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Evaluation of the impact of various methods of analgesia onto duration of labor

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Abstract

Aim: The aim of the study was to compare the duration of particular stages of labor in cases of patient-controlled epidural anesthesia with parenteral use of opioid analgesics.

Material and methods: The study included 128 pregnant women ≥ 37 weeks, who were delivered vaginally in the Department of Obstetrics and Gynaecology of the Pomeranian Medical University in Szczecin between 2013-2017.

The women were divided into four groups:

1. PCEA (n = 33) women giving birth under PCEA in a horizontal position;
2. Pethidine (n = 24) women giving birth subjected to analgesia by parenteral supply of pethidine;
3. Fentanyl (n = 25) women giving birth subjected to analgesia by parenteral supply of fentanyl;
4. Control (n = 46) women giving birth without analgesia.

In every group of patients the length of each stage of labor in minutes was assessed.

Results: There were no significant differences in the length of the first and third stage of labor between the studied groups of patients. Similar results were obtained after the division of the patients in terms of parity. We found a statistically significant increase in the second stage of labor in patients undergoing epidural anesthesia controlled by the patient ($p < 0.05$) both in respect of whole of treatment groups and after they division into subgroups of nulliparous and multiparous.

Conclusion: The use of PCEA extends the duration of second stage of labor, having no influence on the first and third stage duration.

Key words: fentanyl, patient-controlled epidural anesthesia, pethidine, stages of labor

Introduction

The pain of labor has accompanied women for centuries, but the first ways to relieve it appeared over than 150 years ago [1]. Currently, an increasing number of women want to use anesthesia during labor. Therefore, we should fully agree with the opinion of the American Society of Obstetricians and Gynecologists, that there are no medical reasons for justifying the acceptance of the pain of childbirth and the request of woman giving birth should be sufficient reason to give her support by medical personnel [2]. The most commonly used methods of intrapartum analgesia in current obstetrics are parenteral administration of opioid drugs and epidural anesthesia. Most authors consider regional anesthesia to be the most effective method for this purpose [3-8]. Despite the high efficiency and progress that has been made in the technique of epidural anesthesia, this method is still controversy and its impact onto the course of delivery remains under discussion.

The aim of the study was to compare the duration of particular stages of labor in cases of, considered currently as “a gold standard”, patient-controlled epidural anesthesia (PCEA) with parenteral use of opioid analgesics.

Material and methods

The study included 128 pregnant women ≥ 37 weeks, who were delivered vaginally in the Department of Obstetrics and Gynaecology of the Pomeranian Medical University in Szczecin in 2013-2017. The study was approved by the University Bioethic Committee No. KB-0012/56/13.

The women were divided into four groups:

5. PCEA (n = 33) women giving birth under PCEA in a horizontal position;
6. Pethidine (n = 24) women giving birth subjected to analgesia by parenteral supply of pethidine;
7. Fentanyl (n = 25) women giving birth subjected to analgesia by parenteral supply of fentanyl;
8. Control (n = 46) women giving birth without analgesia.

In every group of patients the length of each stage of labor in minutes was assessed. Statistical analysis was performed using the statistical program STATA 11. Differences between two groups were assessed with t-Student and U-Mann-Whitney tests. Differences between several groups were made using analysis of variance test (ANOVA) test or the Kruskal-Wallis test.

Results

We analyzed 128 patients, who delivered vaginally. There were no significant differences in the length of the first and third stage of labor between the studied groups of patients (Tab. 1 and 2).

Table 1. Duration of the first stage of labor in the studied groups (in minutes).

Group	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	33	305.97	159.72	90,00	805,00	195.00	270.00	400,00	NS
Pethidine	24	347.42	169.92	140.00	875,00	235,00	290.00	455.00	
Fentanyl	25	334.52	164.86	95.00	810,00	210.00	310,00	385,00	
Control	46	324.13	176.02	70,00	720,00	195.00	295.00	430.00	

Table 2. Duration of the third stage of labor in the studied groups (in minutes).

Group	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	33	8.39	12.61	3.00	75.00	5.00	5.00	5.00	NS
Pethidine	24	6.38	2.16	2.00	10.00	5.00	5.00	8.00	
Fentanyl	25	6.36	4.52	2.00	16.00	3.00	5.00	7.00	
Control	46	6.59	6.74	2.00	45.00	5.00	5.00	5.00	

Similar results were obtained after the division of the patients in terms of parity (Tab. 3-6).

