

Epidural anesthesia during childbirth — retrospective analysis of maternal and neonatal results

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ABSTRACT

Objectives: In Poland, in accordance with applicable regulations, every woman should have access to epidural anesthesia. The advantage of this type of analgesia is primarily analgesic effectiveness.

The aim of the study is to identify variables related to epidural anesthesia and to verify the relationship between them and the occurrence of perinatal complications in the mother and the child.

Material and methods: This was a single-center retrospective cohort study. Electronic documentation of patients of the Hospital of St. Sofia in Warsaw was used to create an anonymous retrospective database of all births in the years 2015–2020. 27,340 cases were qualified for the analysis.

Results: The logistic regression model showed that the risk of episiotomy (OR = 5.539; CI = 5.169–5.935) increases more than fivefold and perineal laceration (OR = 2.190; CI = 2.036–2.356) increases twice in the case of epidural anesthesia application. There is also an increased risk of operative delivery (OR = 2.668; CI = 2.255–3.156), at the same time the risk of performing a cesarean section decreases more than fivefold (OR = 0.043; CI = 0.036–0.052).

Conclusions: Epidural anesthesia affects the delivery mechanism leading to an increase in the number and intensity of additional medical procedures — episiotomy, perineal laceration, operative delivery. The rationale for the routine use of this method of anesthesia should be considered in the context of the implications for the woman's reproductive health and research on the effectiveness of other methods of birth anesthesia should be conducted.

Key words: epidural anesthesia; risk factors; childbirth

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INTRODUCTION

Childbirth is one of the most painful events in a woman's life, so many of them feel fear about the pain of labor [1]. Future mothers have always tried to find a way to alleviate it [2]. This pain is caused by uterine contractions and dilation of the cervix and other structures in the pelvis. It is transmitted by the sympathetic nerves to the spinal cord from T10 to L1, and in the later stage of labor by the pudendal nerve and sacral from S2 to S4 [3].

According to the World Health Organization (WHO), the most common methods of analgesia during childbirth are regional analgesic methods [4]. Among them, we distinguish epidural anesthesia, which is currently most commonly used in obstetrics [5]. In the absence of contraindications, the patient should not be denied this method of analgesia [6]. Lack

of proper control of acute pain is associated with adverse pathophysiological effects, such as hyperventilation [7, 8].

Currently, both non-pharmacological (natural) and pharmacological techniques for relieving labor pain are available in Poland. The second group includes epidural anesthesia, laughing gas (nitrous oxide) and intravenous opioids [9]. In Poland, in accordance with applicable regulations, every woman should have access to epidural anesthesia [10].

The advantage of this type of analgesia is primarily analgesic effectiveness. Additional benefits for the mother and the child include improved maternal cardiovascular physiology, uteroplacental perfusion, and fetal acid-base balance [11]. Despite the effectiveness and positive experiences of women, the use of epidural anesthesia is associated with risks, both for the mother and the child [2, 12].

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Since the introduction of epidural analgesia to relieve labor pain, there have been controversies about the relationship between this method of anesthesia and operative deliveries, C-section and prolonged labor [13]. However, further studies have not shown the association of epidural anesthesia with an increased incidence of C-sections, but discussions on its impact on the percentage of surgical deliveries and the duration of delivery are still ongoing [11].

Subsequent studies indicate that the use of epidural anesthesia increases the risk of oxytocin use, operative deliveries and perineal incision, and reduces the percentage of spontaneous deliveries [12, 14]. Due to the risk, the use of analgesia during childbirth should always be evaluated by medical personnel [14, 15].

Aims

The aim of the study is to identify variables related to epidural anesthesia and to verify the relationship between them and the occurrence of perinatal complications in the mother and the child.

MATERIAL AND METHODS

Study design

This was a single-center retrospective cohort study. Strobe guidelines for cohort studies were used to ensure proper reporting of results [16]. The study has received approval from the Bioethics Committee of the Medical University of Warsaw (No. AKBE/204/2021). This was a retrospective anonymized data analysis; therefore, no individual patient consent was needed.

