Intrapartum sonography for occiput posterior detection in early low dose combined spinal epidural analgesia by sufentanil and ropivacaine

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Abstract. – Aim: To evaluate the incidence of occiput posterior position in labour with and without combined spinal epidural analgesia (CSE) by low dose of sufentanyl and ropivacaine.

Material and Methods: This study focused on 132 women subdivided in two groups, patients in spontaneous and in labour analgesia, administered by a low dose CSE by sufentanyl and ropivacaine; all women were evaluated by digital examinations and ultrasound till delivery. All data were collected and analyzed by an independent reviewer.

Results: In the second stage, 79 were persistent occiput posterior position (POPP) fetuses and 36 were translated from anterior to posterior position (TAPP) fetuses. Specifically, in spontaneous labour on 25 women in anterior position, there were 17 TAPP and in CSE analgesia on 28 women in anterior position, there were 19 in TAPP, without significant differences. The number of asynclitisms was higher in the POPP group (84%) respect to the TAPP group (75%), so as the rate of caesarean section (67% versus 52.7%).

Conclusions: The labour with low dose of ropivacaine and sufentanil does not increase the occiput posterior position during fetal descent, leading to a POPP. Finally, since in the occiput anterior presentation labour analgesia significantly lengthens time to delivery, in the occiput posterior position this is significantly increased, with a prolonged second stage of labour and reduced time of descent of fetal head in obstetric pelvis.

Key Words: Intrapartum sonography, Obstetric analgesia, Occiput posterior position, Labour, delivery, Early combined spinal-epidural analgesia, CSE, Sufentanyl, Ropivacaine, Side effects.

Introduction

In the 1955 Friedman published a study on 500 pregnant in labour, with single fetus at term, underlining the existing relationship between the duration of labour and the cervical dilatation, describing this relationship in a sigmoid curve stated by a latent and active stage1.

The body mass index (BMI) of the pregnant women was also modified, so as the decreased number of pregnant smokers had a repercussion on the fetal weight and on the dynamics of the birth2.

During the last 50 years, the introduction of the fetal heart monitoring, the use of oxytocin and the labour analgesia, associated with the reduction of the forceps and vacuum extractor applications, has changed labour and delivery management. Nevertheless, during labour, since the uterine cervix is not still well dilated and for the occurrence of “caput succedaneum”, the clinical evaluation of the correct position of the foetal head is often limited and wrong3, so as in the delivery management.

The occiput posterior position (OPP) occurs in 10-30% of fetuses in the first stage of labour, but mostly rotate spontaneously4. Problems arise because the deflexed fetal head presents larger diameters, causing prolonged labours, increased oxytocin use, epidural analgesia doses augmentation and higher operative delivery rates5.

Even if spontaneous vaginal delivery is achieved in the OPP, there is an higher incidence of episioto-

A severe head malposition in labour is the persistent OPP.

Akmal et al. and Souka et al. suggested that the OPP at delivery originates from malposition of the fetal head either before labour or in the first labour stage, whereas Gardberg et al. found that it is the result of malrotation during labour from an occiput anterior or transverse position.

Cesarean section for persistent occiput posterior position (POPP) is mainly due to the failure of progression in labour or fetal distress, the latter often resulting from prolonged labour.

Determination of fetal head position can be useful in the first stage of labour to predict the success of labour management, especially in case of asynclitism diagnosis. This obstetric pitfall has a greater margin of error in the examinations performed using vaginal exploration and clinicians need to use the ultrasound in labour.

By these evidences, the time requested for cervical dilatation and for fetal head descent in the birth channel, had had an impact on the diagnosis of labour progression or arrested labour.

Anyway, literature lacks on evidences about the effect of labour analgesia on anterior and occiput posterior position in first and second stage of labour.

Therefore, the purpose of our investigation is to evaluate the fetal head positioning in first and second stage of labour, with and without analgesia.

**Materials and Methods**

In this study Authors appraised 1156 nulliparous patients in Obstetric & Gynecology Departments of University affiliated Hospitals, from March 2006 to March 2010.

