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## **Comparison of the subjective assessment of severity of pain during labor in various methods of pharmacological analgesia**

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## **Abstract**

**Aim:** To compare assessment of pain severity in the course of labor, according to the Visual Analogue Scale (VAS), in patients undergoing pharmacological anesthesia.

**Material and methods:** The study included 128 pregnant women  $\geq 37$  weeks, who were delivered vaginally in the Department of Obstetrics and Gynecology of the Pomeranian Medical University in Szczecin in 2013-2017.

The women were divided into four groups:

1. PCEA (n = 33) women giving birth under patient-controlled epidural anesthesia (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.

During the first 24 hours after the delivery, a conversation with each patient was conducted, during which the method of describing pain intensity using the VAS scale was explained, and then the patient was asked to assess the perceived pain during labor.

**Results:** Before application of any analgesia, pain was most strongly felt in the group of patients qualified for PCEA and pethidine anesthesia. In contrast, patients from the control group were characterized by statistically the lowest VAS score.

After the application of a specified method of analgesia, there were also statistically significant differences in the perception of the severity of pain, which was the most strongly felt in the control group, while the lowest mean of VAS score was found in the group of patients anaesthetized by PCEA. Analysis of the difference between the VAS scoring values, before and after the application of analgesia (dVAS), showed that in the group of patients anaesthetized by PCEA, it was significantly the highest. There was also a statistically significant reduction in the severity of pain in the group of patients who were anaesthetized with PCEA.

**Conclusion:** The use of epidural analgesia in the PCEA formula is characterized by the best effectiveness in relieving of labor pain among the analyzed methods..

**Key words:** fentanyl, labor pain, patient-controlled epidural anesthesia, pethidine, visual analogue scale

## **Introduction**

Birth of a child is an unique time in the life of every woman, but unfortunately labor is often one of the most painful and traumatic experiences suffered in their life. Most women are aware of pain during labor, but they expect that it should be soothed with currently available methods ensuring simultaneously safety for the mother and the child. In the modern obstetrics pain of labor and methods of its mitigation are the main problem for both, patients and medical staff. The most commonly used methods of intrapartum analgesia in current obstetrics are parenteral administration of opioid drugs and epidural anesthesia. However the first method is the most popular in the developed countries, available scientific proofs and reports generally confirm the second one to be more effective [1].

The aim of the study was to compare assessment of pain severity in the course of labor, according to the Visual Analogue Scale (VAS), in patients undergoing pharmacological anesthesia.

## **Material and methods**

The study included 128 pregnant women  $\geq 37$  weeks, who were delivered vaginally in the Department of Obstetrics and Gynecology 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 patient-controlled epidural anesthesia (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.

During the first 24 hours after the delivery, a conversation with each patient was conducted, during which the method of describing pain intensity using the VAS scale was explained, and then the patient was asked to assess the perceived pain during labor. The VAS scale is a convenient tool for describing the severity of pain sensations. It is presented in the form of a ruler on a colored background, with a scale from 0 to 10. The patient pointed to the severity of pain experienced during labor. The value 0 on the scale corresponds to the situation when the subject does not feel any pain, while the value 10 is assigned the strongest conceivable pain. In addition, the scale has pictograms on the extreme poles showing the face - smiling (no pain) and sad with a grimace of pain (the strongest pain) (Fig. 1)..

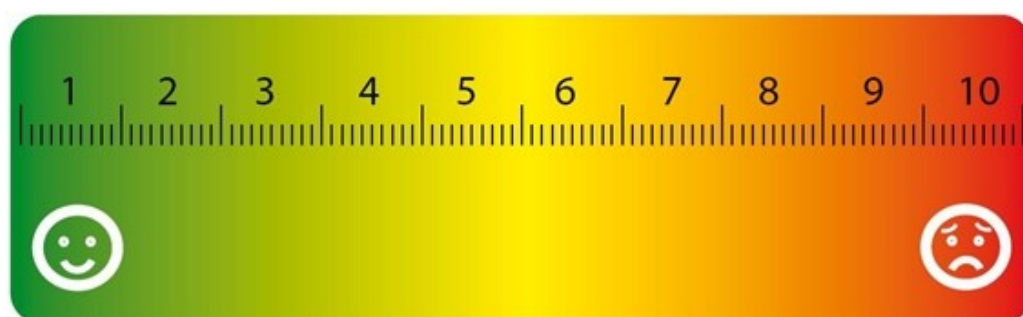


Figure 2. Visual Analogue Scale to assess the severity of pain.

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

Analysis of the severity of pain, assessed by the VAS scale before the implementation of any analgesia, showed significant differences between the groups. Pain was most strongly felt in the group of patients qualified for PCEA and pethidine anesthesia. In contrast, patients from the control group were characterized by statistically the lowest VAS score (Table 1).

Table 1. Comparison of pain intensity on the VAS scale before the application of any form of analgesia (VAS0) in the studied groups.