Setting, participants, and the study size

The electronic patient records of Saint Sophia's Hospital in Warsaw, Poland, a tertiary hospital, with the largest number of deliveries per year, were used to create an anonymous retrospective database of all deliveries from 2015 to 2020. At the hospital, every woman who has obtained the qualifications of an obstetrician and anaesthetist can obtain an epidural anesthesia on request free of charge. This dataset was generated using electronic medical records collected by medical personnel. Therefore, there is no recall bias. Additionally, the dataset was cross-checked for inconsistencies and any detected were verified.

Multiple pregnancies and deliveries before 38 weeks of gestation were excluded from the analysis. Neonates with major birth defects or abnormal karyotype were also excluded [17, 18]. The study included an analysis of two groups, a study group consisting of patients with epidural anesthesia during childbirth and a control group — patients without this anesthesia.

In the process of analyzing electronic documentation, the following information was obtained: maternal diseases,

obstetric history, course and complications of pregnancy, labor data and birth data of the child. The documentation of 40,007 deliveries was analyzed, of which, based on the adopted criteria, 27,340 cases were qualified for the analysis.

Statistical analysis

The data obtained in the documentation analysis process was subjected to statistical analysis, which was performed using the R language in the RStudio environment. Qualitative data are presented as numbers (n) and case percentages (%). Quantitative data were presented as mean (M) and standard deviation (SD). The Pearson Chi-square test was used to assess the dependence within the qualitative variables. Quantitative variables were compared using the student's T-test with the assessment of homogeneity of variance with the Brown Forsythe test. A logistic regression model was developed to assess risk factors for perineal laceration. The backward stepwise method was used in the construction. Model data are presented as odds ratios (OR) together with the 95% confidence interval (95% CI). The usefulness of the model was assessed using the ROC method with the determination of the cut-off point with the tangent method. The level of statistical significance was set at $p < 0.05$.

RESULTS

The statistical analysis showed that epidural anesthesia is more often performed in younger women giving birth (30.6 vs 31.8) and single women (22.7%) — $p < 0.05$. Detailed data are presented in Table 1.

Epidural anesthesia is more often performed in primigravidas (57.5%) and primiparas (67.1%), in more advanced pregnancies (39.4 vs 39.2). In addition, in the case of coexistence of diseases such as gestational diabetes (12.0%), pregnancy hypertension (3.6%) or pregnancy cholestasis (1.3%), as well as with a higher BMI (22.2 vs 22.0). It was also found that epidural anesthesia was more often performed in non-VBAC patients (93.8%), those who had a birth plan (9.5%), had a family birth (66.5%), and had preinduction (12.3%), induction (30.3%) and administered oxytocin to stimulate contractions (44.8%). The above correlations were statistically significant ($p < 0.05$) (Tab. 2).

Statistical analysis showed that when an epidural anesthesia was used during delivery, the average blood loss was lower (403.0 vs 443.4), and the length of hospitalization was longer (4.5 vs 4.2) than in the control group ($p < 0.05$) (Tab. 3).

The logistic regression model showed that the risk of episiotomy (OR = 5.539; CI = 5.169–5.935) increases more than fivefold and perineal laceration (OR = 2.190; CI = 2.036–2.356) increases twice in the case of epidural anesthesia application. There is also an increased risk of operative delivery (OR = 2.668; CI = 2.255–3.156), at the same time

Table 1. Characteristic of the population

	Control group No epidural anesthesia n = (%) *A ± SD	Study group Epidural anesthesia n = (%) *A ± SD	All n = (%) *A ± SD	p value
Age [years]	* 31.80 ± 4.4	* 30.62 ± 4.3	*31.57 ± 4.4	0.00
Place of residence				
City	19423 (85.8)	4633 (86.5)	24056 (85.9)	0.17
Village	3227 (14.2)	724 (13.5)	3951 (14.1)	
Education				
Higher	17871 (87.2)	4004 (87.3)	21875 (87.2)	0.52
Secondary	2279 (11.1)	514 (11.2)	2793 (11.1)	
Primary	181 (0.9)	31 (0.7)	212 (0.8)	
Vocational	161 (0.8)	40 (0.9)	201 (0.8)	
Marital status				
In a relationship	17758 (81.4)	3985 (77.3)	21743 (80.6)	0.00
Single	4056 (18.6)	1196 (22.7)	5225 (19.4)	

