Comparative evaluation of epidural bupivacaine – dexmedetomidine and bupivacaine – fentanyl on Doppler velocimetry of uterine and umbilical arteries during labor

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Summary

Objective: uteroplacental blood flow is affected by myometrial contractions and hypotension. Epidural analgesia is frequently complicated by hypotension. The aim of the study was to compare the effect of bupivacaine-dexmedetomidine (BD) or bupivacaine – fentanyl (BF) on uterine artery pulsatility index (UtA-Pi) and umbilical artery pulsatility index (UA-Pi) during uterine contractions and relaxations.

Methods: this was a prospective controlled observational study performed in 130 healthy full term parturients of them 110 parturients available for statistical analysis and divided into 3 groups [23 cases as control, 44 cases as (BD) epidural group and 43 cases as (BF) epidural group]. Over the study duration of 120 minutes; UtA-Pi and UA-Pi were measured at baseline, 30, 60, 120 minutes during uterine contractions and relaxations. Maternal hemodynamic, visual analogue scale (VAS), sedation score, side effects of epidural analgesia including nausea, vomiting, pruritus and respiratory depression were assessed.

Results: VAS significantly decreased after epidural compared with control group. BD group showed significant improvement in onset and duration of analgesia and sedation scores with lower incidence of nausea and pruritus compared with BF group. The BF and BD groups were associated with significant maternal hypotension and bradycardia that increase the UtA-Pi during uterine contractions and relaxations compared with control group. UA-Pi was increased with uterine contractions compared with during uterine relaxations in the three studied groups yet the effect of epidural and uterine contractions does significantly affect newborns apgar scores or umbilical cord pH.

Conclusion: bupivacaine-dexmedetomidine epidural analgesia showed better maternal satisfaction for labor pains control compared with bupivacaine – fentanyl without deleterious effect on utroplacental circulation and newborns outcome.

Key words: epidural analgesia, dexmedetomidine, fentanyl, Doppler ultrasound, uterine artery, umbilical artery.

Introduction

Epidural analgesia has been extensively used to provide pain relief in labor. Epidural bupivacaine is still the most widely used local anesthetic in obstetric analgesia (1). However, its potential for motor blockage and central nervous system and cardiac toxicity by accidental intravenous injection of high dose is clinically undesirable, especially for obstetric patients (2). In addition, to minimize unwanted motor block, a trend toward the use of lower concentrations of local anesthetics combined with opioids has been used in many clinical trials with good results (3-5). Opioids like fentanyl have been used traditionally as an adjunct for epidural administration in combination with a lower dose of local anesthetic to achieve the desired anesthetic effect (6). The addition of opioid does provide a dose sparing effect of local anesthetic and superior analgesia but there is always a possibility of an increased incidence of pruritis, urinary retention, nausea, vomiting and respiratory depression (7,8).

Clonidine and dexmedetomidine are α-2 adrenergic agonists with analgesic properties which potentiate local anesthetic effects when epidurally administered (9,10). They act on both pre and post synaptic sympathetic nerve terminal and central nervous system thereby decreasing the sympathetic outflow and nor-epinephrine release causing sedative, anti-anxiety, analgesic, sympatholytic and hemodynamic effects (11-14). Overall the experience with dexmedetomidine was quite satisfactory as compared to clonidine because of its superior sedative and anxiolytic properties during the surgical procedure under regional anaesthesia (15-18).

The most common complications occurring with epidural analgesia is maternal hypotension (19). Hypotension threatens the fetus by decreasing uterine blood flow. Modest decreases (≤ 20 %) in maternal blood pressure are of limited concern in a woman with a healthy fetus (20). The maternal blood supply to the placenta is intermittently strangulated by myometrial contractions (21). A significant reduction in the perfusion pressure of the uterine artery blood flow is seen at the maximum pressure of the uterine contraction. In diastole, when intrauterine pressure exceeds maternal diastolic pressure especially if associated with hypotension, the perfusion pressure of the uterine artery blood flow is no longer present (22).
The increase in vascular flow resistance by Doppler velocimetry as UtA-PI is positively correlated to the intratumoral pressure produced by contractions (23). Under normal circumstances the umbilical artery blood flow is not affected by uterine contractions (24,25).

The aim of the present study was to examine the effect of two pharmacological approaches of epidural analgesia (bupivacaine- dexmedetomidine and bupivacaine - fentanyl) on uteroplacental blood flow during uterine contraction and relaxation of active labor by Doppler velocimetry of uterine and umbilical arteries pulsatility indices.

