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Assessing the duration of obstetric analgesia and the time elapsed between analgesia and delivery. Observational trial

Evaluación de la duración de la analgesia obstétrica y del tiempo entre la analgesia y el parto. Estudio observacional

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What do we know about this issue?

- The duration of labor is influenced by several obstetric, fetal, abdominal dynamics and parity variables.
- The impact of neuraxial obstetric analgesia on labor times and postpartum surveillance is controversial.
- Very heterogeneous length of stay and postpartum surveillance times have been described.

What new knowledge does this trial contribute with?

- Early obstetric analgesia (neuraxial technique at ≤ 4 centimeters of cervical dilation) is the most frequently used technique in healthy pregnant women.
- Patients receiving early analgesia exhibited analgesia – delivery times longer than expected, which is feasible and consistent with other trials.

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Abstract

Introduction: The duration of labor and the immediate puerperium are affected by obstetric and maternal-fetal factors. Interventions to provide obstetric analgesia may prolong the hospital stay.

Objective: To characterize the procedure for obstetric analgesia and describe the time elapsed between analgesia and delivery and postpartum surveillance in healthy mothers.

Methods: Observational, descriptive trial. The time elapsed between analgesia and delivery, and postpartum surveillance were measured in healthy pregnant women with vaginal delivery and a prescription of a neuraxial analgesia technique.

Results: 226 patients were included. The mean time elapsed between analgesia and delivery was 4 hours (IQR 3-7). 50.7% (n=114) received early analgesia (neuraxial technique with ≤ 4 centimeters of cervical dilatation), of which 48.2% (n=109) experienced a duration of analgesia until delivery longer than expected. The mean cervical dilatation at the time of the neuraxial approach was 4 centimeters (IQR 4-6) and the epidural technique was the most frequently used – 92.9% (n=210). The mean postpartum surveillance was 20 hours (IQR 15-27).

Conclusions: Half of the patients included received early analgesia and around fifty percent of them took longer than expected in completing delivery. The postpartum surveillance time was consistent with the provisions of the Ministry of Health and with the current trend of a short postpartum surveillance aimed at early hospital discharge and the benefits thereof.

Keywords: Obstetrical analgesia; Length of stay; Patient discharge; Obstetric labor; Postpartum period.

Resumen

Introducción: La duración del trabajo de parto y del puerperio inmediato se afectan por factores obstétricos y materno-fetales. Las intervenciones para brindar analgesia obstétrica pudieran prolongar el tiempo total de estancia hospitalaria.

Objetivo: Caracterizar el procedimiento de analgesia obstétrica y describir los tiempos entre analgesia y parto y vigilancia posparto en maternas sanas.

Métodos: Estudio descriptivo observacional. Se midieron los tiempos entre analgesia y parto y vigilancia posparto en gestantes sanas, cuya vía final del parto fuera vaginal con indicación y aplicación de alguna técnica de analgesia neuroaxial.

Resultados: Se incluyeron 226 pacientes. La mediana del tiempo de analgesia hasta el parto fue de 4 horas (RIC 3-7); el 50,7 % (n = 114) recibió analgesia temprana (técnica neuroaxial a ≤ 4 centímetros de dilatación cervical), de las cuales el 48,2 % (n = 109) tuvo un tiempo de analgesia hasta el parto mayor al esperado. La mediana de dilatación cervical al momento del abordaje del neuroeje fue de 4 centímetros (RIC 4-6) y la técnica epidural fue la más frecuente, 92,9 % (n = 210). La mediana de tiempo de vigilancia posparto fue de 20 horas (RIC 15-27).

Conclusiones: La mitad de las pacientes incluidas recibió analgesia temprana y cerca de la mitad tardó más de lo esperado en finalizar su gestación. El tiempo de vigilancia posparto fue acorde con lo establecido por el Ministerio de Salud y con la tendencia actual de una vigilancia posparto corta que apunte a un alta temprana y sus beneficios.

Palabras clave: Analgesia obstétrica; Tiempo de internación; Alta del paciente; Trabajo de parto; Periodo posparto.

