Chula Med J Vol. 47 No. 1 January 2003

Intrapartum epidural analgesia on nulliparous labor

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Ultchaswadi P, Phupong V. Intrapartum epidural analgesia on nulliparous labor. Chula Med J 2003 Jan; 47(1): 17 - 26

Objective : *To review the effect of epidural analgesia on nulliparous labor and delivery, especially on the course and the mode of delivery.*

Study design : *Cross sectional descriptive study.*

Setting : *Delivery Room, Department of Obstetrics and Gynecology, Faculty of Medicine, Chulalongkorn University.*

Subjects : *Forty-nine termed nulliparous women who had epidural analgesia during labor from July 1, 2001 to December 31, 2001.*

Method : *The patient characteristics, course of labor and delivery and neonatal outcomes were extracted from the records. The cases were also divided into two groups according to the cervical dilatation at epidural block: Group 1 had the block when cervical dilatation was less than 5 cm, while Group 2 had the block when cervical dilatation ≥ 5 cm.*

Results : *The incidence of cesarean delivery was 8.2 %, while the incidence of malposition was 12.2 %. The incidence of assisted vaginal delivery was 59.2 %. There were no maternal and serious neonatal complications. There were 11 women in Group 1 and 38 in Group 2. The total bolus doses of analgesic drug was significantly higher in Group 1 ($p < 0.05$). The time in first and second stage of labor, the requirement of oxytocin augmentation, malposition and assisted vaginal delivery were similar in the two groups. There was no significant difference in decrease cesarean delivery rate in Group 2 when compared with Group 1 (5.3 % vs. 18.2 %; $p > 0.05$).*

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Conclusion : *Epidural analgesia is a safe and effective method for pain relief during labor. It does not increase the incidence of cesarean section when applied in selected cases of nulliparous women.*

Keywords : *Epidural analgesia, Labor, Nulliparous, Cesarean delivery.*

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Received for publication. December 15, 2002.

พรทิพย์ อัชชสวัสดิ์, วรพงศ์ ภู่พงศ์. การให้ยาแก้ปวดที่ชั้นเหนือดูราระหว่างการคลอดบุตรครั้งแรก. จุฬาลงกรณ์เวชสาร 2546 ม.ค; 47(1): 17 - 26

วัตถุประสงค์ : *เพื่อดูถึงผลของการให้ยาแก้ปวดที่ชั้นเหนือดูราระหว่างการคลอดบุตรครั้งแรกต่อการคลอด*

รูปแบบการวิจัย : *การศึกษาเชิงพรรณนา*

สถานที่ทำการศึกษา : *ห้องคลอด ภาควิชาสูติศาสตร์-นรีเวชวิทยา คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย*

ผู้ป่วยที่ได้ทำการศึกษา : *หญิงตั้งครรภ์ครบกำหนดจำนวน 49 คนที่คลอดบุตรครั้งแรก และได้รับยาแก้ปวดที่ชั้นเหนือดูราระหว่างการคลอดบุตรระหว่างวันที่ 1 กรกฎาคม 2544 ถึง 31 ธันวาคม 2544*

วิธีการศึกษา : *ข้อมูลพื้นฐาน ข้อมูลระหว่างการคลอด และผลของทารกที่คลอดได้รับการรวบรวมจากแฟ้มประวัติ ได้มีการแบ่งกลุ่มศึกษาออกเป็น 2 กลุ่ม โดยใช้ขนาดของปากมดลูกในขณะที่เริ่มได้รับยาแก้ปวดที่ชั้นเหนือดูรา โดยกลุ่มที่ 1 เริ่มได้รับยาแก้ปวดที่ชั้นเหนือดูราเมื่อปากมดลูกขยายน้อยกว่า 5 เซนติเมตร ส่วนกลุ่มที่ 2 เริ่มได้รับยาแก้ปวดที่ชั้นเหนือดูราเมื่อปากมดลูกขยายตั้งแต่ 5 เซนติเมตรขึ้นไป*