Patients and methods

The study was approved by the local Clinical Research Ethics Committee of hospital and written informed consent was obtained from the patients before the onset of labor analgesia. This was a prospective comparative study performed during a 20 month period (April 2010 to November 2011) in the labor ward of Jeddah Clinic Hospital AlKanderah, Jeddah, Saudi Arabia. One hundred thirty patients had a singleton healthy full-term pregnancy; 100 patients of them who requested epidural anesthesia during labor were classified as American Society of Anesthesiologists physical status I or II. The remaining 30 women refused to receive epidural and considered as control group.

Inclusion criteria were: gestational age ≥37 weeks; with an engaged vertex presentation; intact membrane; active labor with cervical dilatation >3 cm and uterine contractions occurring at least every 5 min; normal cardiotocography (CTG) [baseline fetal heart rate (FHR) between 110 and 160 beats/minute, baseline variability >5 beats/minute, presence of accelerations, and absence of decelerations].

Subjects were excluded if they had pregnancy-induced hypertension (PIH) (preeclampsia), concomitant cardiovascular disease, documented coagulation abnormality or abnormal bleeding history; evidence of infection or anatomic abnormality at the proposed catheter insertion site, if they declined study participation or were unable to give informed voluntary consent, or were younger than 18 years. Subjects were also excluded from the study in cases of difficult epidural placement, inadvertent epidural puncture (wet tap), rapid progress of labor (delivery in less than 120 minutes of study period), or fetal distress mandating urgent/emergent cesarean delivery. Patients who had received opioids or presented a history of hypersensitivity to local anesthetic, fentanyl or to dexmedetomidine were excluded from the study.

All women laboring without analgesia (control group) admitted to the labor ward immediately and enrolled in the study as controls when meeting inclusion criteria. The control group received no analgesics; patient who requested analgesia during study period was excluded from the study.

Hundred women who had requested epidural analgesia for labor were randomly allocated to two groups (n = 50 each), to receive 12 ml of 0.25% bupivacaine plus either 1μg/kg dexmedetomidine diluted in 5 ml saline (BD group) or 1μg/kg fentanyl diluted in 5 ml saline (BF group). The mixed solutions for epidural analgesia were prepared under sterile conditions by the researcher anesthetist (Hasan AMA) and administered by the researcher anesthetist (ElInabty AMA) who remained blinded to the solution prescription.

Epidural analgesia was administered in the labor ward. An intravenous infusion of 500 ml of lactated Ringer’s solution was administered before the epidural injection. With the patient in a left lateral position, an epidural catheter was inserted into the L3-L4 vertebral interspace using the loss of resistance technique; 2-3 cm of catheter was introduced in the epidural space. With the patient in the supine position, a test dose of local anesthetic (3 ml of 2% lidocaine) was administered through the catheter. Maternal arterial pressure and heart rate were monitored at 5 min intervals. Once it was determined that no adverse effects such as maternal hypotension or fetal bradycardia had occurred, the study drugs were then administered. The solutions were randomly administered as 1:1 ratio for BD and BF groups.

Subject pain was assessed with a 10-cm linear visual analogue scale (VAS), where 0 represented ‘no pain’ and 10 represented ‘most severe pain’. Pain scores were determined just before epidural placement and 5, 10, 15, 20, 30, 60, 90 and 120 min after epidural injection. When VAS was ≥ 4, a second dose of local anesthetic was required and patients were excluded from the study if the second dose of local anesthetic given within the 120 minutes of study protocol.

Sedation score (1= wide awake, 2= dozing, 3= asleep and 4= unrousable) determined at 5,10,20, 30, 60, 90 and 120 minutes after epidural injection. Motor block was assessed by means of a modified four-grade Bromage scale (0 = able to lift extended leg at hip; 1 = able to flex knee but not lift extended leg; 2 = able to move foot only; and 3 = unable to move foot) at 20 minutes after epidural injection.

The onset of analgesia was defined as the time from injection of the study medication to first reduction in pain intensity by at least 1 in VAS; and the duration of analgesia was defined as the time between the onset of analgesia and when VAS becomes ≥ 4. The occurrence of nausea and vomiting, pruritis and respiratory depression (respiratory rate <12/ min) were noted and recorded till delivery.