A — average; SD — standard deviation

Table 2. Characteristics of the study group

	Control group No epidural anesthesia n = (%) *A ± SD	Study group Epidural anesthesia n = (%) *A ± SD	All n = (%) *A ± SD	p value
Pregnancy				
1	8490 (37.4)	3090 (57.5)	11580 (41.2)	0.00
2	8248 (36.3)	1506 (28.0)	9754 (34.7)	
3	3685 (16.2)	525 (9.8)	4210 (15.0)	
4	1394 (6.1)	161 (3.0)	1555 (5.5)	
5	901 (4.0)	94 (1.7)	995 (3.5)	
Pregnancy	*2.0 ± 1.1	*1.6 ± 0.9	*2.0 ± 1.1	0.00
Labor				
1	9992 (44.0)	3607 (67.1)	13599 (48.4)	0.00
2	9155 (40.3)	1416 (26.3)	10571 (37.6)	
3	2667 (11.7)	288 (5.4)	2955 (10.5)	
4	629 (2.8)	42 (0.8)	671 (2.4)	
5	275 (1.2)	23 (0.4)	298 (1.1)	
Labor	*1.8 ± 0.9	*1.4 ± 0.7	*1.7 ± 0.8	0.00
Gestational Age	* 39.2 ± 1.1	* 39.4 ± 1.1	*39.2 ± 1.1	0.00
Gestational diabetes				
No	20342 (89.5)	4732 (88.0)	25074 (89.3)	0.00
Yes	2376 (10.5)	644 (12.0)	3020 (10.7)	
Diabetes mellitus				
No	22662 (99.8)	5366 (99.8)	28028 (99.8)	0.41
Yes	56 (0.2)	10 (0.2)	66 (0.2)	
Pregnancy hypertension				
No	22031 (97.0)	5184 (96.4)	27215 (96.9)	0.04
Yes	687 (3.0)	192 (3.6)	879 (3.1)	

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Table 2. cont. Characteristics of the study group				
	Control group No epidural anesthesia n = (%) *A ± SD	Study group Epidural anesthesia n = (%) *A ± SD	ALL n = (%) *A ± SD	p value
Pre-Pregnancy hypertension				
No	22504 (99.1)	5337 (99.3)	27841 (99.1)	0.13
Yes	214 (0.9)	39 (0.7)	253 (0.9)	
Pregnancy cholestasis				
No	22491 (99.0)	5305 (98.7)	27796 (98.9)	0.04
Yes	227 (1.0)	71 (1.3)	298 (1.1)	
VBAC				
No	18712 (82.4)	5040 (93.8)	23752 (84.5)	0.00
1	3311 (14.6)	321 (6.0)	3632 (12.9)	
2	604 (2.7)	14 (0.3)	618 (2.2)	
3	84 (0.4)	1 (0.0)	85 (0.3)	
4	7 (0.0)	0 (0.0)	7 (0.0)	
Obesity				
No	22099 (97.3)	5214 (97.0)	27313 (97.2)	0.25
Yes	619 (2.7)	162 (3.0)	781 (2.8)	
BMI	*22.0 ± 3.5	*22.2 ± 3.6	*22.1 ± 3.6	0.01
Maternal smoking				
No	22592 (99.4)	5356 (99.6)	27948 (99.5)	0.09
Yes	126 (0.6)	20 (0.4)	146 (0.5)	
Family Childbirth				
No	16435 (72.3)	1802 (33.5)	18237 (64.9)	0.00
Yes	6283 (27.7)	3574 (66.5)	9857 (35.1)	
Childbirth plan				
No	21886 (96.3)	4865 (90.5)	26751 (95.2)	0.00
Yes	832 (3.7)	511 (9.5)	1343 (4.8)	
Induction				
No	20019 (88.1)	3746 (69.7)	23765 (84.6)	0.00
Yes	2699 (11.9)	1630 (30.3)	4329 (15.4)	
Preinduction				
No	21896 (96.4)	4714 (87.7)	26610 (94.7)	0.00
Yes	822 (3.6)	662 (12.3)	1484 (5.3)	
Oxytocin				
No	20330 (89.5)	2967 (55.2)	23297 (82.9)	0.00
Yes	2388 (10.5)	2409 (44.8)	4797 (17.1)	
Intrauterine death				
No	22711 (100.0)	5369 (99.9)	28080 (100)	0.00
Yes	7 (0.0)	7 (0.1)	14 (0.0)	
Duration of 1st stage [min]	*312.0 ± 4303.1	*371.2 ± 615.0	*327.5 ± 3714.0	0.32
Duration of 2nd stage [min]	*30.4 ± 358.4	*34.5 ± 42.0	*31.5 ± 307.5	0.41
Duration of delivery [min]	*455.7 ± 32197.8	*406.7 ± 623.5	*444.1 ± 28119.9	0.91