INTRODUCTION

Labor pain causes stress and anxiety, resulting in undesirable side effects for both the mother and the fetus (1). Improved maternal health has been an ongoing concern for the health and human rights authorities worldwide. The fifth millennium development goal: "improving maternal health" and more generally speaking, the third sustainable development goal of "health and wellbeing" are intended to reduce maternal mortality, increased prenatal care and having skilled healthcare providers taking care of deliveries both in the urban and rural areas (2). The role of the anesthesiologist in a delivery room is essential to maternal advanced life support during labor and the immediate postpartum (massive obstetric hemorrhage, thromboembolic events, and indication for emergency cesarean section, inter alia). However, the obstetric anesthesia services in Colombia are not homogeneous throughout the country and they are more readily available in the

urban areas. Moreover, the proportion of anesthesiologists in Colombia is 6 per 100,000 inhabitants, versus 15 per 100,000 which is the average for Europe (3,4).

The neuraxial approach is considered the technique of choice to control peripartum pain, due to its efficacy, safety and comfort for the patient. The widespread use of neuraxial techniques is based on pain control and patient satisfaction in terms of childbirth experience (5). However, there are other factors that make it suitable during the peripartum since the patient remains conscious, there is less risk of broncho-aspiration and a lower frequency of fetal depression. The current techniques are classified into: epidural, combined spinal-epidural with spinal anesthetic, combined spinal-epidural without spinal anesthetic and continuous spinal anesthesia. In case of a contraindication for a regional technique, other interventions may be used such as IV opioid analgesia, general anesthesia, nitrous oxide inhaled analgesia (6), among other measures of debatable efficacy (hydrotherapy, doula's assistance, hypnotherapy) (7,8).

The hospital stay is the total number of days that the patient remains hospitalized and it is an indicator of healthcare efficiency. The reduction in the postpartum hospital stay is intended to promote a family-focused childbirth for increased parental involvement, less mother-child exposure to hospital acquired infections, enhanced maternal confidence in taking care of the baby, and finally less conflicting advice with regards to lactation practices (9). There is some debate regarding the relationship between the length of hospital stay and the neuraxial approach (10); it has been known that time may be affected by neuraxial techniques – associated adverse events, rather than by the moment of analgesia administration (early or late analgesia, depending on the cervical dilatation). The objective of this paper was to characterize the procedure for obstetric analgesia and to describe the times elapsed from the administration of analgesia and delivery, and postpartum surveillance in healthy mothers.

MATERIALS AND METHODS

Observational, descriptive and longitudinal study endorsed by the research ethics committee of the School of Health Sciences of Universidad Pontificia Bolivariana (minutes n.º 22 of November 25, 2019). The study population comprised pregnant women with vaginal delivery receiving care at the maternal-child unit of the institution, between January 2018 and December 2019. A probabilistic convenience sample was selected from the patients admitted during this time frame, who met all the eligibility criteria: pregnant women undergoing a neuraxial analgesia technique and vaginal delivery. Women with pregnancy-associated hypertensive disorders – both severe and non-severe -, peripartum hemorrhage, gestational and pre-gestational diabetes, heart disease, concomitant infections and social circumstances of the mother that a priori required longer hospital stay were excluded. Mothers undergoing cesarian section and medical records missing significant variables for the trial were also excluded.

The variables were divided into two categories: sociodemographic and anesthesia care (Table 1). The instrument used for collecting the variables was the Magpi® application; the data were exported to Microsoft Excel® for analysis using the IBM SPSS® version 24 (Armonk, NY, USA) statistical program. Because of the heterogeneity of the population, the quantitative variables — such as age and hospital stay — were described using medians and interquartile ranges. The duration of analgesia until delivery was defined as the unit of time elapsed between the administration of the neuraxial technique and delivery. The postpartum surveillance time was defined as the unit of time elapsed between delivery and the doctor's order for discharge by ObGyn or general medicine.

TABLE 1. Sociodemographic characterization of the patients included (n = 226).

Variable	(n, %)
Mother age (years)†	25 (20-30)
Smoking	1.3 % (3)
Alcohol use	0.9 % (2)
Gestational age (weeks)†	39 (30-39)
BMI§ at hospital admission (kg/size 2) †	
BMI§ > 34	7.5 % (17)
BMI§ < 23	10.6 % (24)
Parity	
Primiparous	33.6 % (76)
Multiparous	66.4 % (150)
History of cesarian section	4.9 % (11)
Maternal comorbidities	
Asthma	1.8 % (4)
Gestational Cholestasis	1.8 % (4)
Thrombocytopenia	0.4 % (1)
ASA¶ Classification	
ASA¶ II	97.3 % (220)
ASA¶ III	2.7 % (6)

†Median (IQR: interquartile range).

§Body Mass Index

¶American Society of Anesthesiologists classification system (ASA)

SOURCE: Authors.