For hemodynamic stability; maternal mean arterial pressure (MAP), oxyhemoglobin saturation (pulse oximeter, cadiocap II, Datex, Helsinki) and maternal and fetal pulse rates were recorded every 5 minutes for second 30 minutes, every 10 minutes for second 30 minutes then every 20 minutes for second hour. The first measurement was obtained immediately before epidural dosing (baseline) between uterine contractions. Hypotension was prospectively defined as a 20% decrease in mean arterial pressure (MAP) and bradycardia as pulse rate <60/minute. Uterine artery pulsatility index (UtA-PI) and umbilical artery pulsatility index (UA-PI) during uterine relaxation and contraction were measured before (T0), 30 min (T30), 60 min (T60), 90 min (T90) and 120 min after epidural injection (T120). The uterine contractions were assessed with an external toco-
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Ultrasound Doppler indices measurements were made in uterine arteries and umbilical artery with parturient in the recumbent position by researcher obstetrician (Selim MF) using 4 MHz convex transabdominal probe with color Doppler facility (GE Healthcare ultrasound - Logic 9, 5125134-10 Rev4). Standard Doppler indices of vascular resistance were obtained from at least three similar consecutive waveforms. Increased values indicate increased vascular resistance and correlate with decreased flow. The uterine artery blood velocity was recorded from both uterine. The cervical canal and internal cervical os were identified in a sagittal plane. Doppler color flow mapping was used to highlight the uterine artery on the sides of the cervix and uterus at the level of the internal os. Pulsed-wave Doppler was used where uterine artery crossed the external iliac artery. When three similar, consecutive waveforms were obtained, the PI was measured and the mean UtA-PI was calculated (26).

The umbilical artery Doppler flow spectrum was recorded from a free-floating central part of the umbilical cord. The mean of three consecutive blood velocity waveforms were analyzed for PI (27). Women with absent or reversed diastolic umbilical artery flow were not included in the study.

The fetus was monitored by continuous CTG. The type of delivery and the neonatal Apgar scores at 1, and 5 min and umbilical cord PH were recorded. The newborns were evaluated by pediatric resident on duty.

Statistical analysis was performed with the use of SPPS 16.0 for windows (SPSS Inc., Chicago, IL, USA). Numerical variables were presented as the mean and standard deviation (SD), whereas categorical data were presented using counts and percentages. The following tests were applied according to the type of variables: Student’s t-test, Mann-Whitney U-test, Chi square test, Fisher’s exact probability test for categorical variables, one-way or two-way or repeated ANOVA for normally distributed variables, Pearson’s correlation test were used as appropriate, and a Kruskal-Wallis test for non-parametric data. A post-hoc test was applied using the Bonferroni method for adjusting for multiple comparisons. P values <0.05 were considered statistically significant.

Results

We consented and enrolled 130 women. Twenty women were later excluded from the study. Hundred ten women are available for statistical analysis (23, 44 and 43 cases in control, BD, BF groups respectively) (Fig. 1). The causes of exclusion in control group were; 1 case delivered in less than 2 hours and 6 cases requested analgesia before the two hours duration of study. In the BD and BF groups the causes were as follow:

- Difficult epidural placement (one case in BD group and 2 cases in BF group).
- Inadvertent epidural puncture (one case in BD group and one cases in BF group).
- Second dose of local anesthetic is required before 2 hours of study duration (one case in BD group and 2 cases in BF group).

Figure 1. Flow chart of study.
Failed epidural, after epidural was VAS >4 (one cases in BF group but none in BD group).
Delivered before completion 2 hours of study duration (two cases in BD group and 1 case in BF group).
Emergency cesarean delivery for fetal distress (one cases in BD group but none in BF group).

Demographic and labor characteristics are presented in Tables 1 and 2. The enrolled parturient women were comparable in age, height, weight, parity, gestational age and stage of cervical dilation at time of entry into the study (Tab. 1). Obstetric outcomes, including the mode of delivery (spontaneous or instrumental vaginal delivery and cesarean delivery), were similar among groups (Tab. 2). The birth weight, Apgar scores at 1 and 5 minutes and umbilical cord pH of newborns were comparable in all groups (Tab. 2).

Table 3 gives the comparison of analgesic outcomes between BD and BF groups. The mean onset of analgesic effect was significantly earlier in BD group (5.9±2.7 min) compared with BF group (9.1±1.9 min); P<0.05. The duration of analgesia was also significantly longer in BD group (155.6±28.1 min) compared with BF group (129±18.7 min); P<0.05. The number of parturient women with a sedation score of 2 was significantly higher (P<0.05) in BD group (24 cases) compared with BF group (10 cases). Bromage scores were comparable in both groups. No cases showed bromage scores and sedation scores more than 2 in both groups.

