory block level in this study (% 38, n=118).

PDPH was observed in % 6.3 (n=15) and back pain in % 8.8 (n=21) of the spinal anesthesia group (Table 4). The most common sensation during local anesthetic injection was a feeling of warmth (% 54.6) in patients who received spinal anesthesia and (% 58.3) combined spinal-epidural anesthesia (Table 3). Hypotension was observed in % 56.8 (n=134) of the patients who received spinal anesthesia, % 33.3 of the patients who received epidural anesthesia, and % 45.8 of the patients who received combined spinal-epidural anesthesia. Postoperative complications for each regional anesthesia technique are presented in Table 4.

Table 2. Characteristics of the regional anesthesia techniques

		Spinal Anesthesia (n)	Epidural Anesthesia (n)	CSE Anesthesia (n)
Position During Spinal Anesthesia	Sitting	176	8	20
	Lateral Decubitus	60	1	4
Number of Attempts	1	180	8	18
	2	24	1	3
	3	27	–	2
	4	5	–	1
Dermatomal Level	C7	1	–	–
	T2	8	–	1
	T4	65	2	6
	T6	102	6	10
	T8	20	1	3
	T10	40	–	4

CSE: Combined Spinal Epidural Anesthesia

Discussion

The anesthesia method preferred in caesarean operation is important for the health of the mother and fetus. In the present study, patients who underwent caesarean operation under regional anesthesia techniques such as spinal, epidural, and combined spinal-epidural (CSE) anesthesia were evaluated. Because of the risk of failed intubation and aspiration connected with general anesthesia, regional anesthesia is recommended for cesarean operations [7, 8]. Spinal anesthesia, which has rapid onset, is easily applied, is more qualified anesthesia than general anesthesia, and is used more frequently in regional anesthesia techniques [9]. In addition, spinal anesthesia was the most preferred technique in the present study (Table 2).

PDPH is an important cause of morbidity after neuraxial block in caesarean operation. The prevalence of PDPH after dural puncture is from % 1.5 to % 11.5 according to the type (pencil point, Quincke) and diameter (24 to 27G) of the spinal needle [10-12]. PDPH in epidural anesthesia is caused by inadvertent puncture of the dura mater, and ranges from % 0.04 to % 6 [11]. In Bloom et

al.'s study, the anesthesia techniques for caesarean section were compared, and the authors reported that the prevalence of PDPH was % 0.5 for spinal anesthesia, % 0.3 for epidural anesthesia, and % 0.5 for CSE anesthesia [12]. In our study, the frequency of PDPH in spinal and CSE anesthesia was % 6.3 and % 4.2, respectively. In addition, PDPH did not occur after epidural anesthesia. The prevalence of PDPH in the spinal and CSE anesthesia groups is similar to that observed in the literature; however, the absence of PDPH in the epidural anesthesia group can be explained by the small number of patients and the lack of dural puncture in the group.

Table 3. Sensations During Local Anesthetic Injection

	Spinal Anesthesia (n, %)	Epidural Anesthesia (n, %)	CSE (n, %)
Pain	4 (1.7 %)	—	—
Paresthesia	64 (27.1 %)	3 (33.3 %)	6 (25 %)
Feeling of Warmth	129 (54.6 %)	3 (33.3 %)	14 (58.3 %)
None	39 (16.6 %)	3 (33.3 %)	4 (16.7 %)

CSE: Combined Spinal Epidural Anesthesia

Table 4. Postoperative Complications for Each Regional Anesthesia Techniques

	Spinal Anesthesia (n, %)	Epidural Anesthesia (n, %)	CSE Anesthesia (n, %)
PDPH	15 (6.3 %)	–	1 (4.2 %)
Back Pain	21 (8.8 %)	–	1 (4.2 %)
Neurological Complications	2 (0.8 %)	–	–
Postoperative Nausea	2 (0.8 %)	–	–

Combined Spinal Epidural Anesthesia (CSE),
PDPH: Postdural Puncture Headache

Neurological complications rarely appeared after a neuraxial block. However, when they occurred in young healthy women during the postoperative period, the cause of the complication was the neuraxial block. Epidural hematoma after spinal or epidural anesthesia, paresthesia, and paralysis in lower extremities are neurological complications [8, 13]. Neurological complications in obstetric patients who received epidural anesthesia or spinal anesthesia range from % 0 to % 3.6 and % 0.03 to % 7, respectively [14, 15]. The CSE technique is especially used for labor and delivery analgesia, and no neurological complications have been reported [16, 17]. In the present study, we detected neurological complications after an examination in the first postoperative day in 2 (% 0.8) of the patients. In these cases, we have found 1/5 loss of motor function at the left lower extremity in the first patient and paresthesia in the L5 to S1 dermatomes at the left lower extremity in the second patient (Table 4).

Hypotension during the anaesthesia for caesarean section in the mother has negative effects on the mother and the fetus. Because of the positive correlation between the severity of hypotension in the mother and the increase in fetal acidosis, preventing and treating hypotension in the mother is a priority for the mother and the fetus [5, 18]. Ezri et al. [19] compared epidural and CSE anesthesia in knee arthroplasty and showed that the mean arterial pressure, heart rate, and cardiac index of the groups revealed no difference. Another study that compared the effects of spinal and CSE anesthesia on arterial blood pressure showed that the hypotension

prevalence was % 5-33 in spinal anesthesia and % 10.9 in CSE anesthesia [20]. A previous study that compared the mother and fetus effects of spinal and CSE anesthesia indicated that spinal anesthesia has a lower mean arterial pressure and rapid onset, and thus provided an earlier onset for the operation [21]. A systematic search of the literature revealed that the effects of neuraxial blocks on arterial blood pressure have different aspects [20-24]. Spinal anesthesia showed a substantially higher rate of hypotension than epidural and CSE anesthesia.

Nausea and vomiting, which are associated with hypotension and surgical procedure, are common complaints in patients who received caesarean section under regional anesthesia. Cappelleri et al. [25] compared general and spinal anesthesia in arthroscopy and showed that nausea and vomiting were more frequent in patients who received spinal anesthesia. In another study, no difference between epidural and spinal anesthesia was revealed for nausea and vomiting frequency [26]. In our study, there were no differences among the spinal, CSE, and epidural anesthesia groups in terms of nausea.

Back pain can occur in pregnancy and during the postpartum period and appears at a rate of % 23 to % 54 after delivery. The level of relaxin hormone and the instability of the symphysis pubis and sacroiliac joints cause back pain [27]. Back pain after caesarean section was observed more than PDPH after spinal anesthesia, and ranged from % 2.5 to % 54. In a previous study, the authors reported the prevalence of severe back pain at 11 % and in addition to the needle diameter, the design of the needle and the number of attempts can cause back pain [28]. Another study that compared the two types of regional anesthesia techniques showed that the CSE anesthesia group had a higher frequency of back pain than the epidural anesthesia group [29]. In our study, back pain was shown at a rate of 8.8 % in the spinal anesthesia group and % 4.2 in the CSE anesthesia group; however, back pain was not observed in the epidural anesthesia group. This result can be explained in two ways: more attempts, which may cause back pain, were made in the spinal anesthesia and CSE anesthesia groups than in the epidural anesthesia group, and the patients were not

equally distributed among the groups, which might have affected the results.

Conclusion

The regional anesthesia techniques for caesarean delivery were applied in our department at the same frequencies as in the current literature, and the patients encountered similar complications.

Conflict of interest

All authors declare that there is no conflict of interest.

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