RESULTS

From the population identified, eight pregnant women were excluded due to lack of clinically important variables; three were excluded because of a pregnancy-associated hypertensive disorder, one gestational diabetic and one cardiac patient. Finally, 226 pregnant women in labor were included, with an indication and administration of a neuraxial technique, with vaginal delivery. The sociodemographic characteristics and the analgesia care provided are shown in Tables 1 and 2. Any adverse events and instrumentation of the vaginal delivery are also described.

The time elapsed from analgesia until delivery was 4 hours (IQR 3-7). In order to describe the normal expected time interval from analgesia to delivery,

TABLE 2. Characteristics of care during delivery (n = 226).

Variable	(n, %)
Management with opioid analgesia prior to delivery	1.3 (3)
Analgesia technique	
Epidural	92.9 (210)
Combines epidural with spinal anesthesia	5.3 (12)
Continuous spinal	0.8 (2)
Spinal	0.8 (2)
Characteristics of the cervix when approaching the neuraxis	
Dilatation (cm)†	4 (4-6)
Length (cm)†	0.5 (0-1)
Stage	-2: 24.7 (56) -1: 35.4 (80) 0: 21.7 (49) +1: 11.5 (18) +2: 4.9 (11) Not reported: 5.3 (12)
Type of vaginal delivery	
Spontaneous	88.9 (201)
Instrumented	11.1 (25)
Number of analgesia boluses until childbirth §	
One	18.6 (42)
Two	13.7 (31)
Three	19 (43)
Four	18.1 (41)
Five	10.2 (23)
Six	8.4 (19)
Seven	5.8 (13)
Eight or more	4.9 (11)
None	0.8 (2)
Mean dose of medications* Bupivacaine (mg) Fentanyl (µg)	74.65 ± 43.36 186.63 ± 108.42
Post-puncture headache during hospitalization	0.4 (1)
Times:	
Analgesia-delivery (hours)†	4 (3-7)
Before the expected time ¶	49.5 (112)
After the expected time ¶	50.4 (114)
Post-partum surveillance (hours) †	20 (15-27)
≤12 hours	16.4 (37)
12-48 hours	77 (174)
>48 hours	6.6 (15)
Hospital Readmission	
Post-puncture headache	0.4 (1)
Cholestasis	0.4 (1)
Mastitis	0.4 (1)

†Median (IQR: interquartile range)

*Median ± Standard Deviation

§Boluses of institutional analgesia mix bupivacaine 0.1 % and fentanyl 2.5 µg/mL.

¶The expected labor duration was 1 cm/hour, and 1.5-2 cm/hour in primiparous and multiparous women, respectively.

SOURCE: Authors.

we estimated the time elapsed from the cervical dilatation when the analgesia technique was administered, until delivery (primiparous 1 cm/h or multiparous 1.5 cm/h) (11). Hence, it was determined that 49.1 % (111) of the pregnant women (both primiparous and multiparous) exhibited an analgesia – delivery time equal or less than the expected duration, and the rest of the group took longer in completing the process. Moreover, classifying in terms of early analgesia (cervical dilatation \leq 4 centimeters), 50.7 % (114) of the pregnant women received early analgesia, of which 109 had an analgesia – delivery time longer than expected; no significant differences were seen between the two groups (early versus non-early analgesia). The analgesia-delivery time was longer than expected in multiparous women (57.3 % vs. 37.3 %) ($p = 0.005$).

There were two cases of post-puncture headache (0.8 %) (one during hospitalization but the total length of stay was not extended, and the second one was a patient readmitted after 48 hours). The other readmissions (cholelithiasis, mastitis) are unrelated with adverse events from the neuraxial approach. There were no cases of nausea or vomiting following the administration of any of the neuraxial techniques. There were no cases of epidural hematoma, neuraxial block or persistent neuropathy. The post-partum surveillance time was 20 hours (IQR 15-27) [0.83 days (IQR 0.6-1.1)] (Table 2).

DISCUSSION

Time elapsed from analgesia to delivery

The expected duration of labor varies in each pregnant woman and may be affected by multiple variables associated with abnormal labor (altered expulsive force power, fetal and pelvic maternal factors). It has been said that in general such time depends on the parity; it is estimated that the labor progression rate is of 1 cm/hour in

primiparous women and of 1.5-2 cm/hour in multiparous women (11,12). Epidural analgesia during labor may alter descent because the epidural block may interfere with the abdominal pushing reflexes, making pushing more difficult during the second stage of delivery. The strategy of using very low doses of spinal anesthetics avoids a motor block that interferes with normal labor; the most frequently used opioids in the spinal-epidural technique are sufentanyl, fentanyl and morphine, each with different properties (5). The institution where the study was conducted uses a premix of 0.1 % isobaric bupivacaine and 2.5 $\mu\text{g/mL}$ fentanyl with no added morphine; this combination is administered to the parturient with a prescription of neuraxial analgesia.