ผลการศึกษา : *อุบัติการณ์ของการผ่าตัดคลอดบุตรทางหน้าท้องในการศึกษานี้เท่ากับร้อยละ 8.2 ในขณะที่อุบัติการณ์ของกระหม่อมอยู่ผิดที่เท่ากับร้อยละ 12.2 และอุบัติการณ์ของการช่วยคลอดด้วยเครื่องมือทางช่องคลอดเท่ากับร้อยละ 59.2 ไม่พบว่ามีภาวะแทรกซ้อนที่รุนแรงทั้งต่อมารดาและทารกแรกคลอด มีหญิงตั้งครรภ์ 11 คนอยู่ในกลุ่มที่ 1 และมี 38 คนอยู่ในกลุ่มที่ 2 พบว่ามีจำนวนครั้งของการได้รับยาแก้ปวดที่ชั้นเหนือดูราในกลุ่มที่ 1 มากกว่าอย่างมีนัยสำคัญทางสถิติ ส่วนระยะเวลาที่ใช้ในขั้นที่ 1 และ 2 ของการตั้งครรภ์ การได้รับยากระตุ้นการเจ็บครรภ์คลอด การที่กระหม่อมอยู่ผิดที่ และการช่วยคลอดด้วยเครื่องมือทางช่องคลอดนั้นไม่แตกต่างกันใน 2 กลุ่มที่ศึกษา และไม่พบว่ามีความแตกต่างอย่างมีนัยสำคัญของอุบัติการของการผ่าตัดคลอดบุตรทางหน้าท้องในกลุ่มที่ 2 เมื่อเทียบกับกลุ่มที่ 1 (ร้อยละ 5.3 เทียบกับร้อยละ 18.2, $p > 0.05$).*

วิจารณ์และสรุป : *การให้ยาแก้ปวดที่ชั้นเหนือดูราระหว่างการคลอดบุตรนั้นปลอดภัย และลดความเจ็บปวดระหว่างการคลอดได้ โดยที่ไม่เพิ่มอุบัติการของการผ่าตัดคลอดบุตรทางหน้าท้องในการคลอดบุตรครั้งแรกถ้าเลือกใช้ในรายที่เหมาะสม*

คำสำคัญ : *การให้ยาแก้ปวดที่ชั้นเหนือดูรา, การคลอดบุตร, การคลอดบุตรครั้งแรก, การผ่าตัดคลอดบุตรทางหน้าท้อง*

Epidural analgesia is safe and effective a method of pain relief during labor. However, its effect on labor and delivery still remains controversial regarding its association with prolongation of labor, increase in cesarean delivery rate and increase in operative vaginal deliveries.[1-11] Some studies reported an increase in cesarean delivery rate;[1-4] some studies reported no increase in cesarean delivery rate;[6-11] and some reported an increase in operative vaginal deliveries.[6, 10] Several studies suggest that it has a significant influence on nulliparous labor, thus resulting in the increase of cesarean delivery, primarily under the indication of dystocia;[1-4] hence, the purpose of this study is to determine the effect of intrapartum epidural analgesia on the course of spontaneous nulliparous labor and on the mode of delivery.

Materials and methods

We reviewed records of nulliparous women who had epidural analgesia during labor at the Delivery Room, Department of Obstetrics and Gynecology, Faculty of Medicine, Chulalongkorn University from July 1, 2001 to December 31, 2001. All women met the following criteria: labor was of spontaneous onset with regular and painful contractions, but augmented labors were not excluded; the minimal gestational age at the onset of labor was 37 weeks; all had living singleton fetuses with cephalic presentation at onset of labor; none had major obstetric complications; none had a dural puncture. Women who had an epidural block inserted after full cervical dilatation to facilitate forceps delivery were excluded. Verbal permission was received from every subject before administrating epidural analgesia. After the patient was placed in the lateral decubitus, epidural catheter was placed through the L3-4 interspace. An initial bolus of 0.125 % bupivacaine 8 ml was given, followed by intermittent boluses of 0.25 % bupivacaine 5 ml every 60-90 minutes whenever the pain recurred. The anesthetic level of the patients was consistent with the dermatome level of T10-12. Epidural bolus doses were continued throughout the second stage of labor if adequate progress was made.