A — average; SD — standard deviation; BMI — body mass index; VBAC — vaginal birth after caesarean delivery

Table 3. Results of perinatal complications

	Control group No epidural anesthesia *A ± SD	Study group Epidural anesthesia *A ± SD	All *A ± SD	p value
Blood loss	*443.4 ± 153.00	*403.0 ± 133.6	*433.0 ± 149.3	0.00
Duration of 3 rd stage [min]	*12.7 ± 50.1	*13.7 ± 49.7	*12.9 ± 50.0	0.23
Duration of stay [days]	*4.1 ± 3.4	*4.5 ± 3.1	*4.2 ± 3.4	0.00
Birth weight	*3467.3 ± 438.0	*3479.3 ± 411.5	*3469.6 ± 433.1	0.06
Length	*54.6 ± 2.6	*54.7 ± 2.7	*54.6 ± 2.6	0.21

A — average; SD — standard deviation

the risk of performing a C-section decreases more than five-fold (OR = 0.043; CI = 0.036–0.052). The use of this method of anesthesia also affects the increased risk of the child's mediocre or poor birth condition, but only in 1st and 3rd minute. There was no increased risk of worse birth status as assessed in 5 and 10 minutes (Tab. 4).

DISCUSSION

In our study, we identified variables related to epidural anesthesia and we verified the relationship between them and the occurrence of perinatal complications in the mother and the child. Using the logistic regression model, it was found that the risk of episiotomy increases more than five-fold and perineal laceration increases twice when using epidural anesthesia. There is also an increased risk of operative delivery, at the same time, the risk of performing a C-section is more than fivefold reduced. The use of this method of anesthesia also affects the increased risk of the child's mediocre or poor birth condition, but only in first and third minute. In addition, significant relationships were found between the use of epidural anesthesia and younger age, being single, being a primigravida and a primipara, higher gestational age, the history of gestational diabetes, pregnancy hypertension, pregnancy cholestasis, higher BMI, having a birth plan more frequently, more frequent family births, more frequent use of preinduction, induction and stimulation with oxytocin. In the case of VBAC, patients were less likely to use epidural anesthesia.

Based on the results of our own research, it was found that the age of women who used epidural anesthesia is significantly lower than those who did not. In a study conducted in Qatar (Asia) by Salameh K. et al. [19], the same conclusions were found, however, their result was not statistically significant. In contrast, Antonakou A. et al. [20] noted that English women with epidural anesthesia were significantly older. Perhaps the differences are due to ethnicity.

Our study shows that with the next pregnancy and childbirth, patients significantly less frequently used epidural anesthesia. Primigravidas and primiparas most often

used this method of analgesia in comparison to multiparous women. Lowenberg et al. [21] also noted a higher percentage of primigravidas in the group of patients with epidural anesthesia. In the multivariate regression analysis, Hincz P. et al. [22] showed that epidural anesthesia is an independent risk factor for birth complications only in the group of primiparas, while in the group of multiparas it increases the percentage of births using forceps.

Salameh K. et al. [19] noted that the gestational age in the group of women who used epidural anesthesia is significantly higher compared to women who were not anaesthetized. Our study also confirmed this result as statistically significant.