Of the 114 parturients receiving early analgesia, 109 had an analgesia-delivery time longer than expected. A study conducted in Chinese primiparous mothers (13) identified a relationship between prolonged labor and the administration of epidural analgesia during the non-active phase, versus those that did not receive epidural analgesia; however, there were no significant differences in the duration of labor between the parturients undergoing epidural analgesia after achieving 6 cm or more of cervical dilatation, as compared to parturients without epidural analgesia. It is important to highlight that in contrast with the trial herein discussed, the cervical dilatation threshold used was \leq 6 cm, in addition to including only primiparous women.

There are a series of adverse events derived from the neuraxial approach, which could extend the hospital stay, such as: epidural hematoma, high neuraxial block (dense block), persistent neuropathy, nausea and vomiting, and post-puncture headache. The estimated frequency for the latter is 1.5 %; however, this was rare among the study population (14), and none of the other adverse events were reported during the post-partum surveillance period.

Post-partum surveillance time

The national regulatory agencies fail to establish a clear-cut post-partum surveillance time; they only make reference to the immediate puerperium (2 to 48 hours) as the suggested length of hospital stay (15,16). The postpartum surveillance time used in this study was below that threshold, and below the time period used in other countries (17-19) (Table 3). A systematic review indicated that the usual hospital stay following vaginal delivery ranges between 48 hours and 5 days (10), highlighting the heterogeneity of the length of stay for intrahospital surveillance during the puerperium. Such fluctuation

TABLE 3. Hospital length of stay (delivery-discharge) per country and year.

Year	Country	Length of stay in days (delivery-discharge)
1970	Sweden	6
2006	Poland	4.03
2010	Switzerland	2.3
	United States	2
2011	Chile	2.8
	Australia	2.8
	United Kingdom	1.5
2012	New Zealand	1.8
	Ireland	2
	Mexico	1.3
	Spain	2.4
	Czech Republic	4.4
	France	4.2
	Hungry	5
	Slovakia	5.1
2013	South Korea	2.5

SOURCE: Authors based on Berryman et al. (17), OECD (18) and Johansson et al. (19).

is due to the particular characteristics of the protocols in each hospital, the type of insurance agreements and the country's healthcare policies, inter alia. Moreover, the hospital stay may be affected by variables that favor general morbidity: irregular prenatal control, indication for inotropic support, and dysfunctional gasometric parameters such as PaFiO₂, identified as predictors or prolonged hospital stay of parturients (20). Early discharge strategies may be adopted to reduce the length of stay, with a view to lowering medical care costs, improving the shortage of hospital beds in certain areas and improving the quality of life of patients in a safe and monitored environment. Early discharge involves a postpartum surveillance of 12 to less than 72 hours (21,22). Though this may result in a lack of professional support, a higher incidence of postpartum depression and increased hospital readmission rates (9,23), this strategy may be implemented based on checklists to ensure a safe discharge of the mother and the baby, strict compliance with the telemedicine care protocols, with a high level of suspicion of comorbidities and timely referral to a healthcare institution if needed.

There are some limitations in this study, such as failure to establish whether there were any admissions to other healthcare institutions due to adverse events, although patients were instructed to come to the emergency department of the institution in case of any event. Although the population was based on healthy pregnant women, the analgesia-delivery time may have been longer due to high motor blocks or unidentified abdominal push alterations. Nevertheless, it may be possible that healthy pregnant women undergoing early epidural analgesia could experience longer analgesia-delivery times with no clinically significant outcomes during their hospital stay, based on the consistent findings of the studies cited. Certainly, there could be selection biases because of the characteristics of the inclusion criteria, but there is a strong audit process of the outcome times.

CONCLUSION

In conclusion, half of the patients included received early analgesia and 48.2 % (109) of them had longer labor times than expected, which is feasible and consistent with other trials. The mean in-hospital postpartum surveillance was 20 hours, pursuant to the provisions of the Ministry of Health and in accordance with the current trend of a short postpartum surveillance aimed at early hospital discharge and the benefits thereof.

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Conflicts of interest

The authors have no conflicts of interest to disclose.

Presentations

None declared

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