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CORRESPONDENCE

Association between intrapartum fetal head malrotation and motor block by neuraxial analgesia: a randomized trial

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To the Editor,

Malrotation of the fetal head increases the risk of adverse obstetric and neonatal outcomes.[1] Epidural analgesia may contribute to this inadequate rotation of the fetal head due to motor block of the muscles of the pelvic floor.[2] We performed a prospective randomized study to test whether different degrees of motor block created by different neuraxial regimens influence the incidence of malrotation at delivery.

The study was approved by the Institutional Review Board at Kitasato University Hospital (May 2010). Criteria for inclusion in the study were singleton low-risk Japanese term (> 36 weeks) parturients with fetal vertex position requesting labour analgesia. Before neuraxial analgesia, patients were randomly assigned to one of three treatments by choosing from sealed envelopes. The three groups were: intermittent high-dose epidural injection (H-EPD group: initially 0.25% bupivacaine 9-12 mL and an additional 6 mL as per request), low-dose epidural infusion (L-EPD group: 0.2% ropivacaine 9-12 mL, followed by an infusion of 0.1% ropivacaine with fentanyl 2 $\mu g \cdot mL^{-1}$ at 8 $mL \cdot hr^{-1}$), or CSEA (CSEA group: an intrathecal dose of bupivacaine 2.0 mg with fentanyl 20 μg, followed by 0.1% ropivacaine with fentanyl 2 $\mu g \cdot mL^{-1}$ at 8 $mL \cdot hr^{-1}$). The rescue dose in the L-EPD and CSEA groups was 0.2% ropivacaine 6-8 mL at ≥ ten-minute intervals. Following group allocation, fetal head rotation was examined using ultrasound before or immediately after analgesia and at delivery. Malrotation was defined as an occipital posterior (OP) or occipital transverse position at delivery. The modified Bromage scale (0 = no motor block; 1 = hip blocked; 2 = hip and knee blocked; 3 = hip, knee, and ankle blocked)[3] was recorded at delivery, just before the parturient changed to the lithotomy position for pushing, to indicate the degree of motor blockade in the lower extremities. Incidence of malrotation at delivery was assessed with the Fisher's exact test. Depth of motor block was compared using the Steel-Dwass test. All reported P values are two sided. Multivariable regression was used to explore if the following factors were associated with malrotation at delivery: modified Bromage scale, OP and station at induction of analgesia, induced labour, artificial rupture of membranes, and primiparity. JMP® statistical software v10.0.2, 2012 (SAS Institute Inc.) was used for all analyses.

Enrolment of 1,422 parturients was planned but halted at 305 participants because of inadequate recruitment. Clinical characteristics are shown in the Table. The H-EPD and L-EPD groups showed more profound motor block than the CSEA group ($P < 0.01$; $P < 0.01$, respectively), while there was no difference between the H-EPD and L-EPD groups ($P = 0.07$). Malrotation was recorded in five (5.2%; H-EPD), seven (7.1%; L-EPD), and ten (9.2%; CSEA) cases ($P = 0.54$). Multivariable regression indicated that the OP position at the time of epidural insertion was the only factor associated with malrotation at delivery (adjusted odds ratio 5.31; 95% confidence interval 1.72 to 15.91).

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Table Clinical characteristics by groups

Group	H-EPD (n = 97)	L-EPD (n = 99)	CSEA (n = 109)
Gestational age, weeks (SD)	38.7 (1.0)	38.9 (1.0)	38.8 (1.0)
Parity (primi / para), n	45 / 52	52 / 47	59 / 50
Fetal position at start of analgesia n (%)			
Occiput anterior	21 (22%)	18 (18%)	22 (20%)
Occiput transverse	65 (67%)	67 (68%)	76 (70%)
Occiput posterior	11 (11%)	14 (14%)	11 (10%)
Labour induction, n (%)	80 (82%)	80 (81%)	90 (83%)
Artificial rupture of membrane, n (%)	73 (75%)	75 (76%)	86 (79%)
Early AROM, n (%) †	54 (56%)	61 (62%)	66 (61%)
Cx at analgesia, cm (SD)	3.5 (1.4)	3.4 (1.4)	3.7 (1.6)
ST at analgesia, cm (SD)	−2.0 (1.0)	−2.2 (0.8)	−2.0 (1.0)
Modified Bromage scale 2 and 3, n (%) ※	39 (40%)	12 (13%)	6 (6%)
Mode of delivery n (%)			
Spontaneous	75 (77%)	73 (74%)	71 (65%)
Instrumental	22 (23%)	23 (23%)	35 (32%)
Cesarean	0 (0%)	3 (3%)	3 (3%)

AROM = artificial rupture of membrane; Cx = cervical dilatation; para = multipara; primi = primipara; ST = fetal head station

H-EPD group = intermittent high-dose epidural injection

L-EPD group = low-dose epidural infusion

CSEA group = an intrathecal dose of bupivacaine 2.0 mg with fentanyl 20 μg, followed by 0.1% ropivacaine with fentanyl 2 $\mu g \cdot mL^{-1}$ at 8 $mL \cdot hr^{-1}$

Values are expressed as mean (SD) or n (%). ※ Data exclude cases with Cesarean deliveries. † Early AROM was defined as AROM when the cervical dilatation was < 5 cm[5]

The neuraxial analgesic techniques studied resulted in different degrees of motor block but were not, in turn, associated with malrotation. This result might suggest that motor block of the lower extremities and of the pelvic floor muscles may not be concurrent or that weakness of pelvic floor muscles may not be associated with malrotation. Yancey *et al.* reported that, in spontaneous labour, epidural analgesia did not increase the frequency of malpositioning of the fetal head at vaginal delivery.[4]

This study suggests that the different degrees of motor block produced by various neuraxial regimens did not seem to have a significant impact on malrotation of the fetal head. The OP position before analgesia might be a better predictor of malrotation of the fetal head at delivery instead of motor block or a particular neuraxial regimen.

Conflicts of interest None declared.

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