

Intermittent Epidural TOP-UPS *vs.* Patient Control Epidural Analgesia During Labor

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ABSTRACT

Pain during labor and delivery is often very unpleasant and stressful for the parturients. Patient controlled epidural analgesia (PCEA) has been found to be both safe and effective, providing optimal pain relief and allowing women to participate in their own analgesia). Compared to other epidural techniques, intermittent epidural top-ups and continuous epidural analgesia (CEA), PCEA uses diluted local anesthetic solutions with less motor block and less unscheduled clinician interventions. The purpose of our study was to compare intermittent bolus epidural top-ups and PCEA in labor. Sixty ASA I patients who requested epidural analgesia for labor and had written consent were included in the study. 30 patients in the first group received intermittent bolus epidural top-ups, while patients in the second group received PCEA. We evaluated duration of labor, maternal sense of pain using VAS scale and maternal satisfaction during fetal descent in both groups. We found that the duration of labor was significantly shorter and maternal sense of pain was lower in the PCEA group than in the group receiving epidural bolus top-ups. There were no differences between groups in maternal satisfaction during fetal descent.

Key words: PCEA, intermittent bolus epidural analgesia, duration of labor, maternal sense of pain, diluted local anesthetic solutions

Introduction

With its advantages and availability epidural analgesia has been used in obstetrics for almost 50 years alleviating pain of labor. For several decades epidural top-ups have been standard practice in obstetrics. Regular scheduled bolus top-ups provided mostly by midwives produced excellent analgesia, but this could be associated with administration of larger doses than the patient actually needs¹. With the introduction of patient controlled epidural analgesia (PCEA) for labor by Gambling et al. in 1988, the incidence of unscheduled clinician interventions, the total dose of local anesthetic and the incidence of lower extremity motor block were significantly reduced²⁻⁴. PCEA improved pain relief by giving the patient control over her analgesia, also because of the

psychological factors involved, the placebo effect and because the patient knows how much pain she can tolerate^{5,6}.

The purpose of our study was to compare the effects of PCEA and intermittent epidural top-ups on duration of labor, maternal sense of pain and maternal satisfaction in the second stage of labor during fetal descent.

Methods and Results

Sixty ASA I physical status nulliparous parturients in established termed labor were included in the study. Each patient had requested epidural analgesia for pain

TABLE 1
OBSERVED PARAMETERS IN BOTH GROUPS AND GIVEN RESULTS

	Epidural bolus analgesia	PCEA
Duration of labor (h)	5.73±1.48	4.87±1.38
Subjective sense of pain	2 (1–8)	1 (1–3)
Maternal satisfaction during fetal descent	satisfying	satisfying

relief and had met the terms needed for epidural catheter placement: they were 4-5 cm dilated and had regular uterine contractions. Informed consent was obtained from each patient. Parturients with general contraindications for epidural analgesia were excluded from the study.

Using a standard epidural technique, epidural catheter was placed at L2-L3 or L3-L4 interspace. Correct catheter position was assessed using 3 ml 0.125% levobupivacaine test dose. After 3 minutes further 10 ml of 0.125% L-bupivacaine with 2ml (100ug) of fentanyl was given to produce T10 sensory block. Patients were randomly assigned to one of two groups. The first group of 30 patients received a standard bolus epidural which consisted of 10 ml 0.125% L-bupivacaine with 100 ug fentanyl. The second group of patients received PCEA. A cocktail of 50ml 0.125% L- bupivacaine with 100ug of fentanyl was given with a basal infusion rate of 10 ml/h. Additional 3 ml bolus dose could be activated by the patient once they became aware of a return of pain every 30 minutes. Patients in both groups received a survey evaluating quality of analgesia using pain score - VAS scale (representing the patient's opinion of the degree of her pain) and satisfaction scores evaluating maternal satisfaction during fetal descent in the second stage of labor. Maternal blood pressure, fetal heart rate (continuously monitored), degree of motor block using Bromage's scale and cervical dilatation were also monitored every 30 minutes then hourly.

We used Mann-Whitney test to analyze the collected information and Spearman's rho test to analyze the differences in the duration of labor and subjective pain sensation. Difference was declared significant if $p < 0.05$. Results are given in Table 1.

Patients receiving bolus epidural analgesia had significantly longer duration of labor than the patients in the PCEA group ($p = 0.02$). Pain scores were also different in both groups. Subjective pain sensation was greater in the bolus epidural group than in the PCEA group ($p < 0.01$). Spearman's ρ -test established that the longer duration of labor was associated with greater pain sensation ($p = 0.017$). We found no differences between groups when evaluating maternal satisfaction during fetal descent in the second stage of labor. There was also no significant motor block in patients from either group and no cases of hemodynamic instability.

