

ABSTRACT

BACKGROUND

A programmed intermittent epidural bolus (PIEB) has started to replace the continuous epidural infusion (CEI). The PIEB is delivered at a higher pressure, the medication spreads to more dermatomes, preventing it from accumulating, and delivers analgesia with minor motor blockade.

PURPOSE

The aim of this study was to determine if PIEB would decrease the number of rescue boluses, reduce the duration of the second stage of labor, and increase patient coping scores compared to CEI.

METHODS

A retrospective chart review was conducted at a Midwestern tertiary medical center over six months. This case-control design had an intervention group receiving intermittent epidural bolus and a control group receiving a continuous epidural infusion. Data extraction of a randomized sample of 60 laboring women with epidurals was obtained, with 30 women in each group. A 1:1 case-control matching was performed based on age, gravida and para status, and American Society of Anesthesia physical classification (ASA) score. Primary outcomes were the number of rescue boluses, the duration of second stage of labor, and patient coping scores. Comparison results of the two groups was done by *t*-tests.

RESULTS

The intervention group had fewer rescue boluses ($p = .03$). No statistical difference was shown in the duration of second stage of labor ($p = .63$) and patient coping percentage ($p = .31$). The matching criteria of age ($p = .73$), gravida ($p = .79$) para ($p = .89$), and ASA scores ($p = 1$) were analyzed and showed no statistical significance (see Table 1). This confirms the two groups were matched appropriately to keep the groups equal and did not influence the outcomes data.

CONCLUSIONS

The study showed PIEB decreased the number of rescue boluses. Fewer rescue boluses in the patients with a PIEB can add value to the patient experience and reduces staff workload: both important factors during a pivotal time in the patient's life and during workforce shortages. With this significant outcome, it can be inferred that nurse anesthetists came back to the bedside less often when the epidural setting was PIEB rather than CEI. Furthermore, the duration of second stage of labor and patient coping scores showed no statistical significance between the two groups.

OBJECTIVES

- The epidural setting should reflect best practices.
- If programmed intermittent epidural bolus improves outcomes compared to continuous epidural infusion, then this setting should be universally applied to practice.

PRIMARY OUTCOMES

- Number of rescue boluses
- Duration of second stage of labor
- Coping percentage

PICOT

- The question used to guide this quality improvement project was: In pregnant women in labor aged 18-35 (P), does programmed intermittent epidural bolus with PCEA (I) decrease duration of the second stage of labor by 20 minutes, decrease pain measured by increased coping percentage by 15%, and decrease the number of CRNA rescue boluses by 20% (O), compared to continuous epidural infusion with PCEA (C) in a Midwestern tertiary hospital between September 2021 and April 2022 (T)?

METHODOLOGY

DESIGN

- Quality improvement analysis of an existing evidence-based practice change comparing PIEB vs CEI
- Retrospective chart review
- Case-control design had an intervention group of women receiving PIEB and a control group of women receiving a CEI

- 1:1 matching based on age, gravida/para, and ASA scores

SETTING

- Midwestern tertiary medical center in L&D department

SAMPLE

- 30 laboring women receiving PIEB
- 30 laboring women receiving CEI

RESULTS

- Table 1:
 - Matching criteria of age ($p = .73$), gravida ($p = .79$) para ($p = .89$), and ASA scores ($p = 1$) were analyzed and showed no statistical significance
 - Confirms the two groups were matched appropriately to keep the groups equal and did not influence the outcomes data.
- Table 2:
 - No statistical significance in the other demographic characteristics analyzed such as first time epidural ($p = 1$), type of labor ($p = 1$), and type of epidural placement received between the two groups ($p = 1$)

TABLE 1

Matching Criteria for the CEI and PIEB Groups

Matching Criteria	Entire Sample <i>M</i> (SD)	CEI Group <i>M</i> (SD)	PIEB Group <i>M</i> (SD)	<i>p</i> value
Age	28 (4.4)	27.8 (4.9)	28.2 (3.9)	.73
Gravida	2.2 (1.5)	2.1 (1.3)	2.2 (1.6)	.79
Para	.8 (.9)	.7 (.9)	.8 (1)	.89

Matching Criteria	Entire Sample (%)	CEI Group (%)	PIEB Group (%)	<i>p</i> value
ASA Score				1
	1	0	3.3	
	2	88.3	90	86.7
	3	10	10	10
	4	0	0	0
	5	0	0	0

TABLE 2

Comparison of Demographic Characteristics Between CEI and PIEB Groups

Characteristics	Entire Sample (%)	CEI Group (%)	PIEB Group (%)	<i>p</i> value
First Time Epidural	56.7	56.7	56.7	1
Type of Labor				1
Induced	60	60	60	
Spontaneous	40	40	40	
Type of Epidural				1
CSE Epidural	68.3	70	66.7	
Traditional Epidural	28.3	30	26.7	

Table 3:

- Neither the duration in the second stage of labor ($p = .63$), nor the coping percentage ($\chi^2 = 1.02$, $df = 1$, $p = .31$) showed statistical significance
- Cervical dilation at the time of epidural placement did not show statistical significance between the two groups ($p = .08$)
- Number of rescue boluses did show statistical significance with PIEB group needed fewer rescue boluses compared to the CEI group ($p = .03$)
- Bolus dose and concentration had no statistical significance ($p = 1$).
- No statistical significance was found in patient's ability to cope with labor ($\chi^2 = 4.17$, $df = 2$, $p = .12$)

TABLE 3

Comparison of Outcomes Between CEI and PIEB Groups

Outcomes	Entire Sample <i>M</i> (SD)	CEI Group <i>M</i> (SD)	PIEB Group <i>M</i> (SD)	<i>p</i> value
Duration of Second Stage of Labor (min)	50.4 (51.9)	53.7 (48.6)	47.1 (55.7)	.63
Number of Rescue Boluses ^a	.24 (0.5)	.36 (.6)	.10 (.3)	.03*
Rescue Bolus Dose (mL) ^a	4.1 (1.4)	3.7 (1.5)	5 (0)	1
Cervical Dilation (cm)	4.1 (1.5)	3.8 (4.1)	4.4 (1.5)	.08

Outcomes	Entire Sample (%)	CEI Group (%)	PIEB Group (%)	<i>p</i> value
Coping Percentage				.31
Coping	98.3	96.7	100	
Not Coping	1.7	3.3	0	
Rescue Bolus Concentration ^a				1
Lidocaine 1%	60	57.1	66.7	
Lidocaine 2%	40	42.9	33.3	



DISCUSSION

- Patients who had PIEB received fewer rescue boluses, and these results mirrored previous literature (Fidkowski et al., 2019; Lin et al., 2016; McKenzie et al., 2016)
- It can be inferred that nurse anesthetists came back to the bedside less often when the epidural setting was PIEB rather than CEI
- Fewer rescue boluses in the patients with a PIEB can add value to the patient experience and reduces staff workload: both important factors during a pivotal time in the patient's life and during workforce shortages
- Choosing PIEB may improve staff satisfaction by decreasing the number of call backs to patient bedsides and improving workflow

CONCLUSIONS

- A retrospective chart review was performed and patients that had a PIEB setting had fewer rescue boluses. The duration of second stage of labor and percentage of patients that reported they were effectively coping with labor did not show a statistically significant difference between the two groups. CRNAs can improve workforce labor with the change to PIEB. With fewer rescue boluses given to patients receiving PIEB during labor, these findings support a permanent practice change to PIEB at this organization.

REFERENCES

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