The investigation consisted of 2 parts: the first part included enrolment before the labour; the second implied the control of the effects of epidural analgesia effect on fetal head position during first and second stage of labour.

The inclusion criteria for women undergoing an initial labour were: patients with a single pregnancy at term, fetus in cephalic presentation, no complications in pregnancy.

The exclusion enrolment criteria were women with any previous gynecologic surgery and any of the following experienced during pregnancy: macrosomia; infection; anticoagulation therapy; pre-eclampsia; HELLP syndrome; ruptured membranes for more than 36 hours; placenta previa, and other placental pathologies.

A total of 158 women were eligible to participate and 132 women provided informed consent and were enrolled, after an ultrasound evaluation on initial labour.

These women were submitted to intrapartum transabdominal sonography (ITAS) assessments for detection of head position in first and second stage of labour, to detect either the persistent occiput posterior position and the translation from anterior to posterior position.

The fetal US landmark to detect the occiput posterior position was the single fetal orbit, with “face to pubes” apposed on the presented fetal head side.

All women were subdivided in two groups, patients in spontaneous labour and in labour analgesia.

Labour analgesia was administered by a low dose combined spinal – epidural analgesia (CSE).

The CSE technique used consisted of: double needle and single intervertebral space (L3-L4); the needle used for spinal technique is Withacre 27 G. A mixture of ropivacaine 0.02% with 0.3 mcgs/ml of Sufentanil was administered in the spinal space.

A further mixture of ropivacaine 0.07% with 0.5 micrograms/ml of sufentanyl (12-15 mls) was administered in epidural space in case of persistence of pain.

Maintenance of analgesia was managed with the administration, on demand, of 10-15 ml of ropivacaine (0.07%-0.10%), mixed with 0.5 mcgs/ml of sufentanyl, related to the stage of labour and the degree of pain.

In the second stage of the labour, if necessary, 10 ml of alkaline lidocaine 0.5%, may be administered only in an acute pain appears in the active phase of the second stage and for the possible manoeuvres and surgical procedure.

One hundred thirty two patients were evaluated during first and second stage of labour and were allocated in two groups: the group I, in spontaneous labour and the group II, by CSE analgesia.

These patients were all without an active labour management by oxitocyn use and rupture of membranes.
Table I. Baseline characteristics of the study participants.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group 1 (64 patients)</th>
<th>Group 2 (68 patients)</th>
<th>P value</th>
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<tbody>
<tr>
<td>Age, years</td>
<td>29.2 ± 2.1</td>
<td>30.1 ± 1.3</td>
<td>NS*</td>
</tr>
<tr>
<td>Gestational age, weeks</td>
<td>40 ± 0.9</td>
<td>41 ± 0.3</td>
<td>NS*</td>
</tr>
<tr>
<td>BMI (body mass index)</td>
<td>22.8 ± 4.2</td>
<td>23.3 ± 2.7</td>
<td>NS^</td>
</tr>
</tbody>
</table>

Values are given as mean ± SD. *p-value tested by Welch t test. ^p-value tested by Unpaired Student’s t test.

Starting from 3-4 cm of cervical dilatation and fetal head at ischial spine station -1 or lower, women were assessed by an Aloka instrument (SSd 2000 MultiView, Tokio, Japan), equipped with a multifrequency convex transabdominal transducer; all women were also examined by digital examinations (DE), at intervals of 45-90 min in first stage, and of 15-30 min in second stage.

All women were followed till delivery, and all data were collected and analyzed by an independent reviewer.

**Statistical Analysis**

Comparisons between 2 groups with normality and homogeneity of variances were performed by 2-tailed unpaired Student t test. Alternatively, comparisons between groups with abnormality and heterogeneity of variances were performed by Welch t test. Discrete variables were analyzed with the chi-square test. A p-value less than 0.05 was considered statistically significant.

At the study design, we considered the main objective outcome of the trial the incidence of occiput posterior position in labour with and without combined spinal epidural analgesia by low dose and ropivacaine. One goal of the proposed study is to test the null hypothesis that the proportion positive is identical in the two populations. The criterion for significance (alpha) has been set at 0.050. The test is 2-tailed, which means that an effect in either direction will be interpreted.