Table 4 depicts the comparisons of side effects. Epidural analgesia was associated with significant maternal hypotension and bradycardia compared to the control group. There were statistically insignificant (P>0.05) higher maternal hypotension and bradycardia in BD group compared with BF group. Ephedrine drugs were given for 4 cases in BD group and 2 cases in BF group as treatment for hypotension. Also, atropine drugs were given for 2 cases in BD group and 1 case in BF group as treatment for bradycardia. Non-significant difference seen in fetal heart (>160 or <100/minute) between groups. Fetal distress that occurred did not need emergency interference.
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The incidences of nausea, vomiting and pruritus were highest in BF group and lowest in control group. The nausea and pruritus were significantly higher in BF group compared with BD and control group. Incidence of respiratory depression was nil in all three groups.

MAP was comparable in all three groups at baseline (T0). From T0 to T120 there were no significant changes in MAP in control group, where as it decreased significantly at T20 in both epidural groups compared with control group (p<0.05). MAP showed non significant decrease in BD group compared with BF group (Fig. 2).

Maternal heart rates (HR) were comparable at start of study (0T) in all groups. The epidural groups started to show decrease in HR than control group from T10 till end of study period that were statistically significant at T20, T25 and T30 and non significant in other times. HR showed non significant decrease in BF group compared with BD group (Fig. 2). There were no changes in oxyhemoglobin saturation (SpO2) at any time in all enrolled women. No women with SpO2 less than 94% throughout the study period.

The mean VAS scores decreased significantly at T5 and T10 in BD group compared with control and BF groups. By T20, although both BD and BF groups had a significant lower VAS scores compared with control group, the VAS scores between BD and BF groups were not significantly different (Fig. 3).

Table 4. Anesthetic complications.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control group N= 23</th>
<th>BD group N= 44</th>
<th>BF group N= 43</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotension [&gt;20% decrease in MAP (n %)]</td>
<td>0/23 (0%)</td>
<td>12/44 (27.2%)*</td>
<td>8/43 (18.6%) *</td>
</tr>
<tr>
<td>Maternal Bradycardia [heart rate&lt;60](n %)</td>
<td>0/23 (0%)</td>
<td>10/44 (22.7%)*</td>
<td>5/43 (11.6%) *</td>
</tr>
<tr>
<td>Fetal heart (&gt;160 or &lt;100/ minute)</td>
<td>2/23 (8.6%)</td>
<td>5/44 (11.3%)</td>
<td>3/43 (6.9%)</td>
</tr>
<tr>
<td>Nausea</td>
<td>1/23 (4.3%)</td>
<td>2/44 (4.5%)</td>
<td>7/43 (20.5%)#</td>
</tr>
<tr>
<td>Vomiting</td>
<td>0/23(0%)</td>
<td>1/44(2.7%)</td>
<td>3/43 (6.9%)</td>
</tr>
<tr>
<td>Pruritis</td>
<td>0/23(0%)</td>
<td>1/44(2.7%)</td>
<td>5/43 (11.6%)#</td>
</tr>
<tr>
<td>Respiratory depression</td>
<td>0/23(0%)</td>
<td>0/44(0%)</td>
<td>0/43(0%)</td>
</tr>
</tbody>
</table>

*P<0.05 when compared BD and BF group with control group; # P<0.05 when compared BF group with BD and control groups.

Figure 2. Maternal mean arterial pressure (MAP) and Heart Rate (HR) during study period for the three studied groups. Each data point represents the mean . * Statistically significant (p<0.05)

Figure 3. Visual analog scale (VAS) pain scores over study period in the three studied groups. Each data expressed as Mean. * Statistically significant (P<0.05)

Table 5 shows the uterine and umbilical arteries pulsatility indices during uterine contractions and relaxations at different time periods at baseline, 30, 60 and 120 minutes. Uterine contractions significantly increase UtA-PI when compared with PI during relaxations in all three groups (P<0.05). Also the epidural analgesia groups (BD and BF groups) showed significantly increases UtA-PI when compared with control group during uterine relaxations and contractions. Umbilical artery Doppler pulsatility indices
than during uterine relaxations that can be explained by
reveal any significant differences between the epidural
maintenance of stable hemodynamic parameters did not
(1,9,10,15,28,29). The requirement of vasopressors for
patient in either groups had deep sedation or respiratory
deserved in BD group compared to BF group. The other side
decrease in heart rate and mean arterial pressure was ob-
showed less nausea and pruritis than BF group. A slight
duration of analgesia and sedation score. BD group
pains control. The BD group showed visible superiority
epidural. Comparative VAS scores suggested that
labor pains control was better after epidural than non-
rative analgesia and much better sedation levels (9).