In our study, it was noted that the number of women with gestational diabetes is significantly higher in the group of patients who had epidural analgesia than those who did not. Salameh K. et al. [19] also analysed this issue. In their study, the number of women with gestational diabetes was insignificantly higher in the group of mothers who did not experience epidural analgesia.

Our study shows that the number of women diagnosed with gestational hypertension is significantly higher in the group of patients who used epidural anesthesia. Patients in labor with mild preeclampsia may safely undergo regional analgesia during delivery. Thorough evaluation of the blood test results is necessary prior to administration of this anesthetic. In a retrospective study of 444 patients giving birth with diagnosed hypertension, administration of epidural anesthesia did not increase the incidence of C-sections, renal failure, and pulmonary oedema compared to those who did not use epidural anesthesia [23, 24]. Lucas M. et al. [25] randomized 738 women with diagnosed gestational hypertension. During childbirth, 372 of them received epidural anesthesia and 366 received intravenous anesthesia. Regional analgesia was associated with prolonged second stage of labor, increase in operative deliveries and chorioamnionitis. Relieving labor pain was more effective in the case of epidural anesthesia. The authors concluded that regional analgesia provides effective relief of labor pain,

Table 4. Logistic regression model for the risk of complications in the case of epidural anesthesia application							
	Control group No epidural anesthesia n (%)	Study group Epidural anesthesia n = (%)	All n (%)	p	OR	95% CI	
Type of childbirth							
Physiological	14597 (64.3)	4991 (92.8)	19588 (69.7)	–	1		
C-section	7825 (34.4)	115 (2.1)	7940 (28.3)	0.00	0.043	0.036	0.052
Operative	296 (1.3)	270 (5.0)	566 (2.0)	0.00	2.668	2.255	3.156
Perineal laceration							
No	19748 (87.0)	4044 (75.2)	23792 (84.7)	–	1		
Yes	2970 (13.0)	1332 (24.8)	4302	0.00	2.190	2.036	2.356
Degree of laceration							
No data	19748 (87.0)	4044 (75.2)	23792 (84.7)	–	1		
1	2807 (12.3)	1222 (22.7)	4029 (14.4)	0	2.126	1.972	2.292
2	151 (0.7)	90 (1.7)	241 (0.8)	0.00	3.792	2.913	4.935
3	9	17 (0.3)	26 (0.1)	0.00	9.224	4.109	20.707
4	2	3 (0.1)	5	0.014	7.325	1.224	43.852
Rectal tear	1	0	1	0.10	0.000	0.000	
Episiotomy							
No	20310 (89.4)	3245 (60.4)	23555 (83.8)	–	1		
Yes	2408 (10.6)	2131 (39.6)	4539 (16.2)	0.00	5.539	5.169	5.935
ABG1'							
Good	22347 (98.4)	5208 (96.9)	27555 (98.1)	–	1		
Medium	340 (1.5)	151 (2.8)	491 (1.7)	0.00	1.906	1.570	2.314
Bad	26 (0.1)	16 (0.3)	42 (0.1)	0.00	2.641	1.415	4.926
ABG3'							
Good	22516 (99.3)	5302 (98.9)	27818 (99.2)	–	1		
Medium	147 (0.6)	56 (1.0)	203 (0.7)	0.00	1.618	1.187	2.204
Bad	9	1	10	0.48	0.472	0.060	3.725
ABG5'							
Good	22648 (99.8)	5350 (99.7)	27998 (99.7)	–	1		
Medium	52 (0.2)	17 (0.3)	69 (0.2)	0.2455	1.384	0.800	2.395
Bad	3	1	4	0.7655	1.411	0.147	13.569
ABG10'							
Good	22673 (99.9)	5357 (99.9)	28030 (99.9)	–	1		
Bad	3	0	3	–	–	–	–
Medium	18 (0.1)	5 (0.1)	23 (0.1)	0.7490	1.176	0.436	3.168

OR — odds ratio; CI — confidence interval

but there are no additional therapeutic benefits in women with gestational hypertension [25].