Discussion

Optimal analgesia for labor is an ultimate goal for every parturient and her obstetrician. Various epidural regimens can produce effective labor analgesia from inter-

mittent epidural boluses through continuous epidural infusions to the most popular patient controlled epidural analgesia.

Although intermittent epidural boluses have shown more uniform spread of local anesthetic into the epidural space than continuous epidural infusion, intermittent pain that occurs with the regression of the block is a major disadvantage of this method⁷. Individual differences and pain tolerance make some patients complain on pain an hour after epidural bolus, while others can wait two hours or more before a second bolus is given. With the introduction of PCEA for labor both problems were solved. By using a continuous infusion through the PCA pump, and by adjusting the total dose with the parturient's needs, intermittent pain and number of unscheduled clinician or midwife interventions were significantly reduced.

Comparing the PCEA and bolus epidural top-ups, duration of labor was significantly longer in the bolus group, with average labor duration of 5.73 ± 1.48 hours, while in the PCEA group average labor duration was 4.87 ± 1.38 hours. Subjective pain sensation evaluated by using VAS scale was also lower in the PCEA group. The duration of labor was associated with larger pain sensation, and patients were more cooperative if they felt less pain.

Studies have shown that the use of diluted local anesthetic solutions with opioids for PCEA results in less anesthetic consumption (local anesthetic sparing effect by 15–20%) and less motor block without compromising labor analgesia and without having significant impact on obstetric and neonatal outcomes^{8,9}. Using larger volumes of local anesthetic solution, better analgesia is achieved as a result of more uniform spread of local anesthetic in the epidural space through the intervertebral foramina and along the neural sheaths⁷.

In his study, Gambling et al. compared PCEA with conventional intermittent top-ups during labor and found equal pain relief between both epidural methods but greater patient satisfaction with the PCEA¹⁰. This was explained by the parturient's participation in analgesia, they had control over the dose of the drug they received and could balance benefits of analgesia with the side effects.¹¹ Patients could also benefit because they didn't depend on the availability of the clinician to administer bolus top-ups.

When we were evaluating maternal satisfaction during fetal descent, there was no statistical difference between both groups, which can be explained by lower incidence of lower extremity motor block when dilute local anesthetics are used. In the second stage of labor, the pa-

tient could reduce the amount of the drug delivered, allowing her to push with the right amount of analgesia. This had led to the reduction of length of the second stage of labor and improved obstetrical outcome.

Conclusion

In our study we found that there was a significant difference in the duration of labor and maternal pain sensation when comparing PCEA and bolus epidural

analgesia. Pain scores were lower and the duration of labor was shorter in the patients receiving PCEA. There was no difference in maternal satisfaction during fetal descent probably because of the low incidence of lower extremity motor block.

In summary, PCEA is an effective and satisfactory method of providing optimal analgesia during labor, allowing greater patient participation and autonomy in control of her pain relief and therefore better cooperation during delivery.

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INTERMITENTNA BOLUSNA EPIDURALNA ANALGEZIJA VS. PCEA U PORODU

SAŽETAK

Porodajna bol često je neugodna i stresna za roditelje. PCEA je i sigurna i učinkovita metoda analgezije, osiguravajući optimalno olakšanje bolova i omogućavajući roditeljama da sudjeluju u vlastitoj analgeziji. U usporedbi sa drugim epiduralnim tehnikama, intermitentnim epiduralnim bolusima i kontinuiranom epiduralnom infuzijom, PCEA koristi razrijeđene otopine lokalnog anestetika sa posljedičnim manjim motornim blokom donjih ekstremiteta i manje iznenadnih anestezioloških intervencija. Cilj našeg istraživanja bio je usporediti intermitentnu bolusnu epiduralnu analgeziju i PCEA u porodu. 60 roditelja ASA I kliničkog statusa koje su zatražile epiduralnu analgeziju u porodu i potpisale su informirani pristanak uključene su u istraživanje. 30 roditelja u prvoj skupini primila je intermitentnu bolusnu epiduralnu analgeziju, dok su roditelje u drugoj skupini primile PCEA. Promatrali smo duljinu trajanja poroda, roditeljin subjektivan osjećaj boli koristeći VAS ljestvicu i ocjenu izgona djeteta u drugoj fazi poroda u obje skupine. Rezultati su pokazali da je trajanje poroda značajno kraće i subjektivan osjećaj boli manji u skupini roditelja koje su primale PCEA nego u skupini koja je primala bolusnu epiduralnu analgeziju. Nije nađena statistički značajna razlika među skupinama kada smo ocjenjivali ocjenu izgona djeteta u drugoj fazi poroda.