With the proposed sample size of 64 and 64 for the two groups, the study will have power of 80.6% to yield a statistically significant result. This computation assumes that the difference in proportions is 0.24 (specifically, 0.74 versus 0.50). Statistical analysis was performed using the statistical SAS software (SAS, Cary, NC, USA) and a level of p<0.05 was considered as statistically significant.

**Results**

The clinical characteristics of the two groups of patients were similar and all patients were Caucasians (Table I).

In the first stage, there were 39 in occiput posterior position and 25 patients in anterior position in spontaneous labour, while 40 in posterior and 28 in anterior in CSE analgesia.

In the second stage, 79 were persistent occiput posterior position (POPP) fetuses and 36 were translated from anterior to posterior position (TAPP) fetuses.

Specifically, in spontaneous labour on 25 women in anterior position there were 17 TAPP and in CSE analgesia on 28 women in anterior, there were 19 in TAPP (Table II). Therefore, 8 women with anterior fetal head in spontaneous labour and 9 in CSE analgesia not rotated during labour.

Table II. Intrapartum Trans-Abdominal Sonography in first and second stage of labour for detection of the occiput posterior position of fetus.

<table>
<thead>
<tr>
<th></th>
<th>Group 1 (64 patients)</th>
<th>Group 2 (68 patients)</th>
<th>P value</th>
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<tbody>
<tr>
<td><strong>Women in first stage of labour</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occiput posterior position</td>
<td>39</td>
<td>40</td>
<td>NS</td>
</tr>
<tr>
<td>Anterior position</td>
<td>25</td>
<td>28</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Women in second stage of labour</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Persistent occiput posterior position (POPP)</td>
<td>39</td>
<td>40</td>
<td>NS</td>
</tr>
<tr>
<td>Translated from anterior to posterior position (TAPP)</td>
<td>17</td>
<td>19</td>
<td>NS</td>
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</table>
Statistical analysis not showed significant differences in the two groups. The time of the second stage of labour was compared in the two groups; a statistical difference was detected, with a significant time lengthening for women in labour anesthesia (Table III).

The time of the second stage of labour was compared in the two groups; a statistical difference was detected, with a significant time lengthening for women in labour anesthesia (Table III).

The time of descent of the fetal head, from the level 0 to + 2, has been evaluated in the two groups; a statistical difference was detected, with a significant time lengthening for women in labour anesthesia (Table IV).

All women in fetal head posterior position were evaluated till delivery by ITAS in transversal and sagittal section for the diagnosis of asynclitism. It is determined by placing the ultrasonic beam at right angles to the midline echo, across the maximum convexity of the parietal bone, and by a scan measurement, reading the angle crossing the pubis and the fetal head midline.

The number of asynclitisms in the POPP group was 67 (84%) and in the TAPP group was 27 (75%). The delivery outcome of POPP women was: 53 delivered by caesarean section (67%), 18 by vacuum extractor (22.9%) and 8 by spontaneous delivery (10.1%).

The delivery outcome of TAPP women was: 19 delivered by caesarean section (52.7%), 10 by vacuum extractor (27.8%) and 7 by spontaneous delivery (19.5%).

The vacuum extractor was preferred instead of forceps since in Italy clinicians use mostly the vacuum.

**Discussion**

Obstetric literature evidence that the times of the active stage of labour, non combined to epidural analgesia, has been lengthened in the years80-90. Albers et al10,11 reported a longer active stage of the labour, comparing to Friedman curve, with a middle duration of 8 hours; for Rouse et al12 the second stage of labour could also lengthen of 5 hours without maternal fetal compromising and, in the case of arrest of labour after the two hours and up to the 4 hours, authors suggest the administration of oxytocin.

Concerning literature on the labour analgesia evolving, dates conflict on outcome. Analyzing possible factors linked to arrest of the fetal descent, the epidural analgesia represents only one of the manifold factors that could interfere in the birth dynamics13.