In our study, it was noted that the number of pregnant women with diagnosed cholestasis is significantly higher in the group of patients who had been applied epidural analgesia than in those who had not received it. Epidural anesthesia during delivery should be reserved for a stable and benign course of the disease, so that catheter removal is not associated with further interventions and to avoid

the toxic effects of local anesthetics, which are subject to hepatic metabolism [26].

In our study, it was noted that the number of women after a C-section is significantly lower in the group of patients who underwent epidural analgesia. Grisar-Granovsky S. et al. [27] came to similar conclusions. In their study, among 7149 women qualified for TOLAC (Trial of Labor After Cesarean), 4081 received epidural anesthesia. The frequency of C-section during delivery was significantly lower in the

group of women with epidural anesthesia compared to those without anesthesia, with a simultaneous increase in the rate of operative deliveries. A revised multidimensional model showed that women who received epidural anesthesia experienced VBAC more frequently [27]. Sun J. et al. [28] qualified 423 multiparous women to TOLAC, among which 263 benefited from epidural anesthesia. The VBAC success rate was significantly higher in this group. Epidural analgesia significantly shortened the lactation initiation period and lowered the visual analogue scale (VAS) score for pain assessment [28]. Effective relief of labor pain can encourage more women to try TOLAC [29].

Our study found that the BMI rate is higher among women who used epidural anesthesia. Antonakou A. et al. [20] also found that women with epidural anesthesia had a significantly higher BMI.

González-Tascón C. et al. [30] conducted a study in which 27.4% of patients had a BMI ≥ 30 kg.m². They found the technique of epidural anesthesia to be difficult in obese women giving birth, as evidenced by a significantly higher number of puncture attempts (≥ 3 in 9.1% obese versus 5.3% in non-obese), but the incidence of complications such as dura puncture appears to be similar in both obese and non-obese patients [30].

In our study, it was noted that in the case of diagnosing intrauterine death, women more often opted for the use of epidural anesthesia. There is an increased risk of coagulopathy and sepsis following the intrauterine death, especially in the second week after the death of the fetus. Coagulation abnormalities may occur in approximately 3% of women with seemingly uncomplicated intrauterine death, and in the case of uterine abruption or perforation, approximately 13% [12]. It is therefore reasonable to check the state of coagulation state prior to any regional treatment [31]. The study by Lurie S. et al. [32] compared the course of childbirth of 22 patients with prepartum fetal death who received epidural anesthesia and a group of 22 women who were diagnosed with fetal death but were treated with narcotic painkillers. The first stage of childbirth was significantly shorter in the group of patients anesthetized regionally. The second stage of labor was similar in both groups. The authors of the study concluded that those giving birth receiving this type of anesthesia can benefit both emotionally and physically thanks to effective relief of labor pain and shortening the time of delivery during a difficult situation such as stillbirth [32].

Our study shows that the percentage of operative deliveries was significantly higher in the group of women who received epidural analgesia. In a study conducted by Antonakou A. et al. [20] the analysis of many variables showed that the use of epidural anesthesia was not a risk factor for C-section, but was a risk factor for operative delivery.

In the analysis of multivariate regression, the authors Hincz P. et al. [22] showed that epidural anesthesia is an independent risk factor for operative delivery in multiparous women. Lowenberg, found that women giving birth who used epidural anesthesia had a higher rate of operative deliveries [12]. Other researchers have also come to similar conclusions [19, 33–36]. Au-Yong et al. [37] showed that the independent factors associated with the increased risk of operative delivery among women who used epidural analgesia included maternal factors such as being primipara and advanced maternal age.

In our study, it was found that the number of C-sections was lower in the group of patients who used epidural analgesia - the risk of a C-section decreases more than fivefold. In the analysis of multivariate regression, the authors Hincz P. et al. [22] showed that anesthesia had no impact on the frequency of C-sections, both in primiparas and multiparas. Li C. et al. [38] concluded that early administration of epidural anesthesia during labor (cervical dilatation ≥ 1 cm) does not increase the risk of C-section. Hung T. et al. [39] showed that in primiparous women epidural anesthesia was a factor protecting against C-section. Epidural analgesia was not a risk factor for C-section delivery in multiparous patients.