The following variables were extracted from the records: maternal age, height, weight, gestational age, cervical dilatation at epidural block, course of labor and delivery, and neonatal outcomes. We also divided the cases into two groups according to the cervical dilatation at epidural block: Group 1 had the block when cervical dilatation was less than 5 cm; and Group 2 when cervical dilatation $\geq$ 5 cm.

Statistical analysis was run by computer software (SPSS version 10.0 for Windows, SPSS Inc, Chicago, USA). Data were summarized with applied descriptive statistics. Chi square or Fishers' s exact tests for comparison of proportions, and student t-tests for comparison of means were used. $P < 0.05$ was considered statistically significant.

Results

In total, 49 women met the criteria and were recruited; 11 had epidural analgesia placed when their cervical dilatation was less than 5 cm (Group 1); 38 had epidural analgesia when their cervical dilatation was $\geq$ 5 cm (Group 2).

The patients characteristics, course of labor and delivery, and neonatal outcomes are shown in Table 1. The overall cesarean delivery was 8.2%, whereas the incidence of assisted vaginal delivery

was 59.2 %. There was no maternal complication from epidural analgesia, i.e., hypotension, immediate postpartum headache.

Comparisons between patients in Group 1 and 2 are made in Table 2. There were no differences between the two groups when the following variables were compared: maternal age, height, weight and gestational age.

Table 3 compares the conduct of labor and modes of delivery in patients between the two groups. There were no significant differences between the two groups in the following variables: time in the first and the second stage of labor and the requirement of oxytocin augmentation. There was a significant increase in the total bolus doses of analgesic drug in Group 1 compared with the Group 2 (4.2±1.3 vs. 3.2±1.1; $p < 0.05$). Other variables, namely, malposition, and mode of delivery were of no significant differences between the two groups.

Table 4 compares variables of neonatal outcome between the two groups. Birth weights were similar in both groups (3,219.1±546.9 vs. 3,065.0± 364.6 g; $p > 0.05$). There were 4 cases of low 1-minute Apgar scores in Group 2, but no case of low 5-minute Apgar scores in both groups.

Table 1. Patients characteristics, course of labor and delivery, and neonatal outcomes.

Variables	Total (n=49)
Maternal age (years)	25.5 ± 5.7
Maternal height (cm)	155.4 ± 4.9
Maternal weight (kg)	58.3 ± 15.9
Gestational age at delivery (weeks)	38.6 ± 1.5
Cervical dilatation at epidural block (cm)	5.7 ± 1.6
First stage of labor (min)	555.3 ± 172.4
Second stage of labor (min)	44.3 ± 35.5
Total bolus doses (times)	3.4 ± 1.2
Oxytocin augmentation	10(20.4%)
Malposition	6(12.2 %)
Spontaneous vaginal delivery	16(32.7 %)
Cesarean section	4(8.2 %)
Forceps delivery	19(38.8 %)
Vacuum extraction	10(20.4 %)
Birth weight (g)	3,100 ± 411.1
Apgar scores < 7 at 1 min	4(8.2 %)
Apgar scores < 7 at 5 min	0

Data are reported as mean ± SD or as proportions.

Table 2. Comparison of patients characteristics between two groups.

Variables	Group 1 (n=11)	Group 2 (n=38)	P value
Maternal age (years)	25.8 ± 6.5	25.4 ± 5.5	NS
Maternal height (cm)	157.2 ± 4.6	154.9 ± 4.9	NS
Maternal weight (kg)	66.0 ± 8.3	55.8 ± 17.0	NS
Gestational age at delivery (weeks)	38.6 ± 1.9	38.6 ± 1.3	NS
Cervical dilatation at epidural block (cm)	3.7 ± 0.5	6.2 ± 1.3	< 0.05

Data are reported as mean ± SD.

Table 3. Comparison of course of labor and delivery between two groups.