Table 3. Duration of the first stage of labor in subgroups of nulliparous (in minutes).

Group	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	22	324	170	90	805	195	303	435	NS
Pethidine	19	378	177	140	875	240	350	515	
Fentanyl	14	378	177	150	810	260	348	493	
Control	23	363	158	140	640	225	330	530	

Table 4. Duration of the first stage of labor in subgroups of multiparous (in minutes).

Group	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	11	271	139	95	565	180	222	400	NS
Pethidine	5	230	50	160	285	200	245	260	
Fentanyl	11	279	136	95	595	180	230	360	
Control	23	285	187	70	720	130	205	375	

Table 5. Duration of the third stage of labor in subgroups of nulliparous (in minutes).

Group	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	22	6.55	4.67	5.00	25.00	5.00	5.00	5.00	NS
Pethidine	19	5.84	1.83	2.00	10.00	5.00	5.00	8.00	
Fentanyl	14	6.93	5.03	2.00	16.00	3.00	5.00	10.00	
Control	23	5.00	1.41	2.00	10.00	5.00	5.00	5.00	

Table 6. Duration of the third stage of labor in subgroups of multiparous (in minutes)

Group	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	11	12.09	20.99	3.00	75.00	4.00	5.00	10.00	NS
Pethidine	5	8.40	2.30	5.00	10.00	7.00	10.00	10.00	
Fentanyl	11	5.64	3.88	2.00	15.00	3.00	5.00	7.00	
Control	23	8.17	9.25	2.00	45.00	5.00	5.00	7.00	

We found a statistically significant increase in the second stage of labor in patients undergoing epidural anesthesia controlled by the patient ($p < 0.05$) (Tab. 7 and 8) both in respect of whole of treatment groups and after they division into subgroups of nulliparous and multiparous.

Table 7. Duration of the second stage of labor in the studied groups (in minutes).

Group	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	33	36,58	23.61	7.00	100.00	20.00	30.00	45.00	0.0043
Pethidine	24	27.29	15.74	5.00	70,00	19,00	25.00	35,00	NS
Fentanyl	25	24:16	22,00	5.00	95.00	10.00	18.00	30.00	NS
Control	46	24,48	18.85	3.00	68.00	10.00	15,00	40.00	NS

Table 8. Duration of the second stage of labor in subgroups of nulliparous (in minutes)

Group	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	22	44.91	23,74	15,00	100,00	25,00	37,50	59,00	0.0198
Pethidine	19	31,16	14,96	12,00	70,00	20,00	25,00	45,00	NS
Fentanyl	14	28,00	18,58	5,00	75,00	15,00	22,50	33,00	NS
Control	23	34,04	18,30	5,00	60,00	15,00	30,00	50,00	NS

Table 9. Duration of the second stage of labor in subgroups of multiparous (in minutes).

Group	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	11	19,91	11,88	7,00	48,00	10,00	17,00	25,00	0.0485
Pethidine	5	12,60	8,73	5,00	25,00	5,00	10,00	18,00	NS
Fentanyl	11	19,27	25,80	5,00	95,00	7,00	10,00	20,00	NS
Control	23	14,91	14,17	3,00	68,00	8,00	10,00	15,00	NS

Discussion

The results of the study indicate that the PCEA significantly affect the duration of labor. While there were no differences in the length of the first and third stage of labor, in the case of the second stage was a significant prolongation thereof. Similar results were obtained by Halpern et al. in a multicenter, randomized study in Canada. Their observation indicated that the second stage of labor was on average 23 minutes longer in the group of patients with PCEA compared to the group receiving parenterally fentanyl [9]. These results were confirmed by Anim-Somuah et al., who reviewed Cochrane database comparing epidural anesthetized patient with the groups receiving parenteral opioids, and also with patients who did not receive any analgesia [3]. The above observation was confirmed also by Polish authors [10].

Meta-analysis of Sharma et al. [11] and the study of Sieńko et al. [12] demonstrated also prolongation of the first stage of labor of nulliparous with epidural anesthesia. However, Cambic and Wong [13] suggest that obtained by these authors data are rather

the result of the impact of factors confounding uterine contractions than of epidural analgesia used during labor. The results of our study, in which the mean duration of the first stage of labor in nulliparous does not significantly differ between the studied groups, also do not support the above observations.

Conclusion

The use of PCEA extends the duration of second stage of labor, having no influence on the first and third stage duration.

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