Group	VAS0								
	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	33	9.48	0.80	7.00	10.00	9.00	10.00	10.00	< <b>0.05</b>
Pethidine	24	9.63	0.71	8.00	10.00	9.50	10.00	10.00	< <b>0.01</b>
Fentanyl	25	9.32	0.80	8.00	10.00	9.00	10.00	10.00	NS
Control	46	8.41	1.42	4.00	10.00	8.00	8.50	10.00	< <b>0.001</b>

In the second part of the study - after the application of a specified method of analgesia, there were also statistically significant differences in the perception of the severity of pain, which was the most strongly felt in the control group, while the lowest mean of VAS score was found in the group of patients anaesthetized by PCEA (Table 2).

Table 2. Comparison of the VAS scoring values after application of a specific form of analgesia (VAS1) in the studied groups.

Group	VAS1								
	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	33	4.97	1.99	1.00	8.00	3.00	5.00	6.00	< <b>0.001</b>
Pethidine	24	7.46	0.83	5.00	9.00	7.00	8.00	8.00	NS
Fentanyl	25	7.12	1.20	4.00	9.00	7.00	7.00	8.00	NS
Control	46	8.41	1.42	4.00	10.00	8.00	8.50	10.00	< <b>0.001</b>

Analysis of the difference between the VAS scoring values, before and after the application of analgesia (dVAS), showed that in the group of patients anaesthetized by PCEA, it was significantly the highest (Table 3).

Table 3. Comparison of the difference between the VAS scoring values before and after the application of analgesia (dVAS).

Group	dVAS								
	N	Mean	SD	Min.	Max.	Q25	Median	Q75	p
PCEA	33	4.52	1.70	2.00	8.00	3.00	4.00	6.00	< <b>0.001</b>
Pethidine	24	2.17	0.76	0.00	3.00	2.00	2.00	3.00	NS
Fentanyl	25	2.20	1.26	0.00	6.00	2.00	2.00	3.00	NS
Control	46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	< <b>0.001</b>

The patients included in the study were further divided in terms of the difference between the mean values of VAS score, before and after the application of

analgesia (dVAS) as no improvement, change by 1-2 points, change by 3-4 points and change by 5-8 points.

There was a statistically significant reduction in the severity of pain in the group of patients who were anaesthetized with PCEA (Table 4).

Table 4. Comparison of the difference between the mean VAS scores before the application of analgesia and after its implementation.

Group		Change				p
		No improvement	1-2 points.	3-4 points	5-8 points	
PCEA	N	0	5	12	16	<b>p &lt;0.001</b>
	%	0 %	15.15%	36.36%	48.48%	
Pethidine	N	1	15	8	0	
	%	4.17%	62.50%	33.33%	0 %	
Fentanyl	N	2	14	8	1	
	%	8.00%	56.00%	32.00%	4.00%	
Control	N	46	0	0	0	
	%	100.00%	0%	0%	0%	

## Discussion

The VAS scale was used for subjective pain assessment in the conducted studies. The obtained results confirm the high efficiency of epidural anesthesia, in the PCEA formula, in relieving labor pain. This is reflected by the large difference in the value of VAS scores in the PCEA group in relation to other groups. The mean point value in this group was only 4.97 points while the next, in terms of effectiveness of anesthesia fentanyl was assessed by 7.12 points. The mean value of severity of pain in VAS score in the group of the women anaesthetized with pethidine was 7.46. The obtained results allow to formulate the statement that epidural anesthesia in the PCEA formula is markedly more effective than the parenteral supply of opioids.

These results are also confirmed in the literature. As early as in 1991, Peach described epidural analgesia as a highly effective method of labor pain relief [2]. Wong analyzed the delivery process of 750 patients, finding a reduction in the severity of pain expressed in the VAS scale from 6 to 2 points in the group of epidural anesthesia patients [3]. This coincides with the results obtained in our own research, in which the average reduction in VAS score in the group of epidural

patients was 4.52 points, and for patients anesthetized with fentanyl and pethidine these values were significantly lower (2.2 and 2,17 points respectively). The even greater reduction in VAS scores was described by Sharma et al., who compared the laboring women under epidural anesthesia with these who were anesthetized by intravenous supply of pethidine. The average value of reduction in the VAS score in this study was 7 points respectively for epidural and 5 for pethidine [4]. However, in contrast to our own results, Norwegian researchers, who compared the effectiveness of the relief of labor pain and the satisfaction of women after the delivery, did not show any significant differences between epidural anesthesia and intravenous opioid administration [5]. Analyzing the literature on anesthesia during labor, it should be noted however, that the majority of authors believe that epidural analgesia is the most effective method of treatment of labor pain [6-11].

## **Conclusion**

The use of epidural analgesia in the PCEA formula is characterized by the best effectiveness in relieving of labor pain among the analyzed methods.

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