Variables	Group 1 (n=11)	Group 2 (n=38)	P value
First stage of labor (min)	570.0 ±195.7	551.7 ± 169	NS
Second stage of labor (min)	42.4 ± 27.0	44.8 ± 37.7	NS
Total bolus doses (times)	4.2 ± 1.3	3.2 ± 1.1	< 0.05
Oxytocin augmentation	2(18.2 %)	8(21.1 %)	NS
Malposition	1(9.1 %)	5(13.2 %)	NS
Spontaneous vaginal delivery	5(45.5 %)	11(28.9 %)	NS
Cesarean section	2(18.2 %)	2(5.3 %)	NS
Forceps delivery	3(27.3 %)	16(42.1 %)	NS
Vacuum extraction	1(9.1 %)	9(23.7 %)	NS

Data are reported as mean ± SD or as proportions.

Table 4. Comparison of neonatal outcomes between two groups.

Variables	Group 1 (n=11)	Group 2 (n=38)	P value
Birth weight (g)	3,219.1 ± 546.9	3,065.0 ± 364.6	NS
Apgar scores < 7 at 1 min	0	4(10.1 %)	-
Apgar scores < 7 at 5 min	0	0	-

Data are reported as mean ± SD or as proportions.

Discussion

This study confirms that epidural block for pain relief in nulliparous labor is safe and effective. There is no association of the technique with the increase in cesarean delivery, but it is associated with higher incidence of assisted vaginal delivery.

The incidence of cesarean delivery in this study was 8.2 %. It was within the recommendation of American College of Obstetricians and Gynecologists that cesarean section rate in nulliparous women should be less than 15.2 %,[12] and less than the overall incidence in Department of Obstetrics and Gynecology, Faculty of Medicine, Chulalongkorn University (30.6 -34.5 %).[13] The lower rate of cesarean section in the study may be due to good selected cases for epidural analgesia. The cesarean delivery rate was also lower than those in previous studies (10.3 - 25 %).[1-4, 9] The incidence of assisted vaginal delivery, consisting of low forceps delivery and vacuum extraction was higher (59.2 %) in this study when compared to a previous study (18.7 %).[3] This may explained by the loss of pushing sensation of nulliparous labor when the epidural analgesia was administered.

The time in first and second stage of labor in this study was similar to the previous study [3] and within the mean duration of the first stage of labor and median duration of the second stage of labor in nulliparous women from standard textbook that were 810 and 50 minutes, respectively.[14] Contrast to the previous study noted that epidural analgesia resulted in a significant in the first and the second stage of labor.[3]

The study confirmed that the incidence of malposition was low (12.2 %). It was lower than the range of 18.8 - 30.7 % from earlier reports.[2, 3, 15] The explanation for malposition associated with epidural analgesia is the result from laxity of the pelvic musculature. Under these circumstances the fetal occiput may not be directed anteriorly by the levator ani, as usually happens when the vertex descends, and persistent malposition of the occiput results.[15]

A significant correlation between cervical dilatation at epidural placement and risk of cesarean delivery is also noted in previous studies.[2, 3] The risk of cesarean delivery was lower (0 –11 %) if the epidural was placed at $\geq$ 5 cm of cervical dilatation.[2, 3] Other study found no difference in the risk of cesarean delivery rate for early (10 %) as compared with late (8 %) epidural placement.[16] Our study confirms the latter observation, also noting no significant difference increase in cesarean delivery when the epidural was placed in earlier labor (18.2 % vs. 5.3%, $p > 0.05$). The reason behind this observation may be due to the good selected cases for epidural analgesia in this study. Another cause may be attributed to the relatively small sample size of the patients in both groups.

This is a retrospective study and as such suffers the limitations of retrospective studies. As is true for all retrospective studies, we cannot assure that all potential factors influencing outcome are controlled. Within these recognized limitations of retrospective studies, our data support the contention that epidural anlgesia does not increase the incidence of cesarean section when applied in selected cases of nulliparous women.

In conclusion, epidural analgesia is a safe and effective method for relief pain in labor. It does not increase the incidence of cesarean section when applied in selected cases of nulliparous women.

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