Discussion

This study appears to be the first study to use dexmedeto-
midine as adjuvant drug with bupivacaine in obstetric epidural analgesia. It also, compares two pharmacologi-
al approaches of epidural analgesia (bupivacaine- dexmedetomidine and bupivacaine - fentanyl) with parturi-
ents without epidural during uterine contractions and relaxations. A significant increase in UA-PI was
seen when compared in the same group during uterine contraction compared with during relaxation but epidural
analgesia groups did not showed significant changes in UA-PI compared with control group both during uterine
contractions and relaxations. Pearson's correlation test
drewn during contractions and relaxations with or without epidural analgesia not significantly corre-
late with UA-PI and newborns outcomes.

Table 5. PI of uterine and umbilical arteries during uterine contractions and relaxations.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control group</th>
<th>During Uterine relaxation</th>
<th>During Uterine contraction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N= 23</td>
<td>BD group N= 44</td>
<td>BF group N= 43</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UA-PI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>0.67±0.09</td>
<td>0.66±0.18</td>
<td>0.64±0.22</td>
</tr>
<tr>
<td>At 30 min</td>
<td>0.64±0.12</td>
<td>0.81±0.15*</td>
<td>0.78±0.26</td>
</tr>
<tr>
<td>At 60 min</td>
<td>0.66±0.19</td>
<td>0.76±0.21*</td>
<td>0.76±0.20</td>
</tr>
<tr>
<td>At 120 min</td>
<td>0.70±0.17</td>
<td>0.76±0.22*</td>
<td>0.74±0.24*</td>
</tr>
<tr>
<td>UA-PI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>0.81±0.19</td>
<td>0.79±0.21</td>
<td>0.81±0.18</td>
</tr>
<tr>
<td>At 30 min</td>
<td>0.77±0.16</td>
<td>0.82±0.21</td>
<td>0.81±0.22</td>
</tr>
<tr>
<td>At 60 min</td>
<td>0.79±0.14</td>
<td>0.80±0.09</td>
<td>0.82±0.17</td>
</tr>
<tr>
<td>At 120 min</td>
<td>0.80±0.11</td>
<td>0.81±0.23</td>
<td>0.82±0.21</td>
</tr>
</tbody>
</table>

Data expressed as mean (±SD), *P<0.05 when compared control with either epidural groups; #P<0.05 when compared between contraction and relaxation in the same group.

showed non significant changes in all three studied groups if compared during uterine relaxations or during uterine contractions. A significant increase in UA-PI was
seen when compared in the same group during uterine contraction compared with during relaxation but epidural
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late with UA-PI and newborns outcomes.

The α-2 adrenergic agonists have both analgesic and
sedative properties when used as an adjuvant in regional anaesthesia (28). Dexmedetomidine is a highly selective
α-2 adrenergic agonist with an affinity of eight times
greater than clonidine (16). Clonidine has been used
successfully over the last decade for the said purpose and
the introduction of dexmedetomidine has further widened
the scope of α-2 agonists in regional anaesthesia (29).
Bajwa et al. (10), conclude that dexmedetomidine is a bet-
ter adjuvant than clonidine in epidural anaesthesia as far
as patient comfort, stable cardio-respiratory parameters,
intra-operative and post-operative analgesia is concerned. Epidural administration of dexmedetomidine has not been
well studied in labor analgesia but there are some stud-
ies of clonidine (15,30-33). Clonidine can be considered
a useful adjuvant in labor analgesia with bupivacaine as it
provides longer and better analgesia with local anesthe-
thetic sparing effect without any significant side effects,
but large scale studies are indicated before strong recom-
modation for its routine use in epidural labor analgesia
(15). Epidural clonidine does not induce hemodynamic in-
stability (28,31,32). A study of orthopedic surgery con-
cluded that, Dexmedetomidine seems to be a better alter-
native to fentanyl as an epidural adjuvant as it provides
comparable stable hemodynamics, early onset, and es-
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Chen et al. (34) suggested an increased UA-PI during

Discussion

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al approaches of epidural analgesia (bupivacaine- dexmedetomidine and bupivacaine - fentanyl) with parturi-
ents without epidural during uterine contractions and relaxations.