Some reports evidence that the epidural analgesia determines a meaningful increase of the second stage, with a possible fetal distress14, while the data on first stage length are contradictory14,15. Kuzkowski16 showed an influence of epidural analgesia on timing of cervical dilatation, particularly of combined spinal- epidural analgesia. However it has been stated that epidural analgesia in labour can significantly prolong the active stage, comparing to the original Friedman curve.

In fact, Alexander et al17 published a study on 459 pregnant at term, with a single cephalic fetus and 3 cm of cervical dilatation: 220 patients were submitted to epidural analgesia with auto-administration and 214 were treated by meperidine in vein, always on demand.

The rates of cervical expansion were of 1.4 cm/hs for patients in epidural analgesia against the 1.6 cm/hs in the control group, underlining that the second stage length was increased in epidural analgesia (p<0.002). In fact he brought 1.1 ± 1.5 hours for epidural analgesia group, versus 0.9 ± 1.0 in the analgesia in vein group. The total length of the active stage was of 6.0 ± 3.2 hours for patients in epidural analgesia and of 5.0 ± 3.2 for the control group (p<0.001). Authors concluded that the active stage of labour prolonged, on average, of a hour, in the group treated with epidural analgesia.

Zhang et al18, in a study including nulliparous patient in the active stage with and without

<table>
<thead>
<tr>
<th>Women in second stage of labour</th>
<th>Group 1 (64 patients)</th>
<th>Group 2 (68 patients)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of second stage in persistent occiput posterior position (POPP)</td>
<td>69 ± 22 minutes</td>
<td>95 ± 27 minutes</td>
<td>&lt; 0.01*</td>
</tr>
<tr>
<td>Time of second stage in translated from anterior to posterior position (TAPP)</td>
<td>54 ± 19 minutes</td>
<td>77 ± 23 minutes</td>
<td>&lt; 0.01*</td>
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Values are given as mean ± SD.*p-value tested by Welch t test.
epidural analgesia, showed that the cervical dilatation advances more slowly, 5.5 hours versus 2.5 of the Friedman curve. By these evidences, the labour management of the second stage in epidural analgesia is still object of discussion. Plunkett et al19 affirmed that in nulliparas with continuous low-concentration epidural analgesia, delaying pushing until a strong urge is felt does not reduce the duration of pushing in the second stage of labor.

Our preliminary data, even if related to a small number of patients, suggest that the CSE analgesia could reduce the timing of fetal head descent in occiput posterior position, comparing to spontaneous labour.

Buhimshi et al 20 reported that the epidural analgesia hasn’t effects on the uterine contractility and on the muscular tone of the pelvic pain. They, in fact, have measured the intrauterine pressure in the second stage of labour in the patients in and without analgesia through an intrauterine device, without significant differences in the two groups.

Despite many studies disagree on the risk of caesarean section in nulliparae receiving epidural analgesia before five cm of cervical dilatation, the American College of Obstetricians and Gynecologists (ACOG) confirms, according with the American Society of Anesthesiologists, that the only maternal request for pain, in absence of pharmacological side effects, is an indication to the labour analgesia, and that this should be effected when the cervical dilatation was on 4-5 cms21.

In Author’s trial, the timing of the second stage of labour was lengthening for women in labour in anesthesia, so as the time of descent of the fetal head, from the level 0 to + 2, with a significant prolongation of labour in CSE analgesia group.

Moreover, Authors performed an ITAS on all women in fetal head posterior position, since this obstetric pitfall has a greater margin of error in the examinations performed using vaginal exploration and clinicians need to use the ultrasound in labour in case of head malposition. In fact, when an expert ultrasonographist perform a transverse scan, it is then made with the probe inclined to the angle of tilt of the head, so called angle of asynclitism, differing for the degree of asynclitism4.

Sherer et al.22 reported erroneous determination of the fetal position by vaginal digital examination in 76% of examinations conducted during the active phase in labour.