In our study, it was noted that the number of inductions, preinduction and stimulation with oxytocin is higher in the group of patients who received epidural anesthesia compared to those who did not receive it. Høtoft D. et al. [40] found that women in labor who used epidural analgesia had a higher rate of oxytocin stimulation of uterine contractions. Other researchers have also come to similar conclusions [12, 20].

Another risk factor analyzed in our study was perineal laceration and its degree (2°, 3°, 4°). A higher percentage of perineal lacerations was noted in women who received epidural anesthesia (the risk of perineal laceration doubles). Deepening this analysis, it was noted that perineal lacerations 2°, 3° and 4° occurred more often in the same group of women giving birth. Moallem S. et al. [34] found that a higher rate of 3rd degree (or higher) perineal laceration was observed in women who received epidural anesthesia. Other researchers, on the other hand, concluded that epidural anesthesia was not associated with severe perineal lacerations [12, 20, 21].

Episiotomy is another variable in our research that has been analyzed. It was found that it is more common among the women giving birth who received epidural analgesia (the risk of episiotomy increases fivefold). Loewenberg Y. et al. [21] also reached the same conclusions. In the studies by Clesse C. et al. [41] and Ballesteros-Meseguer C. et al. [36] it was shown that the episiotomy is significantly related to the use of epidural anesthesia.

In our study, increased blood loss after childbirth was significantly less common in women who received epidural anesthesia. Wu S. et al. [42] came to different conclusions. They found that the use of epidural analgesia significantly increases blood loss after delivery. Luo S. et al. [43] deepened this analysis and found that the use of epidural anesthesia can significantly increase blood loss in women with 2 and 3 cm cervical dilatation. They did not show significant differences in women with dilatation of 4 cm or more [43].

In our study, it was noted that the use of epidural analgesia also affects the increased risk of the child's mediocre or poor birth condition, but only in first and third minute. Similar conclusions were also reached by Piotr Hincz et al [22]. Hung T-H. et al. [39] investigating this topic, noticed a significantly higher percentage of newborn babies < 7 points in 1 minute of life in primigravida who were administered epidural analgesia. Luo S. et al. [43] found that the use of epidural anesthesia during cervical dilatation of 2 cm or > 4 cm significantly reduces the Apgar score, while at the stage of 3 cm of cervical dilatation they did not find any differences.

The birth plan allows women to express their needs and expectations for childbirth, as well as allows for communication between the woman and the medical staff [44]. Our study found that women who received epidural analgesia were more likely to have a birth plan than those who did not. The study by López-Gimeno E. et al. [45] found that the number of women who had a birth plan was insignificantly higher in the group of women who received epidural anesthesia.

Preparing a birth plan involves searching for various information from various sources. Oyediran OO et al. [46] stated that more than half of the surveyed women received information on epidural anesthesia from nurses and midwives. Midwives, due to their substantive preparation and knowledge, are a reliable source of knowledge about the methods of anesthesia of childbirth.

Gafoor AA. et al. [47] noted that 87.5% of the surveyed women expressed satisfaction with the epidural analgesia during childbirth. The most frequently mentioned advantages of this method of anesthesia are: adequate pain relief, short waiting time for receiving epidural anesthesia and no side effects.

Despite the effectiveness and positive experiences of women, the use of epidural anesthesia is associated with risks [2, 12]. Further identification of variables associated with epidural anesthesia and verification of the relationship between them and the occurrence of perinatal complications in the mother and the child is valuable as it helps to ensure the highest quality of perinatal care in accordance with current medical knowledge.

CONCLUSIONS

The use of epidural anesthesia during childbirth provides comfort and reduces pain sensation in the woman giving birth. At the same time, this procedure affects the delivery mechanism leading to an increase in the number and intensity of additional medical procedures (episiotomy, perineal laceration, operative delivery) and increases the risk of the child's mediocre or poor birth condition (in 1 and 3 minutes). The rationale for the routine use of this method of anesthesia should be considered in the context of the implications for the woman's reproductive health and research on the effectiveness of other methods of birth anesthesia should be conducted.

Conflict of interest

All authors declare no conflict of interest.

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