In the present study, overall the maternal satisfaction for
labor pains control was better after epidural than non-
epidural. Comparative VAS scores suggested that
dexmedetomidine was as effective as fentanyl for labor pains control. The BD group showed visible superiority
over BF group in some characteristics like the onset and
duration of analgesia and sedation score. BD group
showed less nausea and pruritis than BF group. A slight
decrease in heart rate and mean arterial pressure was ob-
served in BD group compared to BF group. The other side
effects of both groups were quite favorable as none of the patient in either groups had deep sedation or respiratory
depression which correlates very well with other studies
(1,9,10,15,28,29). The requirement of vasopressors for
maintenance of stable hemodynamic parameters did not
reveal any significant differences between the epidural
groups. UA-PI was higher during uterine contractions
during uterine relaxations that can be explained by
strangulation of blood flow by myometrial contractions. During epidural analgesia there was increased in UtA-PI
compared with baseline before epidural administration that can be explained by maternal hypotensive effect of
epidural analgesia. A significant increase in UtA-PI by
combined effects of myometrial contraction and hypoten-
sion of epidural had no effect on uteroplacental blood flow
as UA-PI did not showed significant increase that affect
fetal and neonatal outcomes. The results of the present
study demonstrated that Apagar scores at 1 and 5 min in
all the neonates were more than 7 and umbilical cord pH
was >7.2.

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Chen et al. (34) suggested an increased UA-PI during
continuous epidural infusion with bupivacaine and this increase is further enhanced during uterine contraction that is consistent with our results. However, Chen et al. (34) did not compare these indices with control group throughout the study also they used continuous epidural regimen. Takeuchi et al. have reported that both the resistance index (RI) and PI of the arterial uterine blood flow velocity waveform were significantly increased during uterine contraction than during relaxation. However, they did not compare these indices with those under epidural analgesia (35).

Previous reports of the effects of epidural anesthesia on the Doppler velocimetry of umbilical and uterine arteries during normal term labor have been controversial. Lindblad et al. found no significant changes in resistance in the umbilical vein or fetal aorta associated with uncomplicated epidural anesthesia (36). Hughes et al. concluded that effective epidural anesthesia did not have a significant impact on Doppler flow characteristics of either the maternal or fetal umbilical vasculature, despite lowered maternal blood pressure and heart rate (37). Morrow et al. also concluded that epidural anesthesia had neither a beneficial nor detrimental effect on uterine or umbilical blood velocity in uncomplicated pregnancy (38). Giles et al. reported a significant decrease in umbilical arterial and maternal S/D ratios after administration of epidural anesthesia in their small series of eight non-laboring patients with intact amniotic membranes (39). On the contrary, Stephen et al. reported an increase in PI of the uterine arteries after epidural anesthesia with lidocaine, epinephrine, and fentanyl but there was no change in the umbilical PI (40).

Fratelli et al. reported that UTA-PI measured during contraction was significantly increased 30 min after administration of bolus ropivacaine 0.1% in women laboring with epidural anesthesia when compared with PI measured in women laboring without anesthesia. This increase in uterine arterial impedance, however, was not associated with neonatal acidosis or low Apgar scores at birth. But the increase in UTA-PI did not persist 90 min after the beginning of analgesia, when the action of ropivacaine would be diminished (41). It has been suggested that maternal hypotension related to epidural analgesia is associated with an increase in the Doppler indices for the uterine arteries (11-13). The increased impedance measured during uterine contraction might be related to an insufficient increase in preload because of epidural anesthesia-induced sympathetic block and vasodilation (41,42).

The current and Fratelli et al. (41) studies did not demonstrate a relationship between UTA-PI during contraction in the epidural groups and maternal mean arterial pressure. Reduced uterine blood flow induced by epidural analgesia was not associated with significant decrease in placental blood flow, neonatal acidosis or low Apgar scores at birth.

Conclusion

Epidural analgesia is an effective method for providing pain relief during child birth. Using dexmedetomidine gave better parturients satisfactions than fentanyl as adjuvant drug to local anesthetic for its earlier onset and longer duration of analgesia and fewer side effects as nausea and pruritis. Combined effects of hypotension and uterine contractions during epidural analgesia can increase the resistance of blood flow through uterine artery without deleterious effect on newborns compared with normal labor outcomes. More studies are recommended to support the use of dexmedetomidine as adjuvant drug during obstetric epidural analgesia as this is a new finding and it seems there are no previous reports regarding use of this drug in the labor.

References

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