Akmal et al. reported an increased risk of caesarean delivery when posterior positions were detected during the initial stage of labor (dilation less than 5 cm)23. Therefore, as confirmed by literature9, the occipital posterior position and asynclitism diagnosis can be successfully performed by ITAS. The fetal ultrasound landmark to detect the posterior asynclitism was named by authors “squint sign”, or “the fetal single orbit” (or Malvasi’s sign), with “face to pubes” apposed on the presented fetal head side for OPP diagnosis by ultrasound24.

Authors proposed a spine marker to check the POPP25.

The number of asynclitisms was higher in the POPP group (84%) respect to the TAPP group (75%), so as the rate of caesarean section (67% versus 52.7%), performed for obstructed labour in posterior and asynclitic presentation. The vacuum extractor was used to make easier the delivery, in a non reassuring fetal heart rate monitoring and in arrested labour.

The ITAS is the more safe and feasible method to detect the fetal head malposition during labour, particularly in our investigation on occiput posterior. Ultrasonographic diagnosis of asynclitism is performed by a transverse measurement reading the angle crossing the pubis and the fetal head midline26.

An interesting obstetrical problem is the early detection of OPP (Figure 1) and its persistence in second stage of labour (Figure 2)27. Another unsolved question is the influence of epidural analgesia in the OPP arising and in the POPP main-

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**Table IV.** The time of descent of the fetal head, from the level 0 to + 2, has been evaluated in minutes for the two groups.

<table>
<thead>
<tr>
<th>Women in second stage of labour</th>
<th>Group 1 (64 patients)</th>
<th>Group 2 (68 patients)</th>
<th>P value</th>
</tr>
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<tbody>
<tr>
<td>Time of second stage in persistent occiput posterior position (POPP)</td>
<td>61 ± 16 minutes</td>
<td>83 ± 21 minutes</td>
<td>&lt; 0.01*</td>
</tr>
<tr>
<td>Time of second stage in translated from anterior to posterior position (TAPP)</td>
<td>47 ± 9 minutes</td>
<td>69 ± 13 minutes</td>
<td>&lt; 0.01*</td>
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</tbody>
</table>

Values are given as mean ± SD. *p-value tested by Welch t test.
Ben-Haroush et al. affirmed that the fetal weight and the head position should be evaluated carefully before operative vaginal delivery, and the use of analgesia should be encouraged. Fitzpatrick et al. reported that the use of epidural analgesia was not related to the persistent occiput posterior position. Halpern et al. showed that neuraxial analgesia does not interfere with the progress or outcome of labour; there is no need to withhold neuraxial analgesia until the active stage of labour. Therefore, the concept of progression and arrest need to be revised in the current obstetrician and other larger trials should be conducted to better clarify the influences on the times of cervical dilatation and on the fetal descent during anaesthesiology, as epidural analgesia and the CSE analgesia.

Particularly, the mentioned spinal volume have been used that to reduce the dosing of local analgesia. The epidural concentration used in the CSE have always been very low in every stage of labour, because there is an unavoidable migration of local anaesthetic and opioid from the epidural space to the intrathecal space, trough the dural wound provoked by the spinal needle.

Conclusions

The labour in CSE analgesia, with low dose of ropivacaine and sufentanyl, reduce the modification of dynamic labour and, particularly, does not increase the occiput posterior position during fetal head descent, leading to a POPP. Moreover, since in the occiput anterior presentation labour analgesia significantly lengthens time to delivery, in the occiput posterior position this is significantly increased, with a prolonged second stage of labour and reduced time of descent of fetal head in channel of birth. In the POPP the ITAS leads to monitor the fetal head posterior position and asynclitism, to decide the type of operative delivery, avoiding the emergency delivery. On the contrary, the ITAS in TAPP permits to detect the posterior heads rotating in the second stage of labour, and suggest to attend to spontaneous delivery.

Finally, ITAS in POPP reduces the incidence of emergency operative delivery, particularly the emergency cesarean section, avoiding the described complications, avoiding the reported complications, especially in case of haemorrhagic complication after anaesthesia related hypotensive effect.
Early low dose combined spinal epidural analgesia by sufentanil and ropivacaine

References


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